FINAL DRAINAGE REPORT

For

TRAILS AT ASPEN RIDGE
Filing No. 2

Prepared for:
EL PASO COUNTY
Engineering Development Review Team
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On Behalf of:
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Project No. 19.866.014

SF1927

PCD File No.

Engineer's Statement:
This report and plan for the drainage design of Trails at Aspen Ridge Filing No. 2 was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the El Paso County Drainage Criteria Manual and is in conformity with the master plan of the drainage basin.

_____ SEAL

Jesse Sullivan Date
Registered Professional Engineer
State of Colorado
No. 55600

Developer's Statement:
I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

COLA, LLC
Business Name

By: _____ _____
Tim Buschar Date

Title: Director of Land Acquisition and Development

Address: 555 Middle Creek Parkway, Suite 380
Colorado Springs, CO 80921

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.

_____ _____
Jennifer Irvine, P.E. Date
County Engineer / ECM Administrator

Conditions:

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I. Introduction

The Trails at Aspen Ridge Filing No. 2 development is within the Waterview East (Waterview II) Subdivision, which is within El Paso County jurisdiction and is comprised of a total of 15.730 acres of single-family residential, open space, and public right-of-way. The site is located within the 721.8-acre Waterview Development in the 419.8-acre portion of the development east of Powers. The Trails at Aspen Ridge development was referred to as Waterview East or Waterview II in the original Waterview Master Development Drainage Study (MDDP).

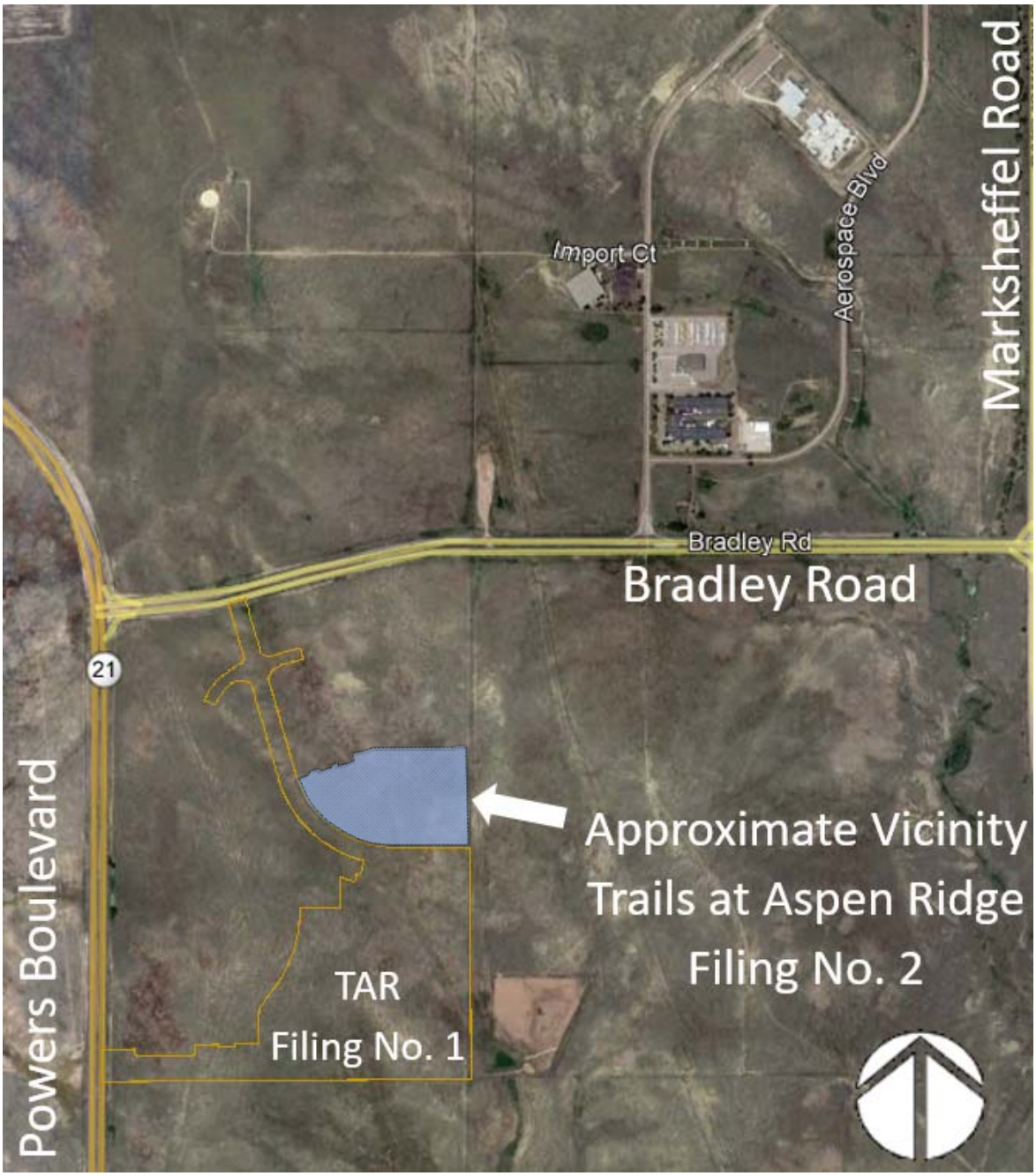


Figure 1 - Project Location

I. PURPOSE AND SCOPE OF STUDY

The purpose of this Final Drainage Report (FDR) is to identify and evaluate the offsite and onsite drainage patterns associated with Filing No. 2 of the Trails at Aspen Ridge development (15.730 acres) and to provide hydrologic and hydraulic analyses of this area to ensure compliance with the El Paso County Drainage Criteria Manual (DCM) and the most recent MDDP Amendment, as well as provide effective, safe routing to downstream outfalls.

II. GENERAL LOCATION AND DESCRIPTION

Trails at Aspen Ridge Filing No. 2 is within the Waterview subdivision, which extends from Grinnell Road on the west to approximately one-half mile east of the north-south portion of Powers Boulevard. The west portion of the subdivision (Waterview I) is bounded on the north by an east-west portion of Powers Boulevard and on the south by Bradley Road. The east portion of the subdivision (Waterview East/Waterview II) is bounded on the north by the Colorado Springs Airport and on the south, approximately 3,260 feet south of the Bradley and Powers intersection by property owned by the State of Colorado. The subject of this report, Trails at Aspen Ridge Filing No. 2, is in the Waterview East portion of the overall Waterview Subdivision and located southeast of the intersection of Powers Boulevard and Bradley Road. More specifically, the study area is located as follows:

A. **General Location:** The southwest ¼ and the northwest ¼ of Section 9, Township 15 South, Range 65 West of the 6th P.M. in the County of El Paso, State of Colorado.

B. **Surrounding Streets and Developments:**

a. **North:** Portions of Trails at Aspen Ridge PUD and Bradley Road.

b. **East:** Several undeveloped properties. See DR-02 for location and ownership

c. **South:** Trails at Aspen Ridge Filing No. 1

d. **West:** Legacy Hill Drive and portions of Trails at Aspen Ridge PUD

C. **Drainageway:** This site is within the West Fork Jimmy Camp Creek Drainage Basin.

a. **West Fork Jimmy Camp Creek**: There appears to be a broad swale running along the west edge of the project area. Flows are conveyed in a southeasterly direction. Total area of basin considered in this report for the East Pond is approximately 165.2 acres. This includes approximately 52.5 acres in Trails at Aspen Ridge Filing No. 1, 77.3 acres of the Trails at Aspen Ridge PUD (Including the 15.730 Acres in Trails at Aspen Ridge Filing No. 2), and 35.1 acres of offsite areas.

D. **Irrigation Facilities**

No known functioning irrigation facilities are within the project area.

E. Utilities and Encumbrances

a) Storm Sewer: A 48" storm sewer is extended out of a manhole on the main Filing No. 1 storm sewer to drain an existing low spot just north of Legacy Hill Drive in Trails at Aspen Ridge Filing No. 1.

b) Sanitary Sewer: Sanitary sewer associated with Trails at Aspen Ridge Filing No. 1 has been stubbed out along Big Johnson Drive at the south boundary of this development.

c) Gas: There is an existing petroleum line running just inside the Powers Boulevard easement west of the proposed development. No known gas encumbrances on the project site.

d) Water: An 8-inch water main associated with Trails at Aspen Ridge Filing No. 1 has been stubbed out along Big Johnson Drive at the south boundary of this development.

e) Electric: There is an existing overhead electric easement parallel to the east side of this development with two sets of overhead lines.

F. Referenced Drainage Reports

This site is within the Waterview II or Waterview East portion of the Waterview Subdivision. This study looks at Trails at Aspen Ridge Filing No. 2, which takes up the south 15.730 acres of the Waterview East Subdivision. The three reports below were used as references for this report.

"Amendment to Waterview Master Drainage Development Plan", completed by Springs Engineering, dated July 2014 *(MDDP-2014)*

"MDDP for Waterview East and PDR for Trails at Aspen Ridge", completed by Matrix Design Group, Dated September 2019. (MDDPA-Matrix)
Note: This report supersedes a previously approved PDR "Springs East at Waterview" by Stantec (SP-17-010).

"Final Drainage Report for Trails at Aspen Ridge Filing No. 1", completed by Matrix Design Group, Dated September 2019. (FDR-F1) (Approval Pending)

G. Land Uses

Land uses for the proposed development will be single family residential, public roads, and open space.

III. SOIL CONDITIONS

Soils can be classified in four different hydrologic groups, A, B, C, or D to help predict stormwater runoff rates. Hydrologic group "A" is characterized by deep, well-drained coarse-grained soils with a rapid infiltration rate when thoroughly wet and having a low runoff potential. Group "D" typically has a clay layer at or near to the surface, or a very shallow depth to impervious bedrock and has a very slow infiltration rate and a high runoff potential. See Soils Map; Appendix C. Table 3.1 on the following page lists the soil types present in the development area:

Table 3.1 – NRCS Soil Survey for El Paso County

SOIL ID NUMBER	***SOIL***	***HYDROLOGIC CLASSIFICATION***	***PERMEABILITY***	***PERCENT ON SITE***
52	Manzanst clay loam, 0 to 3 percent slopes	C	Well Drained	45.3%
56	Nelson-Tassel fine sandy loams, 3 to 18 percent slopes	B	Well Drained	54.7%

Predevelopment site conditions are undeveloped and ground cover consists of sparse natural vegetative land cover.

IV. Project Characteristics

A. Major Basin Description

West Fork Jimmy Camp Creek:

a. **Onsite Flows:** Filing No. 1 is within the West Fork Jimmy Camp Creek Basin. Under predevelopment conditions flows in this area generally flow south. After development flows will generally sheet flow to adjacent streets, where they will be conveyed via gutter flow towards sump or at-grade inlets which will capture the flows. Flows will then be conveyed to the proposed East Pond via storm sewer.

b. **Offsite Flows:**

1. A portion of the Trails at Aspen Ridge PUD (29.0 acres) is upstream of this development. These flows will collect in the low spot/sediment basin uphill of Filing No. 2 and will drain to a 24-inch RCP storm pipe stubbed out from Big Johnson Drive.

2. Another portion of offsite flows to the East Pond are upstream of the PUD. There are two additional offsite areas. The first is approximately 14.5 acres of commercially zoned area in two lots just north of the PUD and south of Bradley Road. (Legacy Hill Drive runs between the two lots). The second, on the north side of Bradley Road, is approximately 19.6 acres (12.3 acres of the West Fork Jimmy Camp Creek Basin plus an additional 7.3 acres of Big Johnson Reservoir drainage area diverted into the West Fork Jimmy Camp Creek by CDOT construction of Powers Boulevard). Runoff south of Bradley Road under predevelopment conditions generally sheet flows to the south and slightly east within the West Fork Jimmy Camp Creek Drainage Basin (DBPS-WFJCC) at slopes ranging from 2 to 9 percent. There appears to be a broad swale running along the middle of this basin in a southeasterly direction. These offsite areas are analyzed in more detail in MDDP-Matrix and FDR-F1.

B. Regulatory Floodplain

Per the ***Flood Insurance Rate Map (FIRM)*** 08041C0768-G, effective date December 7, 2018, published by the Federal Emergency Management Agency (FEMA), no portion of Trails at Aspen Ridge (Waterview East) lies within any designated 100-year floodplain. This map can be found in Appendix C.

V. Drainage Design Criteria

B. Design References

As required by El Paso County, Colorado, this report has been prepared in accordance to the criteria set forth in the ***City of Colorado Springs and El Paso County Drainage Criteria Manual Volume 1 & 2*** (Drainage Criteria Manual or DCM), the El Paso County Engineering Criteria Manual (ECM), and El Paso County Resolutions 15-042 and 19-245.

In addition to the DCM, the ***Urban Storm Drainage Criteria Manuals, Volumes 1-3*** (UDFCD), published by the Urban Drainage and Flood Control District, latest update, have been used to supplement the Drainage Criteria Manual for water quality capture volume (WQCV).

C. Design Frequency

Design frequency is based on the DCM. The 100-year storm event was used as the major storm for the project, and the 5-year storm event was used as the minor storm.

D. Design Discharge

a. Method of Analysis

The hydrology for this project uses the Rational Method as recommended by the Drainage Criteria Manual for the minor and major storms for drainage basins less than 100-acres in size. The Rational Method uses the following equation: $Q=C*i*A$

Where:

Q = Maximum runoff rate in cubic feet per second (cfs)
C = Runoff coefficient
i = Average rainfall intensity (inches per hour)
A = Area of drainage sub-basin (acres)

b. Runoff Coefficient

Rational Method coefficients from Table 6-6 of the Drainage Criteria Manual for developed land were utilized in the Rational Method calculations. See Appendix B for more information.

c. Time of Concentration

The time of concentration consists of the initial time of overland flow and the travel time in a channel to the inlet or point of interest. A minimum time of concentrations of 5 minutes is utilized for urban areas.

d. Rainfall Intensity

The hypothetical rainfall depths for the 1-hour storm duration were taken from Table 6-2 of the Drainage Criteria Manual. Table 5.1, below, lists the rainfall depth for the Major and Minor 1-hour storm events.

Table 5.1 – Project Area 1-Hour Rainfall Depth

Storm Recurrence Interval	Rainfall Depth (inches)
5-year	1.50
100-year	2.52

The rainfall intensity equation for the Rational Method was taken from Drainage Criteria Manual Volume 1 Figure 6-5.

e. StormCAD Analysis

1. Routing

Storm CAD was utilized to analyze the routing of runoff through the proposed storm sewer system. Catchments were created in the model and calibrated to match the values calculated in the Rational Method spreadsheet.

2. HGL Profiles

StormCAD was also used to determine the Hydraulic Grade Profiles for the major and minor storms. The standard method was used to calculate head loss in the system with K coefficients taken from Table 9-4 of the DCM.

Table 9-4. STORMCAD Standard Method Coefficients

Bend Loss		
Bend Angle	**K Coefficient**	
0°	0.05	
22.5°	0.10	
45°	0.40	
60°	0.64	
90°	1.32	
LATERAL LOSS		
One Lateral K Coefficient		
Bend Angle	Non-surcharged	Surcharged
45°	0.27	0.47
60°	0.52	0.90
90°	1.02	1.77
Two Laterals K Coefficient		
45°	0.96	
60°	1.16	
90°	1.52	

VI. Drainage Basins and Sub-basins

A. The ***predevelopment conditions*** for the site have been analyzed and are presented by design points (Table 6.2) and are described as follows:

A. West Fork Jimmy Camp Creek:
The middle portion of the studied area is within the West Fork tributary to Jimmy Camp Creek. A portion of this basin is upstream of Bradley Road. Flows in that sub-basin (OS-1: Q_5 = 5.0 cfs, Q_{100} = 25.3 cfs) sheet flow to the road ditch and are conveyed to two 42-inch CMP crossroad pipes which direct the water across Bradley Road and on to the proposed development area.

The next downstream sub-basin is WF-1 (Q_5 = 17.2 cfs, Q_{100} = 115.2 cfs) which includes 14.5 Acres of commercially zoned offsite area, 66.10 acres of offsite Trails at Aspen Ridge PUD (Originally 8.99), 32.09 Acres of Trails at Aspen Ridge Filing No. 1, 15.89 Acres of Trails at Aspen Ridge Filing No. 2 (PUD area reduced), and 5.00 Acres which are in both Filing No. 1 and the PUD. Flows in this sub-basin sheet flow towards the middle of the sub-basins where they join flows from OS-1 and are conveyed via a broad swale in a southeasterly direction and out of the study area.

The third sub-basin within the West Fork basin is sub-basin WF-2 (Q_5 = 5.4 cfs, Q_{100} = 36.5 cfs) which includes 15.77 Acres of Filing No. 1 and 5.38 Acres of the PUD. Flows in this basin sheet flow in an easterly direction where they are captured by another broad swale at the south limit of the study area and conveyed in a southeasterly direction.

Total discharge to the West Fork Jimmy Camp Creek basin is approximately 22.4 cfs for the Q_5 event and 145.4 cfs for the Q_{100} event.

Existing conditions consider all of the areas as undeveloped. Sub-basins and Design points are summarized in the tables on the following page:

Table 6.1
Trails at Aspen Ridge, Filing No. 1
FDR
Existing Conditions Sub-basin Summary Table

Area ID	Area (Acres)	Q5 (cfs)	Q100 (cfs)
West Fork Jimmy Camp Creek / OS - 1	19.60	4.96	25.28
West Fork Jimmy Camp Creek / WF-1	119.08	17.15	115.23
West Fork Jimmy Camp Creek / WF-2	21.15	5.43	36.51

Table 6.2 **Trails at Aspen Ridge, Filing No. 1** **FDR** **Existing Design Point Summary**				
Design Point	**Sub-Basins**	**Total Area (ac.)**	**Q(5) (cfs)**	**Q(100) (cfs)**
OS-1	OS-1 (7.3 Acres diverted by CDOT from Big Johnson)	19.60	4.96	25.28
WF-1	WF-1 & OS-1	138.69	17.01	108.84
WF-2	WF-2	21.15	5.43	36.51
TO WEST FORK JIMMY CAMP CREEK	WF-1, WF-2, & OS-1 (Basins are parallel, so this is a sum of WF-1 & WF-2.)	**159.84**	**22.44**	**145.35**

B. The fully developed conditions for the site are as follows:

West Fork – Jimmy Camp Creek:

Under proposed conditions, flows for this basin will be directed to a proposed detention pond (East Pond) near the southeast corner of the proposed Trails at Aspen Ridge development. Sub-basins and Design Points for this major basin are summarized in hydrology Tables 6.3, 6.4, and 6.5 below and on the following pages. (Note that grey shading indicates sub-basins within the West Fork Jimmy Camp Creek basin that are covered in previous drainage reports. Sub-basins C-7 and C-8 were covered in ***MDDP-Matrix***, but, as the HGLs for the inlets serving these two sub-basins are included in this report, they are not shaded gray.)

Table 6.3a **Trails at Aspen Ridge** **West Fork - Jimmy Camp Creek** **Proposed Conditions - Sub-basin Summary**			
Basin	**Area**	**Q5**	**Q100**
	acres	**cfs**	**cfs**
OS-1	19.67	4.0	26.8
A-1	12.34	4.4	18.9
A-2	1.09	2.7	5.2
A-3	4.98	2.2	9.0
A-4	0.12	0.6	1.0
B-1	1.06	1.8	4.1
C-1	3.27	5.9	12.9
C-2	1.19	2.4	5.3
C-3	4.60	8.4	18.5
C-4	0.36	1.6	3.0
C-5	3.13	5.7	12.5
C-6	0.07	0.3	0.6
C-7+8 (MDDP Sub-basins C7 and C8 combined)	2.26	4.2	9.2
D-1	2.21	1.6	5.2
E-1	6.43	3.9	12.2
E-2	2.14	3.9	8.7

Table 6.3b
Trails at Aspen Ridge
West Fork - Jimmy Camp Creek
Proposed Conditions - Sub-basin Summary

Basin	Area	Q5	Q100
	acres	cfs	cfs
F-1	1.49	2.7	6.0
F-2	0.58	1.1	2.5
F-3	1.25	2.3	5.0
F-4	0.58	1.1	2.5
F-5	2.27	3.5	7.8
F-6	1.00	1.7	3.9
F-7	5.06	7.5	16.5
F-8	0.84	1.5	3.3
G-1	1.11	2.1	4.6
H-1	3.60	5.6	12.3
H-2	1.16	1.9	4.2
H-3	2.97	4.7	10.3
H-4	0.92	1.6	3.6
H-5	2.42	4.0	8.9
H-6	2.46	4.1	9.1
H-7	2.03	3.0	6.6
H-8	0.97	1.7	3.8
H-9a	1.95	2.3	5.8
H-9b	0.38	0.6	1.3
H-10	1.33	2.5	5.5
H-11	3.42	5.0	11.0
K3	4.18	7.1	15.6
K1			
K2			
K3			
K4			
K5			
K6			
K7			
K8			
K9			
K10			
K11			
K12			
K13			
K-OS Developed			
K-OS Undeveloped			

Fill in the sub-basin summary

Table 6.4a Design Point Summary						
StormCAD						
Design Point	Total Drainage Area	Surface		Storm Sewer		Downstream Design Point
		Q5 (cfs)	Q100 (cfs)	Q5 (cfs)	Q100 (cfs)	
1-OS	**19.67**	4.0	26.8	**-**	**-**	A
1-A	**12.34**	3.5	17.6	**-**	**-**	A
2-A	**1.09**	2.7	5.2	**-**	**-**	A
3-A	**4.98**	2.2	8.9	**-**	**-**	A
4-A	**0.12**	0.6	1.0	**-**	**-**	A
A	**38.20**	-	-	12.0	55.6	B
1-B	**1.06**	1.8	4.1	-	-	B
B	**39.26**	-	-	12.7	57.1	C
1-C	**3.27**	5.9	12.9	-	-	C
2-C	**1.19**	2.4	5.3	-	-	C
3-C	**4.60**	8.4	18.5	-	-	C
4-C	**0.36**	1.6	3.0	-	-	C
5-C	**3.13**	5.7	12.5	-	-	C
6-C	**0.07**	0.3	0.6	-	-	C
7+8-C	**2.26**	4.2	9.2	-	-	C
C	**54.13**	-	-	27.6	90.2	D
1-D	**2.21**	1.6	5.2	-	-	D
D	**56.34**	0.0	0.0	28.1	92.1	E
1-E	**6.43**	2.6	11.4	-	-	E
2-E	**2.14**	3.9	8.7	-	-	E
E	**64.91**	-	-	33.7	108.8	F
1-F	**2.07**	2.7	6.0	2.7	6.0	3-F
2-F	**0.58**	1.1	2.5	1.6	3.6	3-F
3-F	**3.32**	2.3	5.0	3.8	8.4	4-F
4-F	**3.89**	1.1	2.5	5.0	11.1	5-F
5-F	**6.16**	3.5	7.8	6.6	14.6	6-F
6-F	**7.16**	1.7	3.9	7.9	17.5	8-F
7-F	**5.06**	7.5	16.5	7.5	16.5	8-F
8-F	**13.07**	1.5	3.3	16.2	35.8	F
F	**77.97**	-	-	43.5	131.0	G
1-G	**1.11**	2.1	4.6	-	-	G
G	**79.08**	-	-	44.2	132.7	M
1-H	**3.60**	5.9	13.1	-	-	1-2 H
2-H	**1.16**	1.9	4.2	-	-	1-2 H
1-2 H	**4.76**	-	-	9.0	19.8	1-4 H
3-H	**2.97**	4.7	10.3	-	-	1-4 H

Table 6.4b
Design Point Summary

StormCAD

Design Point	Total Drainage Area	Surface		Storm Sewer		Downstream Design Point
		Q5 (cfs)	Q100 (cfs)	Q5 (cfs)	Q100 (cfs)	
4-H	**0.92**	1.6	3.6	-	-	1-4 H
1-4 H	**8.65**	-	-	16.4	36.1	1-6 H
5-H	**2.42**	4.0	8.9	-	-	1-6 H
6-H	**2.46**	3.9	8.6	-	-	1-6 H
1-6 H	**13.53**	-	-	20.2	44.9	1-8 H
7-H	**2.03**	2.9	6.4	-	-	1-8 H
8-H	**0.97**	1.7	3.7	-	-	1-8 H
1-8 H	**16.52**	-	-	23.3	49.3	1-10 H
9a-H	**1.95**	2.3	5.7	-	-	9b-H
9b-H	**0.38**	0.6	1.4	2.8	6.5	10-H
10-H	**1.33**	2.4	5.2	-	-	1-10 H
1-10 H	**20.17**	-	-	29.6	66.5	11-H
11-H	**3.42**	5.0	11.0	-	-	H
H	**23.59**			37.4	83.0	M
J-OS	**4.34**	16.1	29.3	-	-	J-K-OS
K-OS	**18.23**	24.7	54.4	-	-	J-K-OS
J-K-OS	**22.57**	-	-	36.7	77.0	OS-2-K
K-OS-Undeveloped	**29.62**	5.7	38.0	-	-	OS-2-K
1+2-K	**2.37**	3.2	7.9	-	-	OS-2-K
OS-2-K	**24.94**	-	-	39.2	83.6	OS-12-K
3+4-K	**1.23**	2.9	6.3	-	-	3-4-K
OS-4-K	**26.17**	-	-	40.8	87.0	OS-12-K
5-K	**0.95**	2.0	4.4	-	-	6-K
6-K	**0.72**	1.5	3.3	3.4	7.6	5-8-K
7-K	**3.26**	2.9	7.9	-	-	5-8-K
8-K	**0.15**	0.5	0.9	-	-	5-8-K
5-8-K	**5.08**	-	-	4.6	11.5	5-10-K
9-K	**1.16**	2.1	4.7	-	-	9-10-K
10-K	**1.10**	2.2	4.7	-	-	9-10-K
9-10-K	**2.26**	-	-	4.0	8.8	5-10-K
5-10-K	**7.34**	-	-	7.3	17.5	5-12-K
11-K	**1.39**	2.6	5.8	-	-	5-12-K
12-K	**0.67**	1.4	3.0	-	-	5-12-K
5-12-K	**9.40**	-	-	10.5	23.2	OS-12-K
OS-12-K	**35.57**	-	-	47.2	104.0	OS-14-K
13-K	**0.09**	0.3	0.6	-	-	OS-14-K

What does the gray shading staring at DP J-OS for Q5 & Q100 mean? Page 8 noted grey shade was covered under the previous reports that wouldn't apply to these flows.

Table 6.4c Design Point Summary						
StormCAD						
Design Point	Total Drainage Area	Surface		Storm Sewer		Downstream Design Point
		Q5 (cfs)	Q100 (cfs)	Q5 (cfs)	Q100 (cfs)	
14-K	**2.78**	5.0	11.0	-	-	OS-14-K
OS-14-K	**38.43**	-	-	50.6	111.6	K
K	**42.15**	-	-	56.3	121.4	3-I
1-I	**3.13**	6.9	12.3	-	-	K
2-I	**0.59**	2.3	4.1	-	-	K
3-I	**4.18**	9.3	16.5	7.8	17.2	M
I	**46.33**	-	-	62.5	132.6	M
M	**158.60**	-	-	**154.5**	**382.1**	East Pond Discharge
East Pond Discharge UD-Detention Filings 1 & 2	**158.60**	-	-	2.9	91.5	Existing Swale

Table 6.5a DESIGN POINT DESCRIPTIONS		
Design Point	**Description**	**Downstream Design Point**
1-OS	- This design point is at the downstream end of the offsite sub-basin (OS-1) north of Bradley Road. Flows in Sub-basin OS-1 will sheet flow to the road ditch running along Bradley and Powers Boulevard. Once channelized in the ditch flows will be directed to a proposed 24-inch RCP storm pipe sleeved into one of the existing 42-inch CMP cross road pipes to minimize disturbance to Bradley Road and avoid conflicts with existing utilities along the north side of Bradley Road. From there flows will be conveyed on to design point A. The second existing 42" CMP will be plugged. - Please note that approximately 7.3 acres of the area tributary to this design point have been diverted from the Big Johnson Reservoir by CDOT construction of Powers Boulevard. Future development of that portion of the tributary sub-basin must redirect these flows to the Big Johnson Reservoir to maintain compliance with the two relevant DBPS reports. - Development of the OS-1 Sub-basin will require onsite detention and an FDR.	A
1-A	-This design point is located at a sump inlet on the north side of Frontside Drive and just west of the Legacy Hill Drive Roundabout. -Please note that the commercial lot to within Sub-basin A-1 will be treated as undeveloped for the purposes of this report. Per MDDPA-Matrix, future development of this lot will require on-site detention as described in the referenced MDDP. -Development of this basin will require onsite detention and an FDR.	A

Table 6.5b DESIGN POINT DESCRIPTIONS		
Design Point	**Description**	**Downstream Design Point**
2-A	-This design point is located at a sump inlet on the south side of Frontside Drive and just west of the Legacy Hill Drive Roundabout. -Flow to This design point is primarily from street drainage along Frontside Drive.	A
3-A	-This design point is located at a sump inlet on the north side of Frontside Drive and just east of the Legacy Hill Drive Roundabout. -Please note that the commercial lot to within Sub-basin A-3 will be treated as undeveloped for the purposes of this report. Per MDDPA-Matrix, future development of this lot will require on-site detention as described in the referenced MDDP. -Development of this basin will require onsite detention and an FDR.	A
4-A	-This design point is located at a sump inlet on the south side of Frontside Drive and just east of the Legacy Hill Drive Roundabout. -Flow to This design point is almost exclusively from street drainage along Frontside Drive.	A
A	-This design point represents the manhole combining drainage from Design points OS-1 and 1-A through 4-A.	B
1-B	-This design point represents the on-grade inlet south of Frontside Drive.	B
B	-This design point represents the manhole on Legacy Hill Drive combining the flows from design point A with design point 1-B.	C
1-C	-This is an offsite design point in a future filing. This is located at a sump inlet on the west side of Drinking Horse Drive. -Future filing	C
2-C	-This is an offsite design point in a future filing. This is located at a sump inlet on the east side of Drinking Horse Drive. -Future filing	C
3-C	-This design point is at a sump inlet just west of Legacy Hill Drive on the north side of Moose Meadow Street.	C
4-C	-This design point is at a sump inlet just west of Legacy Hill Drive on the south side of Moose Meadow Street.	C
5-C	-This design point is at a sump inlet just east of Legacy Hill Drive on the north side of Moose Meadow Street.	C
6-C	-This design point is at a sump inlet just east of Legacy Hill Drive on the south side of Moose Meadow Street.	C

expand narrative. How is this relevant to Filing No. 2? Is this taking in flows from future filing and small portion of Filing 2 improvements?
identify sub-basin draining into this design point

Table 6.5c
DESIGN POINT DESCRIPTIONS

Design Point	Description	Downstream Design Point
7+8-C	- This design point is located at a sump inlet on the south side of Moose Meadow Street between future Roundhouse Drive and Beartrack Point.	C
C	-This design point is at a manhole in Legacy Hill Drive at its intersection with Moose Meadow Street. It reflects the combination of flows from design points 1-C through 8-C with flows from design point B.	D
1-D	-This design point is an on-grade inlet on Legacy Hill Drive northwest of its intersection with Sunday Gulch.	D
D	-This design point combines flows from design point 1-D with flows from design point C at a manhole in Legacy Hill Drive northwest of its intersection with Sunday Gulch Drive.	E
1-E	-This design point is located at a sump inlet on Falling Rock Drive just west of Sunday Gulch Drive which captures flows from Sub-basin E-1 and flow bypass from design point 1-D.	E
2-E	-This is a sump inlet across the street from design point 1-E. -During lower probability events flows to design point 1-E may equalize across the street to this design point.	E
E	This design point is at a manhole at the intersection of Sunday Gulch Drive and Falling Rock Drive. Flows from Design points 1-E, 2-E, and D are combined at this design point.	F
1-F	-This design point is at an at-grade inlet on the west side of future Lazy Ridge Drive. -Future filing.	3-F
2-F	-This design point is at an at-grade inlet on the east side of future Lazy Ridge Drive. -Future filing.	3-F
3-F	-This design point is at an at-grade inlet on the west side of future Lazy Ridge Drive. -Flows from Sub-basin F-3 are combined with storm sewer flows from design points 1-F and 2-F -Future filing.	4-F
4-F	-This design point is at an at-grade inlet on the east side of future Lazy Ridge Drive. -Flows from sub-basin F-4 are combined with flows from 1-F, 2-F and 3-F. -Future filing.	5-F
5-F	-This design point is at an at-grade inlet on the west side of Wagon Hammer Drive. -Flows from Sub-basin F-5 are combined with storm sewer flows from design points 1-F, 2-F, 3-F, and 4-F	6-F

Table 6.5d
DESIGN POINT DESCRIPTIONS

Design Point	Description	Downstream Design Point
6-F	-This design point is at an at-grade inlet on the east side of Wagon Hammer Drive. -Flows from Sub-basin F-6 are combined with storm sewer flows from design points 1-F, 2-F, 3-F, 4-F, and 5-F	8-F
7-F	-This design point is at a sump inlet located on the north side of Lookout Court just west of its intersection with Sunday Gulch Drive. -This inlet captures flows from Sub-basin F-7	8-F
8-F	-This design point is at a sump inlet and manhole on the south side of Lookout Court just west of its intersection with Sunday Gulch Drive. -Flows from Sub-basin F-8 are combined with flows from design points 1-F, 2-F, 3-F, 4-F, 5-F, 6-F, and 7-F.	F
F	-This design point combines flows from design points 1-F through 8-F with flows from design point E. -Variance Drop Manhole	G
1-G	-This design point is at an at-grade inlet capturing flows from Sub-basin G.	G
G	-This design point reflects the combination of surface flows from design point 1-G with storm sewer flows from design point F	M
1-H	-This design point is at a sump inlet on the west side of Lazy Ridge Drive capturing flows from Sub-basin H-1.	1-2 H
2-H	-This design point is at a sump inlet on the east side of Lazy Ridge Drive capturing flows from Sub-basin H-2.	1-2 H
1-2 H	-Flows from design points 1-H and 2-H are combined at this manhole on the south side of Buffalo Horn Drive at its intersection with Lazy Ridge Drive.	1-4 H
3-H	-This design point is at a sump inlet on the west side of Wagon Hammer Drive capturing flows from Sub-basin H-3	1-4 H
4-H	-This design point is at a sump inlet on the east side of Wagon Hammer Drive capturing flows from Sub-basin H-5	1-4 H
1-4 H	-Flows from design point 1-2 H are combined with flows from 3-H and 4-H at this manhole on the south side of Buffalo Horn Drive at its intersection with Wagon Hammer Drive.	1-6 H
5-H	-This is an at-grade inlet on the north side of Buffalo Horn Drive just west of its intersection with Windy Pass Court.	1-6 H
6-H	-This is an at-grade inlet on the south side of Buffalo Horn Drive just west of its intersection with Windy Pass Court.	1-6 H

While page 8 included a sentence explaining what the gray shade is, Staff recommends including a footnote on the tables explaining the gray shade for additional visibility.

Table 6.5e DESIGN POINT DESCRIPTIONS		
Design Point	**Description**	**Downstream Design Point**
1-6 H	-Flows from design point 1-4 H are combined with flows from 5-H and 6-H at this manhole on the south side of Buffalo Horn Drive west of its intersection with Windy Pass Court.	1-8 H
7-H	-This design point is at an on-grade inlet on the west side of Sunday Gulch Drive just north of its intersection with Buffalo Horn Drive. -This inlet captures flows from Sub-basin H-7	1-8 H
8-H	-This design point is at an on-grade inlet on the east side of Sunday Gulch Drive just north of its intersection with Buffalo Horn Drive. -This inlet captures flows from Sub-basin H-8	1-8 H
1-8 H	-Flows from design point 1-6 H are combined with flows from 7-H and 8-H at this manhole on the south side of Buffalo Horn Drive west of its intersection with Sunday Gulch Drive.	1-10 H
9a-H	-This design point is near the south boundary of Filing No. 1 where a flared end section captures flows from a swale running along this southern boundary of the study area. -This design point captures flows from Sub-basin H-9a.	9b-H
9b-H	-This design point is near the south boundary of Filing No. 1 where a Type C Inlet captures flows within Sub-basin H-9b. -This design point combines flows from Sub-basins H-9a and H-9b.	10-H
10-H	-This design point is at a sump inlet on the south side of the cul-de-sac at the east end of Buffalo Horn Drive. Surface flows from Sub-basin H-10 are combined with storm sewer flows from design point 9-H.	1-10 H
1-10 H	-Flows from design points 10-H and 1-8 H are combined at a manhole towards the north side of the cul-de-sac at the east end of Buffalo Horn Drive.	11-H
11-H	-This design point is at a sump inlet on the north side of the cul-de-sac at the east end of Buffalo Horn Drive. -This inlet captures flows from Sub-basin H-11	H
H	-This design point combines storm sewer flows from design point 11-H and 1-10 H	M
K-OS	-This design point is at the storm sewer stub out from Filing No. 2. Future filings in Trails at Aspen Ridge will extend the storm sewer to the north along Big Johnson Drive. -This design point considers full buildout flows	OS-2-K
K-OS-UD Undeveloped	-This design point is at the 36" FES collecting runoff from the drainage area north of Trails at Aspen Ridge Filing No. 2. -This design point considers undeveloped upstream flows.	OS-2-K
Table 6.5f		

Identify sub-basin draining into these two design points.

These are labeled as DP 2-K and 4-K on map.

Identify the tributary sub-basin or design point draining into these design poinst.

DESIGN POINT DESCRIPTIONS		
Design Point	**Description**	**Downstream Design Point**
1+2-K	- At-grade inlet west of the intersection of Nutterbutter Point and Big Johnson Drive	1-2-K
OS-2 -K	This combines the flows from K-OS with 1+2-K	**OS-4-K**
3+4-K	-At-grade inlet west of the intersection of Turtle Lake Way and Big Johnson	**3-4-K**
OS-4-K	-M	**2-K**
5-K	-A	**6-K**
5-6-K	-A on	**8-K**
7-K	-At-grade inlet on Bird Ridge Drive north of intersection with Roundhouse Drive	**5-8-K**
8-K	-At-grade inlet on Bird Ridge Drive north of intersection with Roundhouse Drive	**5-8-K**
5-8-K	-Manhole combining flows from 5-6-K with 7-K and 8-K	**5-10-K**
9-K	-At-grade inlet on Roundhouse drive west of intersection with Bird Ridge Drive	**9-10-K**
10-K	-At-grade inlet on Roundhouse drive west of intersection with Bird Ridge Drive	**9-10-K**
9-10-K	-Manhole combining flows from 9-K and 10-K	**5-10-K**
5-10-K	-Manhole combining flows from 9-10-K and 5-8-K	**5-12-K**
11+12-K	-Sump inlet on Roundhouse Drive just west of intersection with Big Johnson Drive on the south side of Roundhouse Drive	**5-12-K**
5-12-K	-Manhole combining flows from 5-10-K and 11+12-K	**OS-12-K**
OS-12-K	-Manhole combining flows from 5-12-K and OS-4-K at intersection of Big Johnson Drive and Roundhouse Drive.	**OS-14-K**
13-K	-Sump inlet on the west side of Big Johnson Drive located mid-block between Roundhouse Drive and Legacy Hill Drive.	**OS-14-K**

Check all other design points and description for consistency with the drainage map

Table 6.5f DESIGN POINT DESCRIPTIONS		
Design Point	**Description**	**Downstream Design Point**
14-K	-Sump inlet on the east side of Big Johnson Drive located mid-block between Roundhouse Drive and Legacy Hill Drive.	**OS-14-K**
OS-14-K	-Manhole combining flows from OS-12-K, 13-K, and 14-K	K
K	-This design point combines storm sewer flows from design points 1-14-K, 2-I, and 1-I in a manhole located at the intersection of Big Johnson Drive and Legacy Hill Drive.	3-I
1-I	-This design point is at a sump inlet on the north side of Legacy Hill Drive just west of its intersection with Big Johnson Drive. -Flows from Sub-basin I-1 are captured at this inlet.	K
2-I	-This design point is at a sump inlet on the south side of Legacy Hill Drive just west of its intersection with Big Johnson Drive. -Flows from Sub-basin I-2 are captured at this inlet.	K
3-I	-This design point is at a sump inlet at the south side of the cul-de-sac at the east end of Falling Rock Drive. -Flows from Sub-basin I-3 are captured by this inlet	M
I	-This design point represents the combination of storm sewer flows from design point K with flows captured by the inlet at design point 3-I	M
M	-This design point represents the combinate of all of the flows directed to the East Pond. -Included Sub-basins: OS-1, A-1 to A-4, B-1, C-1 to C-8, D-1, E-1, E-2, F-1 to F-8, H-1 to H-11, I-1 to I-3 and M	East Pond Discharge
East Pond Discharge	-This design point is at the discharge structure from the East Pond. -Developed flows from the proposed improvements will be metered out by this structure at predevelopment levels as determined by a combination of UD-Detention and SWMM modeling of the Full Spectrum Extended Detention Basin	Existing Swale

- Generally, flows will sheet flow off developed lots towards adjacent streets which will capture flows and direct them downstream to the nearest inlets. After capture in inlets the flows will be conveyed onwards towards the downstream detention basin via storm sewer.

VII. Drainage Facility Design

A. Street Capacity

The width of the typical section for streets within Filing No. 2 will be 35 feet from back of curb to back of curb. Curb heights will be 6-inch. These streets will generally utilize EPC Optional Type C curb and gutter with EPC Type A curb and gutter used for the curb radii through intersections. The following table (Table 6.1) lists streets and capacities by Design Point:

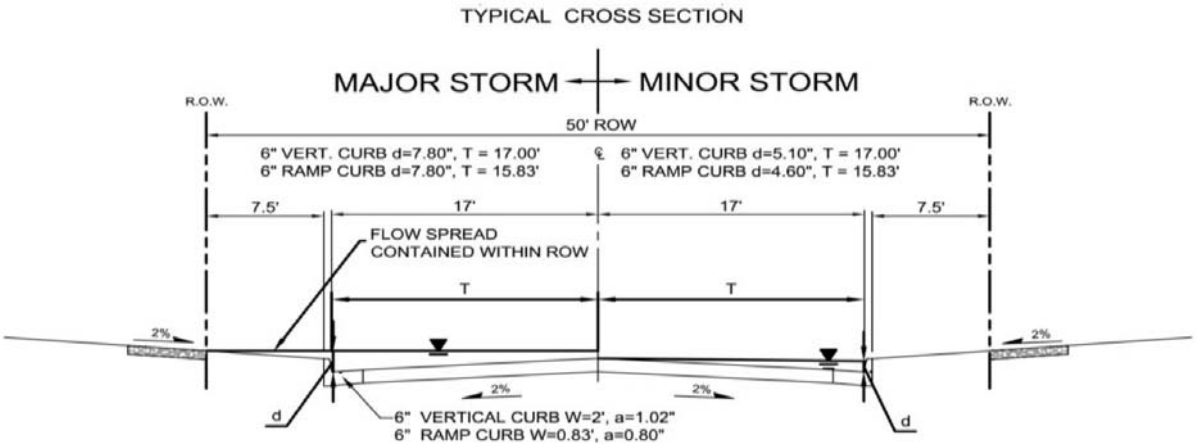
Table 7.1
STREET CAPACITIES
Trails at Aspen Ridge Filing No. 2

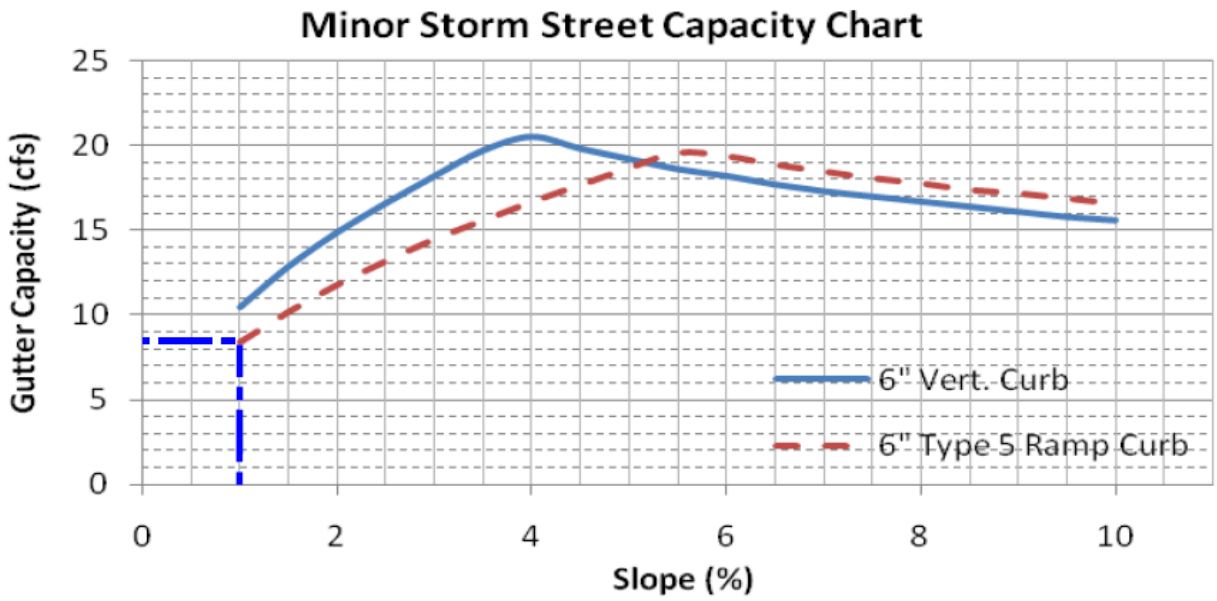
update DPs to match the map

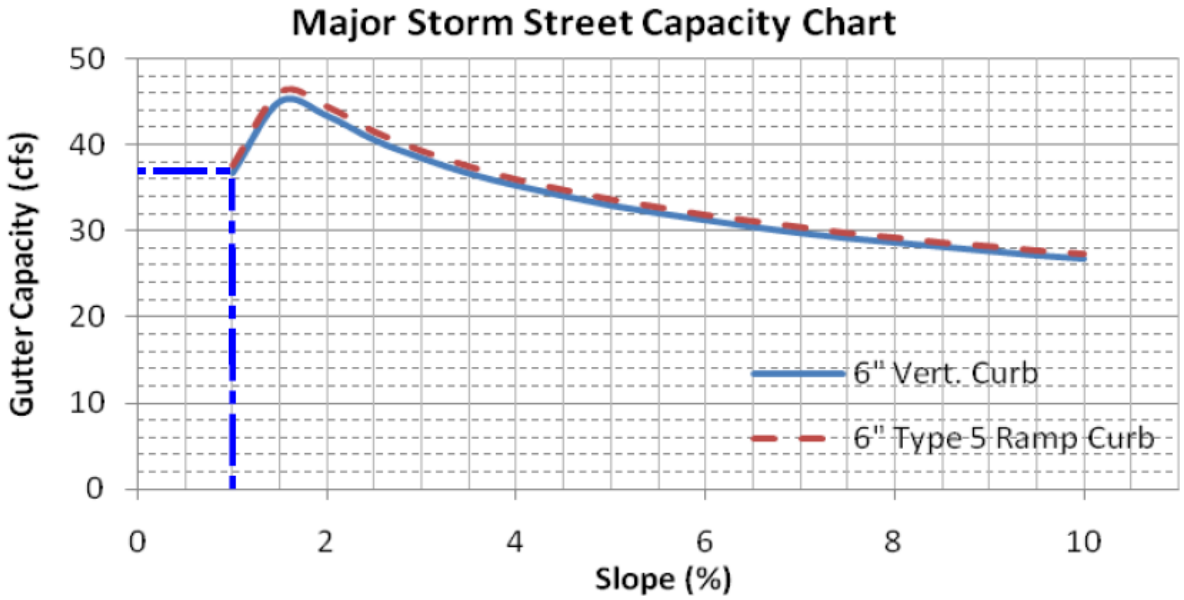
Street	*Location*	*DESIGN POINT*	*Slope %*	*ROAD CAPACITY MINOR STORM (cfs)*	*Q_5 TOTAL FLOW (cfs)*	*ROAD CAPACITY MAJOR STORM (cfs)*	*Q_{100} TOTAL FLOW (cfs)*
Nutterbutter Point	Between Bird Ridge Drive and Big Johnson Drive	1+2-K	1.9	**15.5**	**3.4**	**37.0**	**7.2**
Turtle Lake Way	Between Bird Ridge Drive and Big Johnson Drive	3+4-K	1.6	**10.5**	**2.9**	**46.0**	**6.1**
Beartrack Point	Near Intersection with Bird Ridge Drive	5-K	5.5	**19.5**	**2.0**	**32.0**	**4.4**
Beartrack Point	Near Intersection with Bird Ridge Drive	6-K	5.5	**19.5**	**1.5**	**32.0**	**3.3**
Bird Ridge Drive	Between Turtle Lake Way and Roundhouse Drive	7-K	3.4	**15.5**	**2.9**	**37.0**	**7.9**
Bird Ridge Drive	Between Turtle Lake Way and Roundhouse Drive	8-K	3.4	**15.5**	**0.5**	**37.0**	**0.9**
Roundhouse Drive	Between Moose Meadow Street and Bird Ridge Drive	9-K	4.5	**17.5**	**2.1**	**35.0**	**4.7**
Roundhouse Drive	Between Moose Meadow Street and Bird Ridge Drive	10-K	4.5	**17.5**	**2.2**	**35.0**	**4.7**
Roundhouse Drive	Between Bird Ridge Drive and Big Johnson Drive	11-K	3.5	**15.5**	**2.6**	**37.0**	**5.8**
Roundhouse Drive	Between Bird Ridge Drive and Big Johnson Drive	12-K	3.5	**15.5**	**1.4**	**37.0**	**3.0**
Big Johnson Drive	Between Roundhouse Drive and Legacy Hill Drive	13-K	4.0	**16.5**	**0.3**	**36.0**	**0.6**
Big Johnson Drive	Between the north boundary of TAR Filing No. 2 and Legacy Hill Drive	14-K	4.0	**16.5**	**5.0**	**36.0**	**11.0**

Nomograph 7-7 from the DCM is shown below and on the following page:

Figure 7-7. Street Capacity Charts Residential (Detached Sidewalk)







Notes:

- EPC Optional Type C curb and gutter was used for all streets.
- The nomograph (Figure 7-7) above was used to calculate capacities for the EPC Type C (Local/Residential) streets within the project area. Compared to requirements in the El Paso DCM this nomograph is slightly more conservative for the major storm (7.8-inch depth versus 12-inch depth in Table 6-1 of the El Paso County DCM) and identical for the minor/initial storm.

B. Inlet Capacity

In accordance with the DCM, this project will use Type R inlets. On-grade inlet capacities were determined utilizing UD-Inlet. Sump inlet capacities were determined utilizing DCM Nomograph 8-11 shown below. The following Table 6.2 lists inlets by design point and corresponding capacity. Table 6.3 describes overflow routing for each sump inlet.

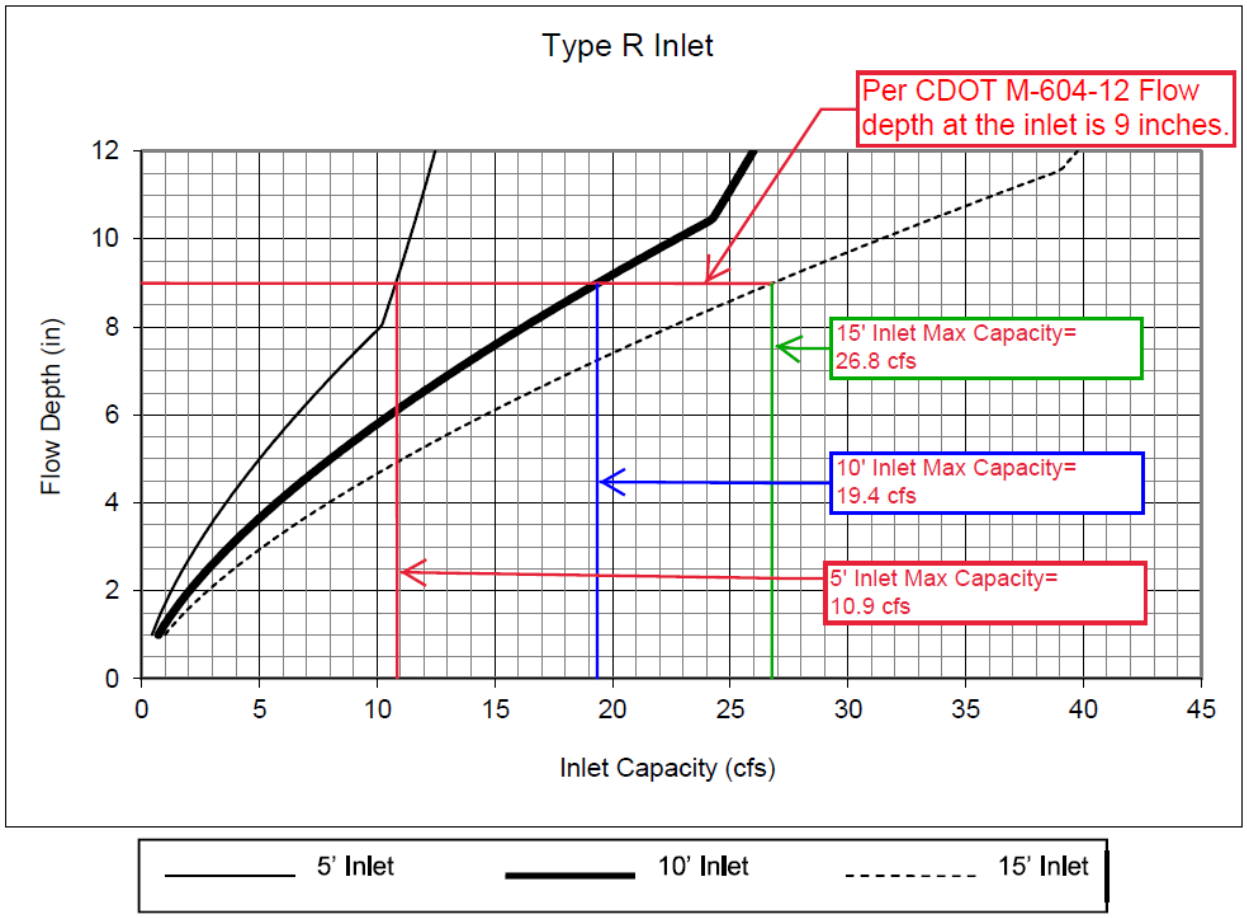


Figure 2-Inlet Capacity - Sump Conditions (DCM Figure 8-11)

Please see Appendix C for CDOT standard M-604-12.

Update DPs to match the map

Table 7.2
PROPOSED INLET SUMMARY
Trails at Aspen Ridge - Filing No. 2

DESIGN POINT	*SUB-BASIN*	*TOTAL AREA (AC)*	*INLET*			*Q(5) BYPASS FLOWS (cfs)*	*Q(5) TOTAL INFLOW*	*Q(100) BYPASS FLOWS (cfs)*	*Q(100) TOTAL INFLOW (cfs)*	*INLET CAPACITY*	*NOTES:*
			SIZE (Ft.)	*TYPE*	*CONDITION*						
1+2-K	K-2	0.40	**10**	**R**	**SUMP**		**3.24**		**7.88**	**19.40**	***SUMP***
3+4-K	K-4	0.45	**10**	**R**	**ON-GRADE**	**0**	**2.93**	**0.8**	**6.25**	**5.45**	***BYPASS GOES TO 11-K***
5-K	K-5	0.95	**10**	**R**	**ON-GRADE**	**0**	**1.98**	**0.1**	**4.37**	**4.27**	***BYPASS GOES TO 7-K***
6-K	K-6	0.72	**10**	**R**	**ON-GRADE**	**0**	**1.50**	**0**	**3.30**	**3.30**	***BYPASS GOES TO 7-K***
7-K	K-7	3.26	**10**	**R**	**ON-GRADE**	**0**	**2.90**	**1.7**	**8.04**	**6.34**	***BYPASS GOES TO 11-K***
8-K	K-8	0.15	**5**	**R**	**ON-GRADE**	**0**	**0.45**	**0**	**0.91**	**0.91**	***BYPASS GOES TO 11-K***
9-K	K-9	1.16	**10**	**R**	**ON-GRADE**	**0**	**2.15**	**0.2**	**4.73**	**4.53**	***BYPASS GOES TO 11-K***
10-K	K-10	1.10	**10**	**R**	**ON-GRADE**	**0**	**2.15**	**0.2**	**4.74**	**4.54**	***BYPASS GOES TO 12-K***
11+12-K	K-11	2.06	**10**	**R**	**SUMP**		**4.00**		**8.81**	**19.40**	***SUMP***
13-K	K-13	0.09	**10**	**R**	**SUMP**		**2.66**		**5.80**	**19.40**	***SUMP, FLOW EQUALIZES ACROSS ROAD***
14-K	K-14	2.78	**10**	**R**	**SUMP**		**2.66**		**5.80**	**19.40**	***SUMP, FLOW EQUALIZES ACROSS ROAD***
7+8-C	**C-7+8**	**2.25**	**5**	**R**	**SUMP**		**4.23**		**9.23**	**10.90**	***SUMP***

Complete the sentence.

Table 7.3 ***Overflow Routing*** ***Trails at Aspen Ridge, Filing No. 2***	
Inlet	***Overflow Routing Under Inlet Blockage Conditions***
7+8-C	Blockage of this inlet will cause flows to back up towards
1+2-K	Blockage of this inlet will cause flows to back up along the curb of Roundhouse Drive and continue southward down Big Johnson drive to Inlet 11+12-K on Roundhouse Drive.
11+12-K	Blockage of this inlet will cause flows to surcharge the crown of Roundhouse Drive and continue to Inlet 11-K. If both inlets are blocked flows will continue down Big Johnson drive to Inlet 13-K
13-K	Blockage of this inlet will cause flows to surcharge the crown of Big Johnson Drive and enter Inlet 14-K. If this inlet is blocked as well, the flows will continue south down Big Johnson Drive and then west along Legacy Hill Drive and into Inlet 1-I in Trails at Aspen Ridge Filing No. 1
14-K	Blockage of this inlet will cause flows to surcharge the crown of Big Johnson Drive and enter Inlet 13-K. If this inlet is blocked as well, the flows will continue south down Big Johnson Drive and then west along Legacy Hill Drive and into Inlet 1-I in Trails at Aspen Ridge Filing No. 1

update. Located in Nutterbutter Pt

Update. No Inlet 11-K shown on the storm sewer exhibit

C. Storm Sewer Capacities

Storm sewer capacities and HGL's were analyzed in StormCAD. The table below lists relevant pipe information. HGL profiles for the Q5 and Q100 events can be found in Appendix A.

Table 7.4					
STORM PIPE SUMMARY TABLE					
PIPE LABEL	**PIPE DIA. (IN)**	**PIPE LENGTH (FT)**	**% GRADE**	**Q100 PIPE FLOW (cfs)**	**Velocity (Ft/s)**
63	48	106.5	0.5	113.5	9.05
200	36	235.7	3.2	77.0	17.92
201	36	146.6	3.1	83.6	17.97
202	42	240	2.0	87.0	9.04
203	48	80.9	0.5	106.1	8.44
205	18	49.9	2.4	7.9	4.45
207	18	7.3	0.4	6.27	4.33
208	18	68.4	3.4	6.26	9.78
209	18	33.2	1.9	4.3	7.13
210	18	60.2	1.9	7.6	8.30
211	18	80.2	3.4	7.5	10.21
212	18	7.3	1.0	6.3	3.57
213	18	29.4	0.5	1.0	0.55
214	18	69.0	0.5	11.5	6.48
215	18	30.7	0.5	4.5	2.57
216	18	9.1	2.8	4.5	8.39
217	18	40.0	3.9	8.8	11.22
218	24	271.8	3.3	17.5	12.49
219	18	30.7	1.4	8.5	4.83
220	18	8.5	6.0	3.2	1.82
221	36	69.8	3.5	25.0	3.54
222	18	8.2	0.7	0.7	0.4
223	18	28.5	1.6	11.0	6.22
224	18	30.7	0.5	8.8	4.98
225	18	7.7	0.5	0.5	0.28
226	18	168.1	1.0	9.2	5.18
227 (Filing 2 only)	36	53.8	1	40.2 (K-OS-Undeveloped)	7.28

D. Detention

Summary information for the East Pond is listed below. Supporting UD-Detention spreadsheets and SWMM analysis for the East Pond can be found in Appendix A. The East and West Ponds will be privately owned and maintained by the Waterview II Metropolitan District.

Table 7.5
Pond Summary Table

Major Basin	Pond ID	Analysis Method	Contributing Basins	Approximate Detention Volumes			EX 5 Year	Proposed 5 Year	EX 100 Year	Proposed 100 Year
				WQCV	EURV	Q100				
				Ac.-Ft.	Ac.-Ft.	Ac.-Ft.	(CFS)	(CFS)	(CFS)	(CFS)
West Fork Jimmy Camp Creek	East Pond	UD-Detention	OS-1, A, B, C, D, E, F, G, J, K, I, H, M	**F2**: 1.738 **FB**: 4.890	4.056 6.581	16.372 18.041	22.3 22.3	**2.9** **5.6**	144.6 144.6	**91.5** **138.2**

Trails at Aspen Ridge, Filing No. 2 = **F2**, Trails at Aspen Ridge, Full Buildout = **FB**

Emergency Overflows

Table 7.6
Emergency Overflow Weirs

Major Basin	Pond ID	Description of Emergency Overflow Weir
West Fork - Jimmy Camp Creek	East Pond	The emergency overflow weir for this pond will release emergency overflows to a proposed swale along the edge of the development boundary and direct the flows south to an existing swale flowing to the southeast. Flows will then follow historic patterns.

Outfall Analysis

East Pond

The outfall for the East Pond was analyzed in ***MDDP-Matrix*** to confirm that the receiving swale should remain stable after construction of the pond. Hydraflow Express was utilized to check the velocity of the anticipated Full Buildout Q100 Discharge and calculated a velocity in the 48" outfall pipe of 12.9 feet per second. A second Hydraflow calculation was performed at the narrowest point in the swale receiving the discharge. The results of this calculation indicated that the anticipated velocity of a Q100 discharge from the pond is around 3.7 feet per second which is well below the maximum 100-year velocity and barely above the maximum low flow velocity indicated for erosive soils in Table 12-3 (shown on the following page) of the DCM regarding Hydraulic Design Criteria for natural unlined channels. Additionally, the outfall will discharge to a rip rap lined low tailwater basin designed in accordance with UDFCD criteria.

Table 12-3. Hydraulic Design Criteria for Natural Unlined Channels

Design Parameter	Erosive Soils or Poor Vegetation	Erosion Resistant Soils and Vegetation
Maximum Low-flow Velocity (ft/sec)	3.5 ft/sec	5.0 ft/sec
Maximum 100-year Velocity (ft/sec)	5.0 ft/sec	7.0 ft/sec
Froude No., Low-flow	0.5	0.7
Froude No., 100-year	0.6	0.8
Maximum Tractive Force, 100-year	0.60 lb/sf	1.0 lb/sf

[1] Velocities, Froude numbers and tractive force values listed are average values for the cross section.
[2] "Erosion resistant" soils are those with 30% or greater clay content. Soils with less than 30% clay content shall be considered "erosive soils."

The Web Soil Survey for the site indicates that the Soils for the receiving swale are are classified as Stoneham sandy loam which is likely an erosive soil.

After receiving the East Pond Discharge, the existing swale will convey the stormwater to an existing detention feature on an adjacent property. According to the West Fork – Jimmy Camp Creek DBPS (See DPBS plan Sheet 6 in Appendix C of ***MDDP-Matrix***) this existing detention feature is expected to receive up to 380 cfs for a Q100 event. The tributary drainage area treated by the East Pond makes up approximately 70 percent of the area tributary to the existing offsite pond. As the anticipated discharge from the East Pond is less than half (Filing No. 2: 91.5 cfs, Full Buildout: 138.2 cfs) of the the flow listed in the DBPS, the existing detention feature should not be adversely affected.

SWMM Analysis: West Fork – Jimmy Camp Creek

Please note that the ***MDDPA-Matrix*** report analyzed the full buildout of the area tributary to the East Pond using pond inflow hydrographs generated in SWMM and input to UD-Detention because full build out of the basin will include detention ponds for the commercial areas along Bradley Road in series with the East Pond. However, as these commercial areas are not anticipated to be developed prior to Trails at Aspen Ridge Filing No. 2, analysis of the East Pond for this filing utilized only the UD-Detention spreadsheet and considered all the upstream areas as undeveloped in order to confirm that the East Pond outlet structure for Filing No. 2 will conform to detention requirements in the DCM.

East Pond Phasing:

The East Pond was constructed as part of Trails at Aspen Ridge Filing No. 1. The pond was built to the size required for full development of the upstream basin, so expansion of the pond volume is not required for this development. (This volume does **not** include developed flows from the commercial areas. These areas will be required to construct full spectrum detention when developed.) The Filing No. 1 orifice plate for the East Pond outlet structure has been evaluated and found **adequate** to discharge the combined Filing No. 1 and Filing No. 2 developed flows in compliance with DCM Criteria. Future filings will require additional evaluations and, possibly, redesigns of the orifice plate to ensure compliance with the DCM and ***MDDPA-Matrix*** criteria.

VIII. Environmental Evaluations

A. WETLAND IMPACTS

There are no designated wetland or riparian areas on site, and no anticipated impacts.

B. STORMWATER QUALITY

All on-site detention facilities shall be designed to accommodate water quality requirements. As the development of each parcel progresses, the detention guidelines outlined in this report are to be upheld. Per Chapter 4, Section 4.1, of the El Paso County DCM, Volume 2, the DCM requires a Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainageways, and implementing long-term source controls.

Step 1: **Employ Runoff Reduction Practices**

- Site specific landscaping will be done on each lot to decrease the connectivity of impervious areas. Grass lined swales will be used where possible to allow ground infiltration.

Step 2: **Stabilize Drainageways.**

- The site is in the West Fork – Jimmy Camp Creek basin. Drainage fees, to be paid by the relevant Trails at Aspen Ridge (Waterview East) developers at the time of platting, will help fund future channel improvements. Specific information on future improvements to the Jimmy Camp Creek channel was unavailable for this report.

Step 3: **Provide Water Quality Capture Volume**

- The East Pond meets the DCM standards for the release rates of Full Spectrum Detention Ponds for Water Quality Capture Volumes.

Step 4: **Consider Need for Industrial and Commercial BMPs**

- There are no commercial or industrial components of this development, therefore no BMPs of this nature are required. The Full Spectrum Detention BMP is provided for the proposed development by the East Pond.

C. PERMITTING REQUIREMENTS

No additional permitting requirements are expected at this time.

IX. Erosion Control Plan

A grading and erosion control plan (GEC) for Trails at Aspen Ridge Filing No. 2 will be completed. The GEC incorporates straw wattles, straw bale check dams, silt fence, vehicle tracking control, inlet & outlet control, sedimentation basins and other best management practices (BMPs) identified in the DCM Volume 2. Please refer to the GEC for phasing and procedural information for adaptations between the Filing No. 2 GEC and the overall GEC.

X. Drainage Fees

TRAILS AT ASPEN RIDGE FILING NO. 2 Final Drainage Report West Fork – Jimmy Camp Creek: 2019 Drainage and Bridge Fees						
	Impervious Area (ac.)	Fee/ Imp. Acre	Fee Due	Reimbursable Const. Costs	Fee Due at Platting	Drainage Fee Credit
Drainage Fee	9.344	$12,564.00	$117,396.15	$0.00	$117,396.15	$0.00
Bridge Fee	9.344	$3,717.00	$34,731.10	$0.00	$34,731.10	$0.00
				$0.00	***$152,127.25***	

Provide the calculation that generated this value.

XI. Construction Cost Opinion

Engineer's Estimate of Probable Construction Costs				
Trails at Aspen Ridge Filing No. 2				
Public Non-Reimbursable				
Item	**Unit**	**Quantity**	**Unit Cost**	**Extension**
18" RCP	LF	831	$65.00	$54,015.00
24" RCP	LF	272	$78.00	$21,216.00
36" RCP	LF	509	$120.00	$61,080.00
42" RCP	LF	240	$160.00	$38,400.00
48" RCP	LF	81	$195.00	$15,795.00
TYPE I MANHOLE	EA	6	$5,000.00	$30,000.00
TYPE II MANHOLE	EA	6	$4,000.00	$24,000.00
5' INLET	EA	3	$6,365.00	$19,095.00
10' INLET	EA	13	$8,443.00	$109,759.00
24" FES	EA	1	$468.00	$468.00
		Sub Total		$373,828.00
		10% Contingency		$37,382.80
		TOTAL:		$411,210.80

Since the engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the contractor's method of determining prices, or over the competitive bidding or market conditions, the opinion of probable construction costs provided herein are made on the basis of the engineer's experience and qualifications and represents the best judgment as an experienced and qualified professional familiar with the construction industry. The engineer cannot, and does not guarantee that proposals, bid or actual construction costs will not vary from the opinions of probable cost.

a 36" FES is shown on the drainage plan and construction drawing. Please revise.

The CD's indicate approx. 99 LF of 48" pipe. Please verify all the other quantities and ensure that they are consistent between the drainage report, CD's and FAE.

XII. References

1. ***El Paso County and City of Colorado Springs Drainage Criteria Manual, Volume 1 & 2***, El Paso County, May 2014
2. ***El Paso County Engineering Criteria Manual,*** El Paso County, Rev. December 2016
3. ***Web Soil Survey of El Paso County Area, Colorado. Unites States Department of Agriculture Soil Conservation Service***.
4. ***Flood Insurance Rate Maps for El Paso County, Colorado and Incorporated Areas, Panel 768 of 1300, Federal Emergency Management Agency***, Effective Date December 7, 2018.
5. ***Urban Storm Drainage Criteria Manual, Vol. 1-3*** by Urban Drainage and Flood Control District (UDFCD), January 2016
6. ***West Fork Jimmy Camp Creek Drainage Basin Planning Study*** by Kiowa Engineering, revised October 2003
7. ***Jimmy Camp Creek Drainage Basin Planning Study, Development of Alternatives & Design of Selected Plan, Report*** by Kiowa Engineering, March 2015
8. **Big Johnson Reservoir/Crews Gulch Drainage Basin Planning Study,** by Kiowa Engineering, September 1991.
9. **"Amendment to Waterview Master Drainage Development Plan"**, completed by Springs Engineering, dated July 2014 *(MDDP-2014)*
10. **"Master Drainage Development Plan Amendment for Waterview East & Preliminary Drainage Plan for Trails at Aspen Ridge",** Completed by Matrix Design Group, Dated August 2019 (MDDPA-Matrix) (Approval Pending)
11. ***"Final Drainage Report for Trails at Aspen Ridge Filing No. 1",*** completed by Matrix Design Group, Dated September 2019. (FDR-F1) (Approval Pending)

XIII. Appendices

APPENDIX A

HYDROLOGIC AND HYDRAULIC CALCULATIONS

Project Name:	TRAILS AT ASPEN RIDGE FILING NO. 2
Project Location:	EL PASO COUNTY
Designer	KZ & JTS
Notes:	Existing Condition

Average Channel Velocity	5	ft/s
Average Slope for Initial Flow	0.04	ft/ft

Channel Flow Type Key

Heavy Meadow	2
Tillage/Field	3
Short Pasture and Lawns	4
Nearly Bare Ground	5
Grassed Waterway	6
Paved Areas	7

		Area		Rational 'C' Values								Flow Lengths				Initial Flow		Channel Flow				Tc	Rainfall Intensity & Rational Flow Rate				
				Surface Type 2 (Impervious)			Surface Type 3 (Undeveloped)			Composite																	
Major Basin / Sub-basin	**Comments**	sf	acres	C5	C100	Area (SF)	C5	C100	Area	C5	C100	Initial ft	True Initial Length ft	Channel ft	True Channe Length ft	Average Slope	Initial Tc (min)	Average (%) Slope	Channel Flow Type (See Key above) Ground Type	Velocity (ft/s)	Channel Tc (min)	Total (min)	i5 in/hr	Q5 cfs	i100 in/hr	Q100 cfs
West Fork Jimmy Camp Creek / OS - 1	***- The most northwestern portion of this basin (7.268 Acres) outside of the proposed Trails at Aspen Ridge development was rerouted out of the Big Johnson Reservoir basin by CDOT construction of Powers Boulevard and Bradley Road. Future development of the rerouted area will require routing the flows back to the Big Johnson Reservoir to return the area to compliance with the relevant DBPS studies.***	853,953.7	19.60	0.90	0.96	42031.00	0.09	0.36	811,923	0.13	0.39	621.00	300.00	2146.00	2467.00	0.106	19.79	2.470	5.000	1.5	26.5	46.3	1.9	**4.8**	3.1	**24.1**
West Fork Jimmy Camp Creek / WF-1		5,187,332.2	119.08	0.90	0.96		0.09	0.36	5,187,332	0.09	0.36	530.00	300.00	3811.00	4041.00	0.089	20.22	2.940	5.000	1.7	39.5	59.8	1.6	**17.1**	2.7	**115.2**
West Fork Jimmy Camp Creek / WF-2	***Located at south end of study area.***	921,440.7	21.15	0.90	0.96		0.09	0.36	921,441	0.09	0.36	300.00	300.00	1014.00	1014.00	0.080	15.74	6.114	5.000	2.5	6.8	22.6	2.8	**5.4**	4.8	**36.5**
EXISTING CONDITIONS - DESIGN POINTS	***INCLUDED SUB-BASINS***																									
OS-1	***OS-1 (Note: 7.3 Acres diverted by CDOT from Big Johnson)***	853,953.7	19.60	0.90	0.96	42031.00	0.09	0.36	811,923	0.13	0.39	621.00	300.00	2146.00	2467.00	0.106	19.79	2.470	5.000	1.5	26.5	46.3	1.9	**4.8**	3.1	**24.1**
WF-1	***WF-1 & OS-1***	6,041,285.9	138.69	0.90	0.96	42031.00	0.09	0.36	5,999,255	0.10	0.36	621.00	300.00	5957.00	6278.00	0.106	20.49	2.771	5.000	1.6	63.7	84.2	1.3	**16.9**	2.1	**108.1**
WF-2	***WF-2***	921,440.7	21.15	0.90	0.96	0.00	0.09	0.36	921,441	0.09	0.36	300.00	300.00	1014.00	1014.00	0.080	15.74	6.114	5.000	2.5	6.8	22.6	2.8	**5.4**	4.8	**36.5**
TO WEST FORK JIMMY CAMP CREEK	***WF-1, WF-2, & OS-1 (Basins are parallel so this is a sum of WF-1 & WF-2.)***	6,962,726.5	159.84	0.90	0.96	42031.00	0.09	0.36	6,920,696	0.09	0.36		0.00		0.00		#DIV/0!		5.000					**22.3**		**144.6**

Note: Q2, Q5 & Q10 are based on C5; Q25, Q50 & Q100 are based on C100

Project Name: TRAILS AT ASPEN RIDGE FILING NO. 2
Project Location: EL PASO COUNTY
Designer KZ & JTS
Notes: Proposed Condition

Average Channel Velocity 4 ft/s (If specific channel vel is used, this will be ignored)
Average Slope for Initial Flow 0.04 ft/ft (If Elevations are used, this will be ignored)

Channel Flow Type Key
Heavy Meadow 2
Tillage/Field 3
Short Pasture and Lawns 4
Nearly Bare Ground 5
Grassed Waterway 6
Paved Areas 7

	Area		Rational 'C' Values														Flow Lengths				Initial Flow		Channel Flow				Tc	Rainfall Intensity & Rational Flow Rate					
			Surface Type 1 Residential 1/8 or less (65% Imp.)			Surface Type 2 Pavement (100% Imp.)			Surface Type 3 Park (7% Imp.)			Surface Type 4 Undeveloped (2% Imp.)			Composite		Initial	True Initial	Channel	True Channel	Average (decimal)	Initial	Average (%)	Channel Flow Type (See Key above)	Velocity	Channel	Total	i2	Q2	i5	Q5	i100	Q100
Basin	sf	acres	C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100	Area	C5	C100	Area	C5	C100	ft	Length ft	ft	Length ft	Slope	Tc (min)	Slope	Ground Type	(ft/s)	Tc (min)	(min)	in/hr	cfs	in/hr	cfs	in/hr	cfs
K-1+2	103,026	2.37	0.45	0.59	80387	0.90	0.96		0.12	0.39	22639	0.09	0.36		0.38	0.55	271.00	271.00	571.00	571.00	0.07	11.19	3.50	7	3.7	2.5	13.7	2.9	2.6	3.6	**3.24**	6.1	**7.88**
K-3+4	53,569	1.23	0.45	0.59	48779	0.90	0.96	4790	0.12	0.39		0.09	0.36		0.49	0.62	85.00	85.00	370.00	370.00	0.11	4.55	3.50	7	3.7	1.6	6.2	3.8	2.3	4.8	**2.93**	8.1	**6.25**
K-5	41,563	0.95	0.45	0.59	41563	0.90	0.96		0.12	0.39		0.09	0.36		0.45	0.59	70.00	70.00	646.00	646.00	0.08	4.98	5.50	7	4.7	2.3	7.3	3.6	1.6	4.6	**1.98**	7.7	**4.37**
K-6	31,527	0.72	0.45	0.59	31527	0.90	0.96		0.12	0.39		0.09	0.36		0.45	0.59	60.00	60.00	458.00	458.00	0.04	5.76	5.50	7	4.7	1.6	7.4	3.6	1.2	4.6	**1.50**	7.7	**3.30**
K-7	141,790	3.26	0.45	0.59	67162	0.90	0.96	7,083	0.12	0.39	67545	0.09	0.36		0.32	0.51	543.00	300.00	560.00	803.00	0.06	18.65	2.40	7	3.1	4.3	23.0	2.2	2.3	2.8	**2.90**	4.7	**7.94**
K-8	6,417	0.15	0.45	0.59	4280	0.90	0.96	2137	0.12	0.39		0.09	0.36		0.60	0.71	56.00	56.00	217.00	217.00	0.09	3.24	3.40	7	3.7	1.0	5.0	4.0	0.4	5.1	**0.45**	8.6	**0.91**
K-9	50,442	1.16	0.45	0.59	50442	0.90	0.96		0.12	0.39		0.09	0.36		0.45	0.59	113.00	113.00	610.00	610.00	0.04	7.59	4.20	7	4.1	2.5	10.1	3.2	1.7	4.1	**2.15**	6.9	**4.73**
K-10	48,002	1.10	0.45	0.59	48002	0.90	0.96		0.12	0.39		0.09	0.36		0.45	0.59	74.00	74.00	653.00	653.00	0.04	6.14	4.20	7	4.1	2.7	8.8	3.4	1.7	4.3	**2.15**	7.2	**4.74**
K-11	60,633	1.39	0.45	0.59	60633	0.90	0.96		0.12	0.39		0.09	0.36		0.45	0.59	180.00	180.00	350.00	350.00	0.08	7.95	3.50	7	3.7	1.6	9.5	3.3	2.1	4.2	**2.64**	7.0	**5.82**
K-12	29,123	0.67	0.45	0.59	29123	0.90	0.96		0.12	0.39		0.09	0.36		0.45	0.59	74.00	74.00	360.00	360.00	0.04	6.14	3.50	7	3.7	1.6	7.7	3.6	1.1	4.5	**1.36**	7.5	**3.00**
K-13	3,706	0.09	0.45	0.59		0.90	0.96	2,946	0.12	0.39	760	0.09	0.36		0.74	0.84	23.00	23.00	80.00	80.00	0.10	1.42	2.20	7	3.0	0.4	5.0	4.0	0.3	5.1	**0.32**	8.6	**0.62**
K-14	120,925	2.78	0.45	0.59	120925	0.90	0.96		0.12	0.39		0.09	0.36		0.45	0.59	180.00	180.00	695.00	695.00	0.07	8.06	4.00	7	4.0	2.9	11.0	3.1	4.0	4.0	**4.99**	6.7	**10.98**
C7&8 combined	98,093	2.25	0.45	0.59	95,674	0.90	0.96	2,419	0.12	0.39	0	0.09	0.36	0	0.46	0.60	110.00	110.00	800.00	800.00	0.05	7.05	3.90	7	3.9	3.4	10.4	3.2	3.4	4.0	**4.23**	6.8	**9.23**
J-OS	189,052	4.34	0.45	0.59	30190	0.90	0.96	158,862	0.65	0.80		0.09	0.36		0.83	0.90	266.00	266.00	909.00	909.00	0.09	3.84	3.20	7	3.6	4.2	8.1	3.5	12.7	4.4	**16.05**	7.4	**29.34**
K-OS	793,893	18.23	0.45	0.59	793893	0.90	0.96		0.12	0.39		0.09	0.36		0.45	0.59	350.00	300.00	1650.00	1700.00	0.06	11.91	2.80	7	3.3	8.5	20.4	2.4	19.6	3.0	**24.68**	5.0	**54.36**
K-OS UNDEVELOPED	1,290,308	29.62	0.45	0.59		0.90	0.96		0.12	0.39		0.09	0.36	1290308	0.09	0.36	1099.00	300.00	314.00	1113.00	0.07	31.51	2.00	7	2.8	6.6	38.1	1.7	4.5	2.1	**5.66**	3.5	**38.05**

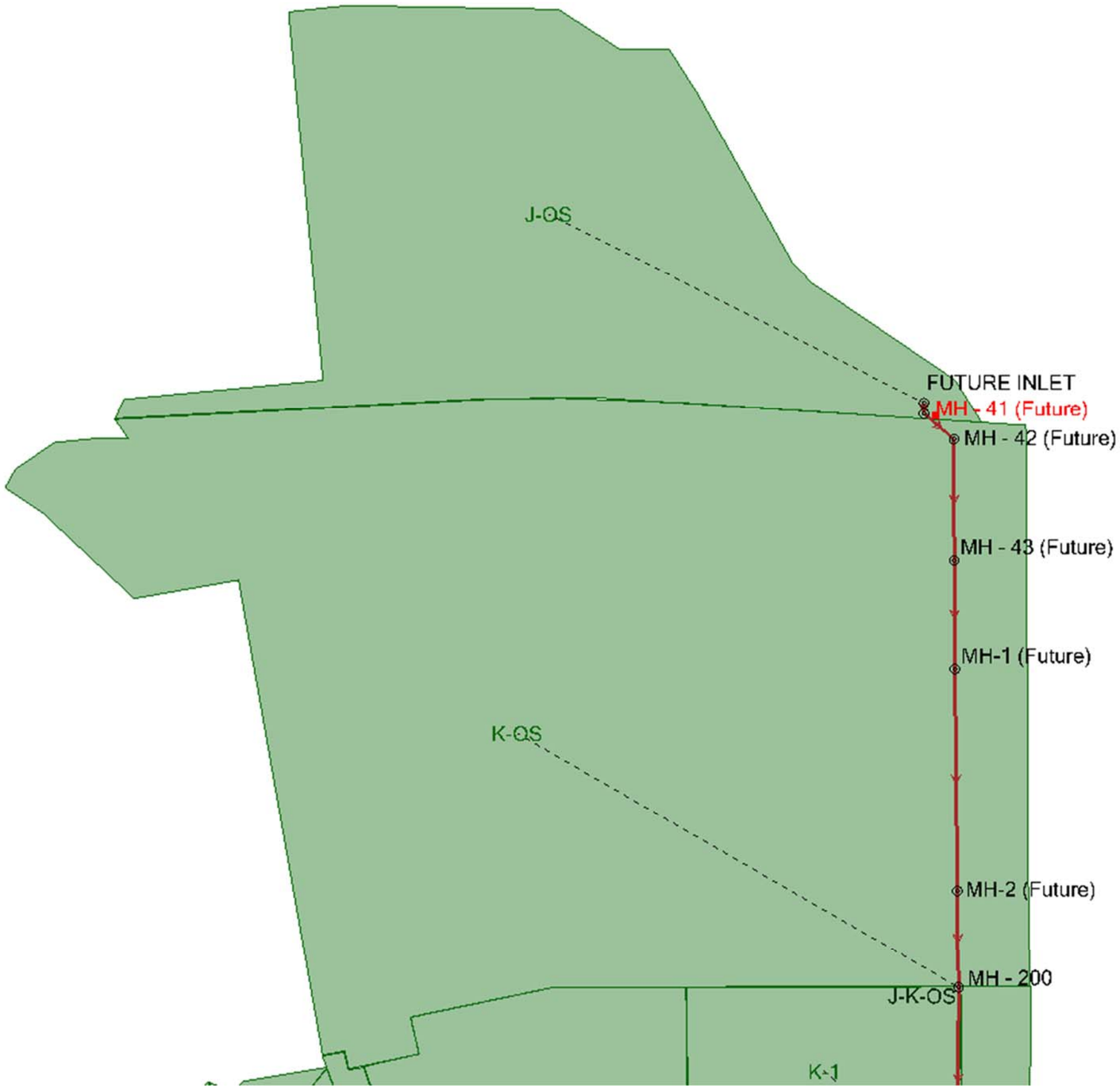
Note: Q2, Q5 & Q10 are based on C5; Q25, Q50 & Q100 are based on C100

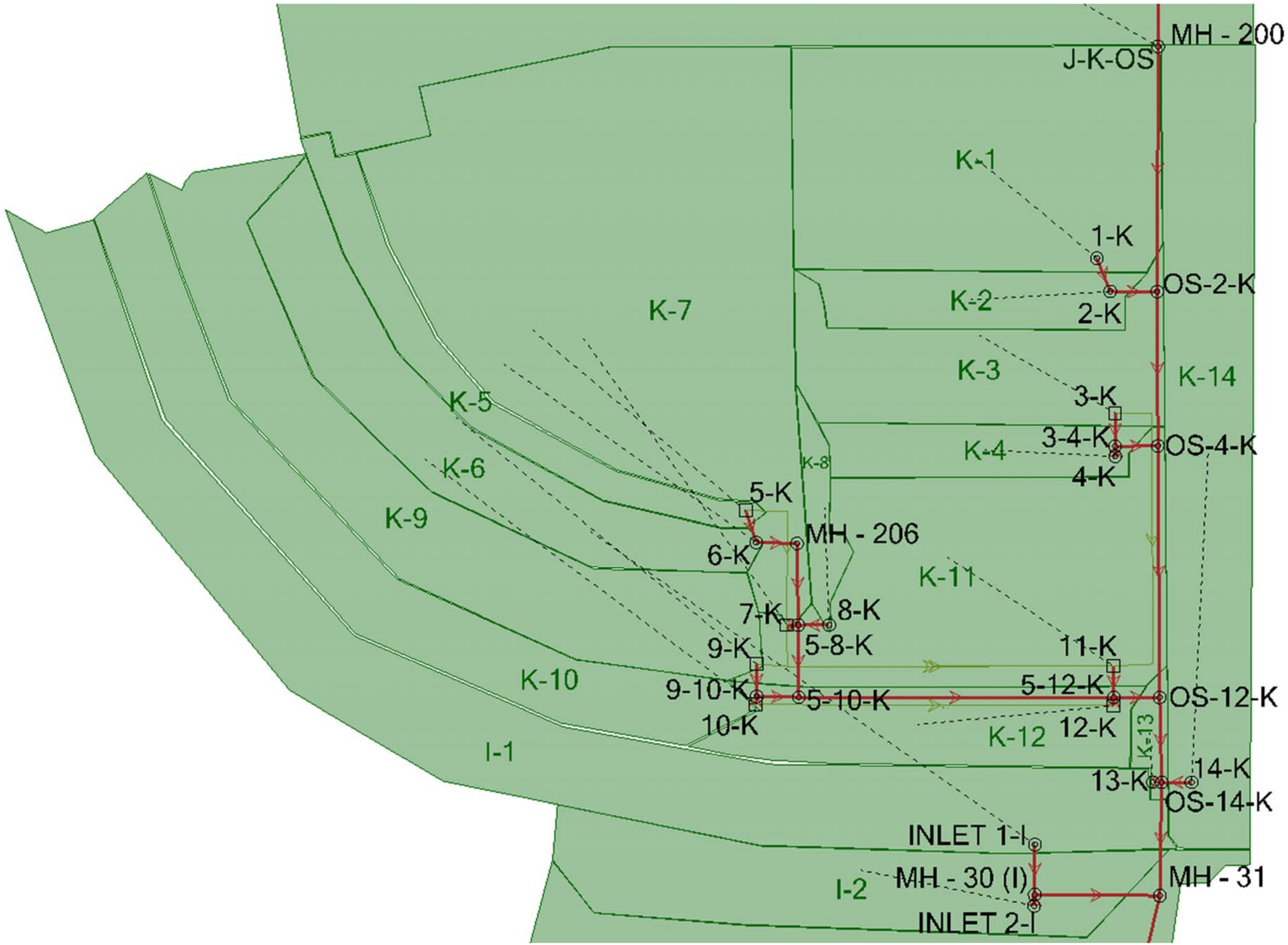
Update to include the calculation that generated composite % Impervious value used in the UD-Detention

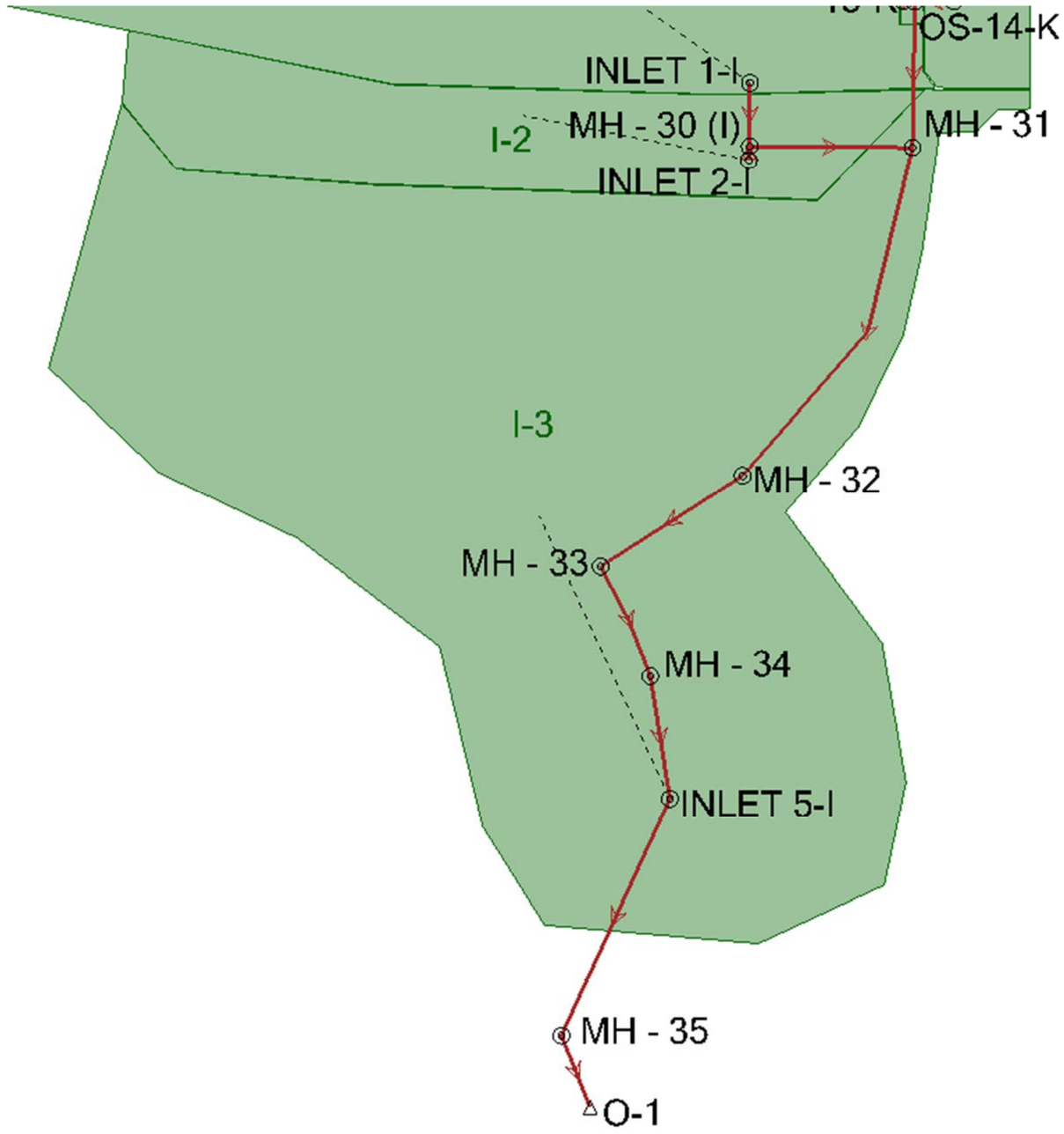
Design Point Routing
Trails at Aspen Ridge Filing No. 2

StormCAD

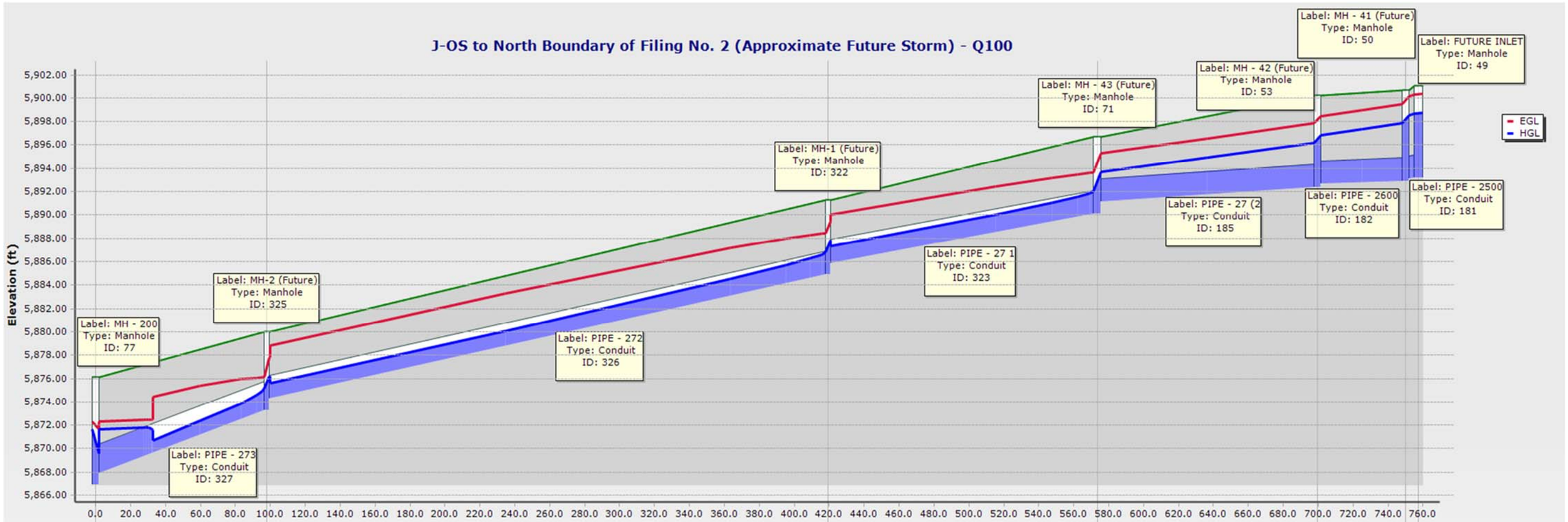
Design Point	Total Drainage Area	Surface		Storm Sewer		Downstream Design Point
		Q5	Q100	Q5	Q100	
1-OS	**19.67**	4.0	26.8	**-**	**-**	A
1-A	**12.34**	3.5	17.6	**-**	**-**	A
2-A	**1.09**	2.7	5.2	**-**	**-**	A
3-A	**4.98**	2.2	8.9	**-**	**-**	A
4-A	**0.12**	0.6	1.0	**-**	**-**	A
A	**38.20**	-	-	12.0	55.6	B
1-B	**1.06**	1.8	4.1	-	-	B
B	**39.26**	-	-	12.7	57.1	C
1-C	**3.27**	5.9	12.9	-	-	C
2-C	**1.19**	2.4	5.3	-	-	C
3-C	**4.60**	8.4	18.5	-	-	C
4-C	**0.36**	1.6	3.0	-	-	C
5-C	**3.13**	5.7	12.5	-	-	C
6-C	**0.07**	0.3	0.6	-	-	C
7+8-C	**2.26**	4.2	9.2	-	-	C
C	**54.14**	-	-	27.6	90.2	D
1-D	**2.21**	1.6	5.2	-	-	D
D	**56.34**	0.0	0.0	28.1	92.1	E
1-E	**6.43**	2.6	11.4	-	-	E
2-E	**2.14**	3.9	8.7	-	-	E
E	**64.91**	-	-	33.7	108.8	F
1-F	**2.07**	2.7	6.0	2.7	6.0	3-F
2-F	**0.58**	1.1	2.5	1.6	3.6	3-F
3-F	**3.32**	2.3	5.0	3.8	8.4	4-F
4-F	**3.89**	1.1	2.5	5.0	11.1	5-F
5-F	**6.16**	3.5	7.8	6.6	14.6	6-F
6-F	**7.16**	1.7	3.9	7.9	17.5	8-F
7-F	**5.06**	7.5	16.5	7.5	16.5	8-F
8-F	**13.07**	1.5	3.3	16.2	35.8	F
F	**77.98**	-	-	43.5	131.0	G
1-G	**1.11**	2.1	4.6	-	-	G
G	**79.09**	-	-	44.2	132.7	M
1-H	**3.60**	5.9	13.1	-	-	1-2 H
2-H	**1.16**	1.9	4.2	-	-	1-2 H
1-2 H	**4.76**	-	-	9.0	19.8	1-4 H
3-H	**2.97**	4.7	10.3	-	-	1-4 H
4-H	**0.92**	1.6	3.6	-	-	1-4 H
1-4 H	**8.65**	-	-	16.4	36.1	1-6 H
5-H	**2.42**	4.0	8.9	-	-	1-6 H
6-H	**2.46**	3.9	8.6	-	-	1-6 H
1-6 H	**13.53**	-	-	20.2	44.9	1-8 H
7-H	**2.03**	2.9	6.4	-	-	1-8 H
8-H	**0.97**	1.7	3.7	-	-	1-8 H
1-8 H	**16.52**	-	-	23.3	49.3	1-10 H
9-H	**2.32**	3.3	8.0	-	-	1-10 H
10-H	**1.33**	2.4	5.2	2.8	6.5	1-10 H
10-H	**1.33**	2.4	5.2	-	-	1-10 H
1-10 H	**21.50**	-	-	29.6	66.5	11-H
11-H	**3.42**	5.0	11.0	-	-	H
H	**24.92**			37.4	83.0	M
J-OS	**4.34**	16.1	29.3	-	-	J-K-OS
K-OS	**18.23**	24.7	54.4	-	-	J-K-OS
J-K-OS	**22.57**	-	-	36.7	77.0	OS-2-K
K-OS-Undeveloped	**29.62**	5.7	38.0	-	-	OS-2-K
1+2-K	**2.37**	3.2	7.9	-	-	OS-2-K
OS-2-K	**24.94**	-	-	39.2	83.6	OS-12-K
3+4-K	**1.23**	2.9	6.3	-	-	3-4-K
OS-4-K	**26.17**	-	-	40.8	87.0	OS-12-K
5-K	**0.95**	2.0	4.4	-	-	6-K
6-K	**0.72**	1.5	3.3	3.4	7.6	5-8-K
7-K	**3.26**	2.9	7.9	-	-	5-8-K
8-K	**0.15**	0.5	0.9	-	-	5-8-K
5-8-K	**5.08**	-	-	4.6	11.5	5-10-K
9-K	**1.16**	2.1	4.7	-	-	9-10-K
10-K	**1.10**	2.2	4.7	-	-	9-10-K
9-10-K	**2.26**	-	-	4.0	8.8	5-10-K
5-10-K	**7.34**	-	-	7.3	17.5	5-12-K
11-K	**1.39**	2.6	5.8	-	-	5-12-K
12-K	**0.67**	1.4	3.0	-	-	5-12-K
5-12-K	**9.40**	-	-	10.5	23.2	OS-12-K
OS-12-K	**35.57**	-	-	47.2	104.0	OS-14-K
13-K	**0.09**	0.3	0.6	-	-	OS-14-K
14-K	**2.78**	5.0	11.0	-	-	OS-14-K
OS-14-K	**38.43**	-	-	50.6	111.6	K
K	**42.15**	-	-	56.3	121.4	3-I
1-I	**3.13**	6.9	12.3	-	-	K
2-I	**0.59**	2.3	4.1	-	-	K
3-I	**4.18**	9.3	16.5	7.8	17.2	M
I	**46.33**	-	-	62.5	132.6	M
M	**157.90**	-	-	**154.5**	**382.1**	East Pond Discharge
East Pond Discharge (Filing 1 & 2 Buildout)	**157.90**	-	-	2.9	91.5	Existing Swale


J-OS
FUTURE INLET
MH - 41 (Future)
MH - 42 (Future)
MH - 43 (Future)
MH-1 (Future)
K-OS
MH-2 (Future)
MH - 200
J-K-OS
K-1


MH - 200
J-K-OS
K-1
1-K
OS-2-K
K-2
2-K
K-7
K-3
K-14
3-K
K-5
3-4-K
OS-4-K
K-4
4-K
K-8
K-6
5-K
K-9
MH - 206
6-K
K-11
7-K
8-K
9-K
5-8-K
11-K
K-10
9-10-K
5-10-K
5-12-K
OS-12-K
10-K
K-12
12-K
K-13
I-1
13-K
14-K
OS-14-K
INLET 1-I
MH - 30 (I)
MH - 31
I-2
INLET 2-I

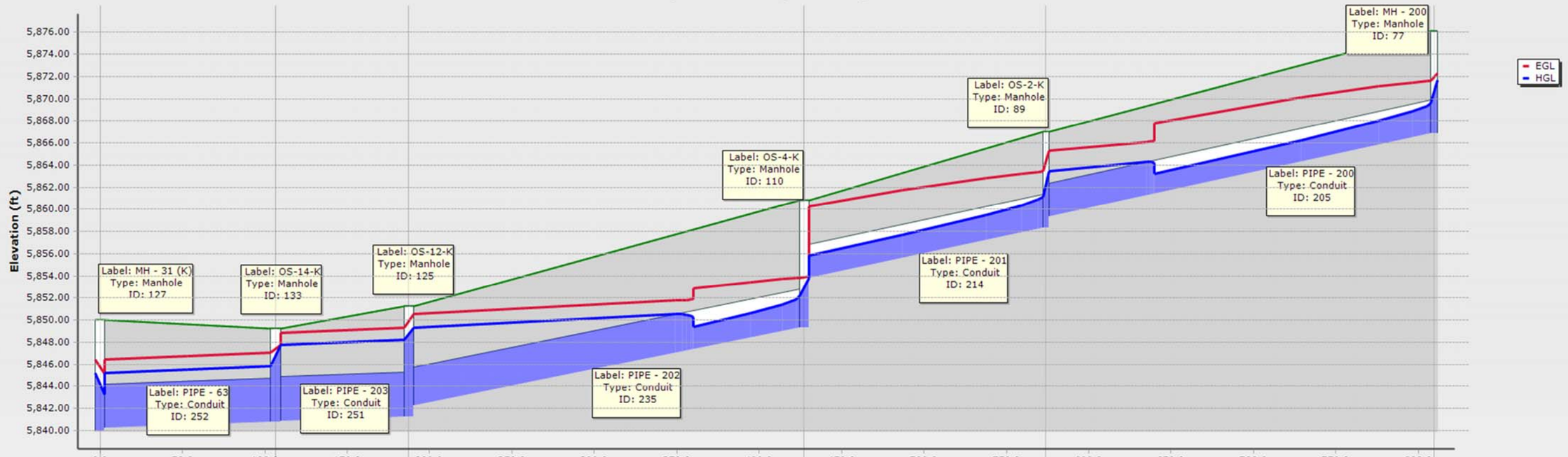

OS-14-K
INLET 1-I
MH - 30 (I)
MH - 31
I-2
INLET 2-I
I-3
MH - 32
MH - 33
MH - 34
INLET 5-I
MH - 35
O-1

HGL Profiles: Q100



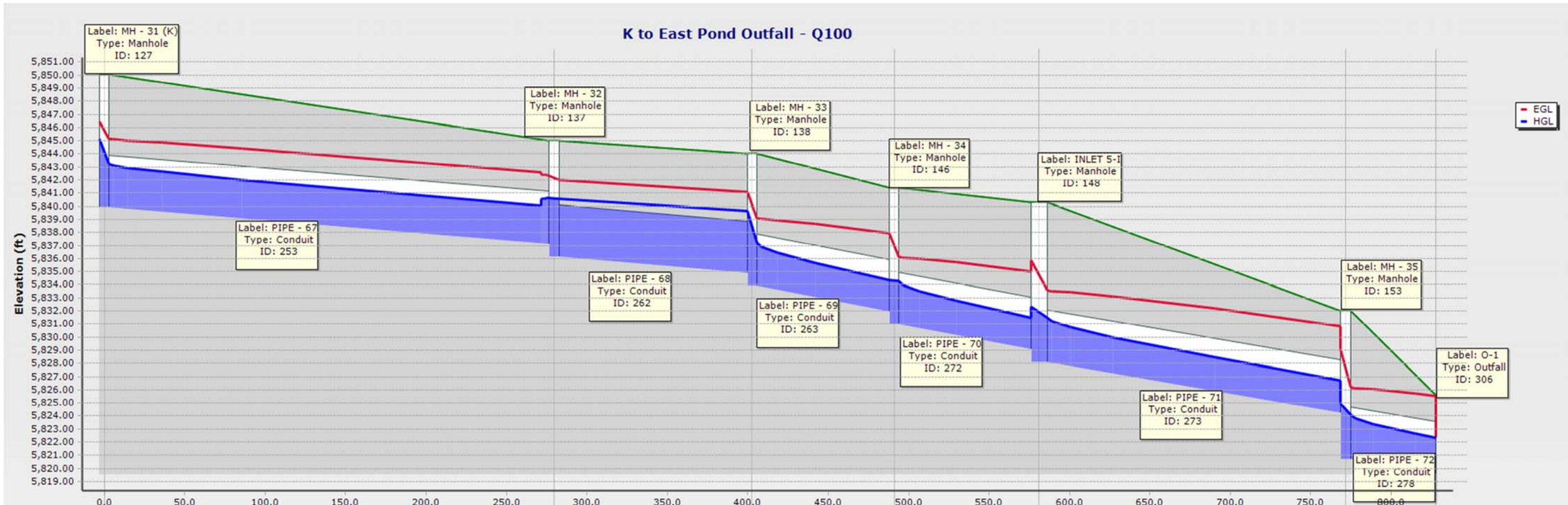
ID\Label	327 \ PIPE - 273	326 \ PIPE - 272	323 \ PIPE - 27 1	185 \ PIPE - 27 (2	182 \ PIPE - 2600	181 \ PIPE - 2500
Link Length (ft)	98.0	321.2	154.2	126.1	50.6	7.2
ise (in)\Material	30.0 \ RCP	24.0 \ RCP	24.0 \ RCP	24.0 \ RCP	24.0 \ RCP	24.0 \ RCP
Flow (cfs)	31.17	31.58	31.80	32.04	32.14	32.15
Slope (ft/ft)	0.055	0.033	0.027	0.010	0.005	0.006
ID\Label	77 \ MH - 200	325 \ MH-2 (Future)	322 \ MH-1 (Future)	71 \ MH - 43 (Future)	53 \ MH - 42 (Future)	50 \ MH - 41 (Future)
Ground (ft)	5876.11	5880.02	5891.30	5896.70	5900.20	5902.02
Invert (ft)	5866.88	5873.27	5884.89	5890.10	5892.36	5893.15
Station (ft)	0.0	98.0	419.2	573.4	699.6	757.3

J-K-OS to K (South of FIling No. 2 - Q100



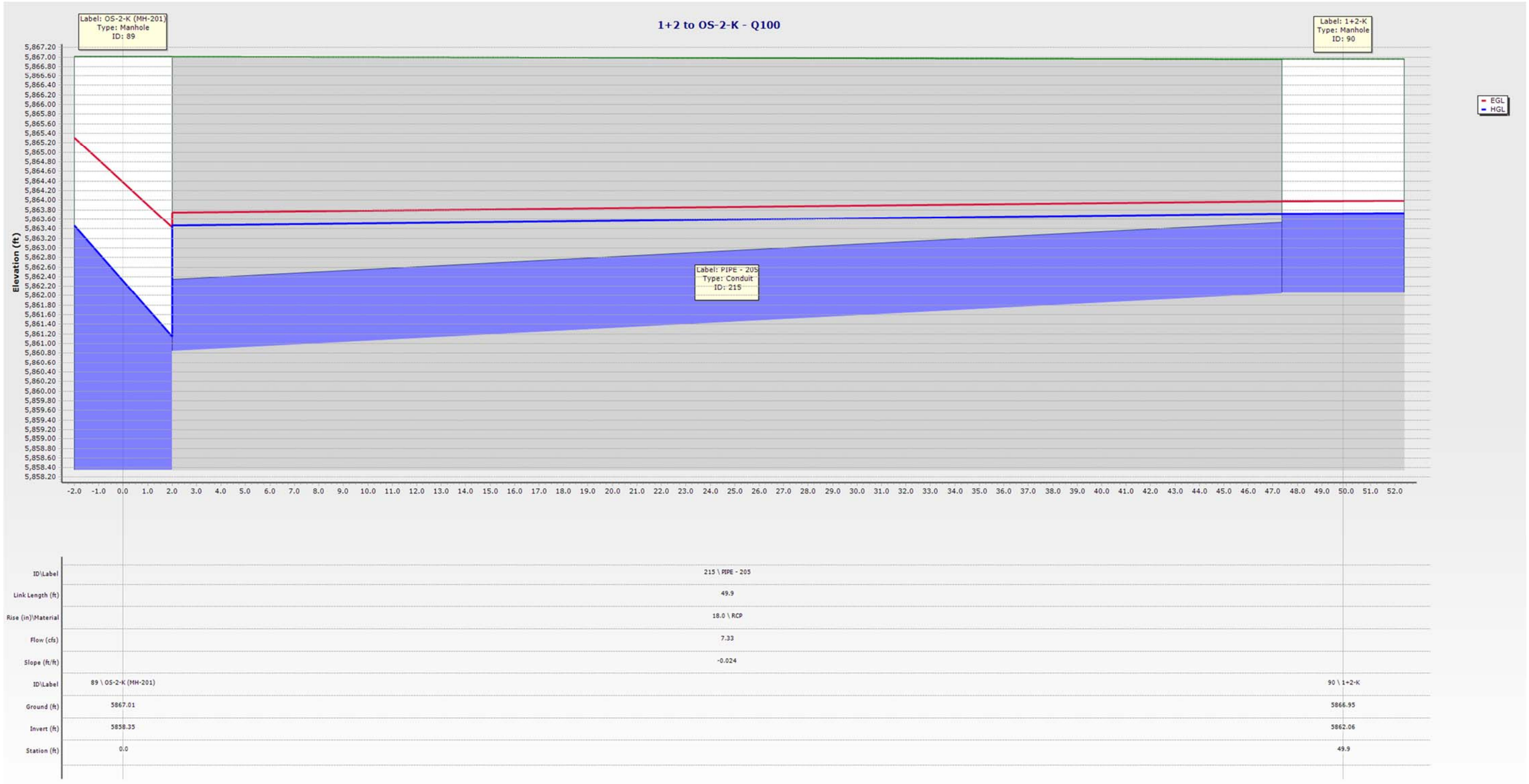
ID\Label	252 \ PIPE - 63	251 \ PIPE - 203	235 \ PIPE - 202	214 \ PIPE - 201	205 \ PIPE - 200
Link Length (ft)	106.5	80.9	240.0	146.6	235.7
Rise (in)\Material	48.0 \ RCP	48.0 \ RCP	42.0 \ RCP	36.0 \ RCP	36.0 \ RCP
Flow (cfs)	113.45	105.80	86.58	83.07	76.95
Slope (ft/ft)	0.005	0.005	0.029	0.031	0.032

ID\Label	127 \ MH - 31 (K)	133 \ OS-14-K	125 \ OS-12-K	110 \ OS-4-K	89 \ OS-2-K	77 \ MH - 200
Ground (ft)	5850.04	5849.24	5851.22	5860.81	5867.01	5876.11
Invert (ft)	5839.92	5840.75	5841.26	5849.30	5858.35	5866.88
Station (ft)	0.0	106.5	187.4	427.4	574.0	809.7

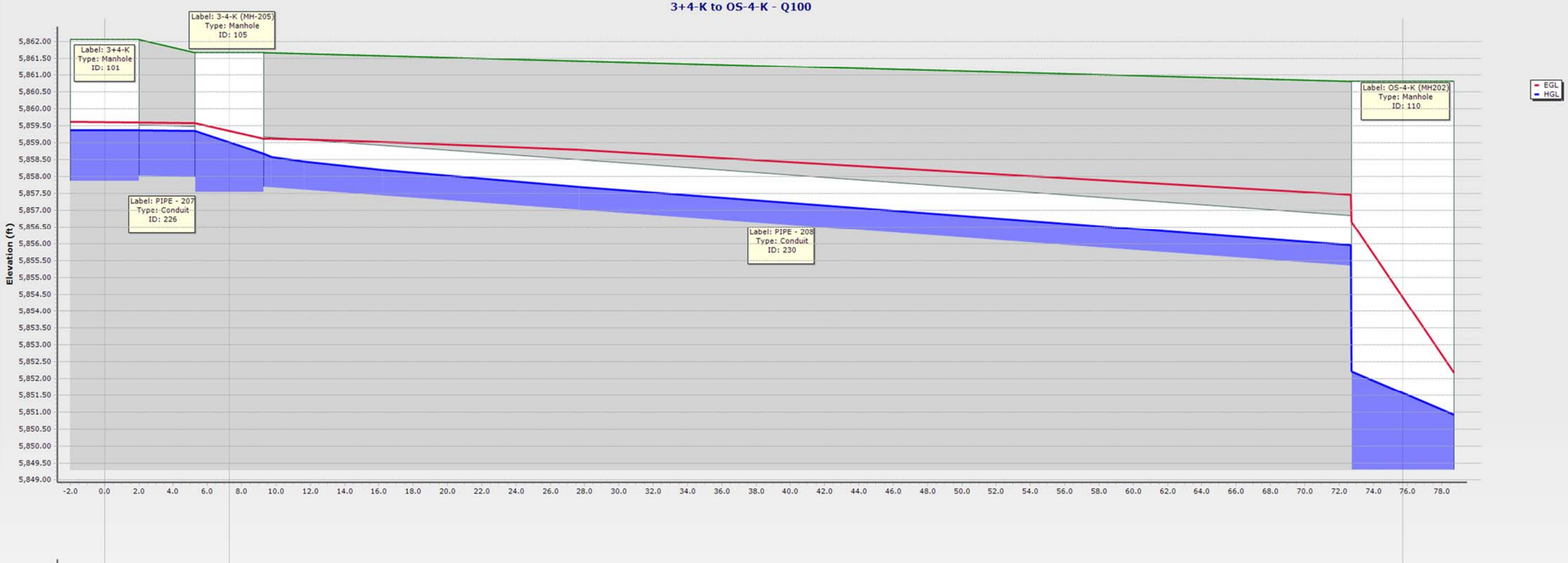


ID\Label	253 \ PIPE - 67	262 \ PIPE - 68	263 \ PIPE - 69	272 \ PIPE - 70	273 \ PIPE - 71	278 \ PIPE - 72
Link Length (ft)	279.6	123.1	88.3	90.1	190.5	56.1
Rise (in)\Material	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP
Flow (cfs)	123.19	122.27	121.74	121.53	132.61	132.11
Slope (ft/ft)	0.010	0.010	0.022	0.021	0.020	0.020

ID\Label	127 \ MH - 31 (K)	137 \ MH - 32	138 \ MH - 33	146 \ MH - 34	148 \ INLET 5-I	153 \ MH - 35	306 \ O-1
Ground (ft)	5850.04	5845.00	5844.06	5841.45	5840.33	5831.98	5825.60
Invert (ft)	5839.92	5836.12	5833.88	5830.94	5828.05	5820.68	5819.58
Station (ft)	0.0	279.6	402.8	491.0	581.2	771.7	827.7


1+2 to OS-2-K - Q100
Label: OS-2-K (MH-201)
Type: Manhole
ID: 89
Label: 1+2-K
Type: Manhole
ID: 90
Label: PIPE - 205
Type: Conduit
ID: 215
EGL
HGL
Elevation (ft)
5,867.20
5,867.00
5,866.80
5,866.60
5,866.40
5,866.20
5,866.00
5,865.80
5,865.60
5,865.40
5,865.20
5,865.00
5,864.80
5,864.60
5,864.40
5,864.20
5,864.00
5,863.80
5,863.60
5,863.40
5,863.20
5,863.00
5,862.80
5,862.60
5,862.40
5,862.20
5,862.00
5,861.80
5,861.60
5,861.40
5,861.20
5,861.00
5,860.80
5,860.60
5,860.40
5,860.20
5,860.00
5,859.80
5,859.60
5,859.40
5,859.20
5,859.00
5,858.80
5,858.60
5,858.40
5,858.20
-2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0 21.0 22.0 23.0 24.0 25.0 26.0 27.0 28.0 29.0 30.0 31.0 32.0 33.0 34.0 35.0 36.0 37.0 38.0 39.0 40.0 41.0 42.0 43.0 44.0 45.0 46.0 47.0 48.0 49.0 50.0 51.0 52.0
ID\Label
215 \ PIPE - 205
Link Length (ft)
49.9
Rise (in)\Material
18.0 \ RCP
Flow (cfs)
7.33
Slope (ft/ft)
-0.024
ID\Label
89 \ OS-2-K (MH-201)
90 \ 1+2-K
Ground (ft)
5867.01
5866.95
Invert (ft)
5858.35
5862.06
Station (ft)
0.0
49.9

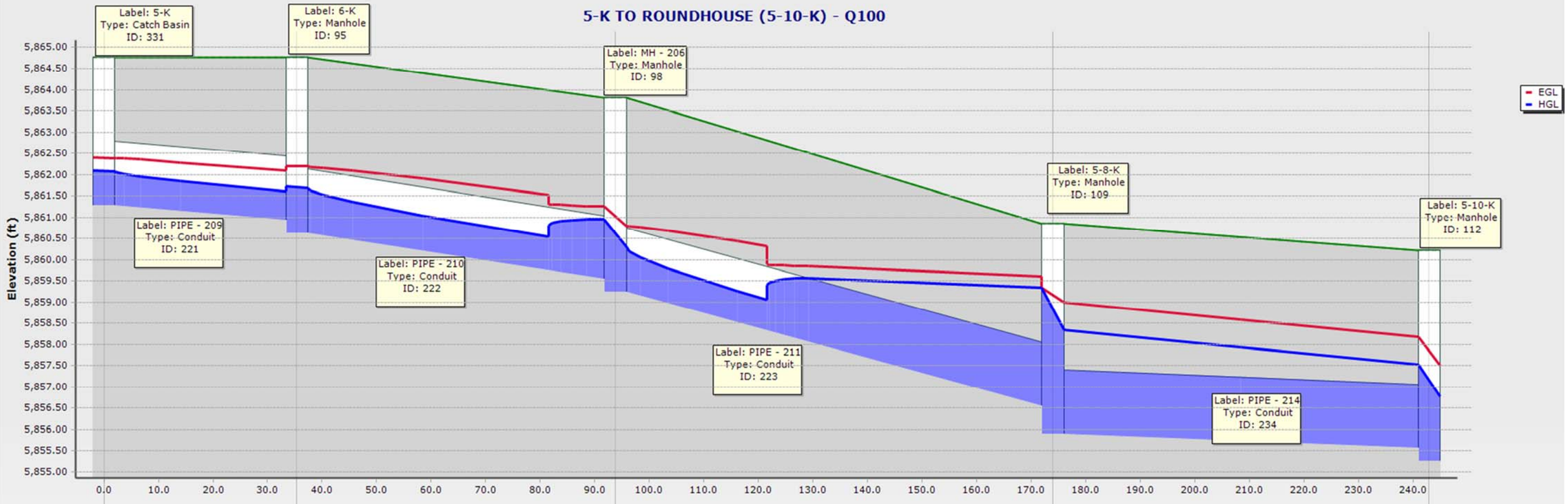
3+4-K to OS-4-K - Q100



ID\Label	226 \ PIPE - 207	230 \ PIPE - 208
Link Length (ft)	7.3	68.4
Rise (in)\Material	18.0 \ RCP	18.0 \ RCP
Flow (cfs)	6.59	6.58
Slope (ft/ft)	-0.004	-0.034

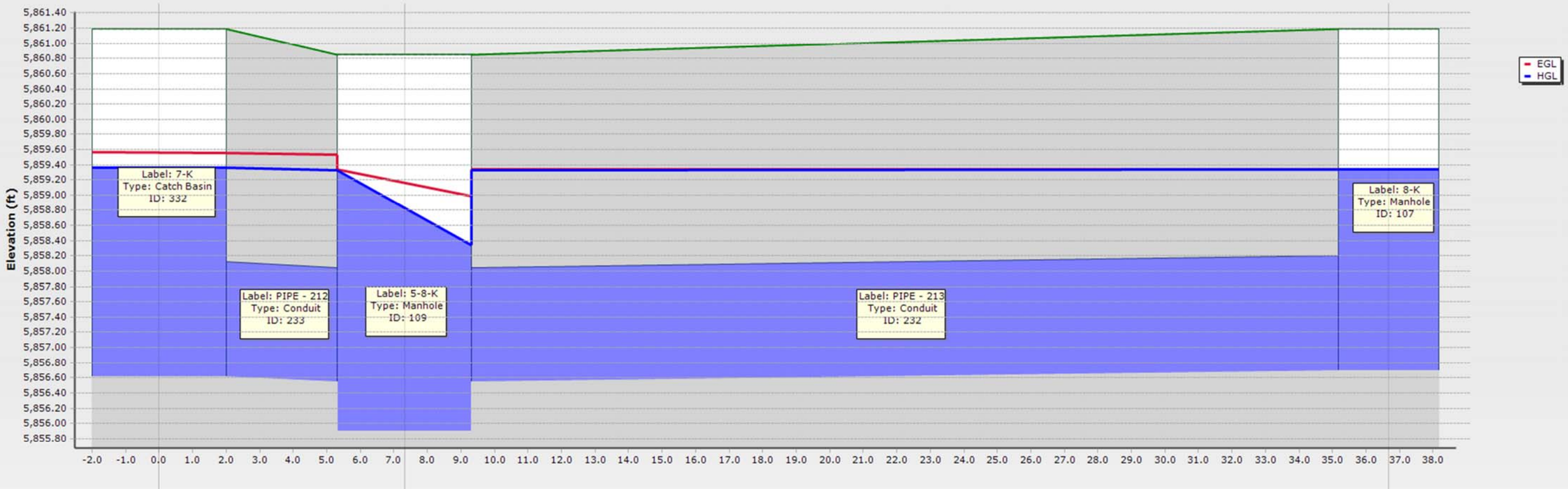
ID\Label	101 \ 3+4-K	105 \ 3-4-K (MH-205)	110 \ OS-4-K (MH202)
Ground (ft)	5862.06	5861.67	5860.81
Invert (ft)	5857.87	5857.54	5849.30
Station (ft)	0.0	7.3	75.7

5-K TO ROUNDHOUSE (5-10-K) - Q100



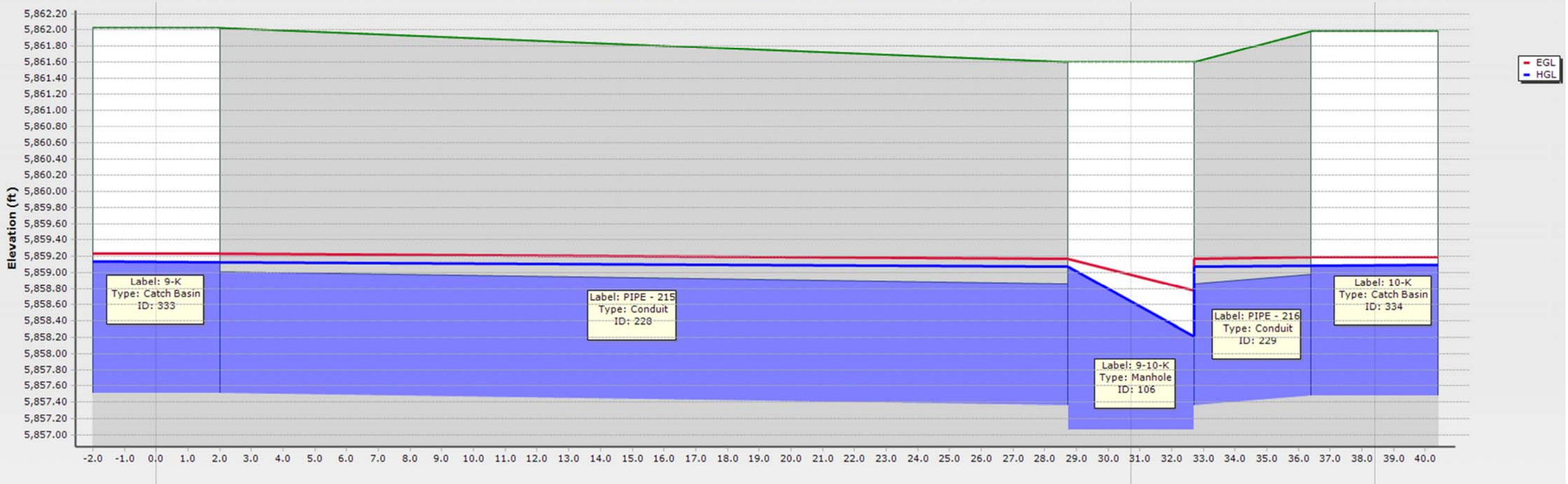
ID\Label	221 \ PIPE - 209	222 \ PIPE - 210	223 \ PIPE - 211	234 \ PIPE - 214	
Link Length (ft)	35.4	58.4	80.2	69.0	
Rise (in)\Material	18.0 \ RCP	18.0 \ RCP	18.0 \ RCP	18.0 \ RCP	
Flow (cfs)	4.27	7.55	7.51	11.45	
Slope (ft/ft)	-0.010	-0.019	-0.034	-0.005	
ID\Label	331 \ 5-K	95 \ 6-K	98 \ MH - 206	109 \ 5-8-K	112 \ 5-10-K
Ground (ft)	5864.76	5864.76	5863.81	5860.85	5860.21
Invert (ft)	5861.28	5860.63	5859.24	5855.90	5855.26
Station (ft)	0.0	35.4	93.8	174.0	243.0

7-K to 8-K INLET LATERAL - Q100

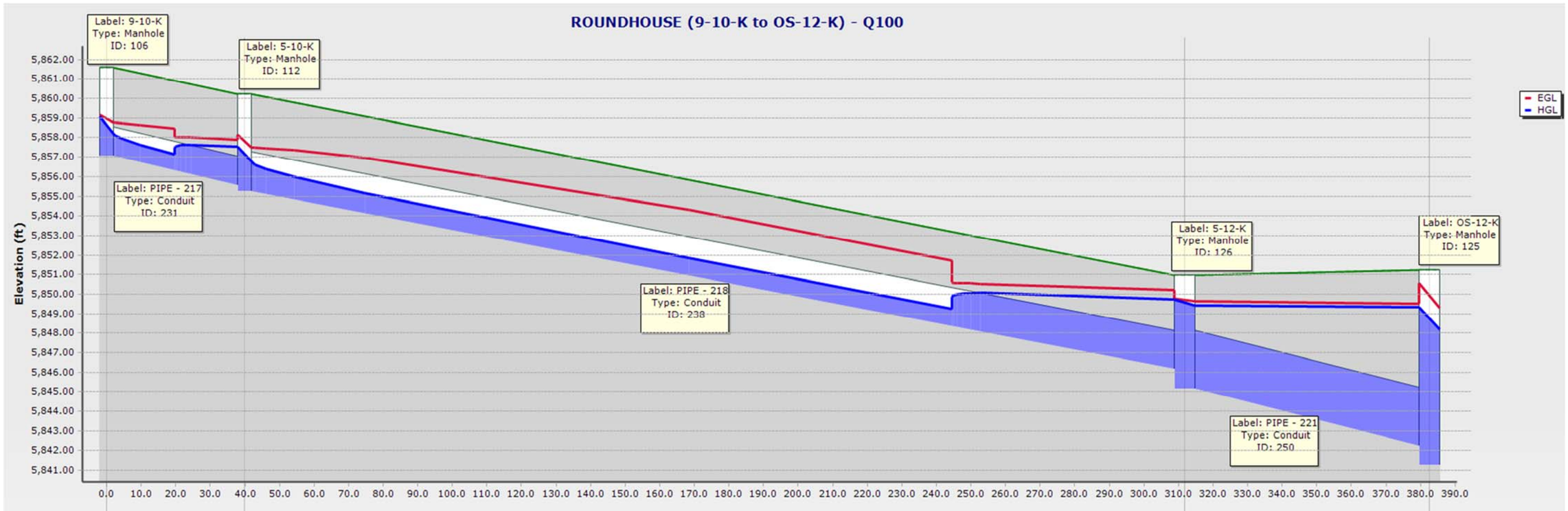


ID\Label		233 \ PIPE - 212	232 \ PIPE - 213
Link Length (ft)		7.3	29.4
Rise (in)\Material		18.0 \ RCP	18.0 \ RCP
Flow (cfs)		6.31	0.98
Slope (ft/ft)		-0.010	-0.005
ID\Label	332 \ 7-K	109 \ 5-8-K	107 \ 8-K
Ground (ft)	5861.19	5860.85	5861.19
Invert (ft)	5856.62	5855.90	5856.70
Station (ft)	0.0	7.3	36.7

9-K to 10-K INLET LATERAL - Q100

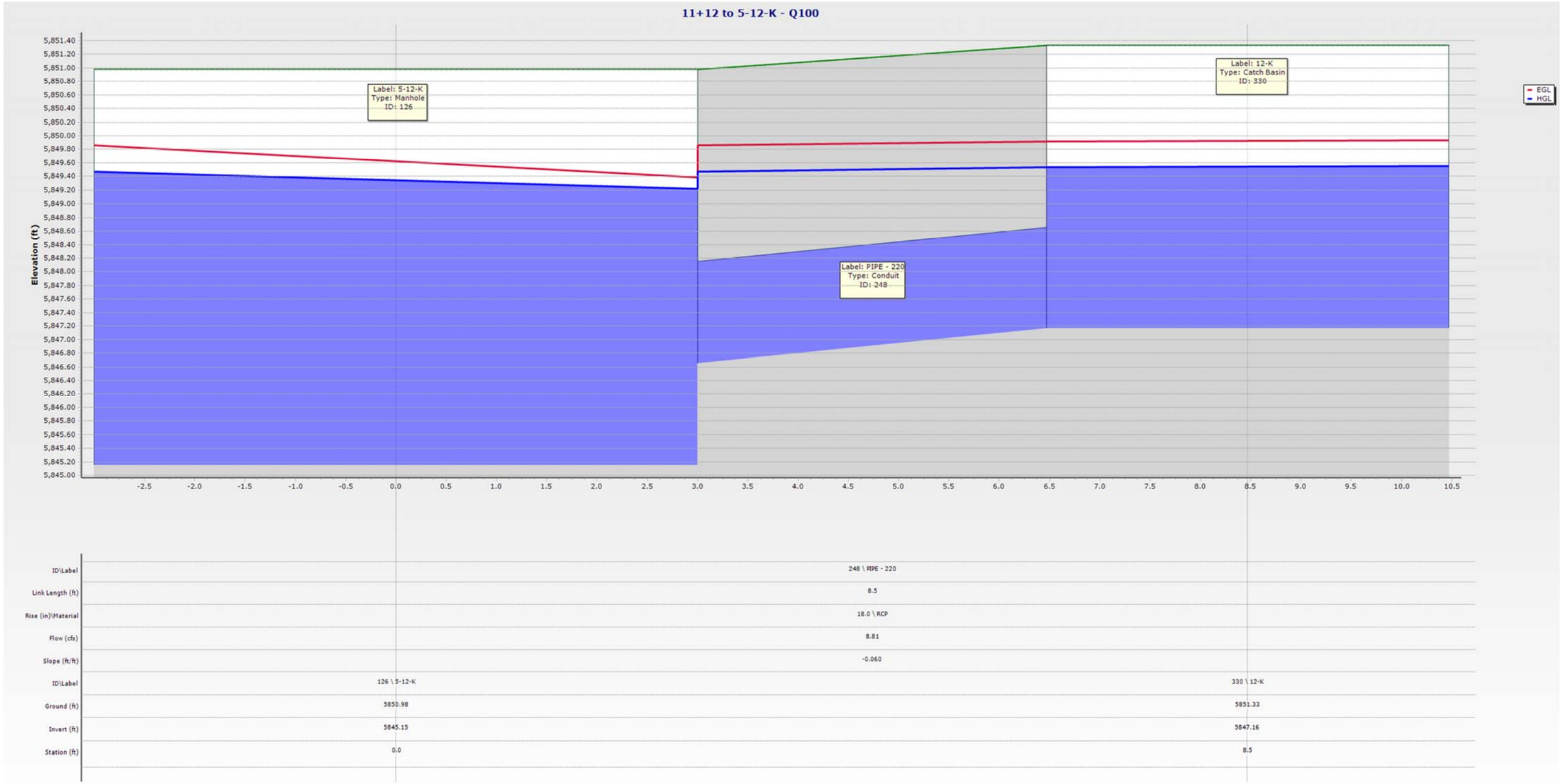


ID\Label		228 \ PIPE - 215		229 \ PIPE - 216
Link Length (ft)		30.7		7.7
Rise (in)\Material		18.0 \ RCP		18.0 \ RCP
Flow (cfs)		4.54		4.54
Slope (ft/ft)		-0.005		-0.016
ID\Label	333 \ 9-K		106 \ 9-10-K	334 \ 10-K
Ground (ft)	5862.03		5861.60	5861.98
Invert (ft)	5857.51		5857.06	5857.48
Station (ft)	0.0		30.7	38.4

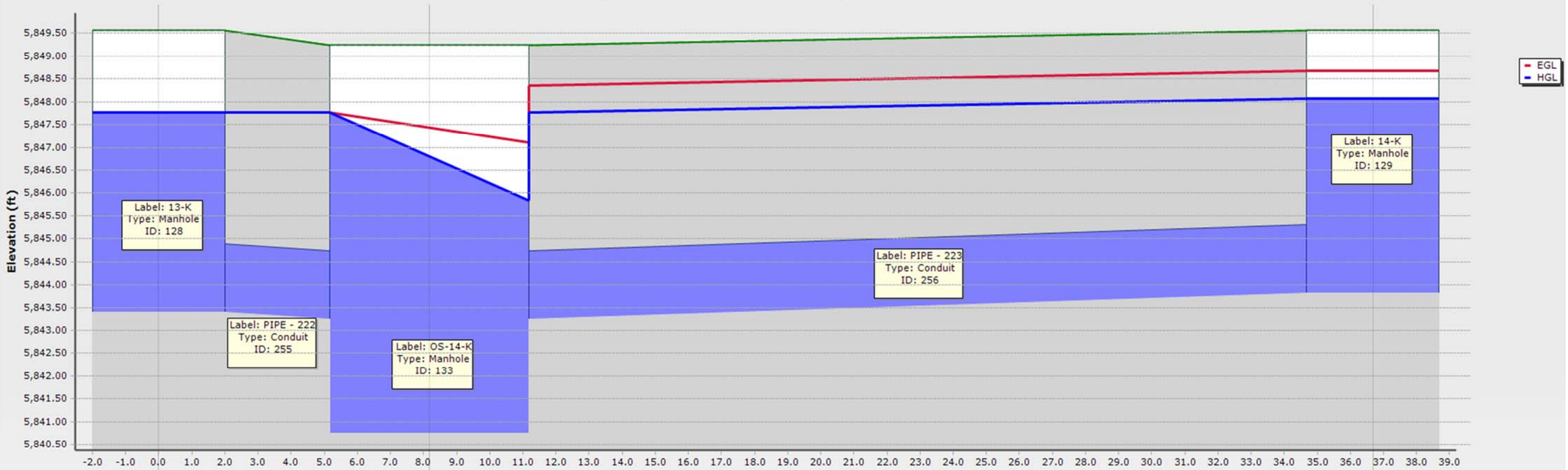


ID\Label	231 \ PIPE - 217	238 \ PIPE - 218	250 \ PIPE - 221
Link Length (ft)	40.0	271.8	70.8
Rise (in)\Material	18.0 \ RCP	24.0 \ RCP	36.0 \ RCP
Flow (cfs)	8.78	17.48	25.07
Slope (ft/ft)	-0.038	-0.034	-0.041

ID\Label	106 \ 9-10-K	112 \ 5-10-K	126 \ 5-12-K	125 \ OS-12-K
Ground (ft)	5861.60	5860.21	5850.98	5851.22
Invert (ft)	5857.06	5855.26	5845.15	5841.26
Station (ft)	0.0	40.0	311.8	382.6

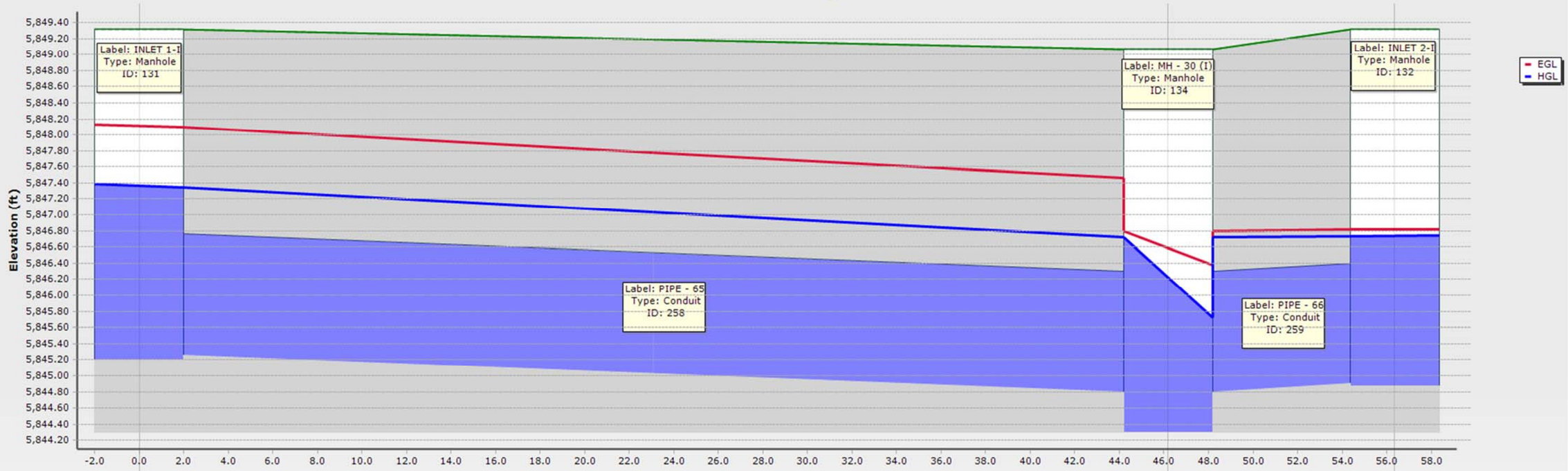

11+12 to 5-12-K - Q100
Elevation (ft)
5,851.40
5,851.20
5,851.00
5,850.80
5,850.60
5,850.40
5,850.20
5,850.00
5,849.80
5,849.60
5,849.40
5,849.20
5,849.00
5,848.80
5,848.60
5,848.40
5,848.20
5,848.00
5,847.80
5,847.60
5,847.40
5,847.20
5,847.00
5,846.80
5,846.60
5,846.40
5,846.20
5,846.00
5,845.80
5,845.60
5,845.40
5,845.20
5,845.00
Label: 5-12-K
Type: Manhole
ID: 126
Label: PIPE - 220
Type: Conduit
ID: 248
Label: 12-K
Type: Catch Basin
ID: 330
EGL
HGL
-2.5 -2.0 -1.5 -1.0 -0.5 0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5
ID\Label
Link Length (ft)
Rise (in)\Material
Flow (cfs)
Slope (ft/ft)
ID\Label
Ground (ft)
Invert (ft)
Station (ft)
248 \ PIPE - 220
8.5
18.0 \ RCP
8.81
-0.060
126 \ 5-12-K
5850.98
5845.15
0.0
330 \ 12-K
5851.33
5847.16
8.5

13-K to 14-K INLET LATERAL - Q100

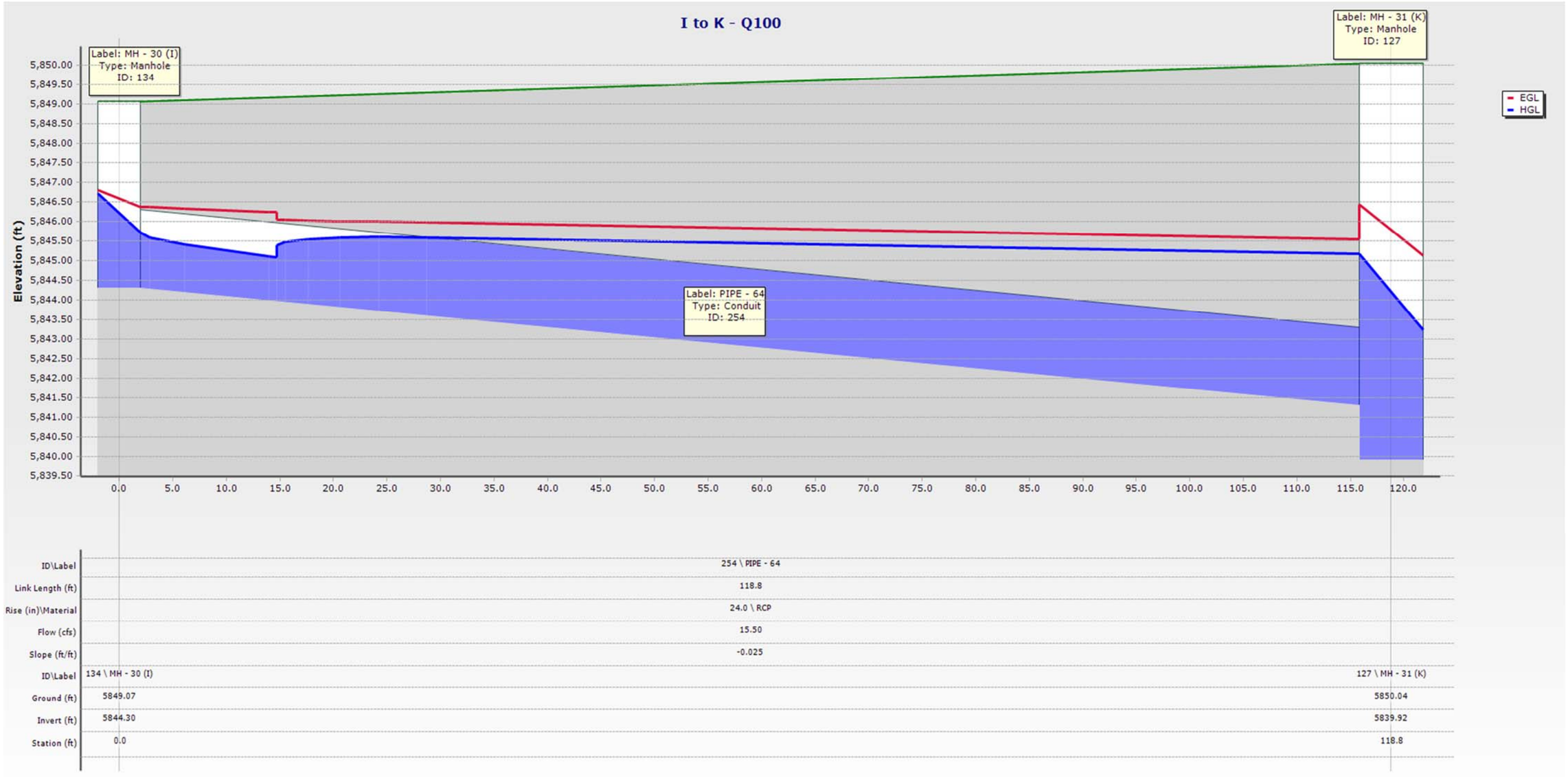


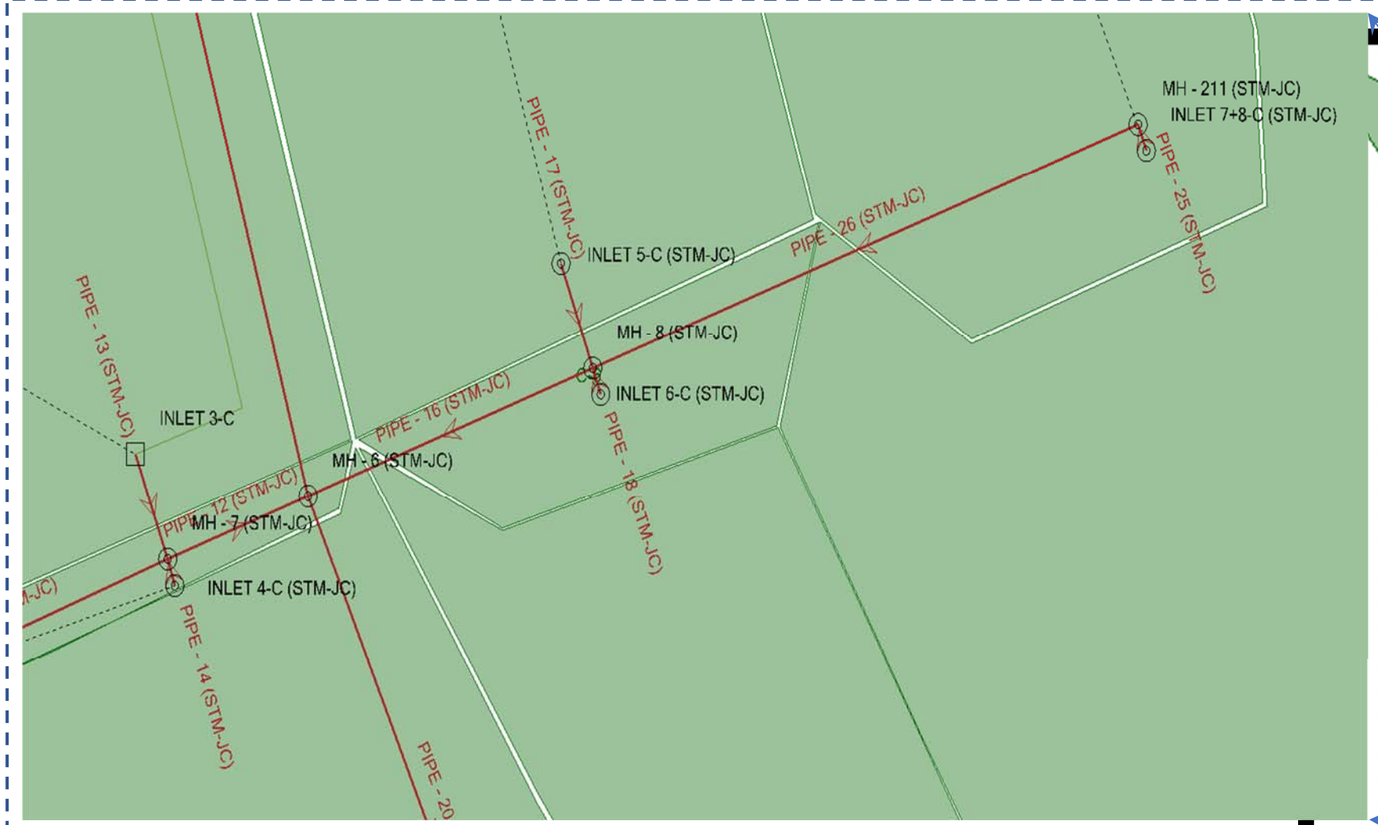
ID\Label	255 \ PIPE - 222		256 \ PIPE - 223	
Link Length (ft)	8.2		28.5	
Rise (in)\Material	18.0 \ RCP		18.0 \ RCP	
Flow (cfs)	0.69		10.98	
Slope (ft/ft)	-0.020		-0.020	
ID\Label	128 \ 13-K	133 \ OS-14-K		129 \ 14-K
Ground (ft)	5849.57	5849.24		5849.56
Invert (ft)	5843.40	5840.75		5843.81
Station (ft)	0.0	8.2		36.7

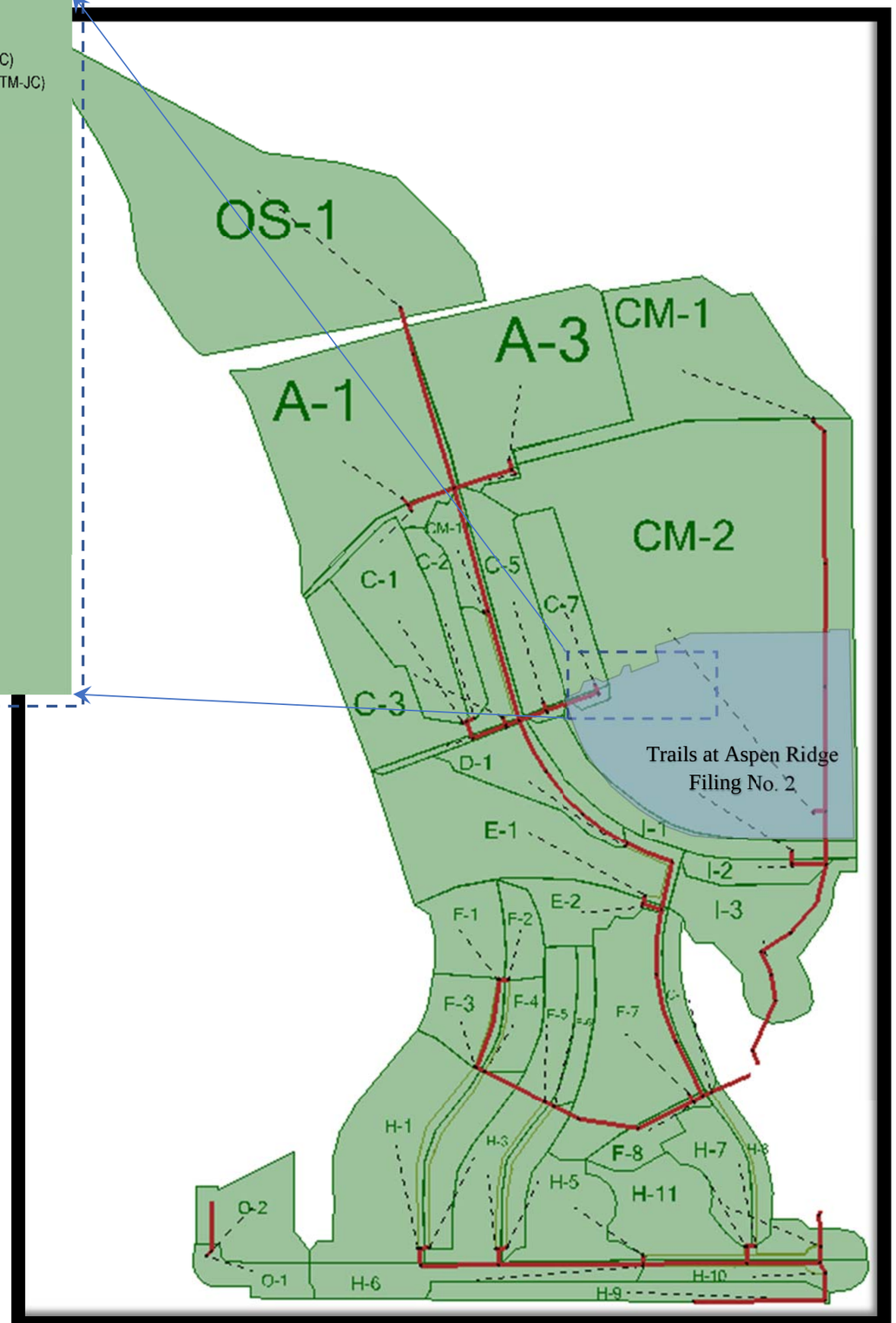
1-I to 2-I INLET LATERAL - Q100



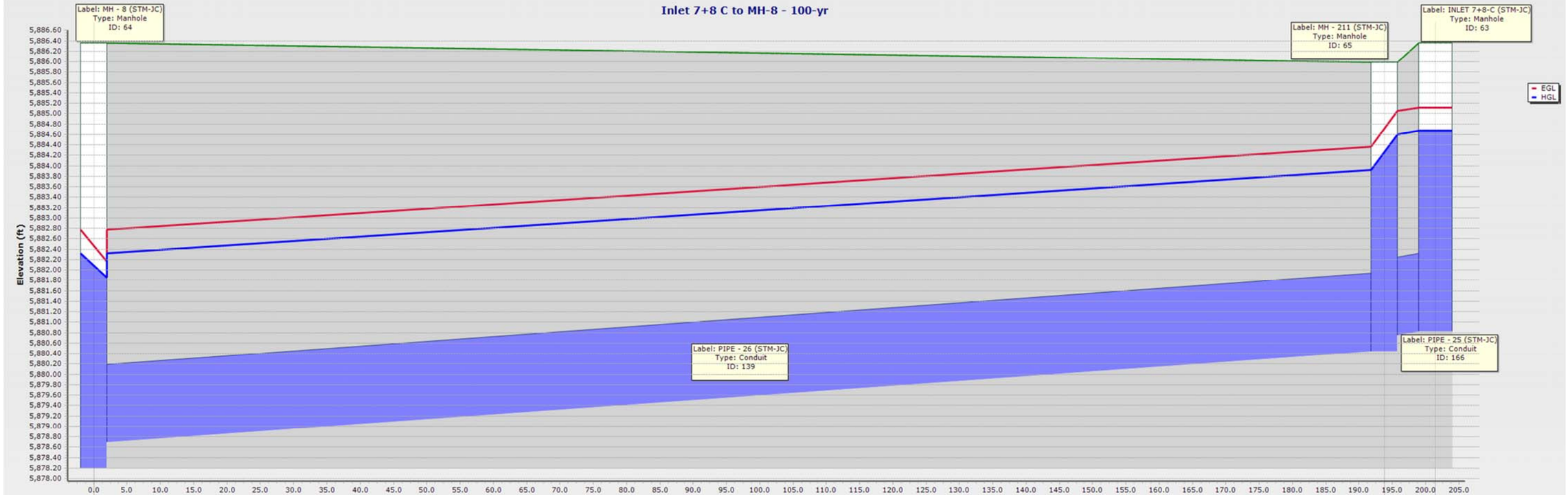
ID\Label		258 \ PIPE - 65	259 \ PIPE - 66
Link Length (ft)		46.2	10.2
Rise (in)\Material		18.0 \ RCP	18.0 \ RCP
Flow (cfs)		12.26	4.05
Slope (ft/ft)		-0.010	-0.010
ID\Label	131 \ INLET 1-I	134 \ MH - 30 (I)	132 \ INLET 2-I
Ground (ft)	5849.31	5849.07	5849.31
Invert (ft)	5845.20	5844.30	5844.87
Station (ft)	0.0	46.2	56.4


I to K - Q100
Label: MH - 30 (I)
Type: Manhole
ID: 134
Label: MH - 31 (K)
Type: Manhole
ID: 127
Label: PIPE - 64
Type: Conduit
ID: 254
EGL
HGL
Elevation (ft)
5,850.00
5,849.50
5,849.00
5,848.50
5,848.00
5,847.50
5,847.00
5,846.50
5,846.00
5,845.50
5,845.00
5,844.50
5,844.00
5,843.50
5,843.00
5,842.50
5,842.00
5,841.50
5,841.00
5,840.50
5,840.00
5,839.50
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0
100.0
105.0
110.0
115.0
120.0
ID\Label
254 \ PIPE - 64
Link Length (ft)
118.8
Rise (in)\Material
24.0 \ RCP
Flow (cfs)
15.50
Slope (ft/ft)
-0.025
ID\Label
134 \ MH - 30 (I)
127 \ MH - 31 (K)
Ground (ft)
5849.07
5850.04
Invert (ft)
5844.30
5839.92
Station (ft)
0.0
118.8



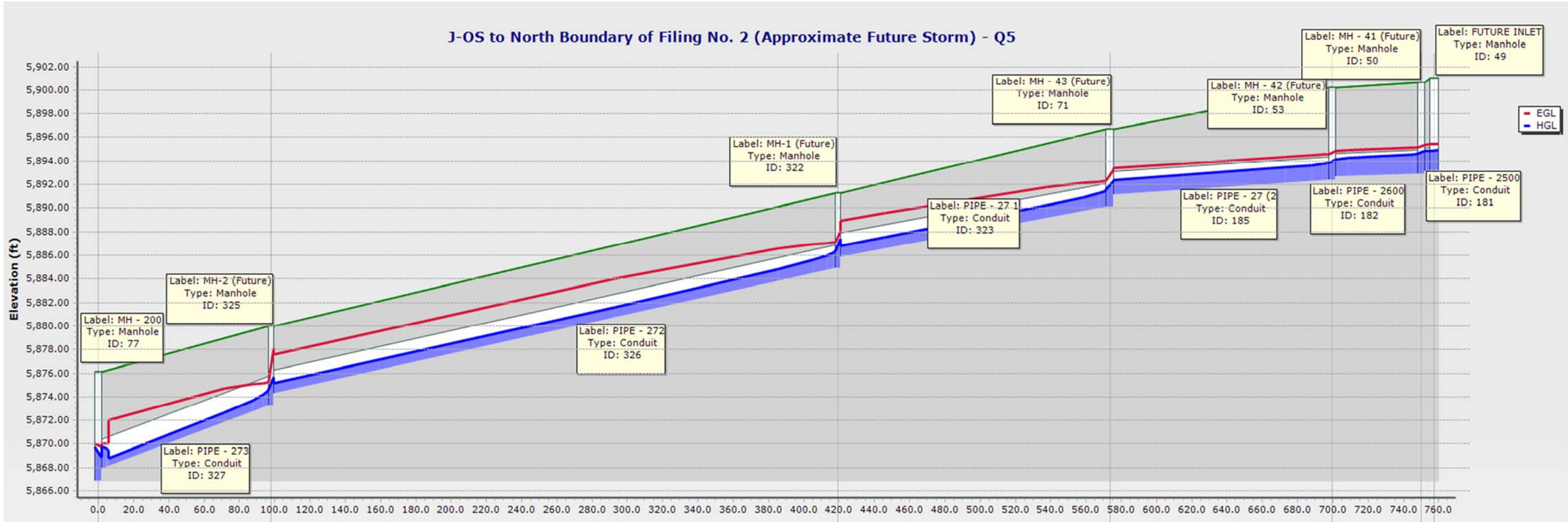


Note: StormCAD modeling for the 7-C and 8-C inlets and connection to the main storm sewer was completed in the Filing No. 1 models because they include the whole Legacy Hill Drive storm sewer system.



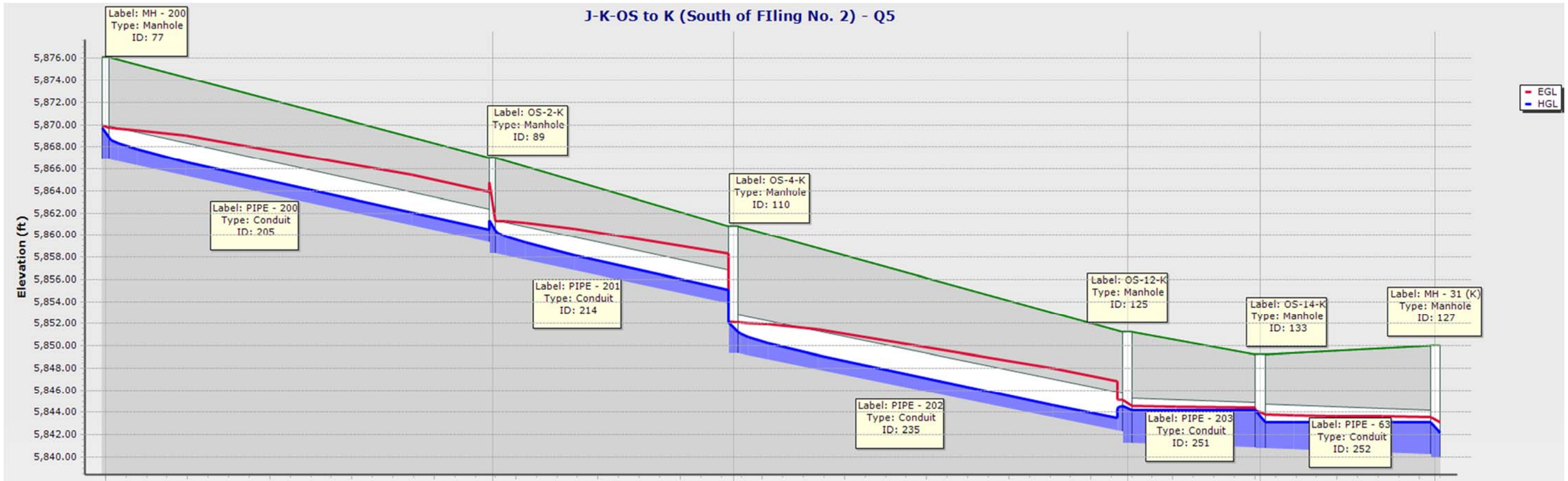
ID\Label		139 \ PIPE - 26 (STM-JC)		166 \ PIPE - 25 (STM-JC)	
Link Length (ft)		193.8		7.7	
Rise (in)\Material		18.0 \ RCP		18.0 \ RCP	
Flow (cfs)		9.52		9.53	
Slope (ft/ft)		0.009		0.010	
ID\Label	64 \ MH - 8 (STM-JC)			65 \ MH - 211 (STM-JC)	63 \ INLET 7+8-C (STM-JC)
Ground (ft)	5886.35			5885.99	5886.36
Invert (ft)	5878.20			5880.44	5880.82
Station (ft)	0.0			193.8	201.5

HGL Profiles: Q5



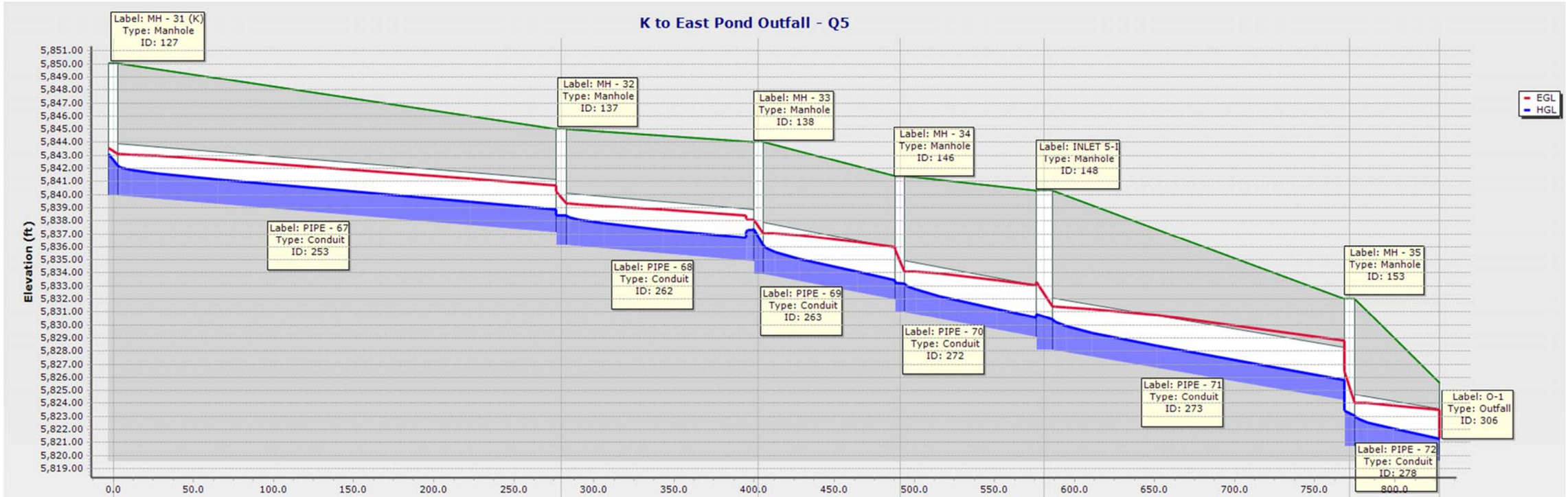
ID\Label	327 \ PIPE - 273	326 \ PIPE - 272	323 \ PIPE - 27 1	185 \ PIPE - 27 (2	182 \ PIPE - 2600	181 \ PIPE - 2500	
Link Length (ft)	98.0	321.2	154.2	126.1	50.6	7.2	
Rise (in)\Material	30.0 \ RCP	24.0 \ RCP	24.0 \ RCP	24.0 \ RCP	24.0 \ RCP	24.0 \ RCP	
Flow (cfs)	16.51	16.79	16.93	17.11	17.21	17.23	
Slope (ft/ft)	0.055	0.033	0.027	0.010	0.005	0.006	
ID\Label	77 \ MH - 200	325 \ MH-2 (Future)	322 \ MH-1 (Future)	71 \ MH - 43 (Future)	53 \ MH - 42 (Future)	50 \ MH - 41 (Future)	49 \ FUTURE INLET
Ground (ft)	5876.11	5880.02	5891.30	5896.70	5900.20	5903.66	5904.02
Invert (ft)	5866.88	5873.27	5884.89	5890.10	5892.36	5895.93	5896.15
Station (ft)	0.0	98.0	419.2	573.4	699.6	750.2	757.3

J-K-OS to K (South of FIling No. 2) - Q5



ID\Label	205 \ PIPE - 200	214 \ PIPE - 201	235 \ PIPE - 202	251 \ PIPE - 203	252 \ PIPE - 63
Link Length (ft)	235.7	146.6	240.0	80.9	106.5
Rise (in)\Material	36.0 \ RCP	36.0 \ RCP	42.0 \ RCP	48.0 \ RCP	48.0 \ RCP
Flow (cfs)	36.70	39.11	40.71	47.81	51.21
Slope (ft/ft)	0.032	0.031	0.029	0.005	0.005

ID\Label	77 \ MH - 200	89 \ OS-2-K	110 \ OS-4-K	125 \ OS-12-K	133 \ OS-14-K	127 \ MH - 31 (K)
Ground (ft)	5876.11	5867.01	5860.81	5851.22	5849.24	5850.04
Invert (ft)	5866.88	5858.35	5849.30	5841.26	5840.75	5839.92
Station (ft)	0.0	235.7	382.3	622.3	703.2	809.7



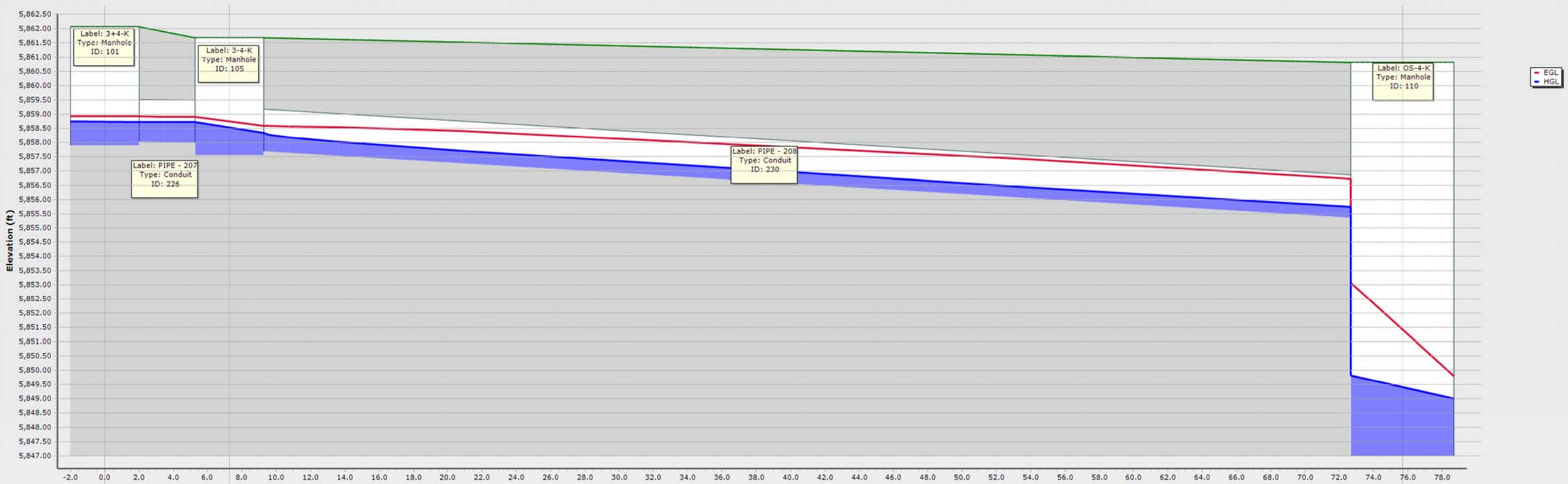
ID\Label	253 \ PIPE - 67	262 \ PIPE - 68	263 \ PIPE - 69	272 \ PIPE - 70	273 \ PIPE - 71	278 \ PIPE - 72
Link Length (ft)	279.6	123.1	88.3	90.1	190.5	56.1
Rise (in)\Material	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP
Flow (cfs)	56.91	56.38	56.15	56.02	62.45	62.16
Slope (ft/ft)	0.010	0.010	0.022	0.021	0.020	0.020

ID\Label	127 \ MH - 31 (K)	137 \ MH - 32	138 \ MH - 33	146 \ MH - 34	148 \ INLET 5-I	153 \ MH - 35	306 \ O-1
Ground (ft)	5850.04	5845.00	5844.06	5841.45	5840.33	5831.98	5825.60
Invert (ft)	5839.92	5836.12	5833.88	5830.94	5828.05	5820.68	5819.58
Station (ft)	0.0	279.6	402.8	491.0	581.2	771.7	827.7

1+2-K to OS-2-K - Q5

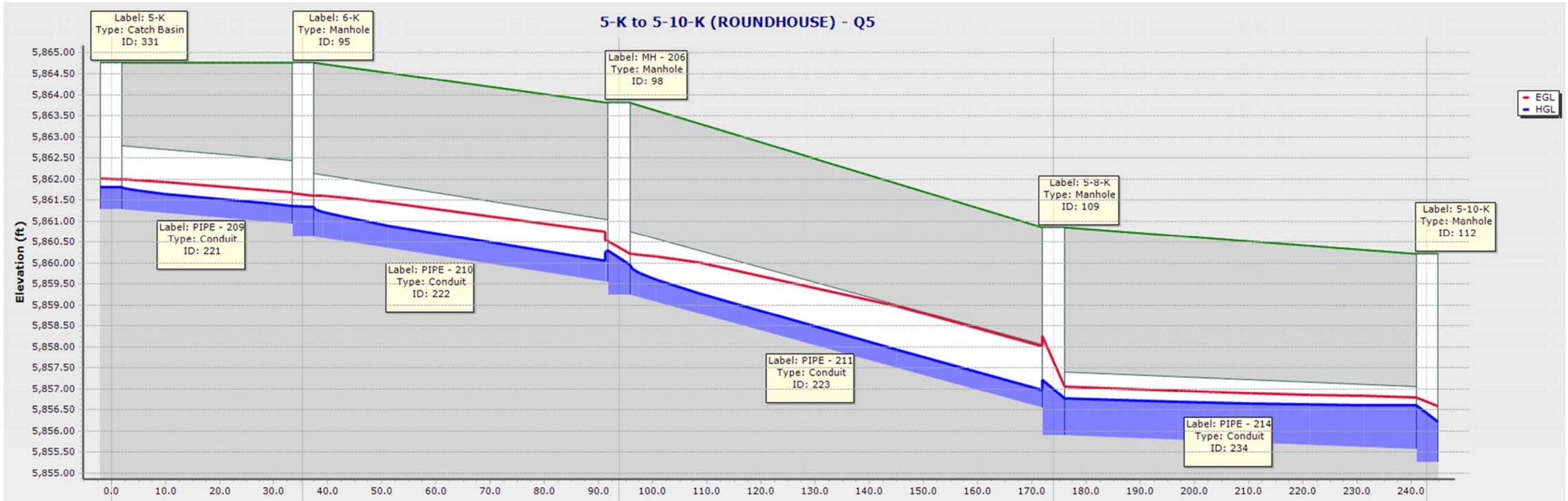
ID\Label		215 \ PIPE - 205
Link Length (ft)		49.9
Rise (in)\Material		18.0 \ RCP
Flow (cfs)		3.28
Slope (ft/ft)		-0.024
ID\Label	89 \ OS-2-K	90 \ 1+2-K
Ground (ft)	5867.01	5866.95
Invert (ft)	5858.35	5862.06
Station (ft)	0.0	49.9

3+4-K to OS-4-K - Q5



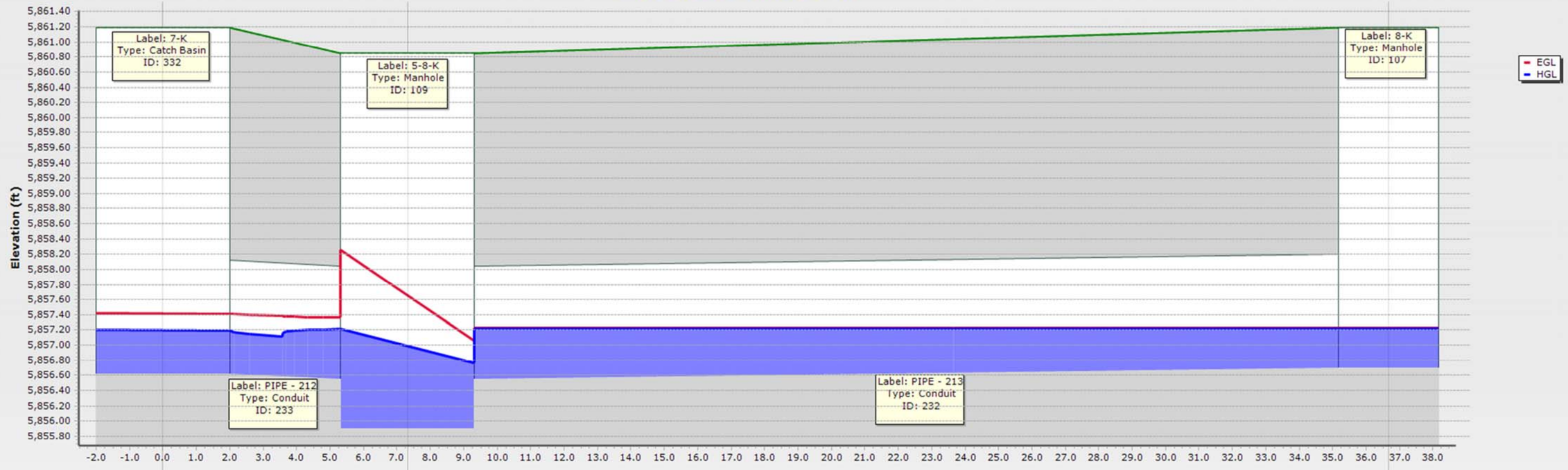
ID\Label	226 \ PIPE - 207	230 \ PIPE - 208	
Link Length (ft)	7.3	68.4	
Rise (in)\Material	18.0 \ RCP	18.0 \ RCP	
Flow (cfs)	2.95	2.95	
Slope (ft/ft)	-0.004	-0.034	
ID\Label	101 \ 3+4-K	105 \ 3-4-K	110 \ OS-4-K
Ground (ft)	5862.06	5861.67	5860.81
Invert (ft)	5857.87	5857.54	5847.00
Station (ft)	0.0	7.3	75.7

5-K to 5-10-K (ROUNDHOUSE) - Q5



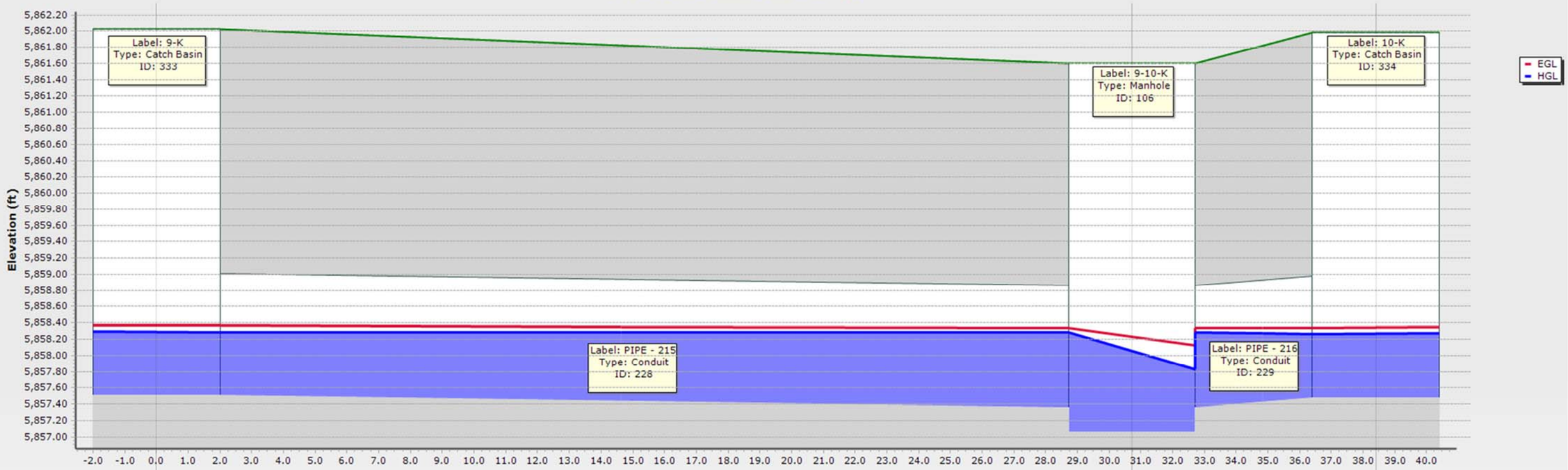
ID\Label	221 \ PIPE - 209	222 \ PIPE - 210	223 \ PIPE - 211	234 \ PIPE - 214	
Link Length (ft)	35.4	58.4	80.2	69.0	
Rise (in)\Material	18.0 \ RCP	18.0 \ RCP	18.0 \ RCP	18.0 \ RCP	
Flow (cfs)	1.94	3.42	3.40	4.62	
Slope (ft/ft)	-0.010	-0.019	-0.034	-0.005	
ID\Label	331 \ 5-K	95 \ 6-K	98 \ MH - 206	109 \ 5-8-K	112 \ 5-10-K
Ground (ft)	5864.76	5864.76	5863.81	5860.85	5860.21
Invert (ft)	5861.28	5860.63	5859.24	5855.90	5855.26
Station (ft)	0.0	35.4	93.8	174.0	243.0

7-K to 8-K INLET LATERAL - Q5



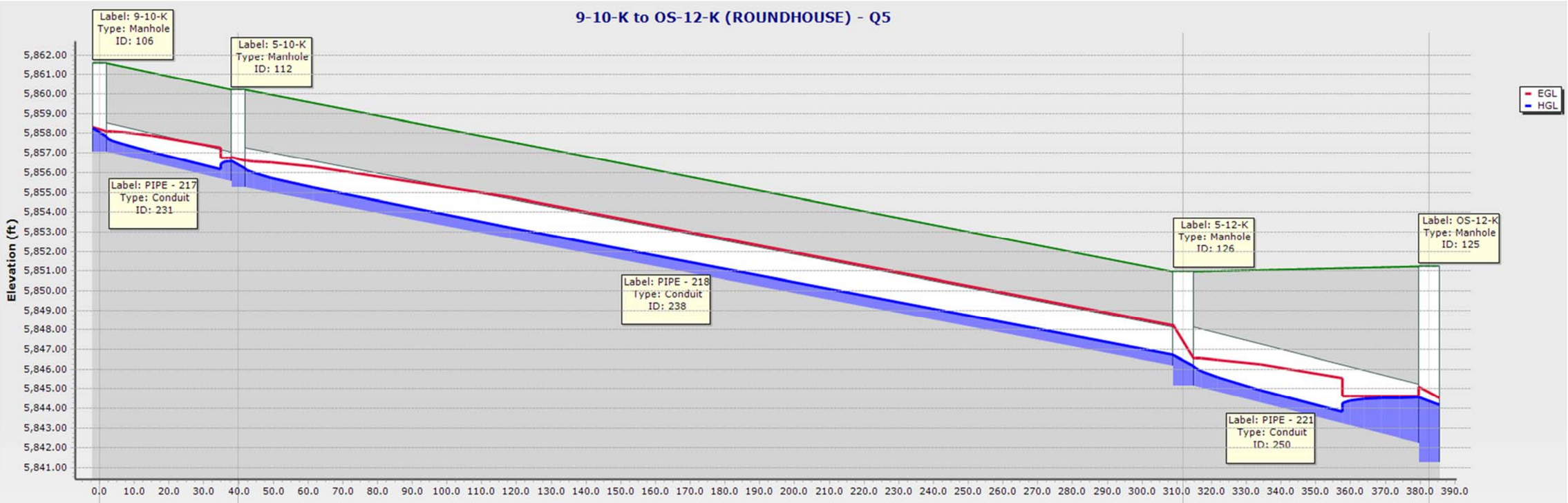
ID\Label		233 \ PIPE - 212		232 \ PIPE - 213	
Link Length (ft)		7.3		29.4	
Rise (in)\Material		18.0 \ RCP		18.0 \ RCP	
Flow (cfs)		2.31		0.46	
Slope (ft/ft)		-0.010		-0.005	
ID\Label	332 \ 7-K		109 \ 5-8-K		107 \ 8-K
Ground (ft)	5861.19		5860.85		5861.19
Invert (ft)	5856.62		5855.90		5856.70
Station (ft)	0.0		7.3		36.7

9-K to 10-K INLET LATERAL - Q5



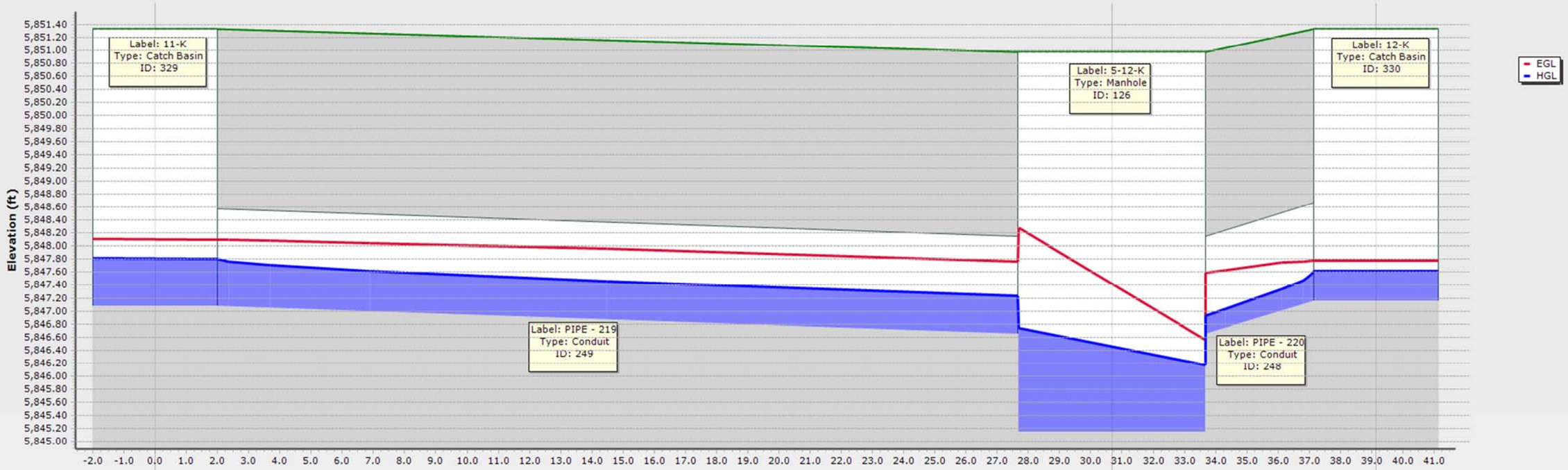
ID\Label		228 \ PIPE - 215	229 \ PIPE - 216	
Link Length (ft)		30.7	7.7	
Rise (in)\Material		18.0 \ RCP	18.0 \ RCP	
Flow (cfs)		2.06	2.06	
Slope (ft/ft)		-0.005	-0.016	
ID\Label	333 \ 9-K		106 \ 9-10-K	334 \ 10-K
Ground (ft)	5862.03		5861.60	5861.98
Invert (ft)	5857.51		5857.06	5857.48
Station (ft)	0.0		30.7	38.4

9-10-K to OS-12-K (ROUNDHOUSE) - Q5



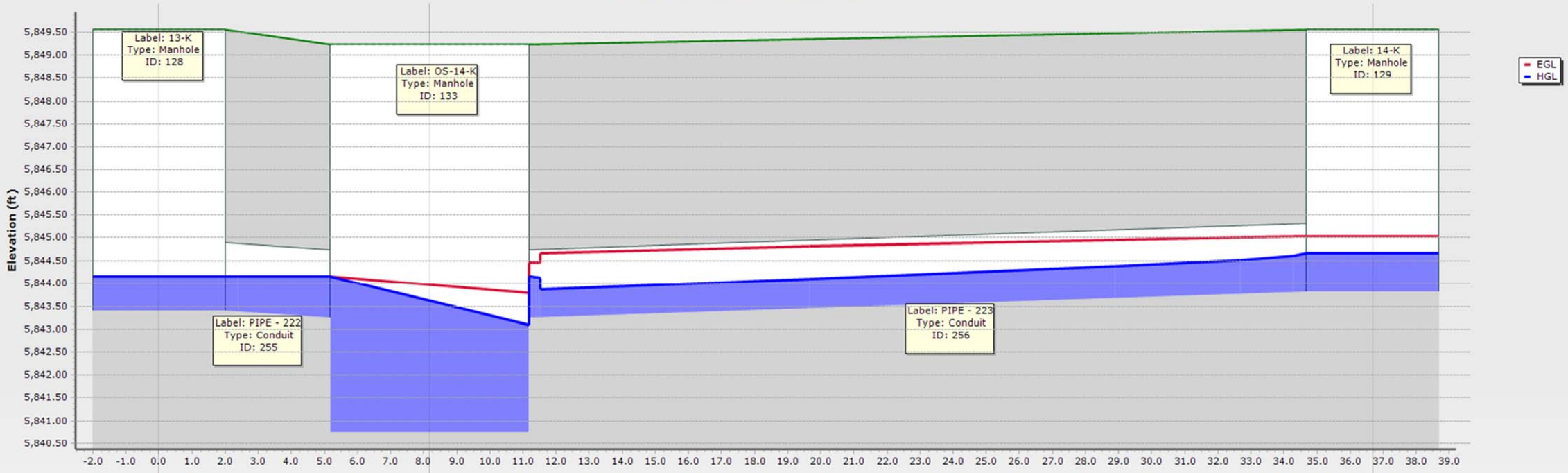
ID\Label	231 \ PIPE - 217		238 \ PIPE - 218		250 \ PIPE - 221	
Link Length (ft)	40.0		271.8		70.8	
Rise (in)\Material	18.0 \ RCP		24.0 \ RCP		36.0 \ RCP	
Flow (cfs)	3.99		7.29		10.50	
Slope (ft/ft)	-0.038		-0.034		-0.041	
ID\Label	106 \ 9-10-K	112 \ 5-10-K			126 \ 5-12-K	125 \ OS-12-K
Ground (ft)	5861.60	5860.21			5850.98	5851.22
Invert (ft)	5857.06	5855.26			5845.15	5841.26
Station (ft)	0.0	40.0			311.8	382.6

11-K to 12-K INLET LATERAL - Q5



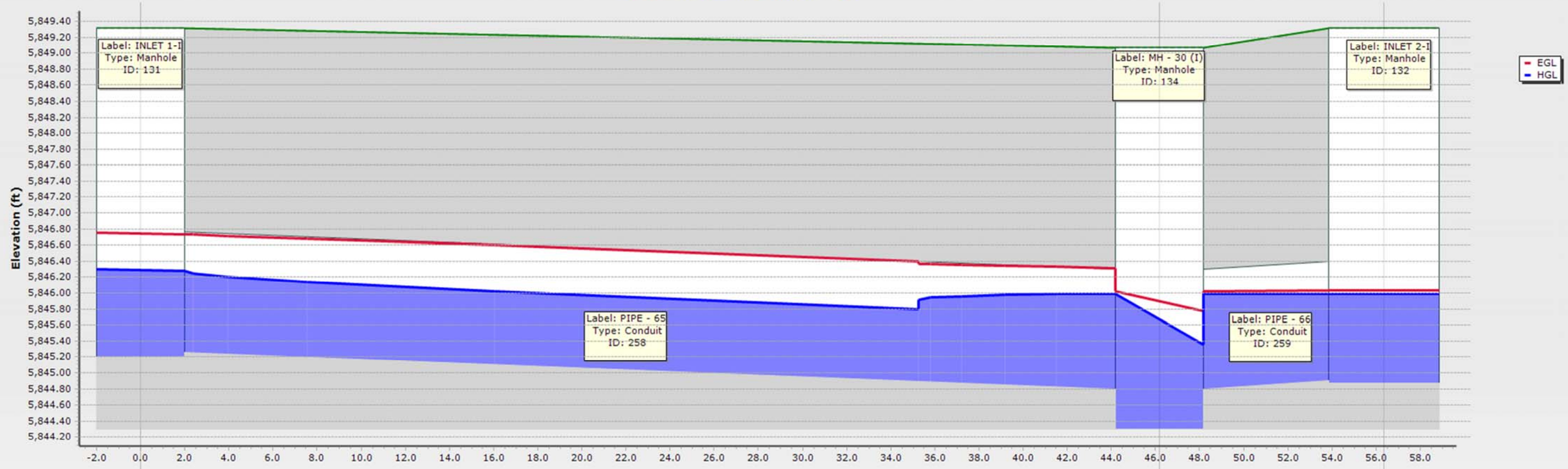
ID\Label		249 \ PIPE - 219	248 \ PIPE - 220
Link Length (ft)		30.7	8.5
Rise (in)\Material		18.0 \ RCP	18.0 \ RCP
Flow (cfs)		3.71	1.46
Slope (ft/ft)		-0.014	-0.060
ID\Label	329 \ 11-K	126 \ 5-12-K	330 \ 12-K
Ground (ft)	5851.33	5850.98	5851.33
Invert (ft)	5847.07	5845.15	5847.16
Station (ft)	0.0	30.7	39.1

13-K to 14-K INLET LATERAL - Q5



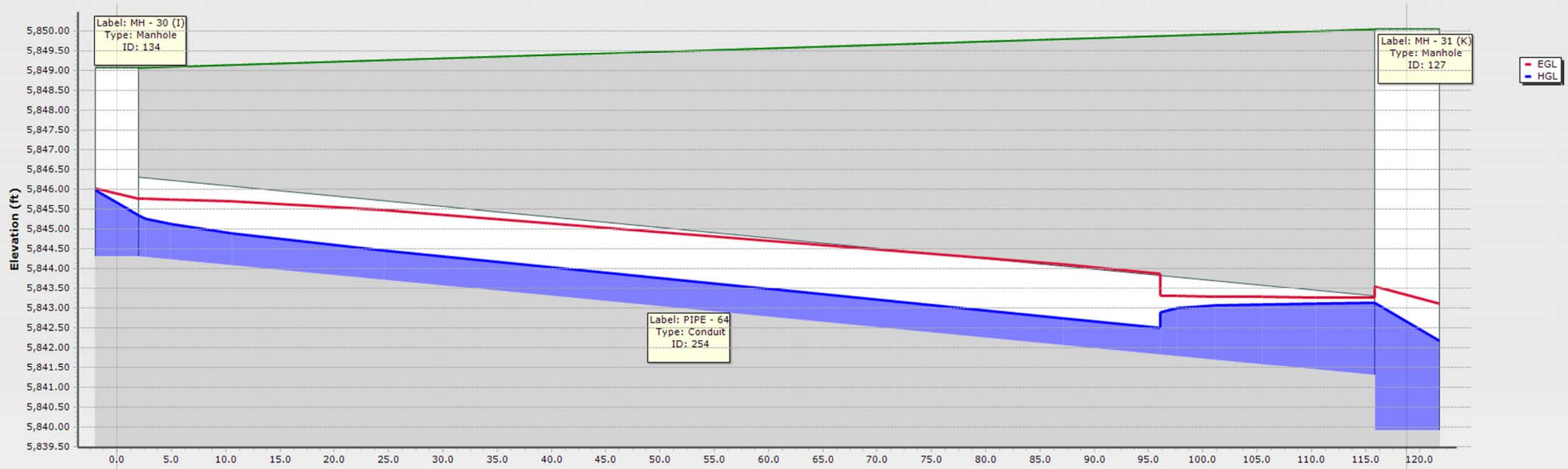
ID\Label	255 \ PIPE - 222	256 \ PIPE - 223	
Link Length (ft)	8.2	28.5	
Rise (in)\Material	18.0 \ RCP	18.0 \ RCP	
Flow (cfs)	0.34	4.99	
Slope (ft/ft)	-0.020	-0.020	
ID\Label	128 \ 13-K	133 \ OS-14-K	129 \ 14-K
Ground (ft)	5849.57	5849.24	5849.56
Invert (ft)	5843.40	5840.75	5843.81
Station (ft)	0.0	8.2	36.7

1-I to 2-I INLET LATERAL - Q5



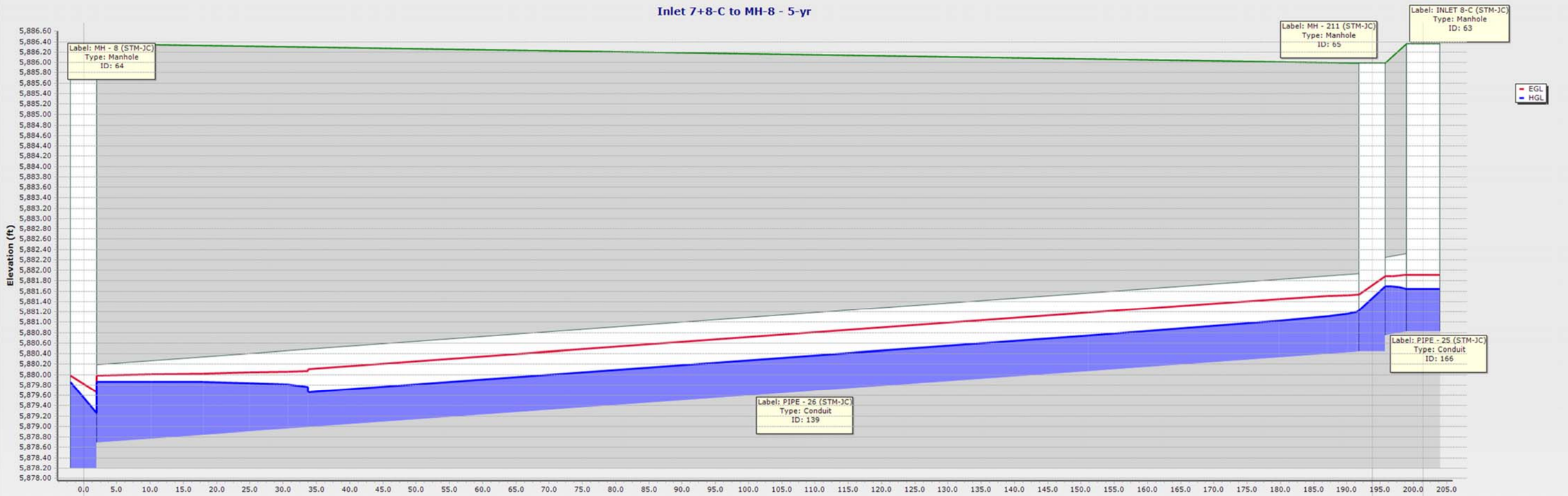
ID\Label		258 \ PIPE - 65		259 \ PIPE - 66	
Link Length (ft)		46.2		10.2	
Rise (in)\Material		18.0 \ RCP		18.0 \ RCP	
Flow (cfs)		6.89		2.27	
Slope (ft/ft)		-0.010		-0.010	
ID\Label	131 \ INLET 1-I		134 \ MH - 30 (I)		132 \ INLET 2-I
Ground (ft)	5849.31		5849.07		5849.31
Invert (ft)	5845.20		5844.30		5844.87
Station (ft)	0.0		46.2		56.4

I to K (Legacy Hill Drive) - Q5



ID\Label		254 \ PIPE - 64
Link Length (ft)		118.8
Rise (in)\Material		24.0 \ RCP
Flow (cfs)		8.71
Slope (ft/ft)		-0.025
ID\Label	134 \ MH - 30 (I)	127 \ MH - 31 (K)
Ground (ft)	5849.07	5850.04
Invert (ft)	5844.30	5839.92
Station (ft)	0.0	118.8

Inlet 7+8-C to MH-8 - 5-yr



ID\Label	139 \ PIPE - 26 (STM-JC)	166 \ PIPE - 25 (STM-JC)	
Link Length (ft)	193.8	7.7	
Rise (in)\Material	18.0 \ RCP	18.0 \ RCP	
Flow (cfs)	4.17	4.17	
Slope (ft/ft)	0.009	0.010	
ID\Label	64 \ MH - 8 (STM-JC)	65 \ MH - 211 (STM-JC)	63 \ INLET 8-C (STM-JC)
Ground (ft)	5886.35	5885.99	5886.36
Invert (ft)	5878.20	5880.44	5880.82
Station (ft)	0.0	193.8	201.5

Analysis Results
Scenario: Q5

Title	S:\19.886.008 Trails at Aspen Ridge\100 Dwg\103 Dref\D-886-PR-STORM.dwg
Engineer	
Company	
Date	9/30/2019
Notes	

Scenario Summary

ID	1
Label	Q5
Notes	
Active Topology	Base Active Topology
User Data Extensions	Base User Data Extensions
Physical	Base Physical
Boundary Condition	Base Boundary Condition
Initial Settings	Base Initial Settings
Hydrology	Base Hydrology
Output	Base Output
Infiltration and Inflow	Base Infiltration and Inflow
Rainfall Runoff	Base Rainfall Runoff
Water Quality	Base Water Quality
Sanitary Loading	Base Sanitary Loading
Headloss	Base Headloss
Operational	Base Operational
Design	Base Design
System Flows	Base System Flows
SCADA	Base SCADA
Energy Cost	Base Energy Cost
Solver Calculation Options	Base Calculation Options

Network Inventory

Conduits	37	Manholes	32
-Circle	37	Property Connections	0
-Box	0	Taps	0
-Ellipse	0	Transitions	0
-Virtual	0	Cross Sections	0
-Irregular Channel	0	Outfalls	1
-Trapezoidal Channel	0	Catchments	17
-Triangular Channel	0	Low Impact Development Controls	0
-Rectangular Channel	0	Ponds	0
-Pipe-Arch	0	Pond Outlet Structures	0
Laterals	0	Headwalls	0
Channels	0	Pumps	0
Gutters	2	Wet Wells	0
Pressure Pipes	0	Pressure Junctions	0
Catch Basins	5	SCADA Elements	0
-Maximum Capacity	0	Pump Stations	0
-Full Capture	1	Variable Speed Pump Batteries	0

Analysis Results
Scenario: Q5

Network Inventory			
-Catalog Inlet	0	Air Valves	0

Outfall elements for network with outlet: <None>

Label	System Additional Flow (cfs)	System Known Flow (cfs)	System Rational Flow (cfs)	System Intensity (in/h)	System Flow Time (min)	System CA (acres)
O-1	0.00	0.00	61.45	2.620	26.076	23.268

Conduit elements for network with outlet: O-1

Label	Section Type	Conduit Description	Length (Unified) (ft)	Number of Barrels	Slope (Calculated) (ft/ft)	Flow (cfs)
PIPE - 2500	Circle		7.2	1	0.006	17.23
PIPE - 2600	Circle		50.6	1	0.005	17.21
PIPE - 27 (2	Circle		126.1	1	0.010	17.11
PIPE - 200	Circle	Circle - 36.0 in	235.7	1	0.032	36.70
PIPE - 201	Circle	Circle - 36.0 in	146.6	1	0.031	39.15
PIPE - 205	Circle	Circle - 18.0 in	49.9	1	-0.024	3.28
PIPE - 209	Circle		33.2	1	-0.019	1.94
PIPE - 210	Circle	Circle - 18.0 in	60.2	1	-0.019	3.42
PIPE - 211	Circle	Circle - 18.0 in	80.2	1	-0.034	3.40
PIPE - 207	Circle	Circle - 18.0 in	7.3	1	-0.004	2.95
PIPE - 215	Circle		30.7	1	-0.005	2.06
PIPE - 216	Circle		9.1	1	-0.029	2.06
PIPE - 208	Circle	Circle - 18.0 in	68.4	1	-0.034	2.95
PIPE - 217	Circle	Circle - 18.0 in	40.0	1	-0.039	3.99
PIPE - 213	Circle		29.4	1	-0.005	0.46
PIPE - 212	Circle		7.3	1	-0.010	2.31
PIPE - 214	Circle	Circle - 18.0 in	69.0	1	-0.005	4.62
PIPE - 202	Circle	Circle - 42.0 in	239.8	1	0.020	40.79
PIPE - 218	Circle	Circle - 24.0 in	271.8	1	-0.033	7.29
PIPE - 220	Circle	Circle - 18.0 in	8.5	1	-0.060	4.00
PIPE - 221	Circle	Circle - 36.0 in	69.8	1	-0.035	9.80
PIPE - 203	Circle	Circle - 48.0 in	80.9	1	0.005	47.17
PIPE - 63	Circle		106.5	1	0.005	50.58
PIPE - 67	Circle		279.6	1	0.010	56.28
PIPE - 64	Circle		118.8	1	-0.025	8.71
PIPE - 222	Circle	Circle - 18.0 in	8.2	1	-0.007	0.34
PIPE - 223	Circle	Circle - 18.0 in	28.5	1	-0.016	4.99
PIPE - 65	Circle		46.2	1	-0.010	6.89
PIPE - 66	Circle		10.2	1	-0.010	2.27
PIPE - 68	Circle		123.1	1	0.010	55.75
PIPE - 69	Circle		88.3	1	0.022	55.52
PIPE - 70	Circle		90.1	1	0.021	55.40
PIPE - 71	Circle		190.5	1	0.020	61.83
PIPE - 72	Circle		56.1	1	0.020	61.53

Analysis Results
Scenario: Q5
Conduit elements for network with outlet: O-1

Label	Section Type	Conduit Description	Length (Unified) (ft)	Number of Barrels	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
PIPE - 27 1	Circle	Circle - 24.0 in	154.2	1	0.027	16.93	6.13	5,893.15	5,893.11	5,894.87	5,894.84
PIPE - 272	Circle	Circle - 24.0 in	321.3	1	0.033	16.79	5.48	5,892.91	5,892.66	5,894.61	5,894.16
PIPE - 273	Circle	Circle - 30.0 in	98.0	1	0.055	16.51	7.91	5,892.36	5,891.10	5,893.85	5,892.40
							14.85	5,866.88	5,859.35	5,868.85	5,860.49
							14.89	5,858.35	5,853.85	5,860.39	5,855.07
							7.19	5,860.85	5,862.04	5,862.73	5,861.31
							5.70	5,860.99	5,861.62	5,862.14	5,861.36
							6.72	5,859.54	5,860.69	5,861.40	5,860.30
							8.20	5,856.55	5,859.24	5,859.94	5,856.98
							3.69	5,857.98	5,858.01	5,858.73	5,858.71
							3.56	5,857.36	5,857.51	5,858.29	5,858.28
							6.70	5,857.36	5,857.62	5,858.16	5,858.28
							7.92	5,855.35	5,857.68	5,858.33	5,855.75
							9.05	5,855.51	5,857.06	5,857.82	5,856.35
							2.36	5,856.55	5,856.70	5,857.17	5,857.17
							4.69	5,856.55	5,856.62	5,857.19	5,857.17
							4.40	5,855.51	5,855.85	5,856.71	5,856.35
							12.73	5,847.00	5,842.24	5,848.99	5,844.52
							9.83	5,846.15	5,855.01	5,855.97	5,846.72
							10.59	5,846.65	5,847.16	5,847.92	5,847.15
							10.47	5,842.74	5,845.15	5,846.14	5,844.52
							7.90	5,841.24	5,840.84	5,844.15	5,844.13
							8.07	5,840.75	5,840.22	5,843.07	5,843.11
							10.73	5,839.92	5,837.12	5,842.17	5,838.86
							9.41	5,841.32	5,844.30	5,845.35	5,843.11
							2.45	5,843.34	5,843.40	5,844.13	5,844.13
							7.06	5,843.34	5,843.81	5,844.67	5,844.00
							6.33	5,844.80	5,845.26	5,846.28	5,845.99
							4.71	5,844.80	5,844.90	5,845.99	5,845.99
							10.71	5,836.12	5,834.89	5,838.36	5,837.33
							14.26	5,833.88	5,831.94	5,836.12	5,833.45
							14.01	5,830.94	5,829.05	5,833.18	5,830.57
							14.18	5,828.05	5,824.24	5,830.42	5,825.79
							14.07	5,820.68	5,819.58	5,823.05	5,821.30
							11.61	5,890.10	5,885.89	5,891.58	5,887.39
							12.43	5,884.89	5,874.27	5,886.37	5,875.16
							14.66	5,873.27	5,867.88	5,874.64	5,869.73

Analysis Results
Scenario: Q5
Catch Basin elements for network with outlet: O-1

Label	Inlet Type	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Capture Efficiency (Calculated) (%)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)	Headloss Method
12-K	Full Capture	4.00	0.00	100.0	5,847.94	5,847.92	0.02	Standard
5-K	Percent Capture	1.94	0.05	97.7	5,862.15	5,862.14	0.01	Standard
7-K	Percent Capture	2.31	0.62	78.9	5,857.21	5,857.19	0.01	Standard
9-K	Percent Capture	2.06	0.09	95.8	5,858.29	5,858.29	0.00	Standard
10-K	Percent Capture	2.06	0.09	95.8	5,858.17	5,858.16	0.01	Standard

Manhole elements for network with outlet: O-1

Label	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)	Headloss Method	System Additional Flow (cfs)	System Known Flow (cfs)
FUTURE INLET	5,894.90	5,894.87	0.03	Standard	0.00	0.00
MH - 41 (Future)	5,894.84	5,894.61	0.23	Standard	0.00	0.00
MH - 42 (Future)	5,894.14	5,893.85	0.29	Standard	0.00	0.00
MH - 43 (Future)	5,892.31	5,891.58	0.73	Standard	0.00	0.00
MH - 200	5,869.73	5,868.85	0.88	Standard	0.00	0.00
OS-2-K	5,861.32	5,860.39	0.93	Standard	0.00	0.00
1+2-K	5,862.74	5,862.73	0.01	Standard	0.00	0.00
6-K	5,861.41	5,861.40	0.01	Standard	0.00	0.00
MH - 206	5,860.30	5,859.94	0.36	Standard	0.00	0.00
3+4-K	5,858.74	5,858.73	0.01	Standard	0.00	0.00
3-4-K	5,858.71	5,858.33	0.38	Standard	0.00	0.00
9-10-K	5,858.28	5,857.82	0.46	Standard	0.00	0.00
8-K	5,857.17	5,857.17	0.00	Standard	0.00	0.00
5-8-K	5,857.17	5,856.71	0.46	Standard	0.00	0.00
OS-4-K	5,849.82	5,848.99	0.83	Standard	0.00	0.00
5-10-K	5,856.35	5,855.97	0.38	Standard	0.00	0.00
OS-12-K	5,844.52	5,844.15	0.37	Standard	0.00	0.00
5-12-K	5,846.69	5,846.14	0.55	Standard	0.00	0.00
MH - 31 (K)	5,843.11	5,842.17	0.94	Standard	0.00	0.00

Analysis Results
Scenario: Q5
Manhole elements for network with outlet: O-1

Label	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)	Headloss Method	System Additional Flow (cfs)	System Known Flow (cfs)	System Rational Flow (cfs)	System Intensity (in/h)	System Flow Time (min)	System CA (acres)
13-K	5,844.13	5,844.13	0.00	Standard	0.00	0.00	17.23	4.275	8.940	3.998
14-K	5,844.67	5,844.67	0.00	Standard	0.00	0.00	17.21	4.272	8.960	3.998
INLET 1-I	5,846.30	5,846.28	0.02	Standard	0.00	0.00	17.11	4.246	9.113	3.998
INLET 2-I	5,845.99	5,845.99	0.00	Standard	0.00	0.00	16.93	4.202	9.379	3.998
OS-14-K	5,844.13	5,843.07	1.07	Standard	0.00	0.00	36.70	2.984	20.400	12.201
MH - 30 (I)	5,845.99	5,845.35	0.64	Standard	0.00	0.00	39.15	2.964	20.665	13.102
MH - 32	5,838.41	5,838.36	0.05	Standard	0.00	0.00	3.28	3.611	13.650	0.901
MH - 33	5,837.33	5,836.12	1.20	Standard	0.00	0.00	3.42	4.580	7.300	0.742
MH - 34	5,833.23	5,833.18	0.05	Standard	0.00	0.00	3.40	4.550	7.449	0.742
INLET 5-I	5,830.82	5,830.42	0.39	Standard	0.00	0.00	2.95	4.860	6.000	0.603
MH - 35	5,823.44	5,823.05	0.39	Standard	0.00	0.00	2.95	4.853	6.033	0.603
MH-1 (Future)	5,887.39	5,886.37	1.02	Absolute	0.00	0.00	3.99	4.065	10.244	0.974
MH-2 (Future)	5,875.66	5,874.64	1.02	Absolute	0.00	0.00	0.46	5.105	5.000	0.090
							4.62	2.758	23.726	1.663
							40.79	2.952	20.829	13.704
							7.29	2.742	23.987	2.637
							47.17	2.707	24.559	17.289
							9.80	2.714	24.448	3.585
							56.28	2.684	24.950	20.801
							0.34	5.105	5.000	0.067
							4.99	3.960	10.950	1.251
							6.89	3.953	11.000	1.729
							2.27	4.837	6.100	0.466
							50.58	2.697	24.730	18.607
							8.71	3.935	11.122	2.195
							55.75	2.659	25.384	20.801
							55.52	2.648	25.575	20.801
							55.40	2.642	25.679	20.801

Analysis Results
Scenario: Q5
Manhole elements for network with outlet: O-1

System Rational Flow (cfs)	System Intensity (in/h)	System Flow Time (min)	System CA (acres)
61.83	2.636	25.786	23.268
61.53	2.624	26.010	23.268
16.79	4.165	9.601	3.998
16.51	4.097	10.031	3.998

Analysis Results
Scenario: 5-yr

Title	S:\19.886.008 Trails at Aspen Ridge\100 Dwg\103 Dref\D-886-PR-STORM.dwg
Engineer	
Company	
Date	6/26/2019
Notes	

Scenario Summary

ID	1
Label	5-yr
Notes	
Active Topology	Base Active Topology
User Data Extensions	Base User Data Extensions
Physical	Base Physical
Boundary Condition	Base Boundary Condition
Initial Settings	Base Initial Settings
Hydrology	Base Hydrology
Output	Base Output
Infiltration and Inflow	Base Infiltration and Inflow
Rainfall Runoff	Base Rainfall Runoff
Water Quality	Base Water Quality
Sanitary Loading	Base Sanitary Loading
Headloss	Base Headloss
Operational	Base Operational
Design	Base Design
System Flows	Base System Flows
SCADA	Base SCADA
Energy Cost	Base Energy Cost
Solver Calculation Options	Base Calculation Options

Network Inventory

Conduits	94	Manholes	71
-Circle	91	Property Connections	0
-Box	0	Taps	0
-Ellipse	3	Transitions	0
-Virtual	0	Cross Sections	0
-Irregular Channel	0	Outfalls	6
-Trapezoidal Channel	0	Catchments	44
-Triangular Channel	0	Low Impact Development Controls	0
-Rectangular Channel	0	Ponds	0
-Pipe-Arch	0	Pond Outlet Structures	0
Laterals	0	Headwalls	0
Channels	0	Pumps	0
Gutters	13	Wet Wells	0
Pressure Pipes	0	Pressure Junctions	0
Catch Basins	23	SCADA Elements	0
-Maximum Capacity	0	Pump Stations	0
-Full Capture	10	Variable Speed Pump Batteries	0

Analysis Results
Scenario: 5-yr

Network Inventory			
-Catalog Inlet	0	Air Valves	0

Conduit elements for network with outlet: HEADWALL 2 (STM-JC)

Label	Section Type	Conduit Description	Length (Unified) (ft)	Number of Barrels	Slope (Calculated) (ft/ft)	Flow (cfs)
PIPE - 26 (STM-JC)	Circle	Circle - 18.0 in	193.8	1	0.009	4.17
PIPE - 25 (STM-JC)	Circle		7.7	1	0.010	4.17

Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
5.40	5,880.44	5,878.69	5,881.23	5,879.87
5.60	5,880.82	5,880.74	5,881.65	5,881.70

Manhole elements for network with outlet: HEADWALL 2 (STM-JC)

Label	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)	Headloss Method	System Additional Flow (cfs)	System Known Flow (cfs)
INLET 8-C (STM-JC)	5,881.65	5,881.65	0.00	Standard	0.00	0.00
MH - 8 (STM-JC)	5,879.87	5,879.26	0.61	Standard	0.00	0.00
MH - 211 (STM-JC)	5,881.70	5,881.23	0.47	Standard	0.00	0.00

System Rational Flow (cfs)	System Intensity (in/h)	System Flow Time (min)	System CA (acres)
4.17	4.071	10.200	1.017
9.98	3.979	10.821	2.489
4.17	4.068	10.223	1.017

Analysis Results
Scenario: 100-yr

Title	S:\19.886.008 Trails at Aspen Ridge\100 Dwg\103 Dref\D-886-PR-STORM.dwg
Engineer	
Company	
Date	6/26/2019
Notes	

Scenario Summary

ID	1
Label	100-yr
Notes	
Active Topology	Base Active Topology
User Data Extensions	Base User Data Extensions
Physical	Base Physical
Boundary Condition	Base Boundary Condition
Initial Settings	Base Initial Settings
Hydrology	Base Hydrology
Output	Base Output
Infiltration and Inflow	Base Infiltration and Inflow
Rainfall Runoff	Base Rainfall Runoff
Water Quality	Base Water Quality
Sanitary Loading	Base Sanitary Loading
Headloss	Base Headloss
Operational	Base Operational
Design	Base Design
System Flows	Base System Flows
SCADA	Base SCADA
Energy Cost	Base Energy Cost
Solver Calculation Options	Base Calculation Options

Network Inventory

Conduits	95	Manholes	71
-Circle	93	Property Connections	0
-Box	0	Taps	0
-Ellipse	2	Transitions	0
-Virtual	0	Cross Sections	0
-Irregular Channel	0	Outfalls	7
-Trapezoidal Channel	0	Catchments	44
-Triangular Channel	0	Low Impact Development Controls	0
-Rectangular Channel	0	Ponds	0
-Pipe-Arch	0	Pond Outlet Structures	0
Laterals	0	Headwalls	0
Channels	0	Pumps	0
Gutters	13	Wet Wells	0
Pressure Pipes	0	Pressure Junctions	0
Catch Basins	24	SCADA Elements	0
-Maximum Capacity	0	Pump Stations	0
-Full Capture	11	Variable Speed Pump Batteries	0

Analysis Results
Scenario: 100-yr

Network Inventory			
-Catalog Inlet	0	Air Valves	0

Conduit elements for network with outlet: HEADWALL - 2 (STM-JC)

Label	Section Type	Conduit Description	Length (Unified) (ft)	Number of Barrels	Slope (Calculated) (ft/ft)	Flow (cfs)
PIPE - 26 (STM-JC)	Circle	Circle - 18.0 in	193.8	1	0.009	9.52
PIPE - 25 (STM-JC)	Circle		7.7	1	0.010	9.53

Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
5.39	5,880.44	5,878.69	5,883.92	5,882.33
5.39	5,880.82	5,880.74	5,884.67	5,884.60

Manhole elements for network with outlet: HEADWALL - 2 (STM-JC)

Label	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)	Headloss Method	System Additional Flow (cfs)	System Known Flow (cfs)
INLET 7+8-C (STM-JC)	5,884.67	5,884.67	0.00	Standard	0.00	0.00
MH - 8 (STM-JC)	5,882.33	5,881.86	0.47	Standard	0.00	0.00
MH - 211 (STM-JC)	5,884.60	5,883.92	0.69	Standard	0.00	0.00

System Rational Flow (cfs)	System Intensity (in/h)	System Flow Time (min)	System CA (acres)
9.53	7.087	10.800	1.333
21.88	6.686	12.458	3.247
9.52	7.081	10.824	1.333

Analysis Results
Scenario: Q100

Title	S:\19.886.008 Trails at Aspen Ridge\100 Dwg\103 Dref\D-886-PR-STORM.dwg
Engineer	
Company	
Date	9/30/2019
Notes	

Scenario Summary

ID	1
Label	Q100
Notes	
Active Topology	Base Active Topology
User Data Extensions	Base User Data Extensions
Physical	Base Physical
Boundary Condition	Base Boundary Condition
Initial Settings	Base Initial Settings
Hydrology	Base Hydrology
Output	Base Output
Infiltration and Inflow	Base Infiltration and Inflow
Rainfall Runoff	Base Rainfall Runoff
Water Quality	Base Water Quality
Sanitary Loading	Base Sanitary Loading
Headloss	Base Headloss
Operational	Base Operational
Design	Base Design
System Flows	Base System Flows
SCADA	Base SCADA
Energy Cost	Base Energy Cost
Solver Calculation Options	Base Calculation Options

Network Inventory

Conduits	37	Manholes	32
-Circle	37	Property Connections	0
-Box	0	Taps	0
-Ellipse	0	Transitions	0
-Virtual	0	Cross Sections	0
-Irregular Channel	0	Outfalls	1
-Trapezoidal Channel	0	Catchments	17
-Triangular Channel	0	Low Impact Development Controls	0
-Rectangular Channel	0	Ponds	0
-Pipe-Arch	0	Pond Outlet Structures	0
Laterals	0	Headwalls	0
Channels	0	Pumps	0
Gutters	2	Wet Wells	0
Pressure Pipes	0	Pressure Junctions	0
Catch Basins	5	SCADA Elements	0
-Maximum Capacity	0	Pump Stations	0
-Full Capture	1	Variable Speed Pump Batteries	0

Analysis Results
Scenario: Q100

Network Inventory			
-Catalog Inlet	0	Air Valves	0

Outfall elements for network with outlet: <None>

Label	System Additional Flow (cfs)	System Known Flow (cfs)	System Rational Flow (cfs)	System Intensity (in/h)	System Flow Time (min)	System CA (acres)
O-1	0.00	0.00	130.16	4.516	27.631	28.591

Conduit elements for network with outlet: O-1

Label	Section Type	Conduit Description	Length (Unified) (ft)	Number of Barrels	Slope (Calculated) (ft/ft)	Flow (cfs)
PIPE - 2500	Circle	Circle - 24.0 in	7.2	1	0.006	32.15
PIPE - 2600	Circle	Circle - 24.0 in	50.6	1	0.005	32.14
PIPE - 27 (2	Circle	Circle - 24.0 in	126.1	1	0.010	32.04
PIPE - 200	Circle	Circle - 36.0 in	235.7	1	0.032	76.95
PIPE - 201	Circle	Circle - 36.0 in	146.6	1	0.031	83.12
PIPE - 205	Circle	Circle - 18.0 in	49.9	1	-0.024	7.33
PIPE - 209	Circle	Circle - 18.0 in	33.2	1	-0.019	4.27
PIPE - 210	Circle	Circle - 18.0 in	60.2	1	-0.019	7.55
PIPE - 211	Circle	Circle - 18.0 in	80.2	1	-0.034	7.52
PIPE - 207	Circle	Circle - 18.0 in	7.3	1	-0.004	6.59
PIPE - 215	Circle	Circle - 18.0 in	30.7	1	-0.005	4.54
PIPE - 216	Circle	Circle - 18.0 in	9.1	1	-0.028	4.54
PIPE - 208	Circle	Circle - 18.0 in	68.4	1	-0.034	6.58
PIPE - 217	Circle	Circle - 18.0 in	40.0	1	-0.039	8.78
PIPE - 213	Circle	Circle - 18.0 in	29.4	1	-0.005	0.98
PIPE - 212	Circle	Circle - 18.0 in	7.3	1	-0.010	6.31
PIPE - 214	Circle	Circle - 18.0 in	69.0	1	-0.005	11.45
PIPE - 202	Circle	Circle - 42.0 in	239.8	1	0.020	86.68
PIPE - 218	Circle	Circle - 24.0 in	271.8	1	-0.033	17.48
PIPE - 220	Circle	Circle - 18.0 in	8.5	1	-0.060	8.81
PIPE - 221	Circle	Circle - 36.0 in	69.8	1	-0.035	23.21
PIPE - 203	Circle	Circle - 48.0 in	80.9	1	0.005	103.98
PIPE - 63 (232)	Circle	Circle - 48.0 in	106.5	1	0.005	111.63
PIPE - 67	Circle	Circle - 48.0 in	279.6	1	0.010	121.37
PIPE - 64	Circle	Circle - 24.0 in	118.8	1	-0.025	15.50
PIPE - 222	Circle	Circle - 18.0 in	8.2	1	-0.007	0.69
PIPE - 223	Circle	Circle - 18.0 in	28.5	1	-0.016	10.98
PIPE - 65	Circle	Circle - 18.0 in	46.2	1	-0.010	12.26
PIPE - 66	Circle	Circle - 18.0 in	10.2	1	-0.010	4.05
PIPE - 68	Circle	Circle - 48.0 in	123.1	1	0.010	120.46
PIPE - 69	Circle	Circle - 48.0 in	88.3	1	0.022	119.93
PIPE - 70	Circle	Circle - 48.0 in	90.1	1	0.021	119.73
PIPE - 71	Circle	Circle - 48.0 in	190.5	1	0.020	130.80

Analysis Results
Scenario: Q100
Conduit elements for network with outlet: O-1

Label	Section Type	Conduit Description	Length (Unified) (ft)	Number of Barrels	Slope (Calculated) (ft/ft)	Flow (cfs)
PIPE - 72	Circle	Circle - 48.0 in	56.1	1	0.020	130.31
PIPE - 27 1	Circle	Circle - 24.0 in	154.2	1	0.027	31.80
PIPE - 272	Circle	Circle - 24.0 in	321.3	1	0.033	31.58
PIPE - 273	Circle	Circle - 30.0 in	98.0	1	0.055	31.17

Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
10.23	5,893.15	5,893.11	5,898.68	5,898.54
10.23	5,892.91	5,892.66	5,897.88	5,896.86
10.20	5,892.36	5,891.10	5,896.22	5,893.69
17.92	5,866.88	5,859.35	5,869.62	5,863.47
17.95	5,858.35	5,853.85	5,861.15	5,855.82
4.15	5,860.85	5,862.04	5,863.72	5,863.47
7.13	5,860.99	5,861.62	5,862.41	5,861.57
8.30	5,859.54	5,860.69	5,861.75	5,860.95
10.21	5,856.55	5,859.24	5,860.30	5,859.08
4.35	5,857.98	5,858.01	5,859.36	5,859.34
2.57	5,857.36	5,857.51	5,859.13	5,859.07
8.39	5,857.36	5,857.62	5,859.09	5,859.07
9.91	5,855.35	5,857.68	5,858.67	5,855.96
11.22	5,855.51	5,857.06	5,858.21	5,857.27
0.55	5,856.55	5,856.70	5,859.08	5,859.08
3.57	5,856.55	5,856.62	5,859.11	5,859.08
6.48	5,855.51	5,855.85	5,858.09	5,857.27
9.01	5,847.00	5,842.24	5,850.91	5,849.13
12.49	5,846.15	5,855.01	5,856.52	5,849.47
4.99	5,846.65	5,847.16	5,849.53	5,849.47
3.28	5,842.74	5,845.15	5,849.22	5,849.13
8.27	5,841.24	5,840.84	5,848.05	5,847.62
8.88	5,840.75	5,840.22	5,845.76	5,845.12
12.82	5,839.92	5,837.12	5,843.23	5,840.52
10.99	5,841.32	5,844.30	5,845.72	5,845.12
0.39	5,843.34	5,843.40	5,847.62	5,847.62
6.22	5,843.34	5,843.81	5,847.93	5,847.62
6.94	5,844.80	5,845.26	5,847.35	5,846.72
2.29	5,844.80	5,844.90	5,846.73	5,846.72
9.59	5,836.12	5,834.89	5,840.45	5,839.58
17.45	5,833.88	5,831.94	5,837.18	5,834.35
17.14	5,830.94	5,829.05	5,834.24	5,831.47
17.17	5,828.05	5,824.24	5,831.47	5,826.68
17.03	5,820.68	5,819.58	5,824.10	5,822.29
13.36	5,890.10	5,885.89	5,891.99	5,887.79
14.43	5,884.89	5,874.27	5,886.77	5,876.19
17.49	5,873.27	5,867.88	5,875.17	5,871.67

Analysis Results
Scenario: Q100
Catch Basin elements for network with outlet: O-1

Label	Inlet Type	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Capture Efficiency (Calculated) (%)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)	Headloss Method
12-K	Full Capture	8.81	0.00	100.0	5,849.55	5,849.53	0.02	Standard
5-K	Percent Capture	4.27	0.10	97.7	5,862.43	5,862.41	0.02	Standard
7-K	Percent Capture	6.31	1.69	78.9	5,859.12	5,859.11	0.01	Standard
9-K	Percent Capture	4.54	0.20	95.8	5,859.13	5,859.13	0.01	Standard
10-K	Percent Capture	4.54	0.20	95.8	5,859.09	5,859.09	0.01	Standard

Manhole elements for network with outlet: O-1

Label	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)	Headloss Method	System Additional Flow (cfs)	System Known Flow (cfs)
FUTURE INLET	5,898.76	5,898.68	0.08	Standard	0.00	0.00
MH - 41 (Future)	5,898.54	5,897.88	0.65	Standard	0.00	0.00
MH - 42 (Future)	5,896.86	5,896.22	0.65	Standard	0.00	0.00
MH - 43 (Future)	5,893.69	5,891.99	1.70	Standard	0.00	0.00
MH - 200	5,871.67	5,869.62	2.05	Standard	0.00	0.00
OS-2-K (MH-201)	5,863.47	5,861.15	2.33	Standard	0.00	0.00
1+2-K	5,863.73	5,863.72	0.01	Standard	0.00	0.00
6-K	5,861.78	5,861.75	0.02	Standard	0.00	0.00
MH - 206	5,860.95	5,860.30	0.65	Standard	0.00	0.00
3+4-K	5,859.37	5,859.36	0.01	Standard	0.00	0.00
3-4-K (MH-205)	5,859.34	5,858.67	0.66	Standard	0.00	0.00
9-10-K	5,859.07	5,858.21	0.87	Standard	0.00	0.00
8-K	5,859.08	5,859.08	0.00	Standard	0.00	0.00
5-8-K	5,859.08	5,858.09	0.99	Standard	0.00	0.00
OS-4-K (MH202)	5,852.20	5,850.91	1.29	Standard	0.00	0.00
5-10-K	5,857.27	5,856.52	0.75	Standard	0.00	0.00

Analysis Results
Scenario: Q100
Manhole elements for network with outlet: O-1

Label	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)	Headloss Method	System Additional Flow (cfs)	System Known Flow (cfs)	System Rational Flow (cfs)	System Intensity (in/h)	System Flow Time (min)	System CA (acres)
OS-12-K	5,849.13	5,848.05	1.09	Standard	0.00	0.00	32.15	7.134	10.620	4.471
5-12-K	5,849.47	5,849.22	0.25	Standard	0.00	0.00	32.14	7.131	10.632	4.471
MH - 31 (K)	5,845.12	5,843.23	1.88	Standard	0.00	0.00	32.04	7.110	10.714	4.471
13-K	5,847.62	5,847.62	0.00	Standard	0.00	0.00	31.80	7.056	10.920	4.471
14-K	5,847.93	5,847.93	0.00	Standard	0.00	0.00	76.95	5.014	22.800	15.227
INLET 1-I	5,847.38	5,847.35	0.04	Standard	0.00	0.00	83.12	4.988	23.019	16.530
INLET 2-I	5,846.74	5,846.73	0.00	Standard	0.00	0.00	7.33	5.579	18.500	1.304
OS-14-K	5,847.62	5,845.76	1.86	Standard	0.00	0.00	7.55	7.707	8.628	0.972
MH - 30 (I)	5,846.72	5,845.72	1.00	Standard	0.00	0.00	7.52	7.669	8.749	0.972
MH - 32	5,840.52	5,840.45	0.07	Standard	0.00	0.00	6.59	8.570	6.200	0.763
MH - 33	5,839.58	5,837.18	2.40	Standard	0.00	0.00	6.58	8.559	6.228	0.763
MH - 34	5,834.33	5,834.24	0.09	Standard	0.00	0.00	8.78	6.815	11.899	1.277
INLET 5-I	5,832.28	5,831.47	0.81	Standard	0.00	0.00	0.98	9.086	5.000	0.106
MH - 35	5,824.90	5,824.10	0.81	Standard	0.00	0.00	11.45	4.733	25.384	2.401
MH-1 (Future)	5,887.79	5,886.77	1.02	Absolute	0.00	0.00	86.68	4.973	23.155	17.293
MH-2 (Future)	5,876.19	5,875.17	1.02	Absolute	0.00	0.00	17.48	4.715	25.562	3.678
							103.98	4.644	26.279	22.214
							23.21	4.679	25.924	4.921
							121.37	4.609	26.641	26.124
							0.69	9.086	5.000	0.076
							10.98	6.643	12.650	1.640
							12.26	7.036	11.000	1.729
							4.05	8.610	6.100	0.466
							111.63	4.628	26.441	23.930
							15.50	7.008	11.111	2.195

Analysis Results
Scenario: Q100
Manhole elements for network with outlet: O-1

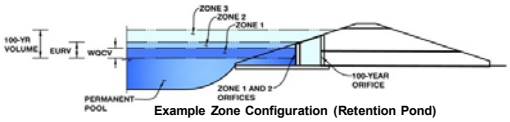
System Rational Flow (cfs)	System Intensity (in/h)	System Flow Time (min)	System CA (acres)
120.46	4.574	27.005	26.124
119.93	4.554	27.219	26.124
119.73	4.547	27.303	26.124
130.80	4.538	27.391	28.591
130.31	4.521	27.576	28.591
31.58	7.007	11.113	4.471
31.17	6.915	11.484	4.471

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Trails at Aspen Ridge - Filing No. 2

Basin ID: West Fork of Jimmy Camp Creek: East Pond(located in Sub-basin M)



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB			
Watershed Area =	157.90	acres		
Watershed Length =	3,742	ft		
Watershed Slope =	0.030	ft/ft		
Watershed Imperviousness =	27.03%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	87.0%	percent		
Percentage Hydrologic Soil Groups C/D =	13.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			
Water Quality Capture Volume (WQCV) =	1.867	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	4.278	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	3.322	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	4.890	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	7.605	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	13.125	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	16.756	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	21.488	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.55 in.) =	34.868	acre-feet	3.55	inches
Approximate 2-yr Detention Volume =	3.101	acre-feet		
Approximate 5-yr Detention Volume =	4.592	acre-feet		
Approximate 10-yr Detention Volume =	6.623	acre-feet		
Approximate 25-yr Detention Volume =	7.764	acre-feet		
Approximate 50-yr Detention Volume =	8.181	acre-feet		
Approximate 100-yr Detention Volume =	9.824	acre-feet		

Stage-Storage Calculation

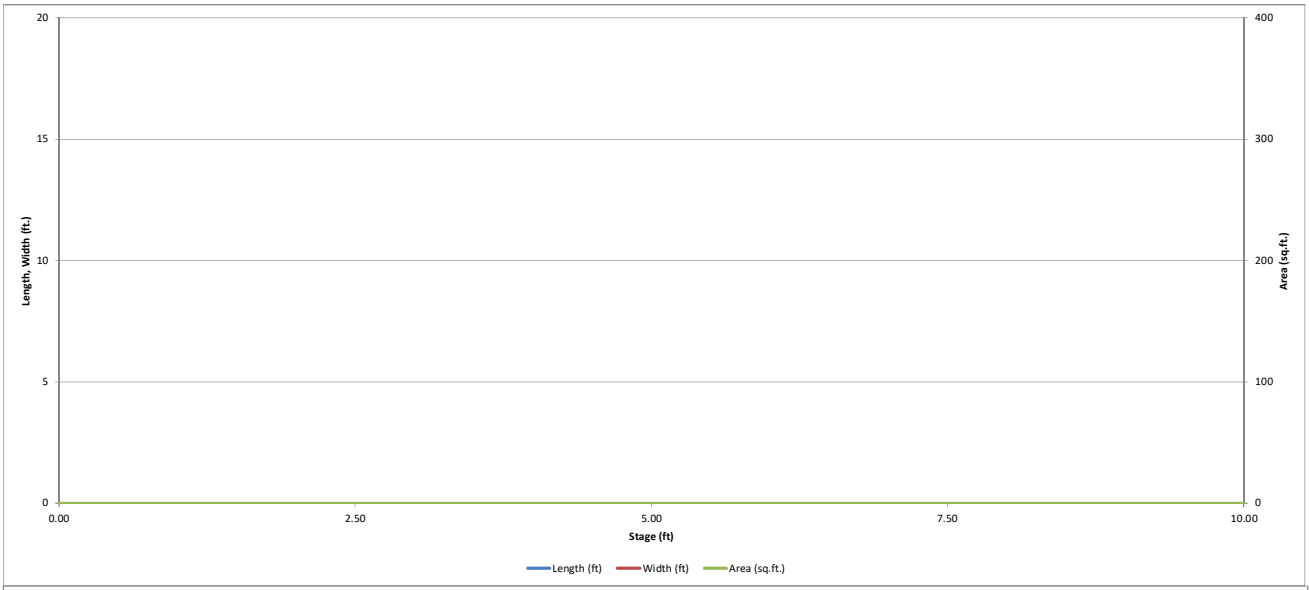
Zone 1 Volume (WQCV) =	1.867	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.412	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	5.546	acre-feet
Total Detention Basin Volume =	9.824	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (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

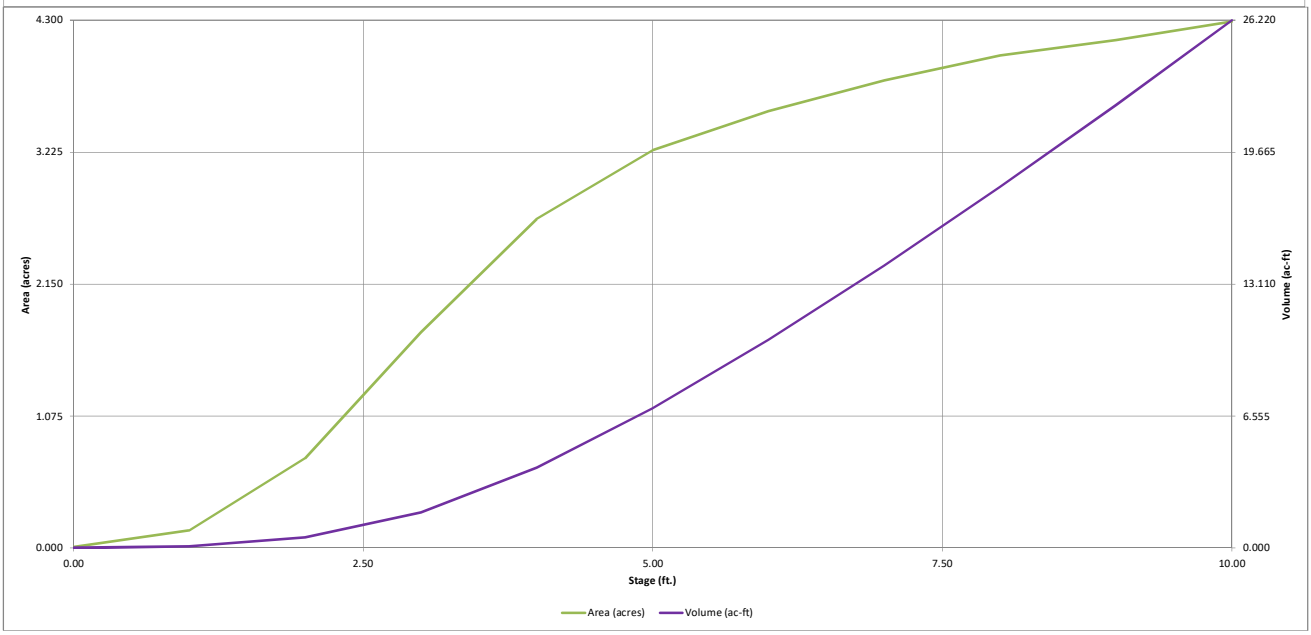
Depth Increment = 1 ft

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	--	--	--	443	0.010		
5817	--	1.00	--	--	--	6,211	0.143	3,265	0.075
5818	--	2.00	--	--	--	31,782	0.730	22,007	0.505
5819	--	3.00	--	--	--	76,551	1.757	76,490	1.756
5820	--	4.00	--	--	--	116,770	2.681	173,150	3.975
5821	--	5.00	--	--	--	141,034	3.238	302,052	6.934
5822	--	6.00	--	--	--	154,951	3.557	450,045	10.332
5823	--	7.00	--	--	--	165,754	3.805	610,397	14.013
5824	--	8.00	--	--	--	174,708	4.011	780,628	17.921
5825	--	9.00	--	--	--	180,233	4.138	958,098	21.995
5826	--	10.00	--	--	--	186,799	4.288	1,141,614	26.208

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



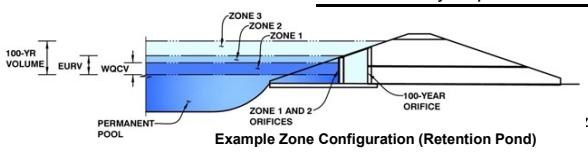


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Trails at Aspen Ridge - Filing No. 2

Basin ID: West Fork of Jimmy Camp Creek-East Pond. (Filing No. 2 Conditions)



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.07	1.867	Orifice Plate
Zone 2 (EURV)	4.12	2.412	Rectangular Orifice
Zone 3 (100-year)	5.86	5.546	Weir&Pipe (Restrict)
		9.824	Total

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)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area CHECK CELLS AB84:BE84	N/A	ft^2
Depth at top of Zone using Orifice Plate =	2.90	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	8.00	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	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	0.70	1.40	2.10	2.80			
Orifice Area (sq. inches)	4.10	4.20	4.20	4.20	4.30			

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected		Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	3.73	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	2.50	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	6.95	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.63	N/A	feet
Vertical Orifice Height =	15.00	N/A	inches				
Vertical Orifice Width =	24.00		inches				

Calculated Parameters for Vertical Orifice

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected		Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	6.94	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	6.94	N/A	feet
Overflow Weir Front Edge Length =	14.50	N/A	feet	Over Flow Weir Slope Length =	9.50	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)	Grate Open Area / 100-yr Orifice Area =	9.23	N/A	should be ≥ 4
Horiz. Length of Weir Sides =	9.50	N/A	feet	Overflow Grate Open Area w/o Debris =	103.31	N/A	ft^2
Overflow Grate Open Area % =	75%	N/A	%, grate open area/total area	Overflow Grate Open Area w/ Debris =	56.82	N/A	ft^2
Debris Clogging % =	45%	N/A	%				

Calculated Parameters for Overflow Weir

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 =	0.50	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	11.19	N/A	ft^2
Outlet Pipe Diameter =	48.00	N/A	inches	Outlet Orifice Centroid =	1.80	N/A	feet
Restrictor Plate Height Above Pipe Invert =	40.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	2.30	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	8.08	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.85	feet
Spillway Crest Length =	136.00	feet	Stage at Top of Freeboard =	9.93	feet
Spillway End Slopes =	5.00	H:V	Basin Area at Top of Freeboard =	4.28	acres
Freeboard above Max Water Surface =	1.00	feet			

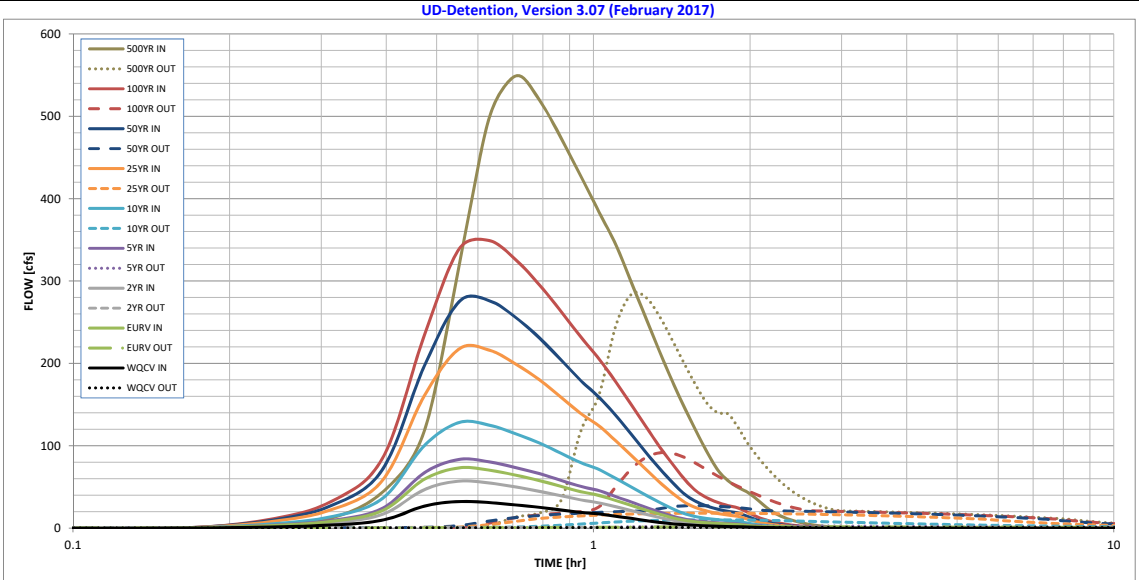
Calculated Parameters for Spillway

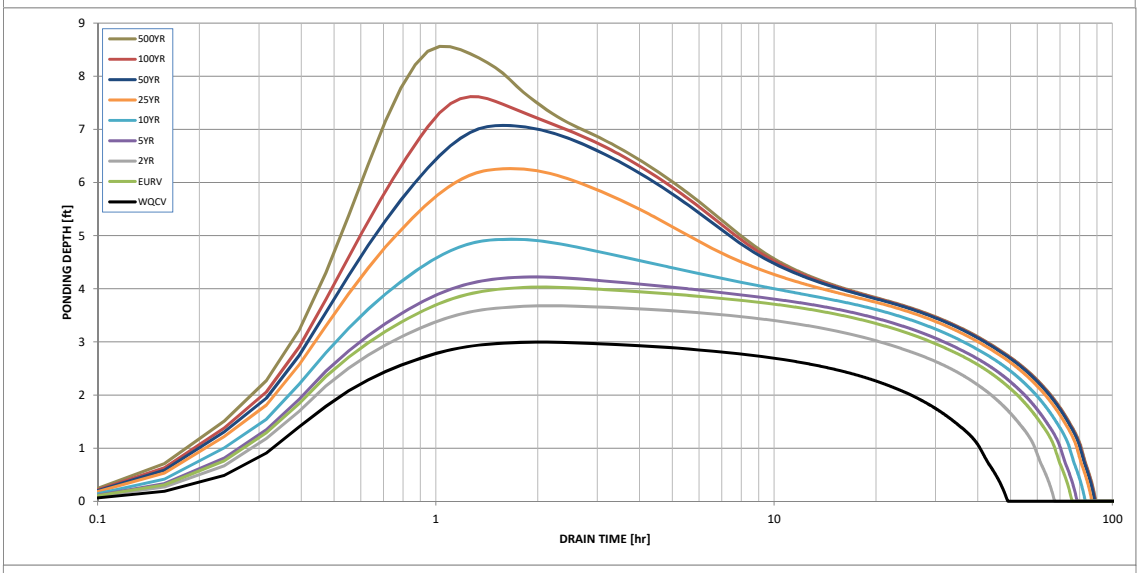
Routed Hydrograph Results

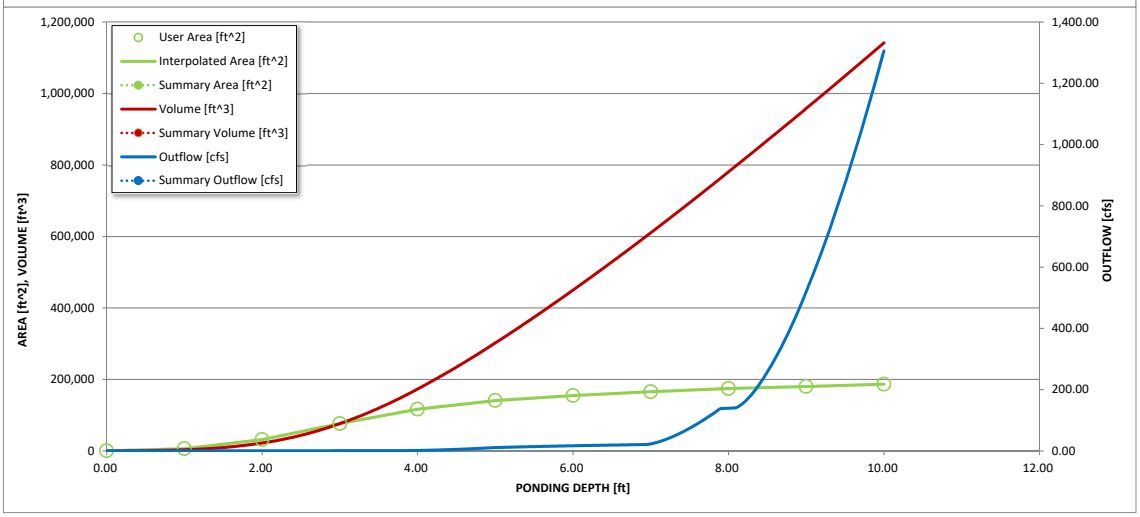
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.55
Calculated Runoff Volume (acre-ft) =	1.867	4.278	3.322	4.890	7.605	13.125	16.756	21.488	34.868
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	1.866	4.278	3.321	4.889	7.600	13.117	16.748	21.480	34.859
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.04	0.24	0.73	1.00	1.33	2.22
Predevelopment Peak Q (cfs) =	0.0	0.0	2.1	5.8	37.2	114.6	157.3	210.2	349.8
Peak Inflow Q (cfs) =	32.3	73.2	57.1	83.4	128.3	217.6	276.2	349.2	549.2
Peak Outflow Q (cfs) =	0.8	1.8	1.0	2.9	10.1	18.2	27.4	91.5	283.8
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.5	0.3	0.2	0.2	0.4	0.8
Structure Controlling Flow =	Plate	Vertical Orifice 1	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Grate 1	Overflow Grate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	0.1	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	N/A
Time to Drain 97% of Inflow Volume (hours) =	42	65	58	67	68	67	65	62	54
Time to Drain 99% of Inflow Volume (hours) =	**46**	70	62	72	75	76	76	74	70
Maximum Ponding Depth (ft) =	3.00	4.03	3.68	4.22	4.93	6.26	7.07	7.62	8.56
Area at Maximum Ponding Depth (acres) =	1.75	2.70	2.39	2.80	3.19	3.62	3.82	3.93	4.08
Maximum Volume Stored (acre-ft) =	1.738	4.056	3.164	4.578	6.677	11.229	14.280	16.372	20.187

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







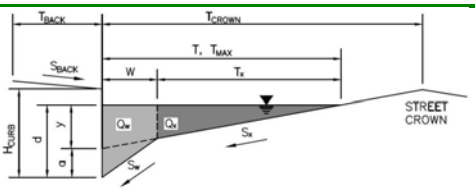
Version 4.05 Released March 2017

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

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

Project: Trails at Aspen Ridge Filing No. 2

Inlet ID: 1+2-K



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	13.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	13.5	13.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

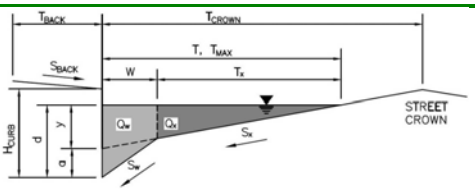
Version 4.05 Released March 2017

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

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

Project: Trails at Aspen Ridge Filing No. 2

Inlet ID: 3+4-K



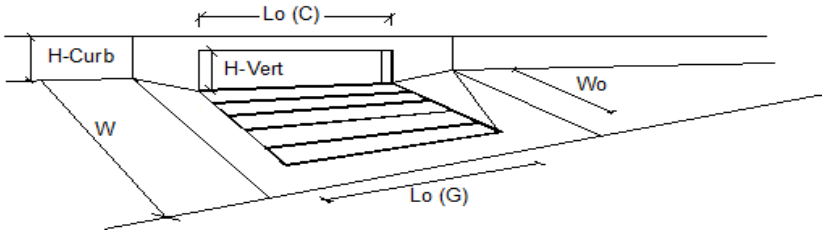
Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.016		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes
MINOR STORM Allowable Capacity is based on Spread Criterion		Minor Storm	Major Storm	
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**14.8**	**14.8**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.9**	**5.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**87**	**%**

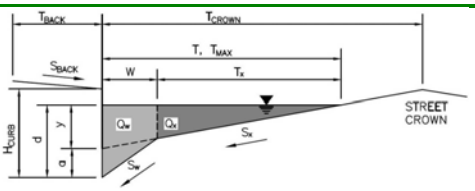
Version 4.05 Released March 2017

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

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

Project: Trails at Aspen Ridge Filing No. 2

Inlet ID: 5-K



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	13.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.055	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	13.5	13.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

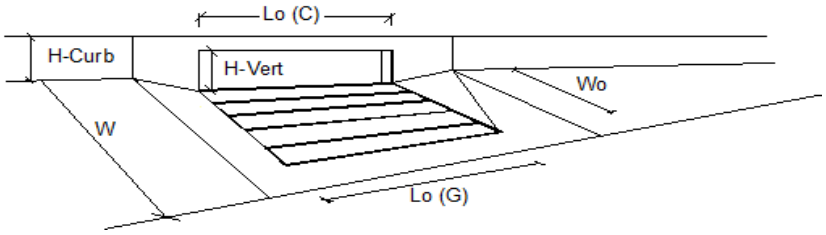
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**14.4**	**14.5**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



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

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.0**	**4.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**98**	**%**

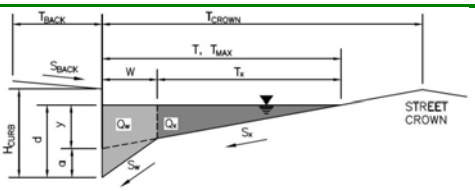
Version 4.05 Released March 2017

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

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

Project: Trails at Aspen Ridge Filing No. 2

Inlet ID: 6-K



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	13.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.055	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	13.5	13.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

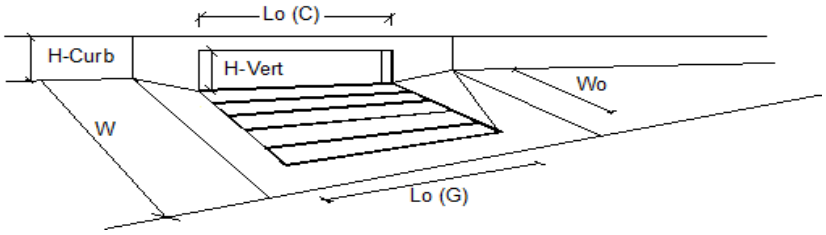
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**14.4**	**14.5**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



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

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.5**	**3.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

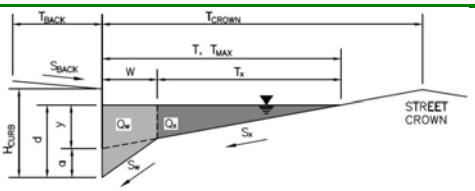
Version 4.05 Released March 2017

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

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

Project: Trails at Aspen Ridge Filing No. 2

Inlet ID: 7-K



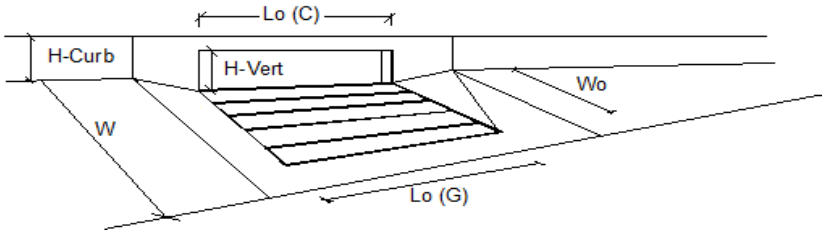
Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.024		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes
MINOR STORM Allowable Capacity is based on Spread Criterion		Minor Storm	Major Storm	
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**18.1**	**18.1**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



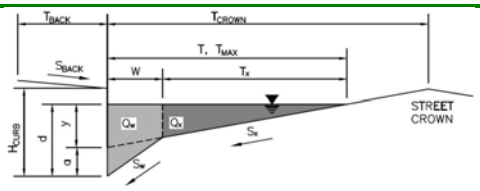
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.9**	**6.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**79**	**%**

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

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

Project: Trails at Aspen Ridge Filing No. 2

Inlet ID: 8-K



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.007	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

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

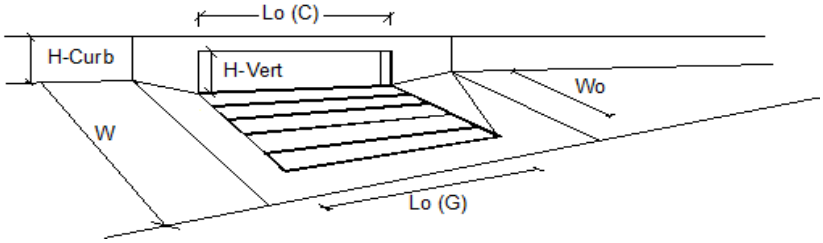
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**9.1**	**9.1**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)

		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'

		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**0.4**	**0.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

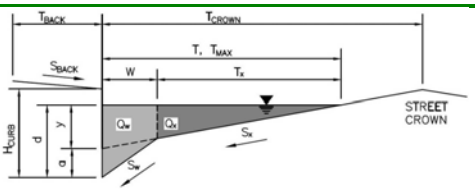
Version 4.05 Released March 2017

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

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

Project: Trails at Aspen Ridge Filing No. 2

Inlet ID: 9-K



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.039	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

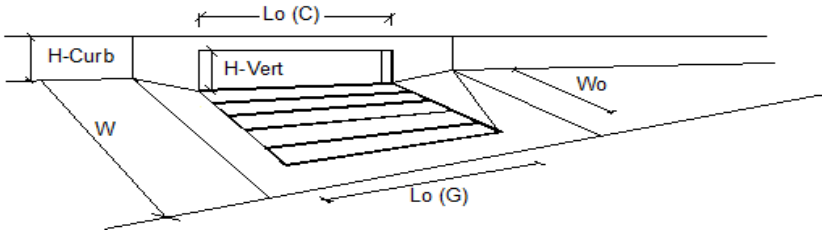
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**16.4**	**23.0**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



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

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.1**	**4.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**96**	**%**

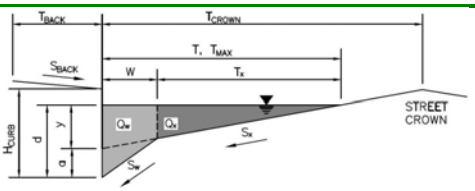
Version 4.05 Released March 2017

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

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

Project: Trails at Aspen Ridge Filing No. 2

Inlet ID: 10-K



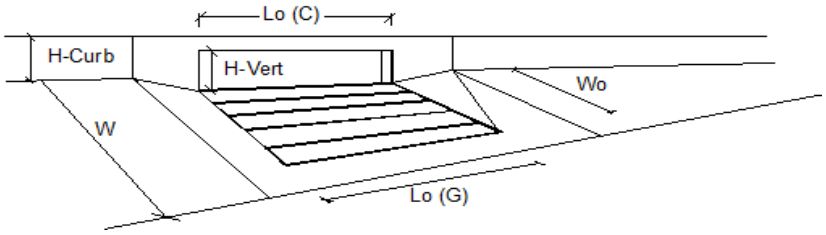
Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.039		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**16.4**	**23.0**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.1**	**4.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**96**	**%**

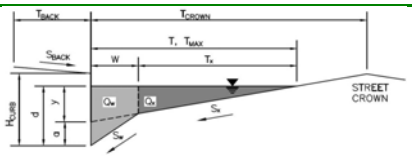
Version 4.05 Released March 2017

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

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

Project: Trails at Aspen Ridge Filing No. 2

Inlet ID: 11+12-K



Gutter Geometry (Enter data in the blue cells)

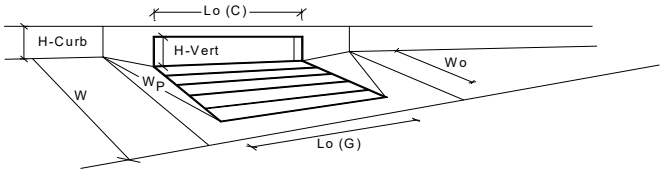
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	9.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_x =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_w =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_o =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)

		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	0.00	0.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.7	5.7	inches

Grate Information

		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	

Curb Opening Information

		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)

		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.31	0.31	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.54	0.54	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.92	0.92	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**7.3**	**7.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.0	5.5	cfs

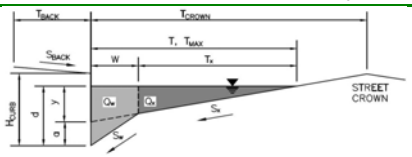
Version 4.05 Released March 2017

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

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

Project: Trails at Aspen Ridge Filing No. 2

Inlet ID: 13-K



Gutter Geometry (Enter data in the blue cells)

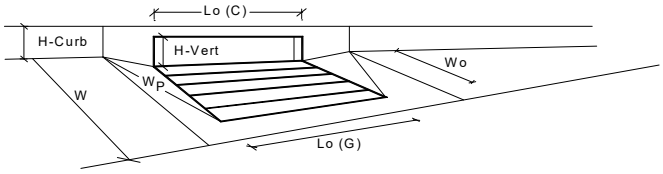
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_x =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_w =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_o =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)

Type of Inlet: CDOT Type R Curb Opening

		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.7	5.7	inches

Grate Information

		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	

Curb Opening Information

		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)

		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.31	0.31	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.54	0.54	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.92	0.92	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**7.3**	**7.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.7	5.8	cfs

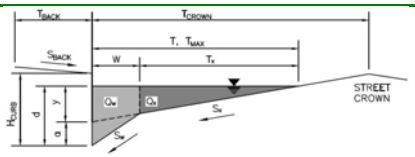
Version 4.05 Released March 2017

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

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

Trails at Aspen Ridge Filing No. 2

14-K



Gutter Geometry (Enter data in the blue cells)

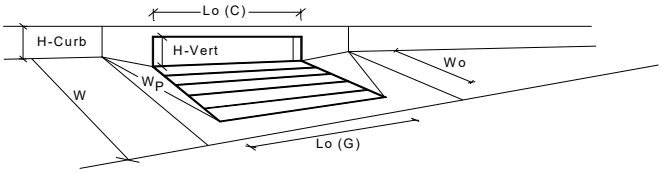
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)

		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.7	5.7	inches

Grate Information

		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	

Curb Opening Information

		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)

		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.31	0.31	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.54	0.54	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.92	0.92	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**7.27**	**7.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.66	5.8	cfs

APPENDIX B

STANDARD DESIGN CHARTS AND TABLES

Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis--Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

3.2 Time of Concentration

One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.

Figure 6-25. Estimate of Average Concentrated Shallow Flow

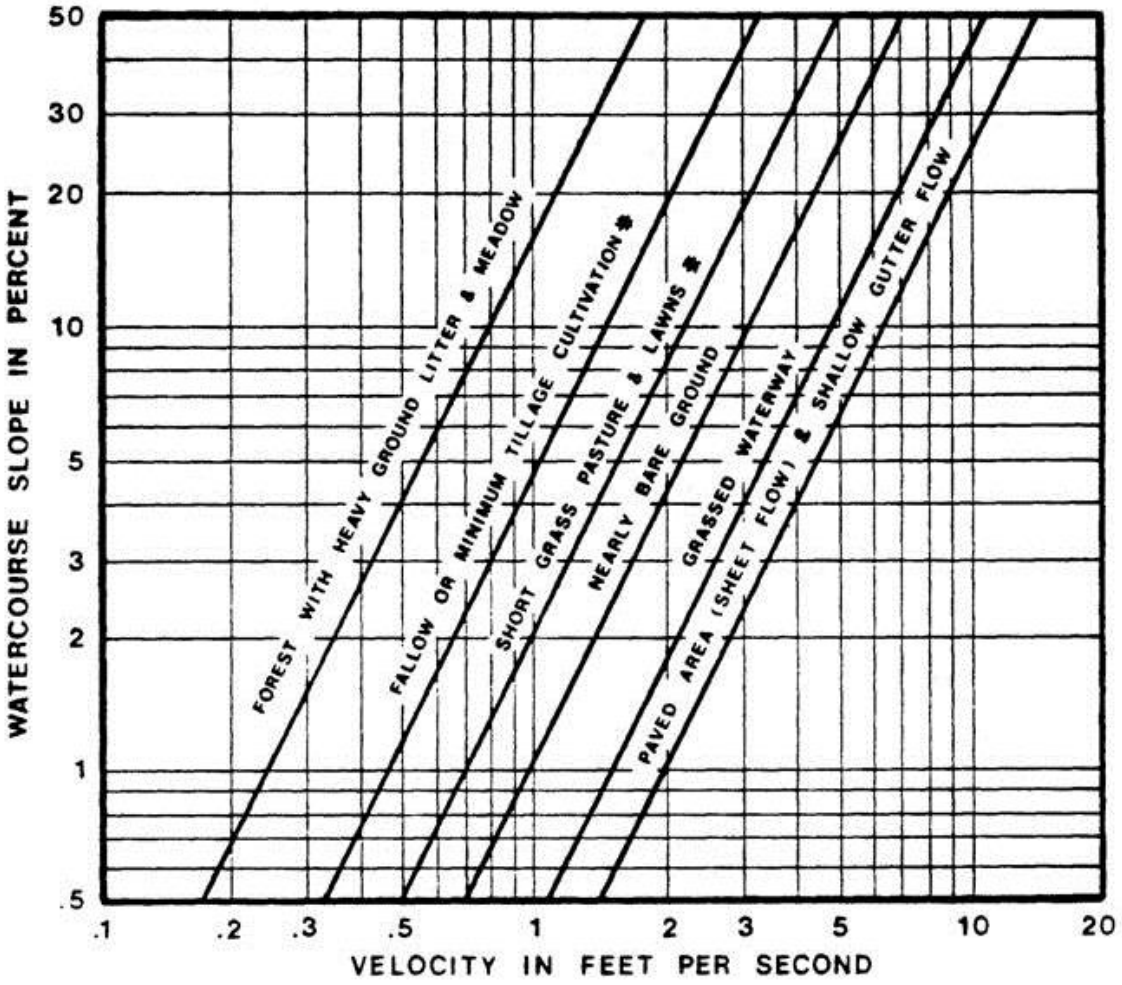
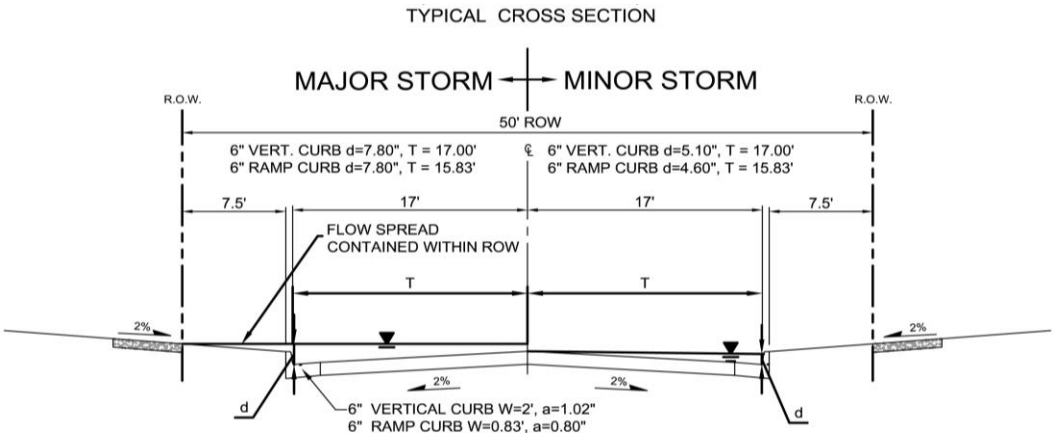
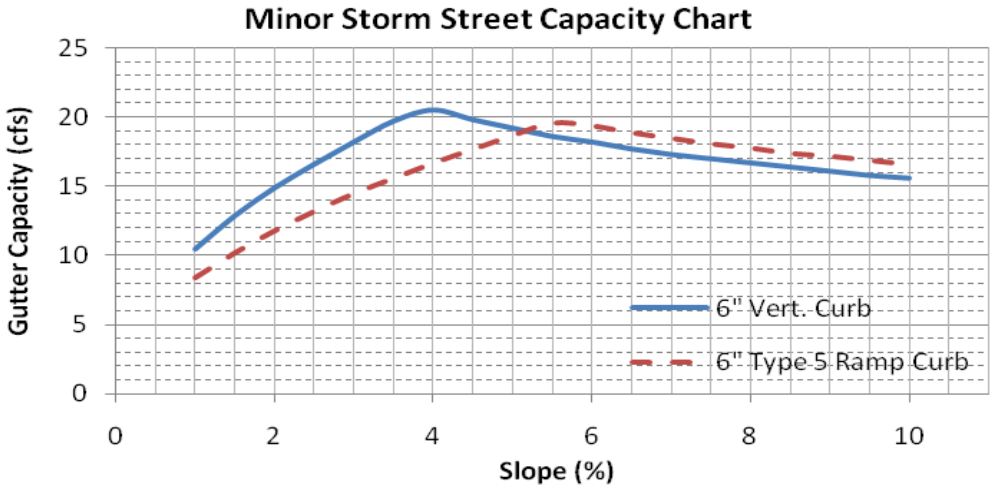
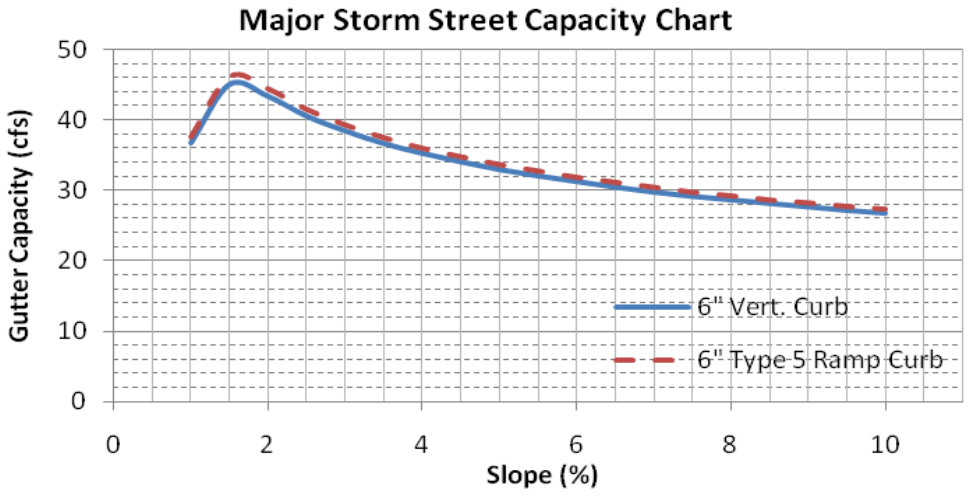


Figure 7-7. Street Capacity Charts Residential (Detached Sidewalk)

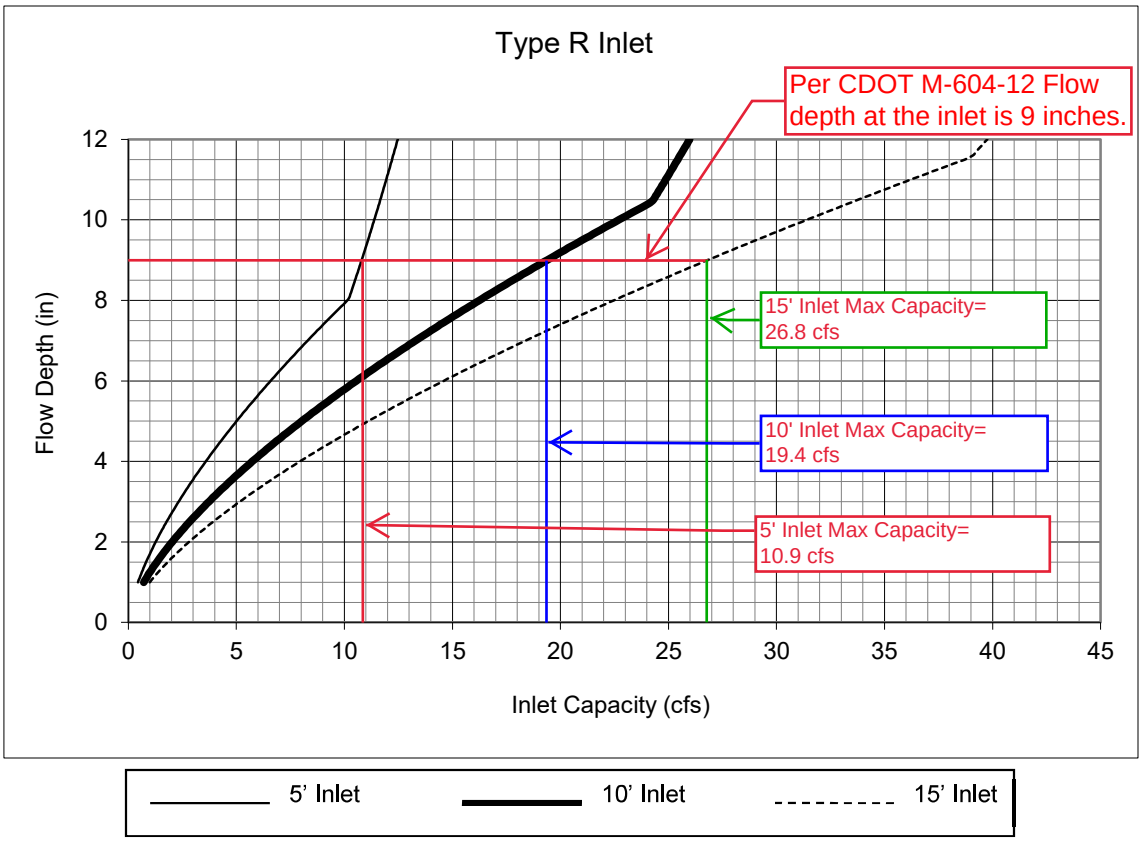






These charts shall only be used for the standard street sections as shown. The capacity shown is based on ½ the street section as calculated by the UD-Inlet spreadsheets. Minor storm capacities are based on no crown overtopping, curb height or maximum allowable spread widths. Major storm capacities are based on flow being containing within the public right-of-way, including conveyance capacity behind the curb. The UDFCD Safety Reduction Factor was applied. An 'n_{STREET}' of 0.016 and 'n_{BACK}' of 0.020 was used. Calculations were done using UD-Inlet 3.00.xls, March, 2011.

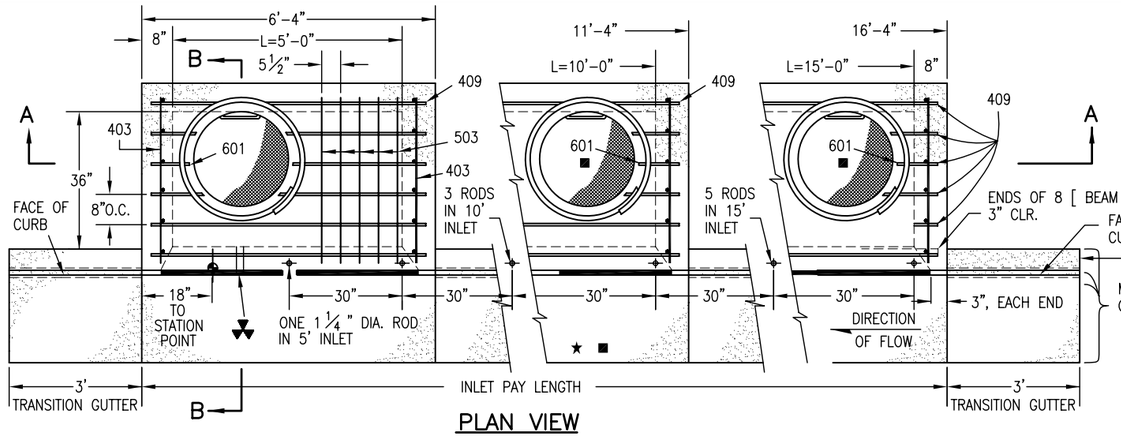
Figure 8-11. Inlet Capacity Chart Sump Conditions , Curb Opening (Type R) Inlet



SUMP INLETS:
DP 1-A: 18.9 CFS=> 10' INLET
DP 2-A: 5.2 CFS=> 5' INLET
DP 3-A: 9.0 CFS=> 5' INLET
DP 4-A: 1.0 CFS=> 5' INLET
DP 1-C: 12.9 CFS=> 10' INLET
DP 2-C: 5.3 CFS=> 5' INLET
DP 3-C: 11.1 CFS=> 10' INLET
DP 4-C: 11.1 CFS=> 10' INLET
DP 5-C: 12.5 CFS=> 10' INLET
DP 6-C: 0.6 CFS=> 5' INLET
DP 7-C: 8.8 CFS=> 5' INLET
DP 8-C: 0.5 CFS=> 5' INLET
DP 1-E: 16.65 CFS=> 10' INLET
DP 2-E: 16.65 CFS=> 10' INLET

DP 7-F: 16.5 CFS=> 10' INLET
DP 8-F: 3.3 CFS=> 5' INLET
DP 1-H: 16.0 CFS=> 10' INLET
DP 2-H: 4.7 CFS=> 5' INLET
DP 3-H: 13.3 CFS=> 10' INLET
DP 4-H: 4.2 CFS=> 5' INLET
DP 9-H: 13.0 CFS=> 10' INLET
DP 10-H: 8.8 CFS=> 5' INLET
DP 11-H: 18.0 CFS=> 10' INLET
DP 1-I: 12.4 CFS=> 10' INLET
DP 2-I: 4.7 CFS=> 5' INLET
DP 3-I: 15.6 CFS=> 10' INLET

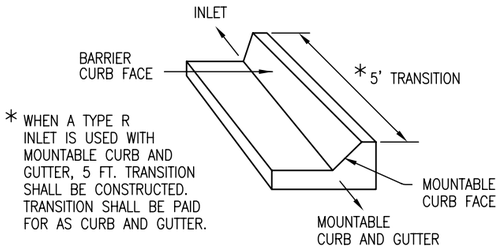
Notes:
1. The standard inlet parameters must apply to use this chart.



PLAN VIEW

★ FOR LENGTH (L) GREATER THAN 5 FT. PROVIDE MAINTENANCE ACCESS AT BOTH ENDS.

■ ADDITIONAL MANHOLE RING AND COVER REQUIRED WHEN L=10 FT. OR MORE. CUT REINFORCEMENT BAR ACCORDINGLY.

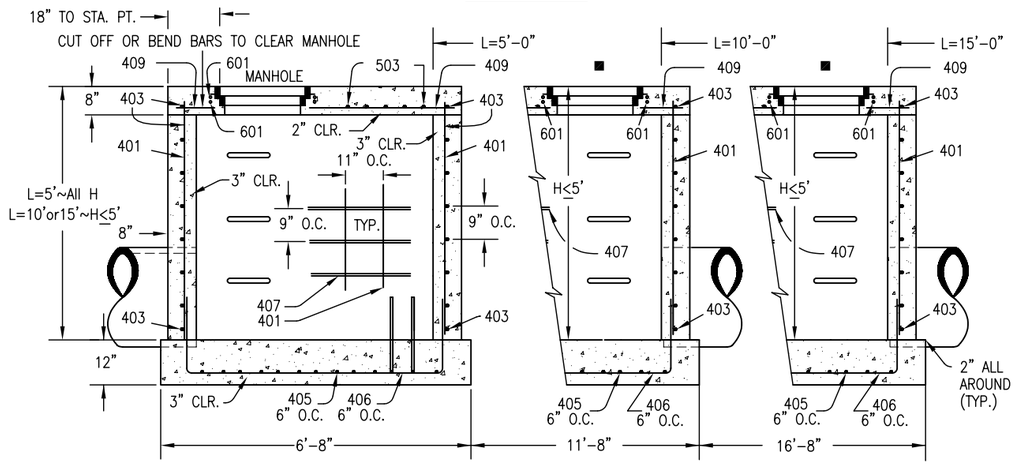


* WHEN A TYPE R INLET IS USED WITH MOUNTABLE CURB AND GUTTER, 5 FT. TRANSITION SHALL BE CONSTRUCTED. TRANSITION SHALL BE PAID FOR AS CURB AND GUTTER.

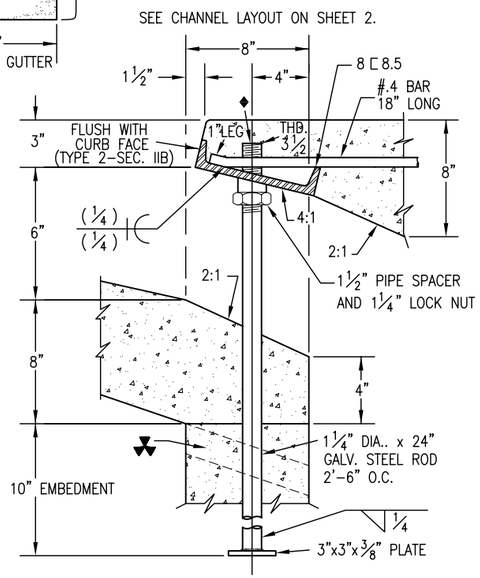
TRANSITION CURB

GENERAL NOTES:

SEE SHEET 2.



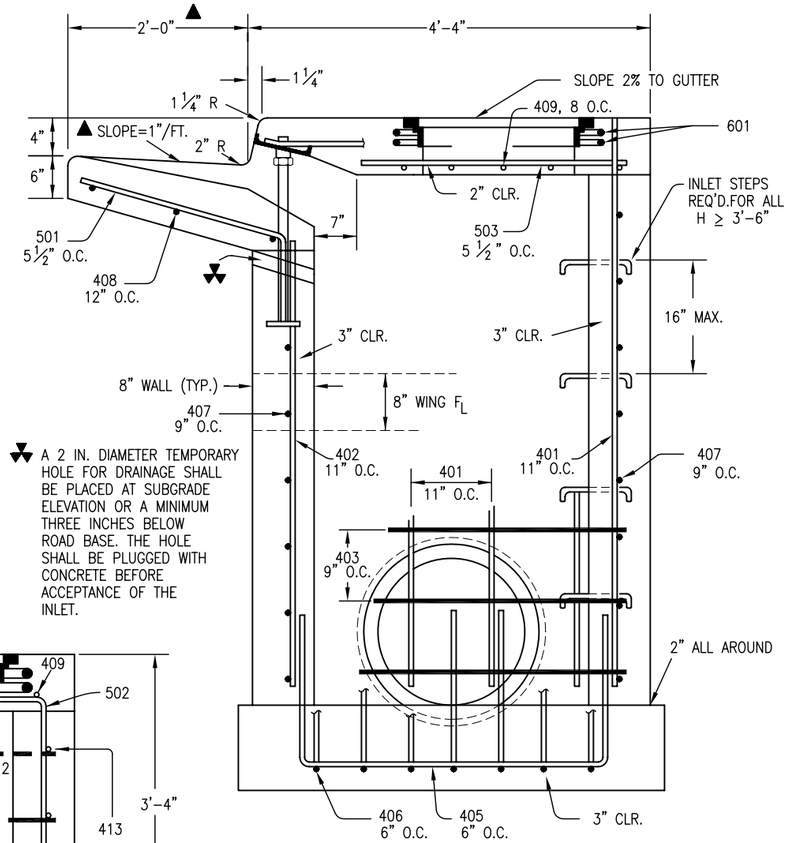
SECTION A–A REGULAR INLET



CURB FACE ASSEMBLY

◆ PLACE ENTIRE ASSEMBLY BEFORE POURING CONCRETE.

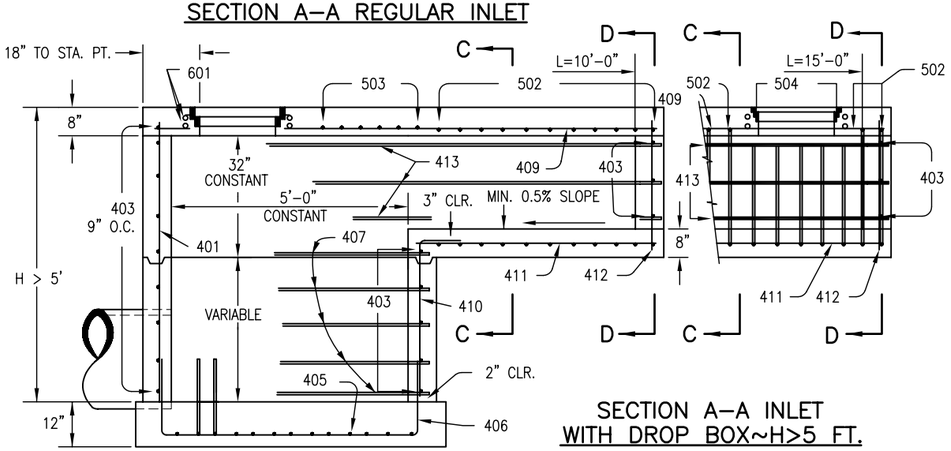
▲ – FOR A 1'–0" PAN SLOPE 2" PER FT.



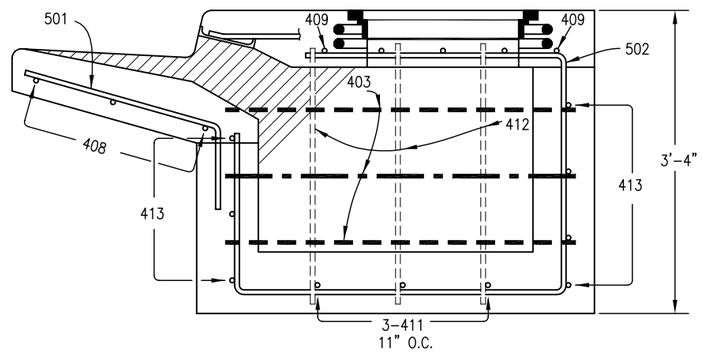
SECTION B–B END VIEW

NOTE: MANHOLE RING AND COVER, STATION POINT AND OUTFLOW PIPE SHALL BE LOCATED AT THE SAME END OF THE INLET.

♣ A 2 IN. DIAMETER TEMPORARY HOLE FOR DRAINAGE SHALL BE PLACED AT SUBGRADE ELEVATION OR A MINIMUM THREE INCHES BELOW ROAD BASE. THE HOLE SHALL BE PLUGGED WITH CONCRETE BEFORE ACCEPTANCE OF THE INLET.



SECTION A–A INLET WITH DROP BOX~H>5 FT.



SECTIONS C–C & D–D (DOTTED BARS ARE IN SECTION D–D)

Computer File Information		Sheet Revisions	
Creation Date: 07/04/06 Initials: SJR	(R-X)	Date:	Comments
Last Modification Date: 07/04/06 Initials: LTA	(R-X)		
Full Path: www.dot.state.co.us/DesignSupport/	(R-X)		
Drawing File Name: 6040120102.dwg	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English			

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Phone: (303) 757–9083
Fax: (303) 757–9820
Project Development Branch SRJ/LTA

CURB INLET TYPE R

Issued By: Project Development Branch on July 04, 2006

STANDARD PLAN NO.
M-604-12
Sheet No. 1 of 2

MARK	BAR # OR SIZE	O.C. SPACING	TYPE	ALL INLETS L = 5 FT.		INLETS: H ≤ 5 FT. L = 10 FT.		INLETS: H ≤ 5 FT. L = 15 FT.		INLETS: H > 5 FT. L = 10 FT.		INLETS: H > 5 FT. L = 15 FT.	
				NO. REQ'D.	LENGTH	NO. REQ'D.	LENGTH	NO. REQ'D.	LENGTH	NO. REQ'D.	LENGTH	NO. REQ'D.	LENGTH
401	4	11"	II	15	*	21	*	26	*	11	*	11	*
402	4	11"	II	7	*	13	*	18	*	7	*	7	*
403	4	9"	II	*	4'-0"	*	4'-0"	*	4'-0"	*	4'-0"	*	4'-0"
405	4	6"	VI	11	6'-10"	21	6'-10"	31	6'-10"	11	6'-10"	11	6'-10"
406	4	6"	VIII	7	8'-10"	7	13'-10"	7	18'-10"	7	8'-10"	7	8'-10"
407	4	9"	II	*	5'-10"	*	10'-10"	*	15'-10"	*	5'-10"	*	5'-10"
408	4	12"	II	3	6'-10"	3	11'-10"	3	16'-0"	3	11'-10"	3	16'-0"
409	4	8"	II	6	5'-10"	6	10'-10"	6	15'-10"	6	10'-10"	6	15'-10"
410	4	11"	VII							3	*	3	*
411	4	11"	II							3	5'-2"	3	10-2"
412	4	11"	II							3	2'-9"	3	2'-9"
413	4	9"	II							7	10'-10"	7	15'-10"
501	5	5½"	IV	11	3'-4"	22	3'-4"	33	3'-4"	22	3'-4"	33	3'-4"
502	5	5½"	III							11	11'-5"	17	11'-5"
503	5	5½"	II	5	3'-6"	16	3'-6"	27	3'-6"	6	3'-6"	6	3'-6"
504	5	5½"	IX									5	8'-4"
601	6	2½"	V	2	8'-10"	2	8'-10"	2	8'-10"	2	8'-10"	4	8'-10"
■8[8.5				1	5'-10"	1	10'-10"	1	15'-10"	1	10'-10"	1	15'-10"
				2 BARS, 1 RODS	——	4 BARS, 3 RODS	——	8 BARS, 5 RODS	——	4 BARS, 3 RODS	——	8 BARS, 5 RODS	——
						REGULAR INLETS				DROP BOX INLETS			

* VARIABLE REFER TO TABLE TWO.

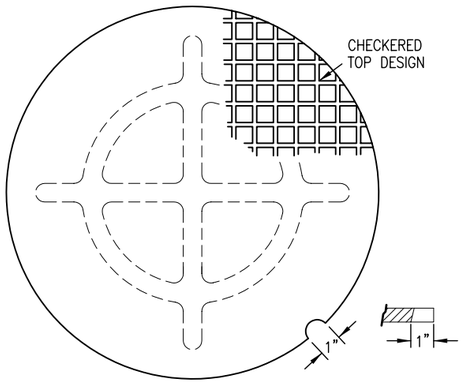
■ INCLUDE #4, 18 IN. BARS (SEE CHANNEL LAYOUT).

TABLE ONE ~ BAR LIST FOR CURB INLETS, TYPE "R"

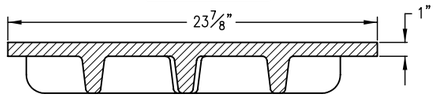
"H"	LENGTH 401	LENGTH 402	LENGTH 410	NO. REQ'D. REGULAR 403	NO. REQ'D. REGULAR 407	NO. REQ'D. DROP BOX 403	NO. REQ'D. DROP BOX 407	L = 5 FT. CONC. CU. YDS.	L = 5 FT. STEEL LBS.	L = 10 FT. CONC. CU. YDS.	L = 10 FT. STEEL LBS.	L = 15 FT. CONC. CU. YDS.	L = 15 FT. STEEL LBS.
3'-0"	2'-8"	1'-8"		10	7			3.2	285	5.3	497	7.4	706
3'-6"	3'-2"	2'-2"		10	7			3.4	305	5.7	528	7.9	747
4'-0"	3'-8"	2'-8"		12	9			3.7	326	6.0	559	8.4	786
4'-6"	4'-2"	3'-2"		12	9			3.9	334	6.4	571	8.8	803
5'-0"	4'-8"	3'-8"		14	11			4.1	354	6.7	602	9.3	844
5'-6"	5'-2"	4'-2"	3'-5"	16	13	15	6	4.4	375	6.0	607	7.4	850
6'-0"	5'-8"	4'-8"	3'-11"	16	13	16	6	4.6	382	6.2	616	7.6	860
6'-6"	6'-2"	5'-2"	4'-5"	18	15	18	8	4.8	402	6.4	637	7.8	880
7'-0"	6'-8"	5'-8"	4'-11"	20	17	19	10	5.0	423	6.6	654	8.0	897
7'-6"	7'-2"	6-2"	5'-5"	20	17	20	10	5.3	430	6.9	664	8.3	907
8'-0"	7'-8"	6'-8"	5'-11"	22	19	22	12	5.5	451	7.1	684	8.5	927
8'-6"	8'-2"	7'-2"	6'-5"	24	21	23	14	5.7	471	7.3	702	8.7	944
9'-0"	8'-8"	7'-8"	6'-11"	24	21	24	14	6.0	479	7.6	711	9.0	954
9'-6"	9'-2"	8'-2"	7'-5"	26	23	26	16	6.2	499	7.8	732	9.2	974
10'-0"	9'-8"	8'-8"	7'-11"	28	25	27	18	6.4	520	8.0	749	9.4	992
10'-6"	10'-2"	9'-2"	8'-5"	28	25	28	18	6.7	527	8.3	759	9.7	1001
11'-0"	10'-8"	9'-8"	8'-11"	30	27	30	20	6.9	547	8.5	779	9.9	1022

NOTES: FOR L=5 FT., L=10 FT., AND L=15 FT.
REGULAR INLETS: TOTAL QUANTITIES NEEDED ARE OUTSIDE THE HEAVY BLACK LINE.
DROP BOX INLETS: TOTAL QUANTITIES NEEDED ARE INSIDE THE HEAVY BLACK LINE.
STEEL WEIGHTS DO NOT INCLUDE STRUCTURAL STEEL CHANNEL.

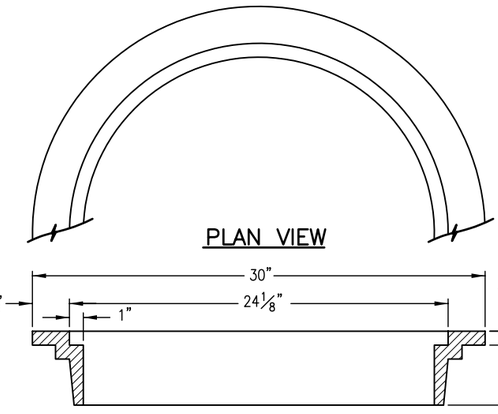
TABLE TWO ~ BARS AND QUANTITIES VARIABLE WITH "H"



PLAN VIEW



ELEVATION VIEW
MANHOLE COVER (TYP.)



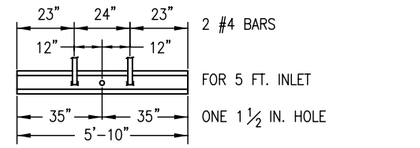
PLAN VIEW

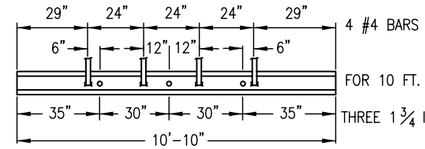
ELEVATION VIEW
MANHOLE RING (TYP.)

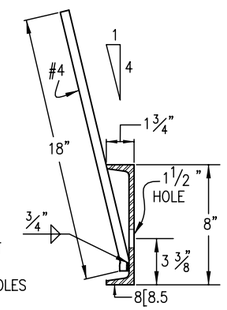
WEIGHTS: COVER = 125 LBS.
+ RING = 135 LBS.
TOTAL = 260 LBS.

GENERAL NOTES

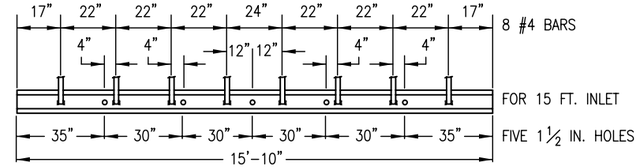
1. CONCRETE SHALL BE CLASS B. INLET MAY BE CAST-IN-PLACE OR PRECAST.
2. CONCRETE WALLS SHALL BE FORMED ON BOTH SIDES AND SHALL BE 8 IN. THICK.
3. INLET STEPS SHALL BE IN CONFORMANCE WITH AASHTO M 199.
4. CURB FACE ASSEMBLY SHALL BE GALVANIZED AFTER WELDING.
5. EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED ¾ IN. CURB AND GUTTER CORNERS SHALL BE FINISHED TO MATCH THE EXISTING CURB AND GUTTER BEYOND THE TRANSITION GUTTER.
6. REINFORCING BARS SHALL BE DEFORMED AND SHALL HAVE A 2 IN. MINIMUM CLEARANCE. ALL REINFORCING BARS SHALL BE EPOXY COATED.
7. DIMENSIONS AND WEIGHTS OF TYPICAL MANHOLE RING AND COVER ARE NOMINAL.
8. MATERIAL FOR MANHOLE RINGS AND COVERS SHALL BE GRAY OR DUCTILE CAST IRON IN ACCORDANCE WITH SUBSECTION 712.06.
9. SINCE PIPE ENTRIES INTO THE INLET ARE VARIABLE, THE DIMENSIONS SHOWN ARE TYPICAL. ACTUAL DIMENSIONS AND QUANTITIES FOR CONCRETE AND REINFORCEMENT SHALL BE AS REQUIRED IN THE WORK. QUANTITIES INCLUDE VOLUMES OCCUPIED BY PIPES.
10. STRUCTURAL STEEL SHALL BE GALVANIZED AND SHALL BE IN ACCORDANCE WITH SUBSECTION 712.06.





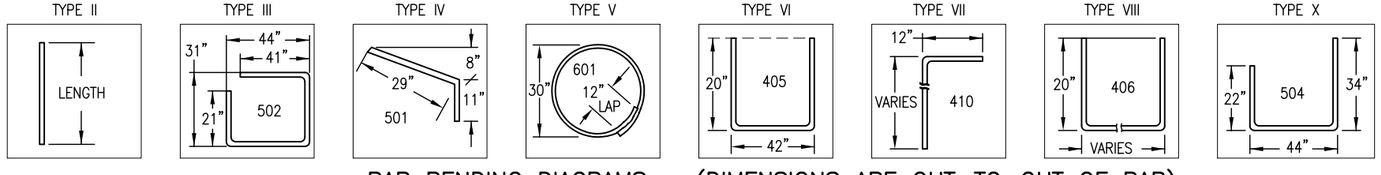


SECTION AT HOLE (TYP.)



CHANNEL LAYOUT DETAILS

SEE CURB FACE ASSEMBLY ON SHEET 1.



BAR BENDING DIAGRAMS ~ (DIMENSIONS ARE OUT-TO-OUT OF BAR)

Computer File Information		Sheet Revisions	
Creation Date: 07/04/06	Initials: SJR	Date:	Comments
Last Modification Date: 07/04/06	Initials: LTA		
Full Path: www.dot.state.co.us/DesignSupport/			
Drawing File Name: 6040120202.dwg			
CAD Ver.: MicroStation V8 Scale: Not to Scale	Units: English		

(R-X) (R-X) (R-X) (R-X)

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Project Development Branch SRJ/LTA

CURB INLET TYPE R

Issued By: Project Development Branch on July 04, 2006

STANDARD PLAN NO.
M-604-12
Sheet No. 2 of 2

APPENDIX C

REPORT REFERENCES

EXCERPTS FROM DBPS
WEST FORK JIMMY CAMP CREEK

on the design plans. The purpose of the detention basins is to limit peak discharges at the basin's outfall to Jimmy Camp Creek to the existing hydrologic condition. The regional basins have also been sited within each of the major land developments to more locally control runoff to existing levels. Wherever practical, the regional detention basins should be designed so as to take advantage of the adjacent roadway embankments. It is not anticipated that any of the regional detention basins will be subject to State Engineer's regulations. Stormwater quality measures should be designed into the regional stormwater detention basins. These measures would include the provision of a water quality and sediment pool area in addition to the volume required for stormwater detention.

Right-of-Way

For the most part the main channels within the basin which pass through undeveloped areas and the right-of-way can be dedicated as part of the land development process. For those segments of the drainageway where floodplain preservation is the recommended plan, a combination of open space dedication (such as park-land and greenbelts), in combination with a more narrow dedicated right-of-way along the low flow area of the drainageway should be obtained through the land development process. Land acquisition will be required for the regional detention basins. The dedication of easements and right-of-way for the drainageways and detention basins would be accomplished at the time of development planning and platting of the parcels that lie adjacent to or upstream of the stormwater facility.

Cost Estimates and Drainage Basin Fees

Cost estimates have been prepared and are contained within the DBPS. The cost of the major drainageway facilities has been determined for each jurisdiction. The facility cost estimate will be used in the determination of the drainage and bridge fees for this basin. Bridge crossing costs have been determined as well for the basin.

Presented on Table 17 through 19 is the cost and plattable acreage (i.e., that area available for platting into subdivisions), data associated with the determination of drainage and bridge fees for the basin. The plattable acreage has been determined using a combination of assessor's maps, aerial photographs and topographic mapping that covering the watershed. As presented on Table 17, the reductions in the area available for platting have been listed. The reductions are mostly attributable to areas that are already platted, known roadway or planned road right-of-ways for minor and major arterials, and the area underlying the proposed detention basins.

Drainage basin fees have been determined for those areas that are within the City of Colorado Springs and El Paso County. The City of Fountain does not have a drainage basin fee system and therefore no fees have been calculated for the areas within the City of Fountain. The area of the basin within the City of Colorado Springs lies within the Colorado Centre development and the Banning-Lewis Ranch Flood Conservancy District (District). It is the intent of the City of Colorado Springs that the District will be responsible for all drainage, detention and bridge improvement construction and maintenance. Prior to any development within the City, specific agreements will have to be finalized between the City and the District. The drainage and bridge fees calculated for the County areas have been determined in accordance with Resolution No. 99-383. The percent impervious values listed on Exhibit 3 of this resolution where applied when calculating the weighted percent impervious value for the sub-basins within the County.

THE COLORADO CENTRE DEVELOPMENT

City of Colorado Springs

LAND USES:
Light Industrial
Office/commercial

CURVE NUMBER RANGE:

85-95

UNDEVELOPED LAND

LAND USES:
Light Industrial
Office/commercial

CURVE NUMBER RANGE:

85-95

CRESCENT HEIGHTS DEVELOPMENT

City of Fountain

LAND USES:
Medium/high density residential
Office/commercial

CURVE NUMBER RANGE:

79-93

THE GLEN AT WIDEFIELD DEVELOPMENT

LAND USES:
Low/medium/high density residential
Office/commercial
School
Park and open space

CURVE NUMBER RANGE:

68-95

CROSS CREEK AT MESA RIDGE

LAND USES:
Office/commercial
Industrial

CURVE NUMBER RANGE:

85-95

LEGEND

MAJOR LAND DEVELOPMENT BOUNDARY

0' 1000' 2000'

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado
80904
(719) 630-7342

West Fork Jimmy Camp Creek Drainage Basin Planning Study

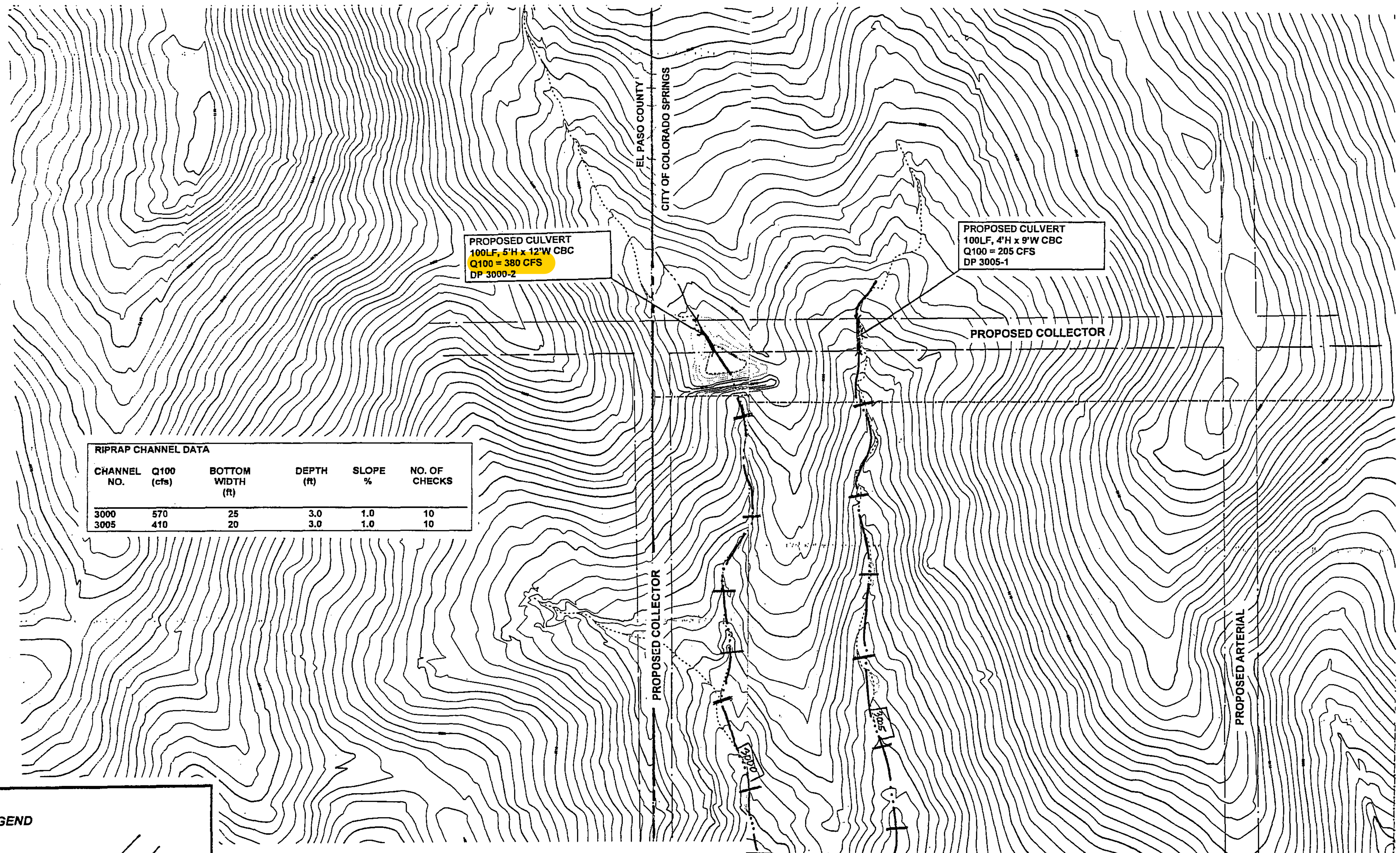
MAJOR DEVELOPMENT & LAND USE MAP

EL PASO COUNTY, COLORADO

Project No.:	9893
Date:	6/99
Design:	RNW
Drawn:	CAD
Check:	RNW
Revisions:	

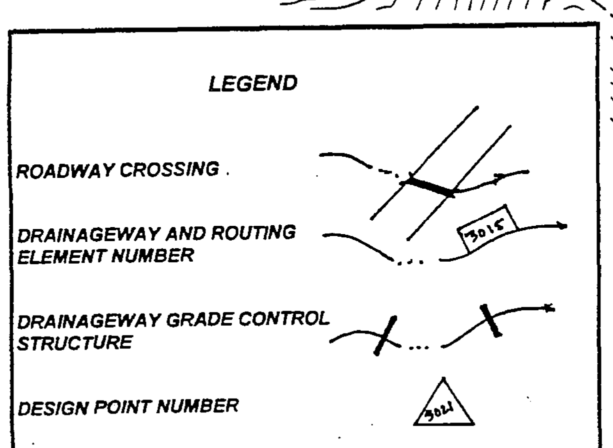
FIGURE 2

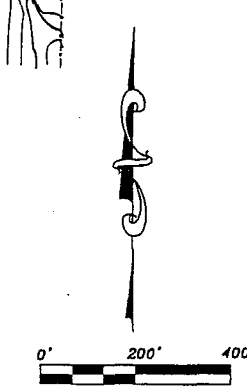
THIS DRAWING IS A MASTER PLANNING SHEET REPRESENTING PRELIMINARY AND CONCEPTUAL ENGINEERING. IT SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.



RIPRAP CHANNEL DATA

CHANNEL NO.	Q100 (cfs)	BOTTOM WIDTH (ft)	DEPTH (ft)	SLOPE %	NO. OF CHECKS
3000	570	25	3.0	1.0	10
3005	410	20	3.0	1.0	10





Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado
80904
(719) 630-7342

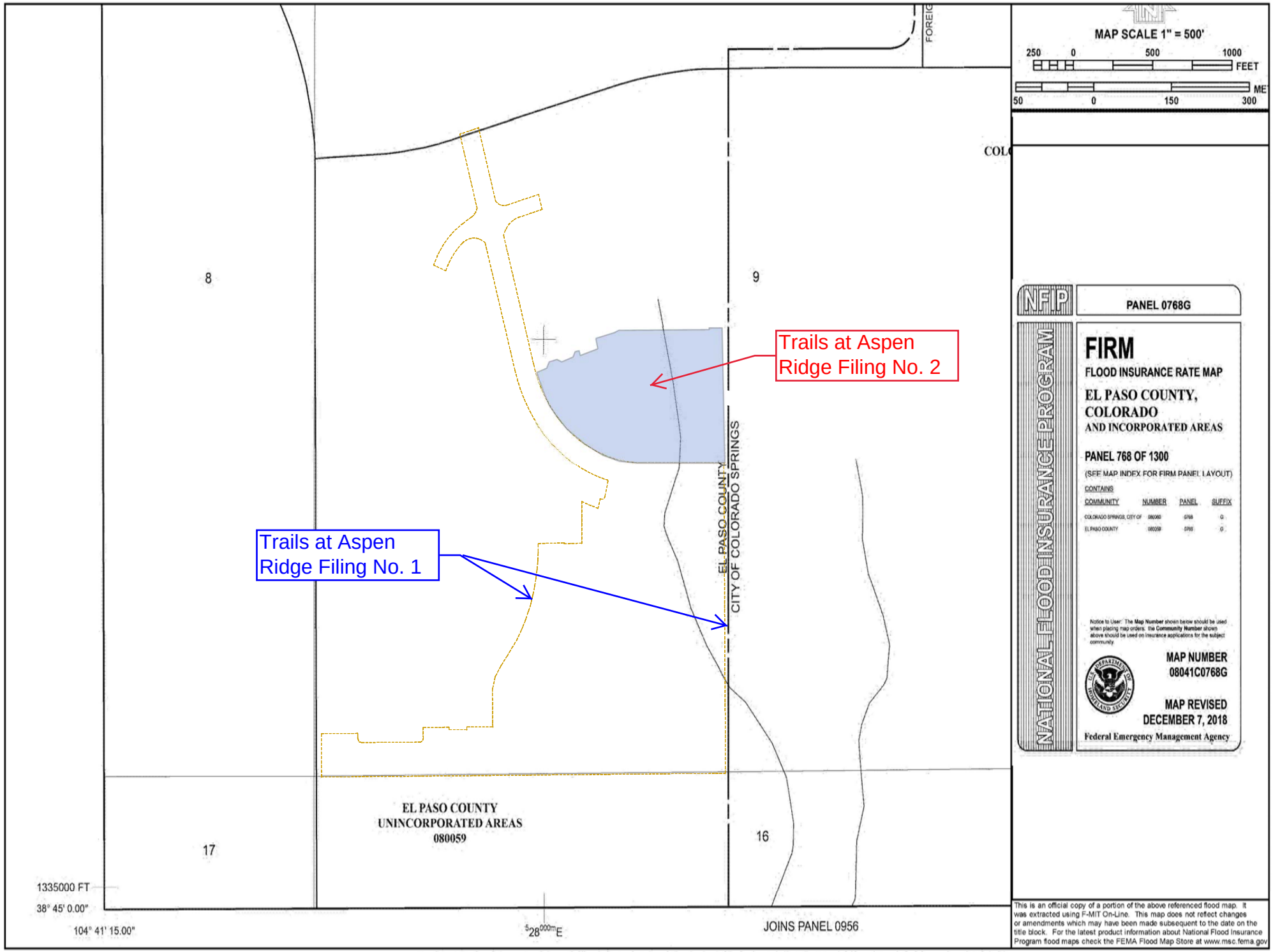
WEST FORK JIMMY CAMP CREEK DRAINAGE BASIN PLANNING STUDY

PRELIMINARY PLAN

EL PASO COUNTY, COLORADO

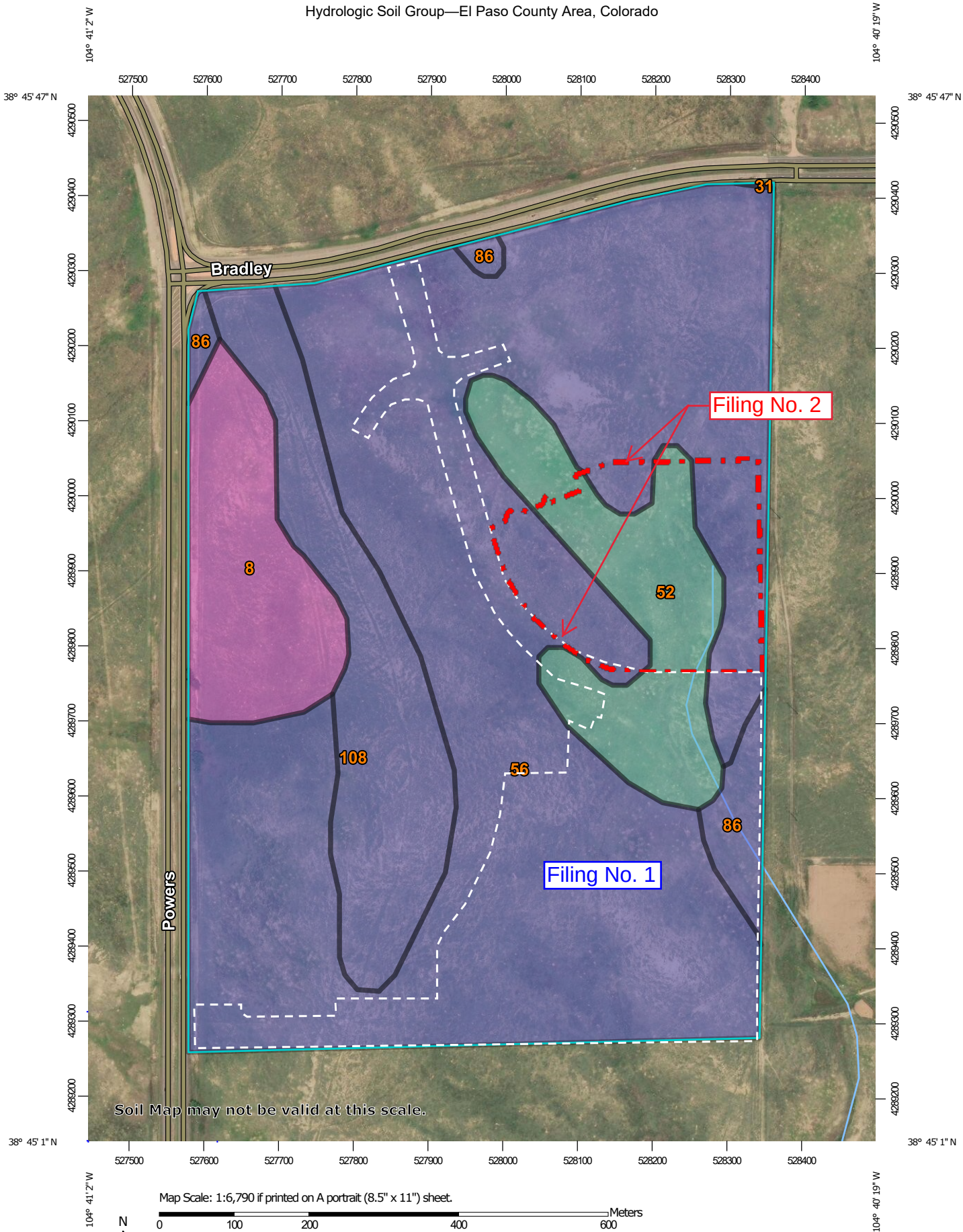
Project No.: 9893
Date: 2/00
Design: RNW
Drawn: CAD
Check: RNW
Revisions:

FIRMETTE



This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

USDA NRCS WEB SOIL SURVEY REPORT



Map Scale: 1:6,790 if printed on A portrait (8.5" x 11") sheet.

N

0 100 200 400 600 Meters

0 300 600 1200 1800 Feet

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 16, Sep 10, 2018

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

Date(s) aerial images were photographed: Apr 12, 2017—Nov 17, 2017

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	17.8	8.6%
31	Fort Collins loam, 3 to 8 percent slopes	B	0.0	0.0%
52	Manzanst clay loam, 0 to 3 percent slopes	C	21.0	10.2%
56	Nelson-Tassel fine sandy loams, 3 to 18 percent slopes	B	137.7	66.8%
86	Stoneham sandy loam, 3 to 8 percent slopes	B	5.3	2.6%
108	Wiley silt loam, 3 to 9 percent slopes	B	24.3	11.8%
Totals for Area of Interest			**206.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

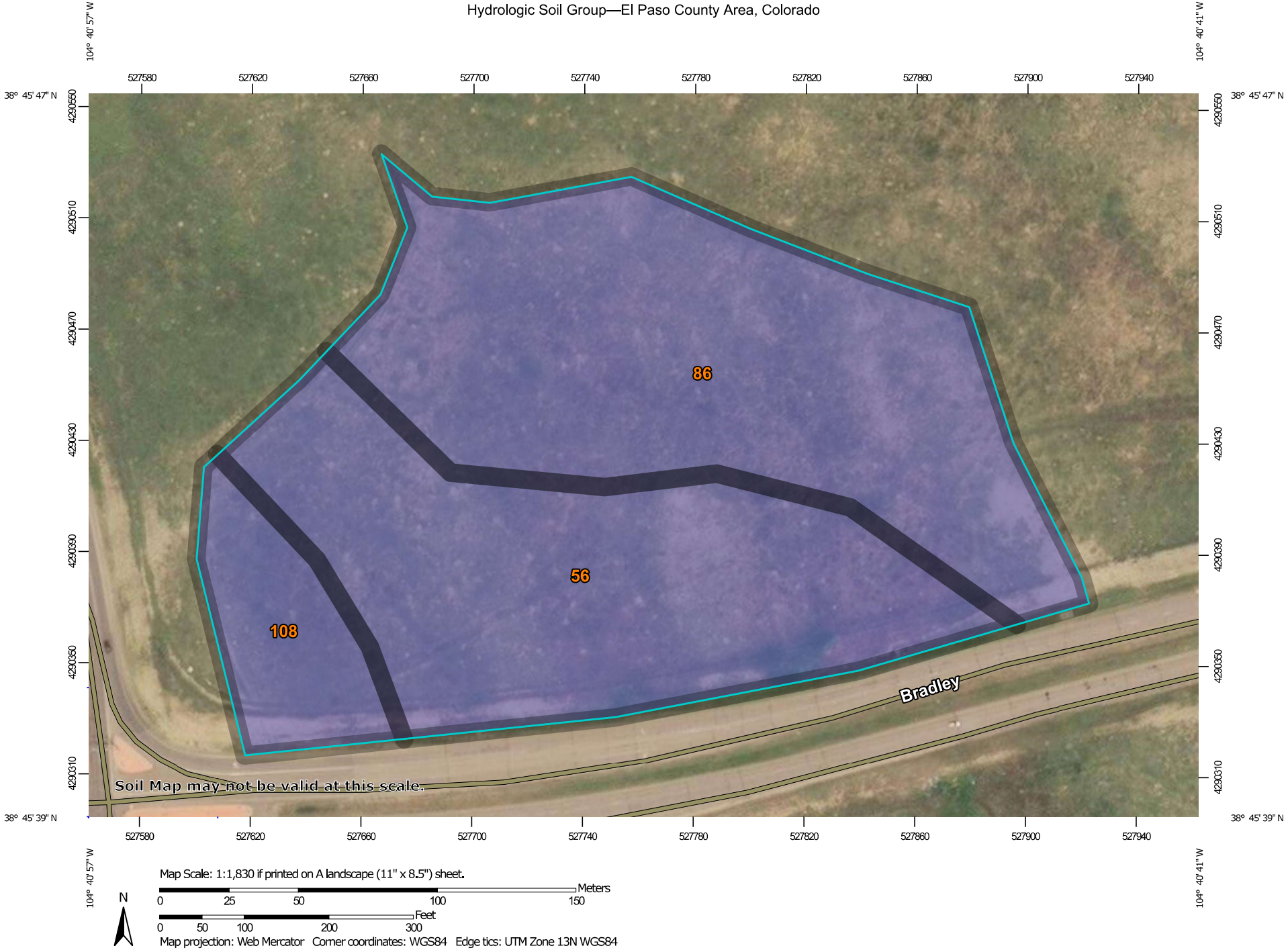
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Map Scale: 1:1,830 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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 16, Sep 10, 2018

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

Date(s) aerial images were photographed: Apr 12, 2017—Nov 17, 2017

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
56	Nelson-Tassel fine sandy loams, 3 to 18 percent slopes	B	4.8	41.2%
86	Stoneham sandy loam, 3 to 8 percent slopes	B	5.7	49.2%
108	Wiley silt loam, 3 to 9 percent slopes	B	1.1	9.6%
Totals for Area of Interest			**11.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX D

MAPS

Trails at Aspen Ridge Vicinity Map

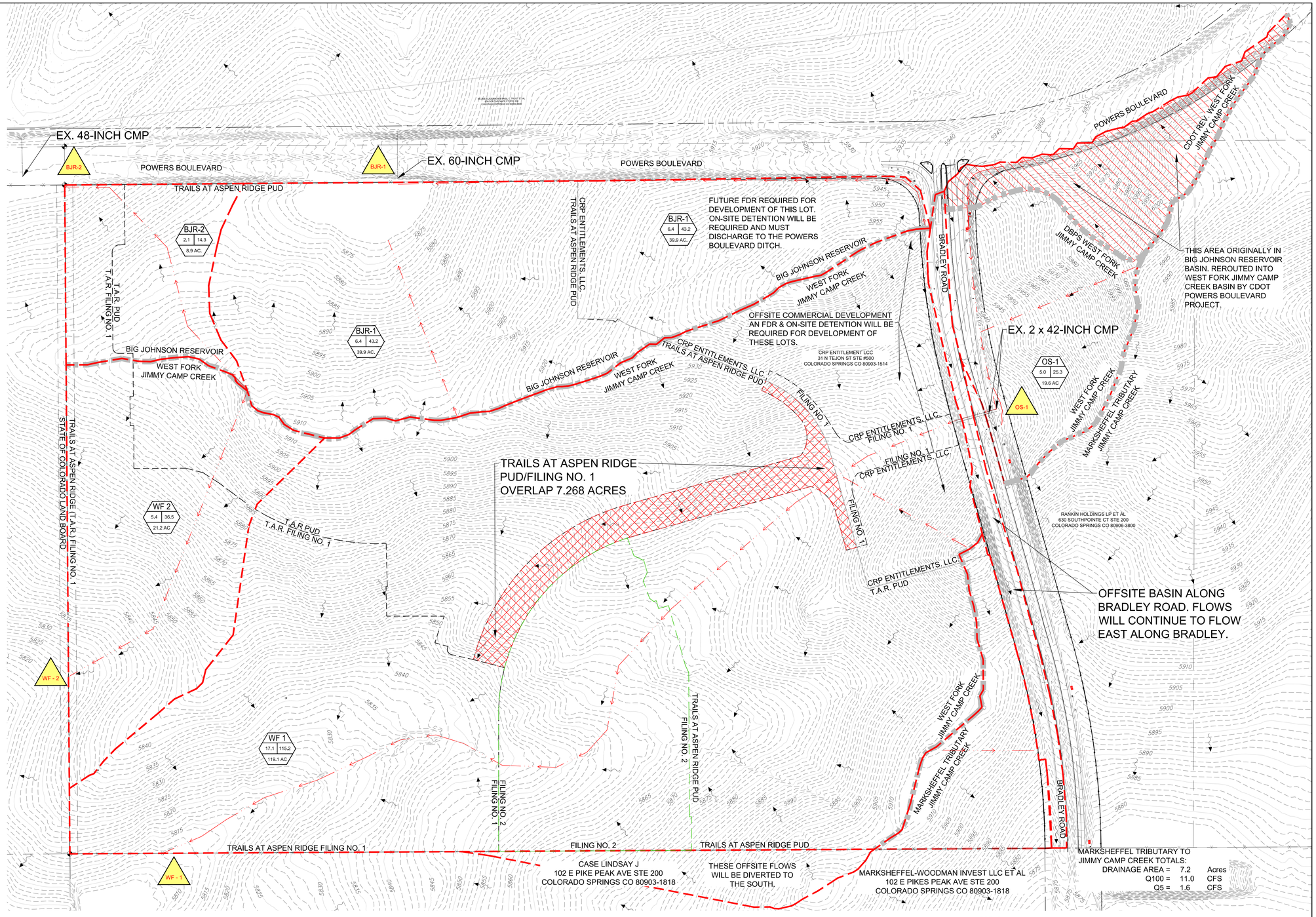
Know what's below. Call before you dig.

Trails at Aspen Ridge Filing No. 1
Final Drainage Report
Existing Design Point Summary

Design Point	Sub-Basins	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
BJR-1	BJR-1	39.94	6.43	43.22
BJR-2	BJR-2	8.85	2.13	14.32
TO BIG JOHNSON RESERVOIR	BJR-1 & BJR-2 (Basins are parallel so this is a sum of BJR-1 & BJR-2.)	**48.79**	**8.56**	**57.54**
OS-1	OS-1 (Note: 7.3 Acres diverted by CDOT from Big Johnson)	19.60	4.79	24.15
WF-1	WF-1 & OS-1	138.69	16.90	108.09
WF-2	WF-2	21.15	5.43	36.51
TO WEST FORK JIMMY CAMP CREEK	WF-1, WF-2, & OS-1 (Basins are parallel so this is a sum of WF-1 & WF-2.)	**159.84**	**22.33**	**144.60**

Trails at Aspen Ridge Filing No. 1
Final Drainage Report
Existing Conditions Basin Summary Table

Area ID	Area (Acres)	Q5 (cfs)	Q100 (cfs)
Big Johnson Reservoir / BJR-1	39.94	6.43	43.22
Big Johnson Reservoir / BJR-2	8.85	2.13	14.32
West Fork Jimmy Camp Creek / OS - 1	19.60	4.79	24.15
West Fork Jimmy Camp Creek / WF-1	119.08	17.15	115.23
West Fork Jimmy Camp Creek / WF-2	21.15	5.43	36.51



LEGEND

- DESIGN POINT IDENTIFIER (L)
- BASIN IDENTIFICATION (BASIN)
- BASIN FLOWS (Q5 / Q100)
- BASIN AREA (AREA)
- BASIN BOUNDARY
- DBPS BASIN BOUNDARY
- EXISTING CONTOURS (5965)

GRAPHIC SCALE
150' 0' 150' 300'
(IN FEET)
1 inch = 150 ft.

REFERENCE DRAWINGS
X-886-PR SITE
10415-Storm Base-2017
886-PR Legacy Drive
X-886-EX SURVEY
X-Title(Drainage)

NO.	DATE	DESCRIPTION	BY

REVISIONS

NAME: S:\19.886.014 (Trails at Aspen Ridge - F2)\200 Drainage\201 Drainage Reports\FDR\DWG\DR01-TAR FDR F2.dwg
PCP: Matrix.ctb
PLOT DATE: Fri Nov 01, 2019 4:14pm

BENCHMARK DATA(ELEV.) _____
(DATUM) _____
(DESCRIPTION/LOCATION) _____

VERTICAL BENCHMARK:

BASIS OF BEARING:

PREPARED UNDER MY DIRECT SUPERVISION, FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.

Matrix DESIGN GROUP
2435 Research Parkway, Suite
300 Colorado Springs, CO 80920
Phone 719-575-0100
Fax 719-575-0208

COLA, LLC.

TRAILS AT ASPEN RIDGE: FILING #2
FINAL DRAINAGE REPORT

DESIGNED BY: JTS
DRAWN BY: JTS
CHECKED BY:
SCALE
HORIZ:
VERT:
DATE ISSUED: NOVEMBER 2019
SHEET NO. 1 OF 3 SHEETS

DR-01

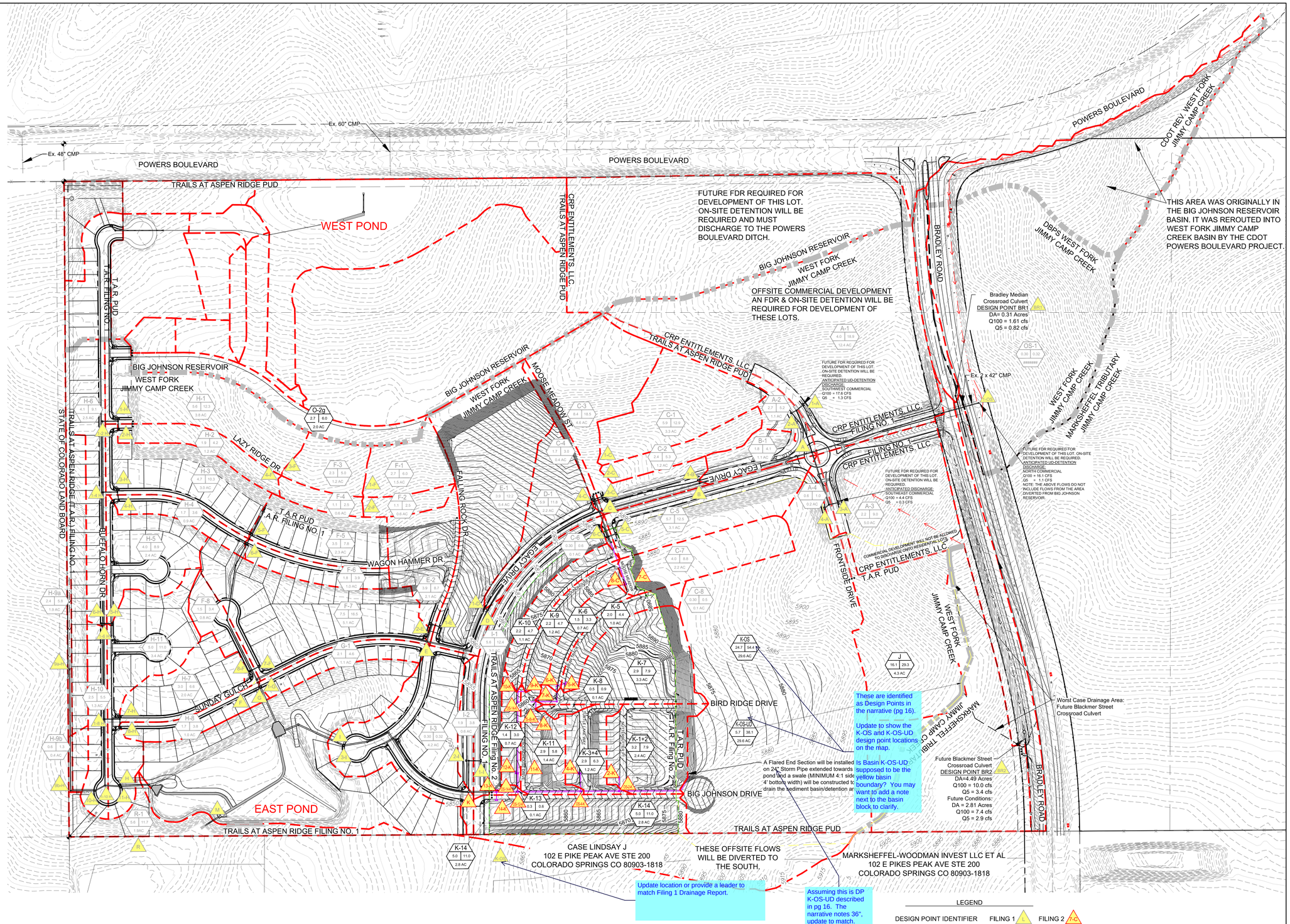
811 Know what's below. Call before you dig.

Trails at Aspen Ridge Filing No. 2
Proposed Conditions
Sub-basin Summary

Basin	Area	Q5	Q100
	acres	cfs	cfs
K-1+2	2.37	3.2	7.9
K-3+4	1.23	2.9	6.3
K-5	0.95	2.0	4.4
K-6	0.72	1.5	3.3
K-7	3.26	2.9	7.9
K-8	0.15	0.5	0.9
K-9	1.16	2.1	4.7
K-10	1.10	2.2	4.7
K-11	1.39	2.6	5.8
K-12	0.67	1.4	3.0
K-13	0.09	0.3	0.6
K-14	2.78	5.0	11.0
J-OS	4.34	16.1	29.3
K-OS	18.23	24.7	54.4
K-OS UNDEVELOPED	29.62	5.7	38.0

Design Point Routing
Trails at Aspen Ridge Filing No. 2
StormCAD

Design Point	Total Drainage Area	Surface Q5	Surface Q100	Storm Sewer Q5	Storm Sewer Q100	Downstream Design Point
1-OS	19.67	4.0	26.8	-	-	A
1-A	12.34	3.5	17.6	-	-	A
2-A	1.09	2.7	5.2	-	-	A
3-A	4.98	2.2	8.9	-	-	A
4-A	0.12	0.6	1.0	-	-	A
A	38.20	-	-	12.0	55.6	B
1-B	1.06	1.8	4.1	-	-	B
B	39.26	-	-	12.7	57.1	C
1-C	3.27	5.9	12.9	-	-	C
2-C	1.19	2.4	5.3	-	-	C
3-C	4.60	8.4	18.5	-	-	C
4-C	0.36	1.6	3.0	-	-	C
5-C	3.13	5.7	12.5	-	-	C
6-C	0.07	0.3	0.6	-	-	C
7+8-C	2.26	4.2	9.2	-	-	C
C	54.14	-	-	27.6	90.2	D
1-D	2.21	1.6	5.2	-	-	D
D	56.34	0.0	0.0	28.1	92.1	E
1-E	6.43	2.6	11.4	-	-	E
2-E	2.14	3.9	8.7	-	-	E
E	64.91	-	-	33.7	108.8	F
1-F	2.07	2.7	6.0	2.7	6.0	3-F
2-F	0.58	1.1	2.5	1.6	3.6	3-F
3-F	3.32	2.3	5.0	3.8	8.4	4-F
4-F	3.89	1.1	2.5	5.0	11.1	5-F
5-F	6.16	3.5	7.8	6.6	14.6	6-F
6-F	7.16	1.7	3.9	7.9	17.5	8-F
7-F	5.06	7.5	16.5	7.5	16.5	8-F
8-F	13.07	1.5	3.3	16.2	35.8	F
F	77.98	-	-	43.5	131.0	G
1-G	1.11	2.1	4.6	-	-	G
G	79.09	-	-	44.2	132.7	M
1-H	3.60	5.9	13.1	-	-	1-2 H
2-H	1.16	1.9	4.2	-	-	1-2 H
1-2 H	4.76	-	-	9.0	19.8	1-4 H
3-H	2.97	4.7	10.3	-	-	1-4 H
4-H	0.92	1.6	3.6	-	-	1-4 H
1-4 H	8.65	-	-	16.4	36.1	1-6 H
5-H	2.42	4.0	8.9	-	-	1-6 H
6-H	2.46	3.9	8.6	-	-	1-6 H
1-6 H	13.53	-	-	20.2	44.9	1-8 H
7-H	2.03	2.9	6.4	-	-	1-8 H
8-H	0.97	1.7	3.7	-	-	1-8 H
1-8 H	16.52	-	-	23.3	49.3	1-10 H
9-H	2.32	3.3	8.0	-	-	1-10 H
1-10 H	1.33	2.4	5.2	2.8	6.5	1-10 H
10-H	1.33	2.4	5.2	-	-	1-10 H
1-10 H	21.50	-	-	29.6	66.5	11-H
11-H	3.42	5.0	11.0	-	-	H
H	24.92			37.4	83.0	M
J-OS	4.34	16.1	29.3	-	-	J-K-OS
K-OS	18.23	24.7	54.4	-	-	J-K-OS
J-K-OS	22.57	-	-	36.7	77.0	OS-2-K
K-OS-Undeveloped	29.62	5.7	38.0	-	-	OS-2-K
1+2-K	2.37	3.2	7.9	-	-	OS-2-K
OS-2-K	24.94	-	-	39.2	83.6	OS-12-K
3+4-K	1.23	2.9	6.3	-	-	3-4-K
OS-4-K	26.17	-	-	40.8	87.0	OS-12-K
5-K	0.95	2.0	4.4	-	-	6-K
6-K	0.72	1.5	3.3	3.4	7.6	5-8-K
7-K	3.26	2.9	7.9	-	-	5-8-K
8-K	0.15	0.5	0.9	-	-	5-8-K
5-8-K	5.08	-	-	4.6	11.5	5-10-K
9-K	1.16	2.1	4.7	-	-	9-10-K
10-K	1.10	2.2	4.7	-	-	9-10-K
9-10-K	2.26	-	-	4.0	8.8	5-10-K
5-10-K	7.34	-	-	7.3	17.5	5-12-K
11-K	1.39	2.6	5.8	-	-	5-12-K
12-K	0.67	1.4	3.0	-	-	5-12-K
5-12-K	9.40	-	-	10.5	23.2	OS-12-K
OS-12-K	35.57	-	-	47.2	104.0	OS-14-K
13-K	0.09	0.3	0.6	-	-	OS-14-K
14-K	2.78	5.0	11.0	-	-	OS-14-K
OS-14-K	38.43	-	-	50.6	111.6	K
K	42.15	-	-	56.3	121.4	3-I
1-I	3.13	6.9	12.3	-	-	K
2-I	0.59	2.3	4.1	-	-	K
3-I	4.18	9.3	16.5	7.8	17.2	M
I	46.33	-	-	62.5	132.6	M
M	157.90	-	-	154.5	382.1	East Pond Discharge
East Pond Discharge (Filing 1 & 2 Buildout)	157.90	-	-	2.9	91.5	Existing Swale



Pond Summary Table

Major Basin	Pond ID	Analysis Method	Contributing Basins	Approximate Detention Volumes WQCV Ac.-Ft.	EURV Ac.-Ft.	Q100 Ac.-Ft.	EX 5-YR (CFS)	PR 5-YR (CFS)	EX 100-YR (CFS)	PR 100-YR (CFS)
West Fork - Jimmy Camp Creek	East Pond	Preliminary: UD-Detention Final: SWMM	OS-1, A, B, C, D, E, F, G, J, K, I, H, M	3.289	10.877	13.732	22.3	21.1	144.6	127.4

REFERENCE DRAWINGS
886-PR Legacy Drive
X-Title(Drainage)
X-886-EX SURVEY
X-886-PR SITE-F2
X-886-PR STORM-F2
X-886-PR STORM_F1
X-886-PR SITE
X-886-PR SITE_F1

NO.	DATE	DESCRIPTION	BY

REVISIONS

NAME: S:\19.886.014 (Trails at Aspen Ridge - F2)\200 Drainage\201 Drainage Reports\FDR\DWG\0002 Filing 2 Basins.dwg
PCP: Matrix.ctb
PLOT DATE: Fri Nov 01, 2019 4:11pm

BENCHMARK DATA(ELEV.)
(DATUM)
(DESCRIPTION/LOCATION)

VERTICAL BENCHMARK:

BASIS OF BEARING:

PREPARED UNDER MY DIRECT SUPERVISION, FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.

Matrix DESIGN GROUP
2435 Research Parkway, Suite
300 Colorado Springs, CO 80920
Phone 719-575-0100
Fax 719-575-0208

COLA, LLC.

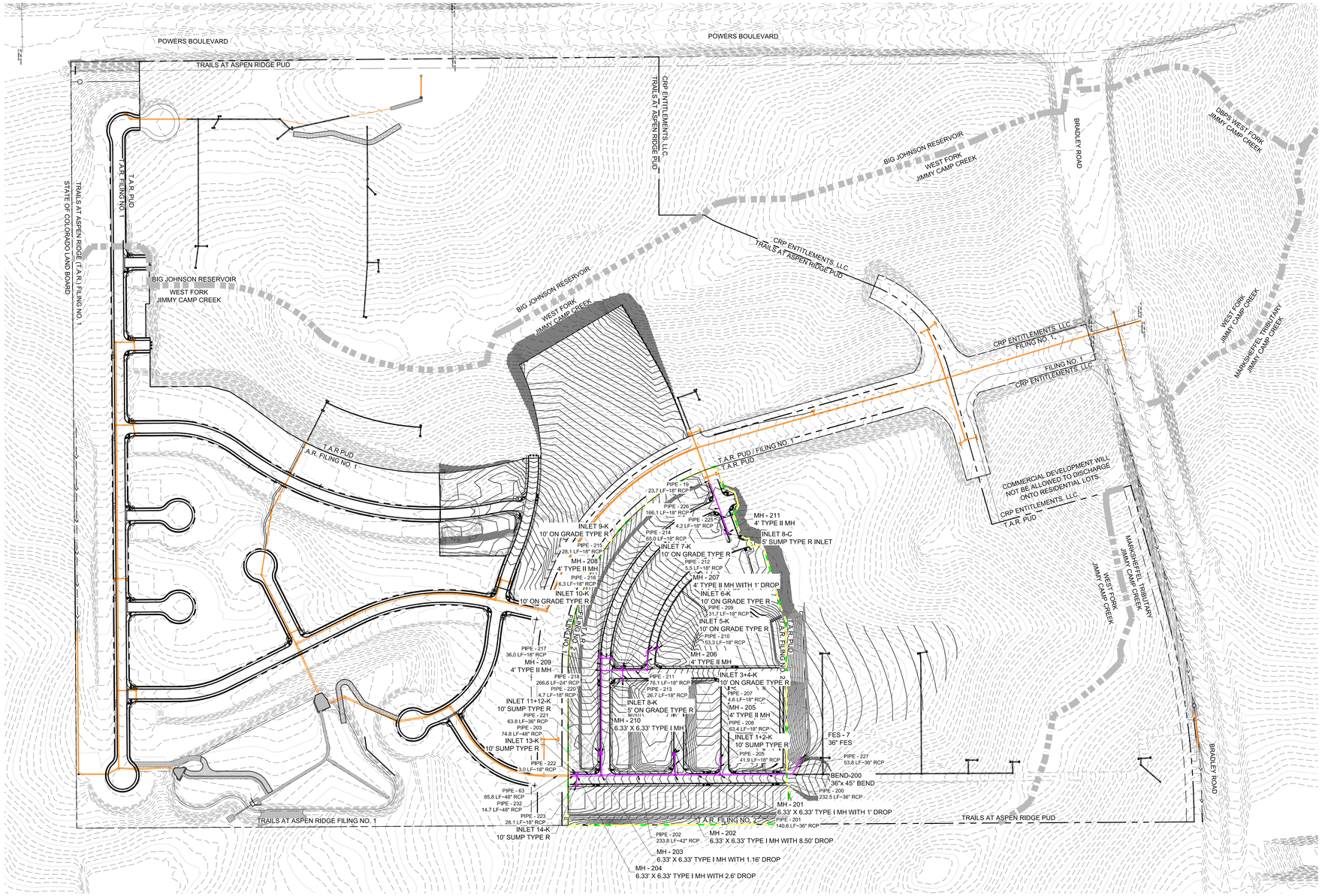
TRAILS AT ASPEN RIDGE FILING #2
FINAL DRAINAGE REPORT

DESIGNED BY: JTS	SCALE:	DATE ISSUED: NOVEMBER 2019	DR-02
DRAWN BY: JTS	HORIZ:		
CHECKED BY:	VERT:	SHEET NO. 2 OF 3 SHEETS	

811 Know what's below. Call before you dig.

LEGEND

- OFFSITE FUTURE STORM PIPE
- FILING NO. 2 STORM PIPE
- FILING NO. 1 STORM PIPE
- EXISTING STORM PIPE



STORM PIPE SUMMARY TABLE
Trails at Aspen Ridge Filing No. 2

PIPE LABEL	PIPE DIA. (IN)	PIPE LENGTH (FT)	% GRADE	Q100 PIPE FLOW (cfs)	Velocity (Ft/s)
63	48	106.5	0.5	113.5	9.05
200	36	235.7	3.2	77	17.92
201	36	146.6	3.1	83.6	17.97
202	42	240	2	87	9.04
203	48	80.9	0.5	106.1	8.44
205	18	49.9	2.4	7.9	4.45
207	18	7.3	0.4	6.27	4.33
208	18	68.4	3.4	6.26	9.78
209	18	33.2	1.9	4.3	7.13
210	18	60.2	1.9	7.6	8.3
211	18	80.2	3.4	7.5	10.21
212	18	7.3	1	6.3	3.57
213	18	29.4	0.5	1	0.55
214	18	69	0.5	11.5	6.48
215	18	30.7	0.5	4.5	2.57
216	18	9.1	2.8	4.5	8.39
217	18	40	3.9	8.8	11.22
218	24	271.8	3.3	17.5	12.49
219	18	30.7	1.4	8.5	4.83
220	18	8.5	6	3.2	1.82
221	36	69.8	3.5	25	3.54
222	18	8.2	0.7	0.7	0.4
223	18	28.5	1.6	11	6.22
224	18	30.7	0.5	8.8	4.98
225	18	7.7	0.5	0.5	0.28
226	18	168.1	1	9.2	5.18
227 (Filing 2 only)	36	53.8	1	40.2 (K-OS-Undeveloped)	7.28

PROPOSED INLET SUMMARY
TRAILS AT ASPEN RIDGE FILING NO. 2

DESIGN POINT	SUB-BASINS	TOTAL AREA (AC)	INLET SIZE (Ft.)	INLET TYPE	INLET CONDITION	Q(5) BYPASS FLOWS (cfs)	Q(5) TOTAL INFLOW (cfs)	Q(100) BYPASS FLOWS (cfs)	Q(100) TOTAL INFLOW (cfs)	INLET CAPACITY (cfs)	NOTES:
1+2-K	K-1+2	2.37	10	R	SUMP		3.24		7.88	19.40	*SUMP*
3+4-K	K-3+4	1.23	10	R	ON-GRADE	0	2.93	0.8	6.25	5.45	*BYPASS GOES TO 11-K*
5-K	K-5	0.95	10	R	ON-GRADE	0	1.98	0.1	4.37	4.27	*BYPASS GOES TO 7-K*
6-K	K-6	0.72	10	R	ON-GRADE	0	1.50	0	3.30	3.30	*BYPASS GOES TO 7-K*
7-K	K-7	3.26	10	R	ON-GRADE	0	2.90	1.7	8.04	6.34	*BYPASS GOES TO 11-K*
8-K	K-8	0.15	5	R	ON-GRADE	0	0.45	0	0.91	0.91	*BYPASS GOES TO 11-K*
9-K	K-9	1.16	10	R	ON-GRADE	0	2.15	0.2	4.73	4.53	*BYPASS GOES TO 11-K*
10-K	K-10	1.10	10	R	ON-GRADE	0	2.15	0.2	4.74	4.54	*BYPASS GOES TO 12-K*
11+12-K	K-11 & K12	2.06	10	R	SUMP		4.00		8.81	19.40	*SUMP*
13-K	K-13	0.09	10	R	SUMP		2.66		5.80	19.40	*SUMP, FLOW CROSSES ROAD*
14-K	K-14	2.78	10	R	SUMP		2.66		5.80	19.40	*SUMP, FLOW CROSSES ROAD*

GRAPHIC SCALE
150' 0' 150' 300'
(IN FEET)
1 inch = 150 ft.

REFERENCE DRAWINGS
X-886-PR SITE_F1
X-886-PR SITE
10415-Storm Base-2017
X-Title(Drainage)
X-886-PR STORM_F1
X-886-FUTURE STORM-F2
X-886-PR SITE-F2
X-886-PR-UTIL-F2
886-PR Legacy Drive

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

NAME: S:\19.886.014 (Trails at Aspen Ridge - F2)\200 Drainage\201 Drainage Reports\FDR\DWG\Exhibits\Exhibits 2.dwg
PCP: Matrix.ctb
PLOT DATE: Mon Nov 04, 2019 1:58pm

BENCHMARK DATA(ELEV.) _____
(DATUM) _____
(DESCRIPTION/LOCATION) _____

VERTICAL BENCHMARK:

BASIS OF BEARING:

PREPARED UNDER MY DIRECT SUPERVISION, FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.

Matrix DESIGN GROUP
2435 Research Parkway, Suite
300 Colorado Springs, CO 80920
Phone 719-575-0100
Fax 719-575-0208

COLA, LLC.

TRAILS AT ASPEN RIDGE FILING #2
FINAL DRAINAGE REPORT
STORM SEWER EXHIBIT

DESIGNED BY: JTS
DRAWN BY: JTS
CHECKED BY:
SCALE:
HORIZ:
VERT:
DATE ISSUED: NOVEMBER 2019
SHEET NO. 3 OF 3 SHEETS

DR-03