FINAL DRAINAGE REPORT

For

TRAILS AT ASPEN RIDGE
Filing No. 2

Prepared for:
EL PASO COUNTY
Engineering Development Review Team
2880 International Circle
Colorado Springs, CO 80910

On Behalf of:
COLA, LLC.
555 Middle Creek Parkway, Suite 380
Colorado Springs, CO 80921

Prepared by:
Matrix
Matrix Design Group
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
(719) 575-0100
fax (719) 572-0208

February 2021

Project No. 19.866.014

PCD File No. SF1927

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.

Jesse Sullivan   Date 7/13/2021
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: ______________________ 7/13/21
~~Tim Buschar~~ SDS Stephen Schoonover 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).

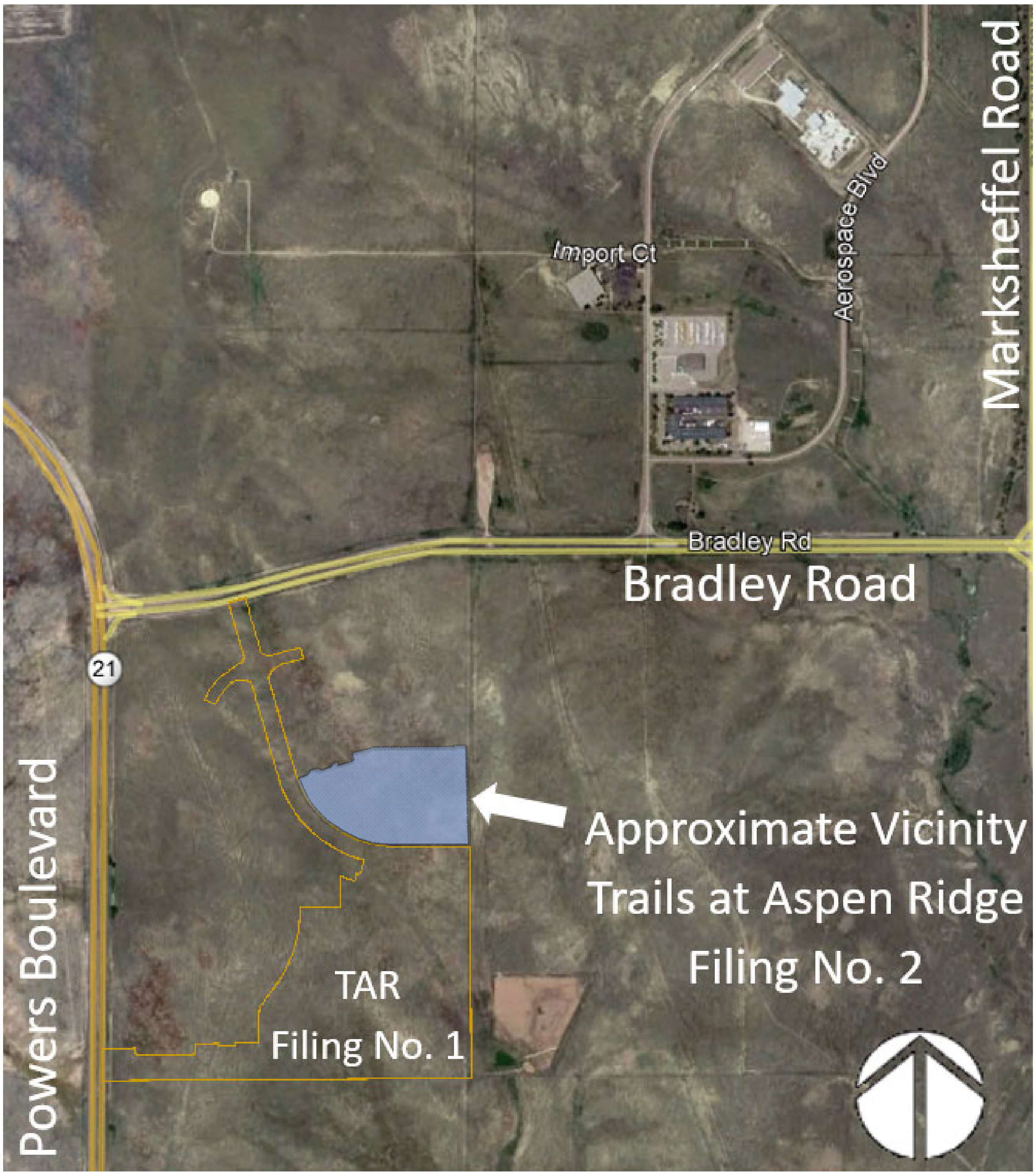


Figure 1 - Project Location

II. 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.

III. 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 6^{th} 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 January 2020. (FDR-F1)

G. Land Uses

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

IV. 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.

V. 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.

VI. 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	

VII. 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 <u>fully developed</u> conditions for the site are as follows:

<u>West Fork – Jimmy Camp Creek:</u>
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 *(Gray shading: Covered in previous drainage report)*			
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
(Gray shading: Covered in previous drainage report)

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
I-3	4.18	7.1	15.6
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
OS-East Side	4.15	0.6	4.0
J-OS	5.26	17.2	32.2
K-OS	18.23	24.7	54.4
K-OS UNDEVELOPED	29.62	5.7	38.0

Table 6.4a
Design Point Summary - StormCAD
(Gray shading: Covered in previous drainage report)

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
(Gray shading: Covered in previous drainage report)

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-K	**0.78**	0.8	2.3			
2-K	**1.58**	2.7	5.9	-	-	OS-2-K
OS-2-K	**24.93**	-	-	39.8	72.8	OS-12-K
3+4-K	**1.23**	2.9	6.3	-	-	3-4-K
OS-4-K	**26.16**	-	-	41.4	76.7	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**	-	-	5.2	12.0	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**	-	-	7.8	18.0	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**	-	-	10.3	23.6	OS-12-K
OS-12-K	**35.56**	-	-	47.8	89.5	OS-14-K
13-K	**0.09**	0.3	0.6	-	-	OS-14-K

Table 6.4c
Design Point Summary - StormCAD
(Gray shading: Covered in previous drainage report)

Design Point	Total Drainage Area	Surface		Storm Sewer		Downstream Design Point
		Q5 (cfs)	Q100 (cfs)	Q5 (cfs)	Q100 (cfs)	
OS-E	**4.15**	3.1	3.4	-	-	14-K
14-K	**2.78**	5.0	11.0	5.1	11.0	OS-14-K
OS-14-K	**38.42**	-	-	51.3	100.5	K
K	**42.14**	-	-	56.9	110.2	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	8.7	15.5	M
I	**46.32**	-	-	62.4	119.8	M
M	**158.79**	-	-	**154.5**	**383.7**	East Pond Discharge
East Pond Discharge (Filing 1 & 2 Buildout)	**158.79**	-	-	3.6	97.5	Existing Swale

Table 6.5a
DESIGN POINT DESCRIPTIONS
(Gray shading: Covered in previous drainage report)

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 crossroad 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
(Gray shading: Covered in previous drainage report)

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

Table 6.5c
DESIGN POINT DESCRIPTIONS
(Gray shading: Covered in previous drainage report)

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 Roundhouse Drive and Beartrack Point. Sub-basins C-7+8 is tributary to this location. This sub-basin will not be developed in this filing excepting the extension of Moose Meadow Drive from its Filing No. 1 termination point just east of Legacy Hill Drive over to its intersection with Bear Track 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
(Gray shading: Covered in previous drainage report)

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

Table 6.5e
DESIGN POINT DESCRIPTIONS.
(Gray shading: Covered in previous drainage report)

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. -Sub-basins K-OS and J-OS contribute flows to this location	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 (Sub-basin K-OS-UD). -This design point considers all undeveloped upstream flows tributary to the design point at K-OS.	OS-2-K

Table 6.5f
DESIGN POINT DESCRIPTIONS
(Gray shading: Covered in previous drainage report)

Design Point	Description	Downstream Design Point
1+2-K	- Sump inlet on Nutterbutter Point just west of the intersection of Nutterbutter Point and Big Johnson Drive. Captures flows from Sub-basin K-1+2.	**OS-2 -K**
OS-2 -K	This manhole in Big Johnson Drive combines flows from Design Points K-OS and 1+2-K	**OS-4-K**
3+4-K	-At-grade inlet on Turtle Lake Way just west of the intersection of Turtle Lake Way and Big Johnson. Captures flows from Sub-basin K-3+4.	**OS-4-K**
OS-4-K	-Manhole in Big Johnson Drive and Turtle Lake Way intersection combining Design Points 3+4-K and OS-2-K	**OS-12-K**
5-K	-At-grade inlet west of the intersection of Bear Track Point and Bird Ridge Drive (north side of Bear Track Point). Captures flows from Sub-basin K-5.	**5-6-K**
6-K	-At-grade inlet west of the intersection of Bear Track Point and Bird Ridge Drive (south side of Bird Ridge Drive). Combines captured flows from Sub-basin K-6 with flows from Design Point 5-K.	**5-8-K**
7-K	-At-grade inlet on Bird Ridge Drive north of intersection with Roundhouse Drive (west side of road). Captures flows from Sub-basin K-7.	**5-8-K**
8-K	-At-grade inlet on Bird Ridge Drive north of intersection with Roundhouse Drive (east side of road). Captures flows from Sub-basin K-8.	**5-8-K**
5-8-K	-Manhole in Bird Ridge Drive combining flows from Design Point 5-6-K with flows from Design Points 7-K and 8-K	**5-10-K**
9-K	-At-grade inlet on Roundhouse drive west of intersection with Bird Ridge Drive. Captures flows from Sub-basin K-9.	**9-10-K**
10-K	-At-grade inlet on Roundhouse drive west of intersection with Bird Ridge Drive. Captures flows from Sub-basin K-10.	**9-10-K**
9-10-K	-Manhole in Roundhouse Drive combining flows from Design Points 9-K and 10-K	**5-10-K**
5-10-K	-Manhole in Roundhouse Drive and Bird Ridge Drive intersection combining flows from Design Points 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 road. Captures flows from Sub-basins K-11 and K-12.	**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. Captures flows from Sub-basin K-13.	**OS-14-K**

Table 6.5f
DESIGN POINT DESCRIPTIONS
(Gray shading: Covered in previous drainage report)

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. This inlet captures flows from sub-basin K-14 and combines them with flows captured from Sub-basin OS-East Side.	**OS-14-K**
OS-14-K	-Manhole combining flows from OS-12-K, 13-K, and 14-K	K
OS-E	-Type C inlet capturing flows from sub-basin OS-East Side. Flows will be conveyed to Design Point 14-K via 18-inch storm pipe.	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, K-1+2 to K-14, K-OS, OS-East Side, 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.

VIII. Drainage Facility Design

A. Street Capacity

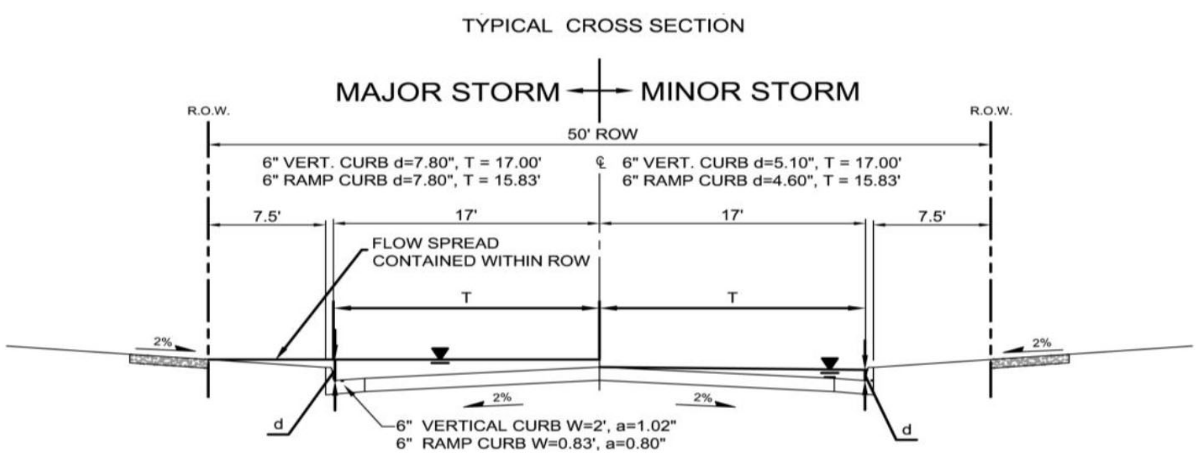
The width of the typical section for streets within Filing No. 2 will be 35 feet from back of curb to back of curb. Curb heights will be 6-inch. These streets will generally utilize EPC Optional Type C curb and gutter with EPC Type A curb and gutter used for the curb radii through intersections. The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

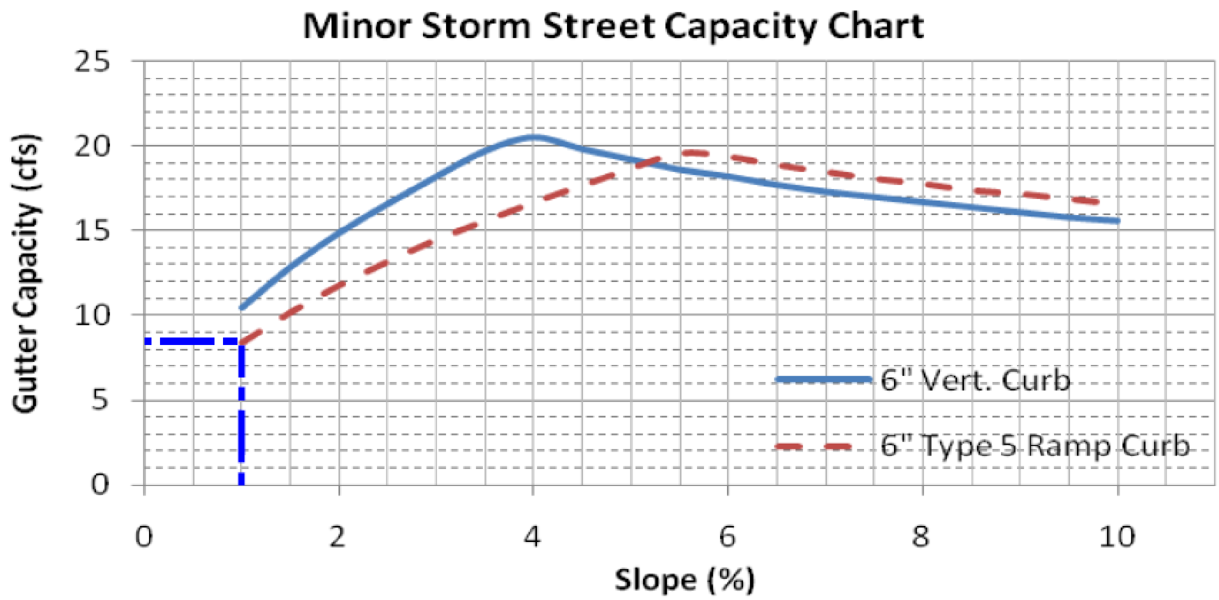
Table 7.1
STREET CAPACITIES
Trails at Aspen Ridge Filing No. 2

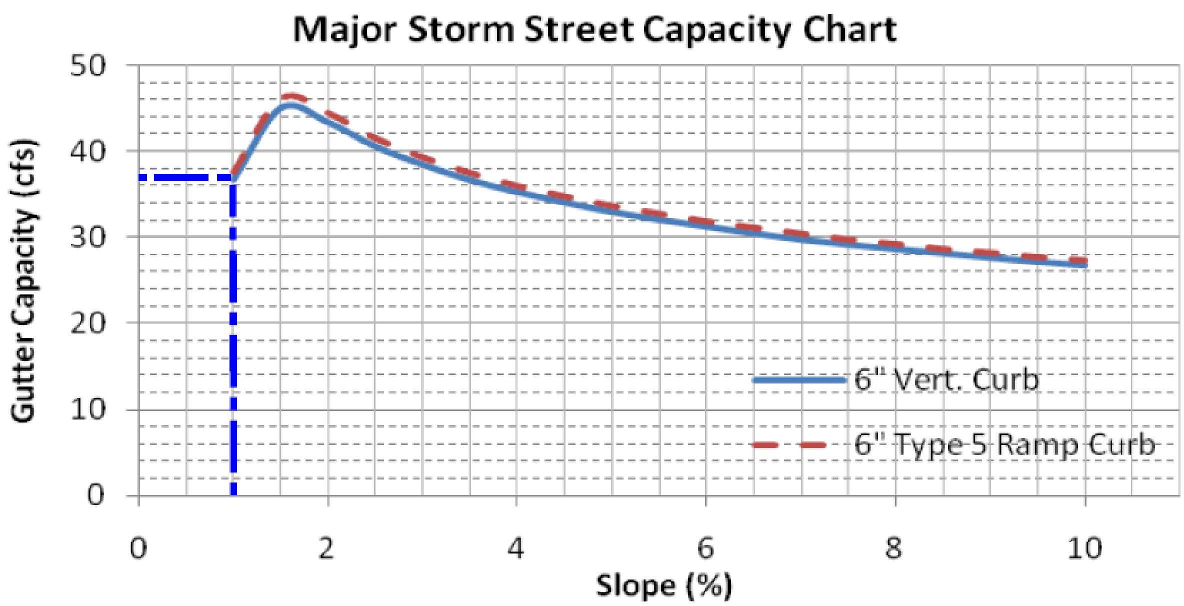
Street	Location	DESIGN POINT	Slope %	ROAD CAPACITY MINOR STORM (cfs)	Q_5 TOTAL FLOW (cfs)	ROAD CAPACITY MAJOR STORM (cfs)	Q_{100} TOTAL FLOW (cfs)
Nutterbutter Point	Between Bird Ridge Drive and Big Johnson Drive	2-K	3.5	**15.5**	**2.7**	**37.0**	**5.9**
Turtle Lake Way	Between Bird Ridge Drive and Big Johnson Drive	3+4-K	1.6	**10.5**	**2.9**	**46.0**	**6.3**
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**	**2.5**	**37.0**	**6.9**
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.

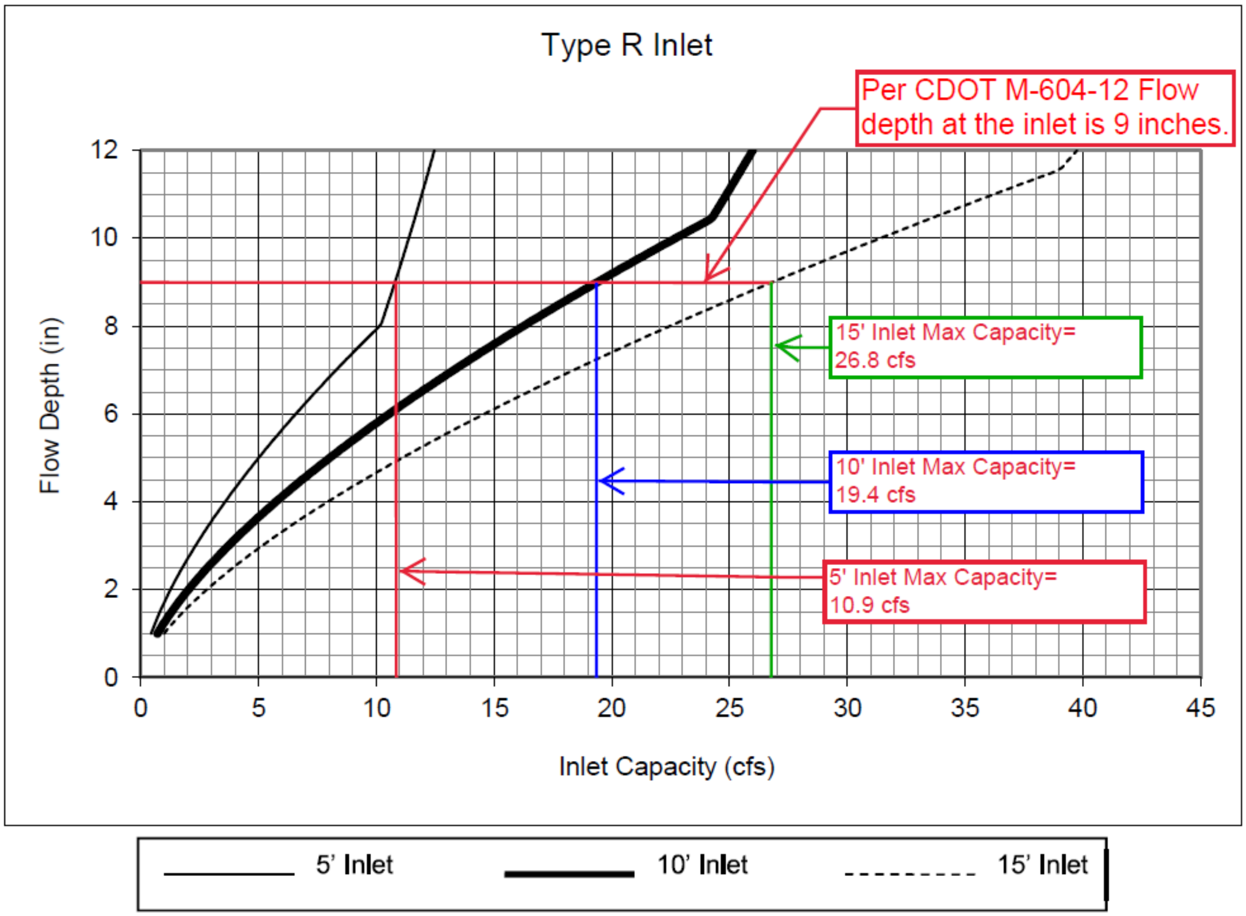


Figure 2-Inlet Capacity - Sump Conditions (DCM Figure 8-11)

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

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-K	K-1	0.78	4x4	C	SUMP		0.78		2.25	9.00	SUMP
2-K	K-2	1.58	5	R	SUMP		2.68		5.90	10.90	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	2.89	10	R	ON-GRADE	0	2.51	1.7	7.00	5.30	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
7+8-C	C-7+8	2.25	5	R	SUMP		4.23		9.23	10.90	SUMP
1-K	K-1	0.78	4x4	C	SUMP		0.78		2.25	9.00	SUMP

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 Bear Track Point. Flows in Bear Track Point will continue south to be captured in downstream inlets and conveyed onward to the East Pond.
7-K-Area	Blockage of this inlet will cause flows to surcharge the sump area around the inlet and enter the Bird Ridge Drive curb and gutter. At Grade inlet 7-K will then capture the runoff.
1-K	Blockage of this inlet will cause flows to surcharge the inlet sump area and enter Big Johnson Drive. Flows will then be captured by inlet 2-K.
2-K	Blockage of this inlet will cause flows to back up along the curb of Nutterbutter Point 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 back up Roundhouse Drive to Big Johnson Drive and continue downhill 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

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	100.5	8
200 (1)	36	82.6	2	66.1	14.4
200 (2)	36	153	3.2	68	17.43
201	36	146.6	3.1	72.8	17.43
202	42	240	2	76.68	15.02
203	48	80.9	0.5	89.53	7.12
205	18	49.9	2.4	5.9	8.46
207	18	7.3	0.4	6.59	4.35
208	18	68.4	3.4	6.58	14.94
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	11.44	11.36
212	18	7.3	1	5.9	3.57
213	18	29.4	0.5	1	0.55
214	18	69	0.5	11.96	9.24
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	13.48
218	24	271.8	3.3	17.95	12.66
220	18	8.5	6	8.8	4.99
221	36	69.8	3.5	23.62	3.34
222	18	8.2	0.7	0.7	0.4
223	18	28.5	1.6	14.38	8.14
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	53.8 123	7	38.68 (K-OS-Undeveloped)	7.28
233	18	123	2	3.4	6.82
234	18	35	1	3.4	1.92
239	18	155	2	6.9	8.25
240	18	17.1	1.2	6.9	6.82
241	18	22.8	1	2.3	1.32

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	Proposed	EX	Proposed
				WQCV	EURV	Q100	5 Year	5 Year	100 Year	100 Year
				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, & OS-East Side	**F2**: 1.756 **FB**: 4.833	4.029 6.581	16.490 18.001	22.3 22.3	**2.9** **5.8**	144.6 144.6	**96.2** **139.5**

Trails at Aspen Ridge, Filing No. 2 = **F2**, Trails at Aspen Ridge, Full Buildout = **FB** (**with OS-East Side added**)

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: 96.2 cfs, Full Buildout: 139.5 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 or OS-East Side. 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.

IX. 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.

X. 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.

XI. Drainage Fees

TRAILS AT ASPEN RIDGE FILING NO. 2 Final Drainage Report West Fork Jimmy Camp Creek 2021 Drainage and Bridge Fees						
	Impervious Area (ac.)	Fee/ Imp. Acre	Fee Due	Reimbursable Const. Costs	Fee Due at Platting	Drainage Fee Credit
Drainage Fee	9.058	$13,524.00	$122,500.39	$0.00	$122,500.39	$0.00
Bridge Fee	9.058	$4,001.00	$36,241.06	$0.00	$36,241.06	$0.00
				$0.00	***$158,741.45***	

Note: See Rational Method Spreadsheet in Appendix for impervious area calculations

XII. 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	585	$65.00	$38,025.00
24" RCP	LF	271	$78.00	$21,138.00
36" RCP	LF	496	$120.00	$59,520.00
42" RCP	LF	240	$160.00	$38,400.00
48" RCP	LF	142	$195.00	$27,690.00
TYPE I MANHOLE (Box Base)	EA	6	$11,627.00	$69,762.00
TYPE II MANHOLE (Slab Base)	EA	8	$6,395.00	$51,160.00
5' INLET	EA	4	$5,542.00	$22,168.00
10' INLET	EA	7	$7,693.86	$53,857.00
Type C Inlet	EA	2	$4,640.00	$9,280.00
36" FES	EA	1	$720.00	$720.00
		Sub Total		$391,720.00
Private Non-Reimbursable				
18" RCP	LF	287	$65.00	$18,655.00
10' INLET	EA	3	$7,627.00	$22,881.00
Type C Inlet	EA	1	$4,640.00	$4,640.00
		Sub Total		$46,176.00
		Total Estimated Construction Costs		$437,896.00

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.

XIII. 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)

XIV. 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**							
				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
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
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
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
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
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
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
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

	Flow Lengths				**Initial Flow**		**Channel Flow**				**Tc**	**Rainfall Intensity & Rational Flow Rate**			
Major Basin / Sub-basin	Initial ft	True Initial Length ft	Channel ft	ˈrue 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	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	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	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															
OS-1	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	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	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		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

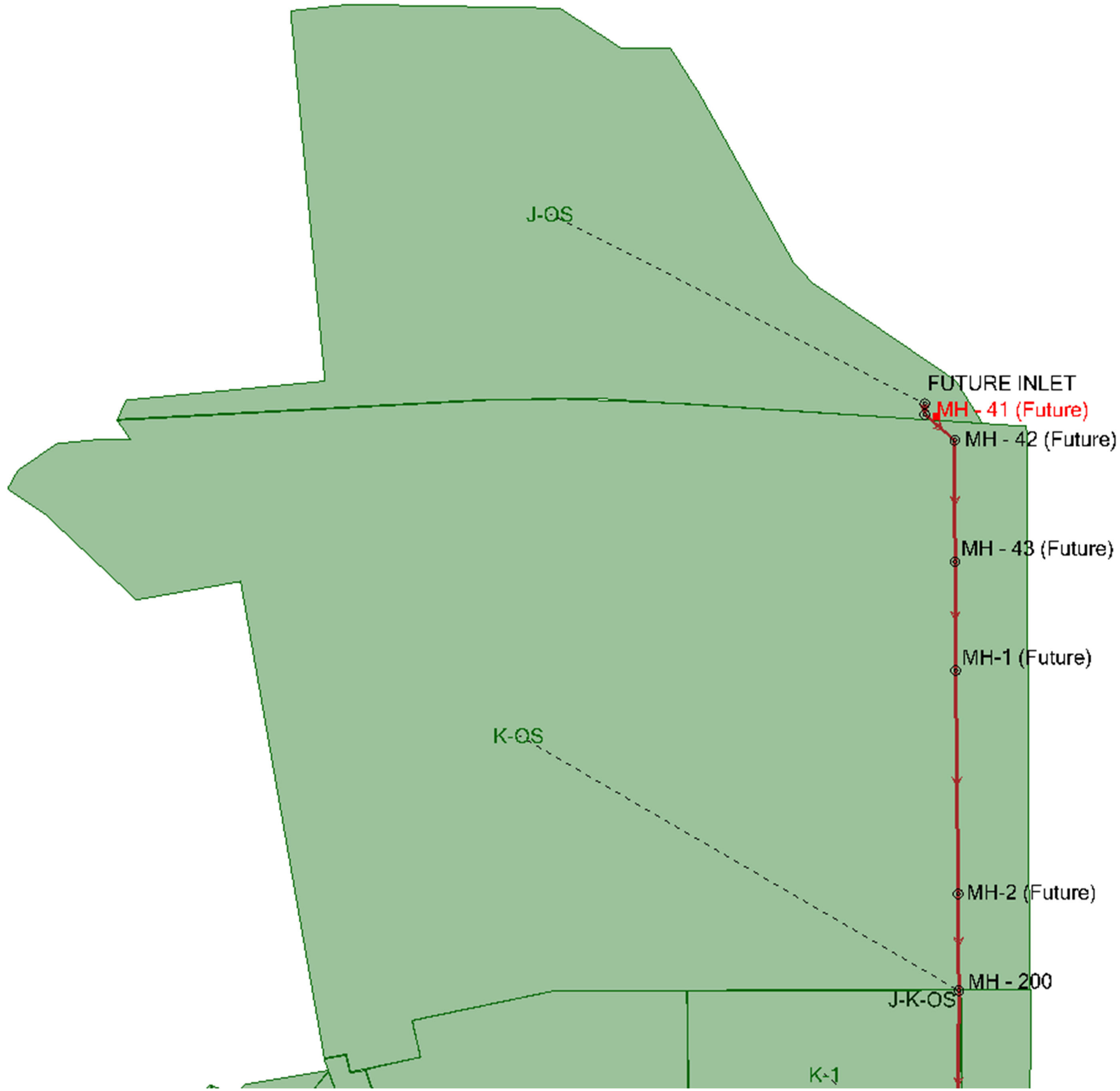
Heavy Meadow	2
Tillage/Field	3
Short Pasture and Lawns	4
Nearly Bare Ground	5
Grassed Waterway	6
Paved Areas	7

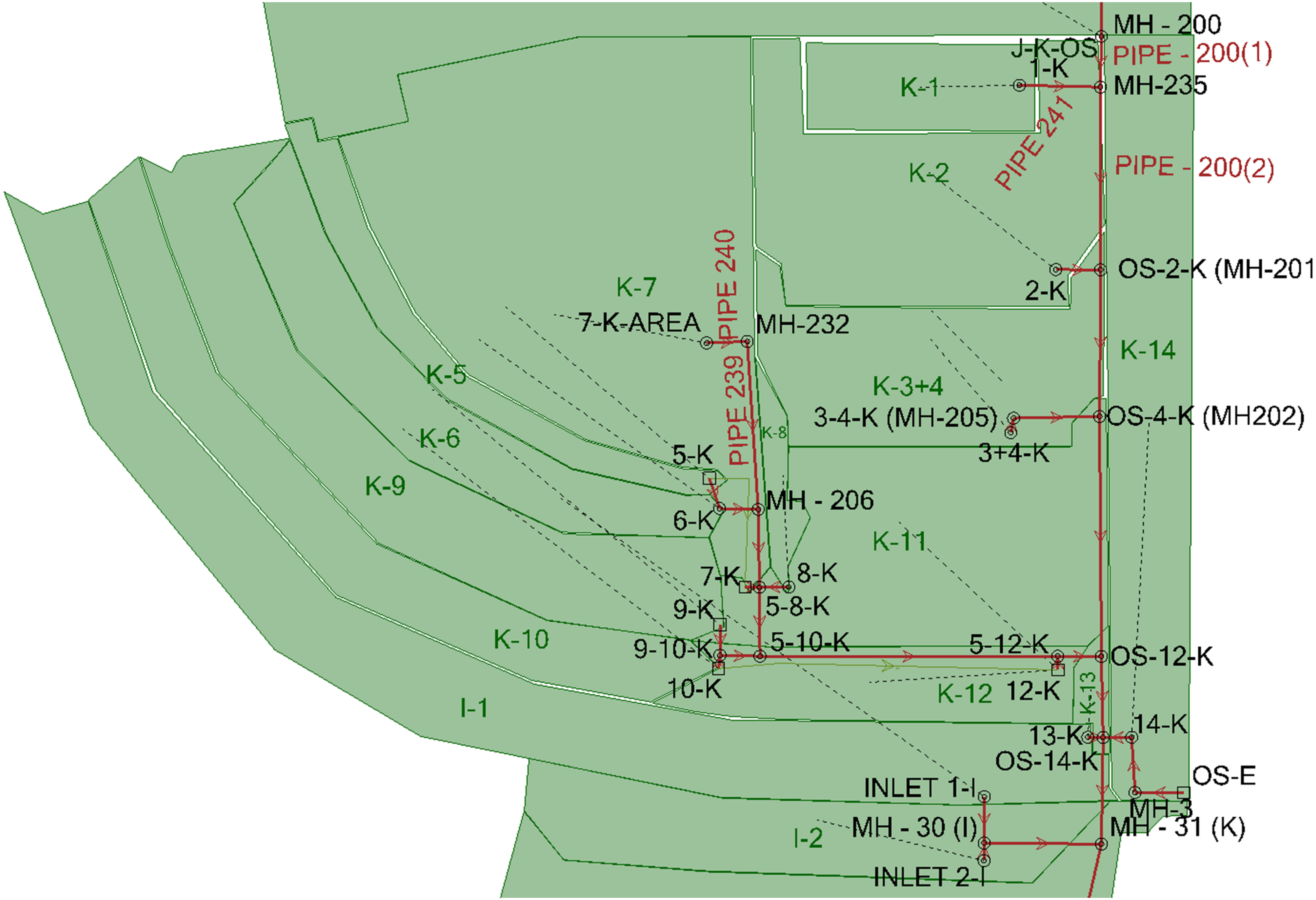
	Area		Rational 'C' Values														Flow Lengths				Initial Flow		Channel Flow				Tc	Rainfall Intensity & Rational Flow Rate					
			Surface Type 1 Residential 1/8 or less (65% Imp.)			Surface Type 2 Pavement (100% Imp.)			Surface Type 3 Park (7% Imp.)			Surface Type 4 Undeveloped (2% Imp.)			Composite		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	95674	0.90	0.96	2419	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	158862	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**
OS-EAST SIDE	180,740	4.15	0.45	0.59		0.90	0.96		0.12	0.39		0.09	0.36	180740	0.09	0.36	165.00	165.00	1421.00	1421.00	0.07	12.21	3.90	2	0.5	48.0	60.2	1.3	0.5	1.6	**0.59**	2.7	**4.00**

Filing No. 2 Impervious Calculations	685,199	15.73	582,823	16,956	90,944	0	% Impervious	Impervious Acreage
			65.00	100.00	7.00	2.00	58.69	9.232

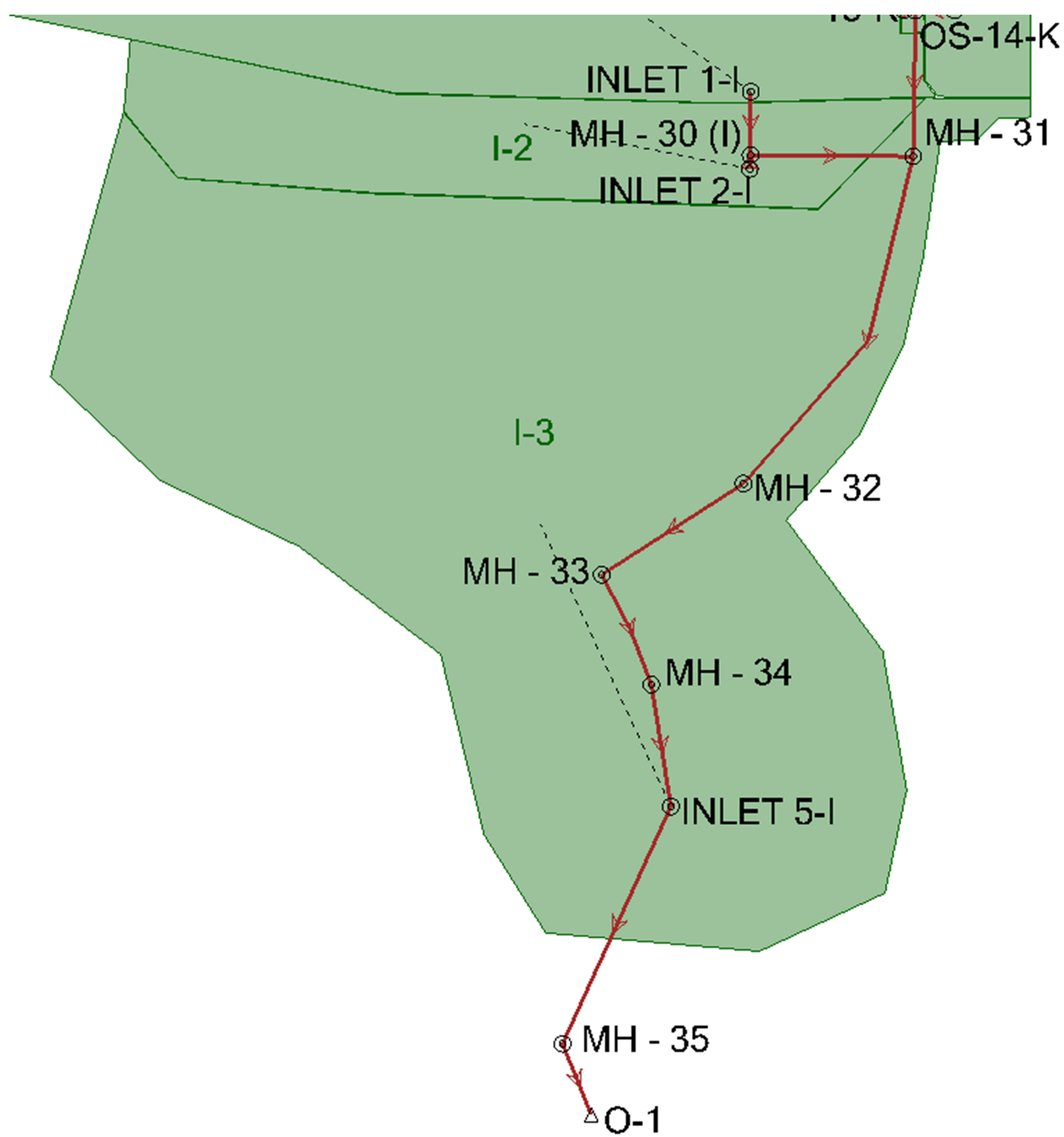
Note: Q2, Q5 & Q10 are based on C5; Q25, Q50 & Q100 are based on C100

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-K	**0.78**	0.8	2.3			
2-K	**1.58**	2.7	5.9	-	-	OS-2-K
OS-2-K	**24.93**	-	-	39.8	72.8	OS-12-K
3+4-K	**1.23**	2.9	6.3	-	-	3-4-K
OS-4-K	**26.16**	-	-	41.4	76.7	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**	-	-	5.2	12.0	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**	-	-	7.8	18.0	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**	-	-	10.3	23.6	OS-12-K
OS-12-K	**35.56**	-	-	47.8	89.5	OS-14-K
13-K	**0.09**	0.3	0.6	-	-	OS-14-K
OS-E	**4.15**	3.1	3.4	-	-	14-K
14-K	**2.78**	5.0	11.0	5.1	11.0	OS-14-K
OS-14-K	**38.42**	-	-	51.3	100.5	K
K	**42.14**	-	-	56.9	110.2	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	8.7	15.5	M
I	**46.32**	-	-	62.4	119.8	M
M	**158.79**	-	-	**154.5**	**383.7**	East Pond Discharge
East Pond Discharge (Filing 1 & 2 Buildout)	**158.79**	-	-	2.9	96.2	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

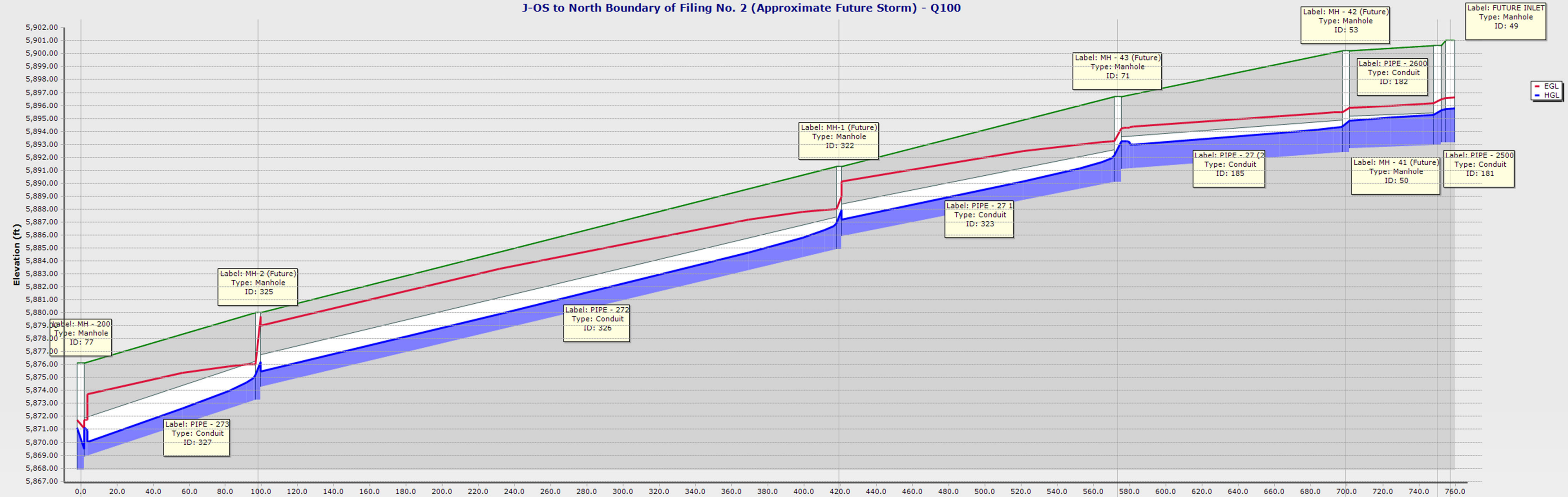


MH - 200
J-K-OS
PIPE - 200(1)
1-K
K-1
MH-235
PIPE 241
K-2
PIPE - 200(2)
OS-2-K (MH-201)
2-K
K-7
PIPE 240
7-K-AREA
MH-232
K-14
K-5
K-3+4
PIPE 239
3-4-K (MH-205)
OS-4-K (MH202)
K-8
K-6
5-K
3+4-K
K-9
MH - 206
6-K
K-11
7-K
8-K
5-8-K
9-K
K-10
5-10-K
5-12-K
9-10-K
OS-12-K
10-K
K-12
12-K
K-13
I-1
14-K
13-K
OS-14-K
OS-E
INLET 1-I
MH-3
I-2
MH - 30 (I)
MH - 31 (K)
INLET 2-I



HGL Profiles: Q100

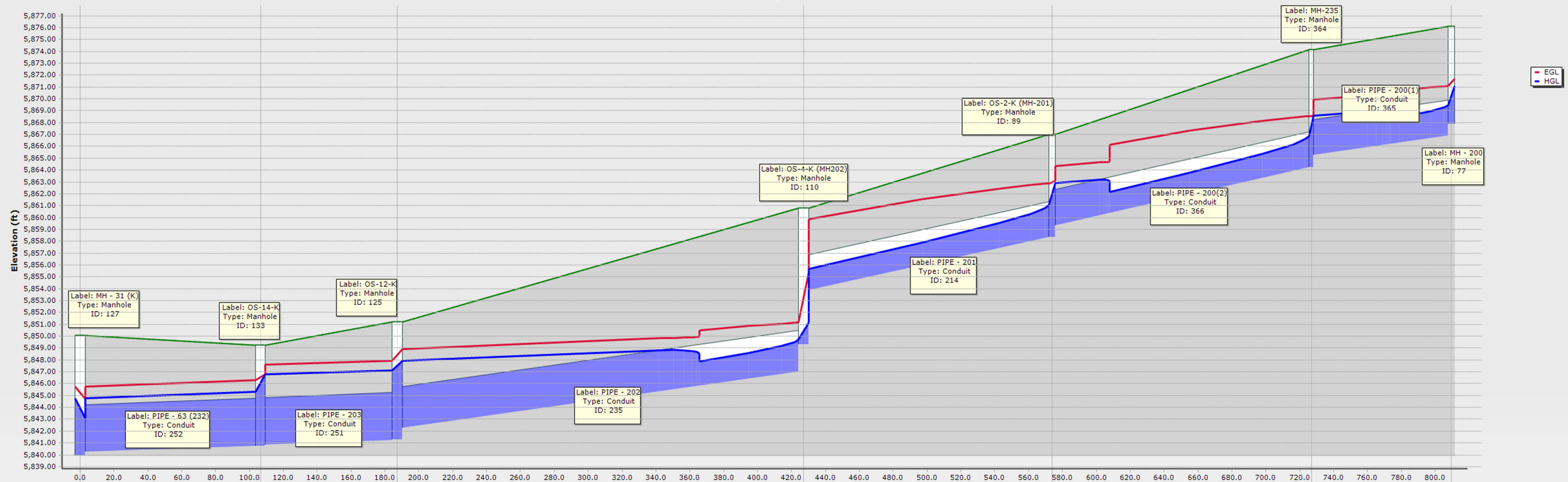
J-OS to North Boundary of Filing No. 2 (Approximate Future Storm) - Q100



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
Rise (in)\Material	36.0 \ RCP	30.0 \ RCP	30.0 \ RCP	30.0 \ RCP	30.0 \ RCP	30.0 \ RCP
Flow (cfs)	35.20	35.61	35.82	36.09	36.23	36.25
Slope (ft/ft)	0.045	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	[illegible]	[illegible]1.02
Invert (ft)	5867.88	5873.27	5884.89	5890.10	5892.36	[illegible]	[illegible]3.15
Station (ft)	0.0	98.0	419.2	573.4	699.6	750.[illegible]	[illegible]57.3

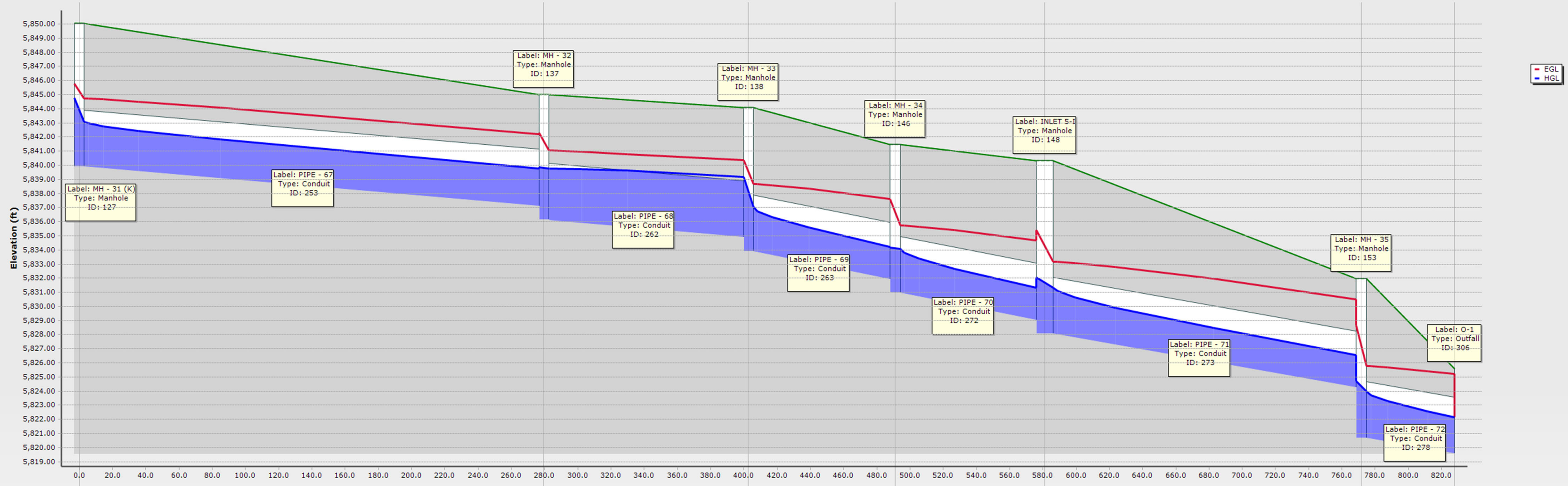
J-K-OS to K (South of Filing No. 2) - Q100



ID\Label	252 \ PIPE - 63 (232)	251 \ PIPE - 203	235 \ PIPE - 202	214 \ PIPE - 201	366 \ PIPE - 200(2)	365 \ PIPE - 200(1)
Link Length (ft)	106.5	80.9	239.8	146.6	153.0	82.6
Rise (in)\Material	48.0 \ RCP	48.0 \ RCP	42.0 \ RCP	36.0 \ RCP	36.0 \ RCP	36.0 \ RCP
Flow (cfs)	100.51	89.53	76.68	72.83	68.04	66.13
Slope (ft/ft)	0.005	0.005	0.020	0.031	0.032	0.020

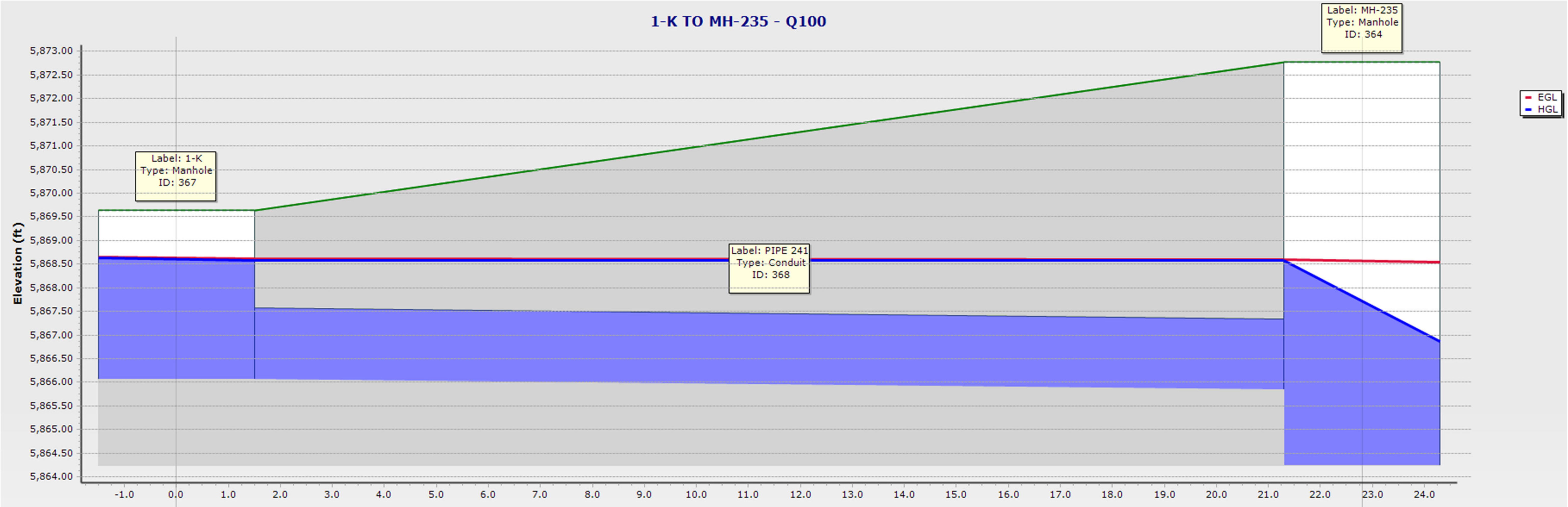
ID\Label	127 \ MH - 31 (K)	133 \ OS-14-K	125 \ OS-12-K	110 \ OS-4-K (MH202)	89 \ OS-2-K (MH-201)	364 \ MH-235	77 \ MH - 200
Ground (ft)	5850.04	5849.24	5851.22	5860.81	5867.01	5874.13	5876.11
Invert (ft)	5839.92	5840.75	5841.26	5849.30	5858.35	5864.24	5867.88
Station (ft)	0.0	106.5	187.4	427.2	573.8	726.8	809.4

K to East Pond Outfall - Q100

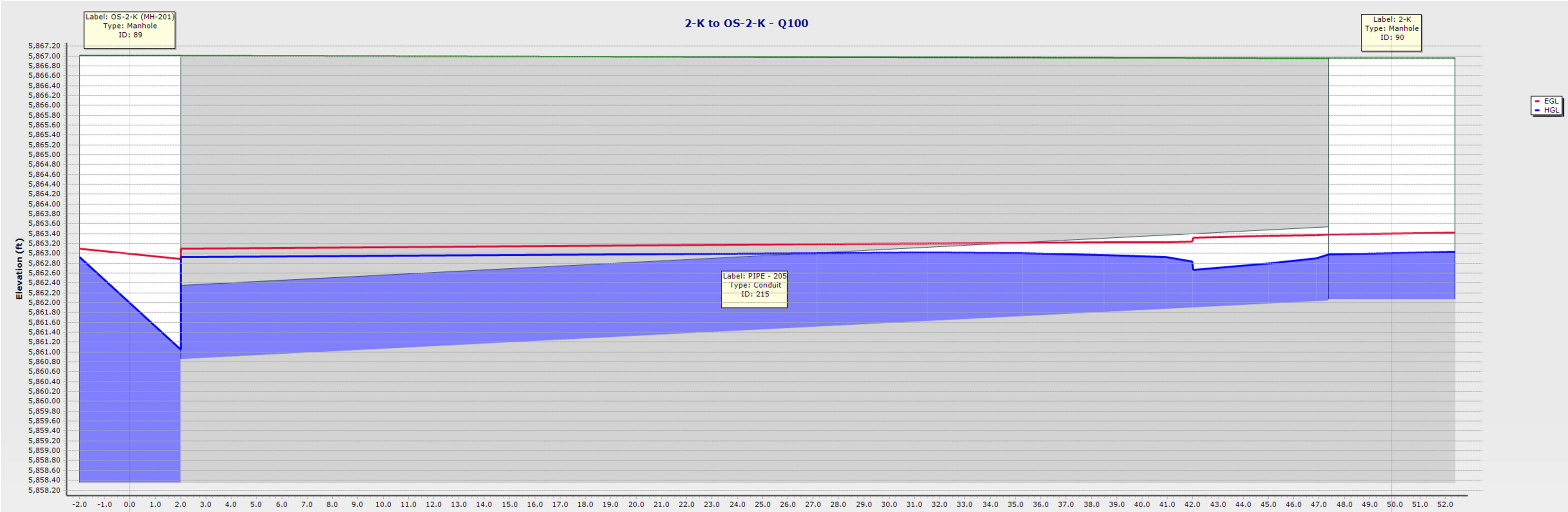


ID\Label	253 \ PIPE - 67	262 \ PIPE - 68	263 \ PIPE - 69	272 \ PIPE - 70	273 \ PIPE - 71	278 \ PIPE - 72
Link Length (ft)	279.6	123.1	88.3	90.1	190.5	56.1
Rise (in)\Material	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP
Flow (cfs)	110.16	109.36	109.01	108.83	119.82	119.38
Slope (ft/ft)	0.010	0.010	0.022	0.021	0.020	0.020

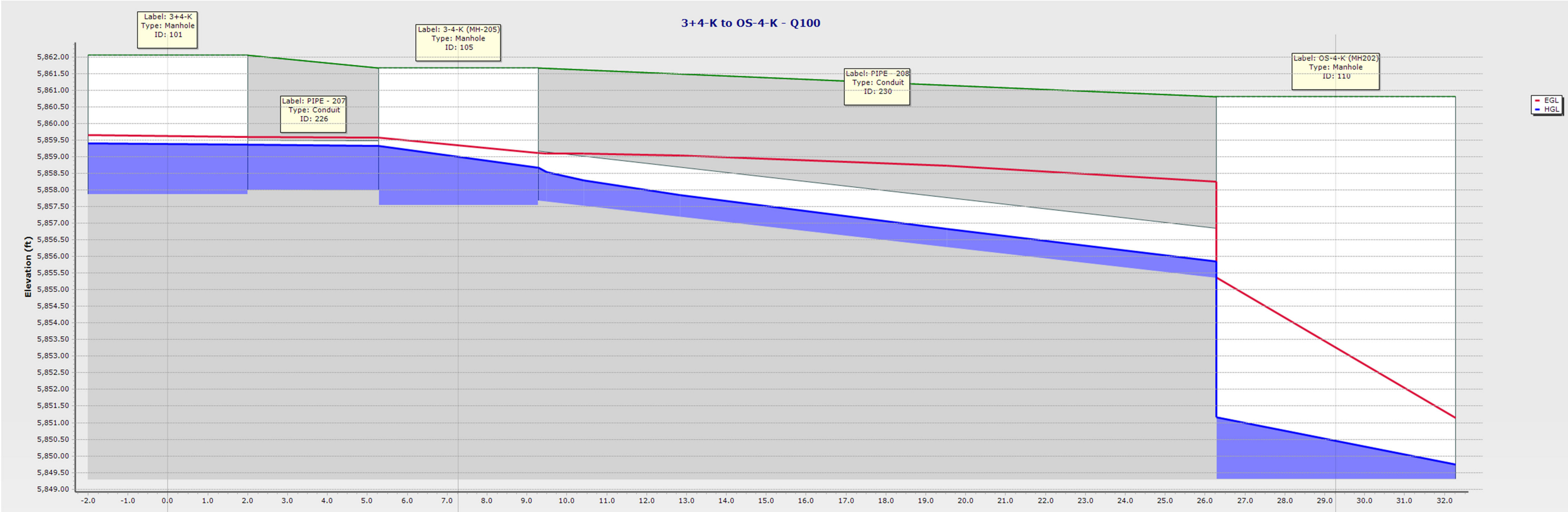
ID\Label	127 \ MH - 31 (K)	137 \ MH - 32	138 \ MH - 33	146 \ MH - 34	148 \ INLET 5-I	153 \ MH - 35	306 \ O-1
Ground (ft)	5850.04	5845.00	5844.06	5841.45	5840.33	5831.98	5825.60
Invert (ft)	5839.92	5836.12	5833.88	5830.94	5828.05	5820.68	5819.58
Station (ft)	0.0	279.6	402.8	491.0	581.2	771.7	827.7



ID\Label		368 \ PIPE 241	
Link Length (ft)		22.8	
Rise (in)\Material		18.0 \ Concrete	
Flow (cfs)		2.33	
Slope (ft/ft)		0.010	
ID\Label	367 \ 1-K		364 \ MH-235
Ground (ft)	5869.63		5872.77
Invert (ft)	5866.07		5864.24
Station (ft)	0.0		22.8

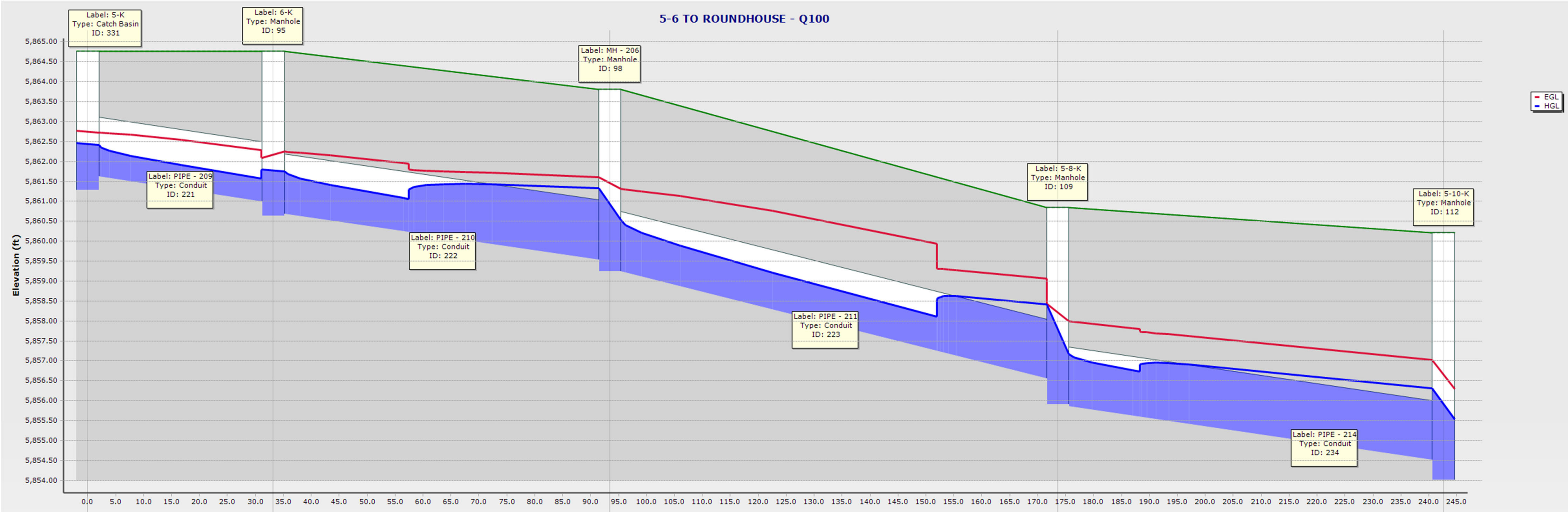


	OS-2-K (MH-201)	PIPE - 205	2-K
ID\Label		215 \ PIPE - 205	
Link Length (ft)		49.9	
Rise (in)\Material		18.0 \ RCP	
Flow (cfs)		5.90	
Slope (ft/ft)		-0.024	
ID\Label	89 \ OS-2-K (MH-201)		90 \ 2-K
Ground (ft)	5867.01		5866.95
Invert (ft)	5858.35		5862.06
Station (ft)	0.0		49.9



ID\Label	226 \ PIPE - 207	230 \ PIPE - 208
Link Length (ft)	7.3	22.0
Rise (in)\Material	18.0 \ RCP	18.0 \ RCP
Flow (cfs)	6.59	6.58
Slope (ft/ft)	-0.004	-0.106

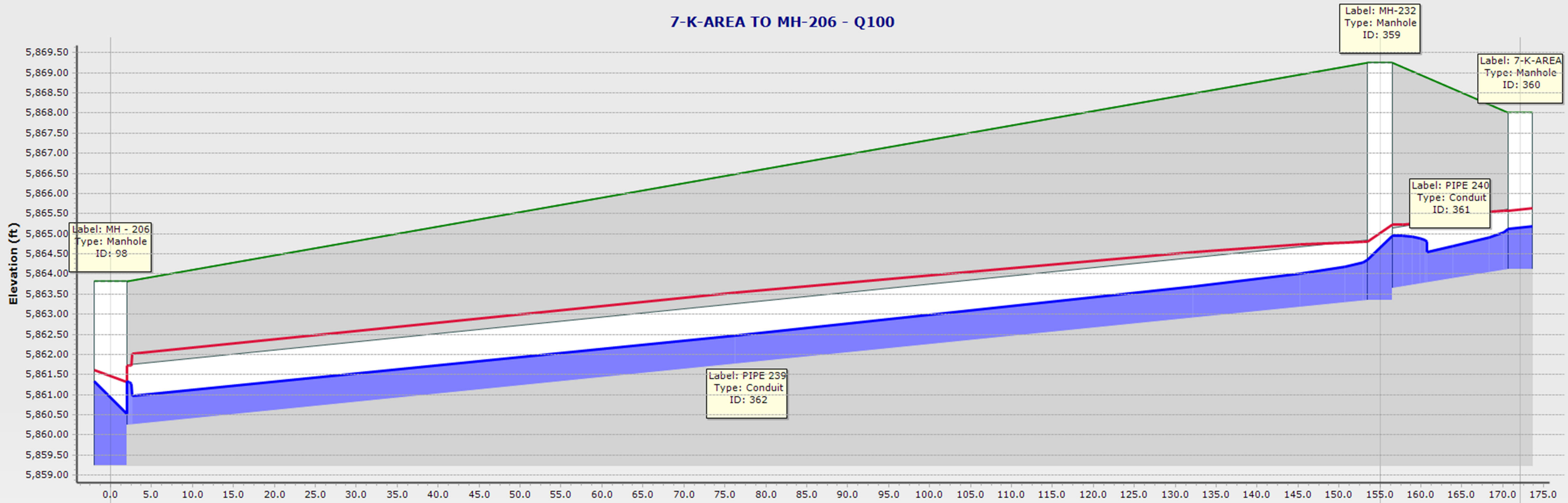
ID\Label	101 \ 3+4-K	105 \ 3-4-K (MH-205)	110 \ OS-4-K (MH202)
Ground (ft)	5862.06	5861.67	5860.81
Invert (ft)	5857.87	5857.54	5849.30
Station (ft)	0.0	7.3	29.3



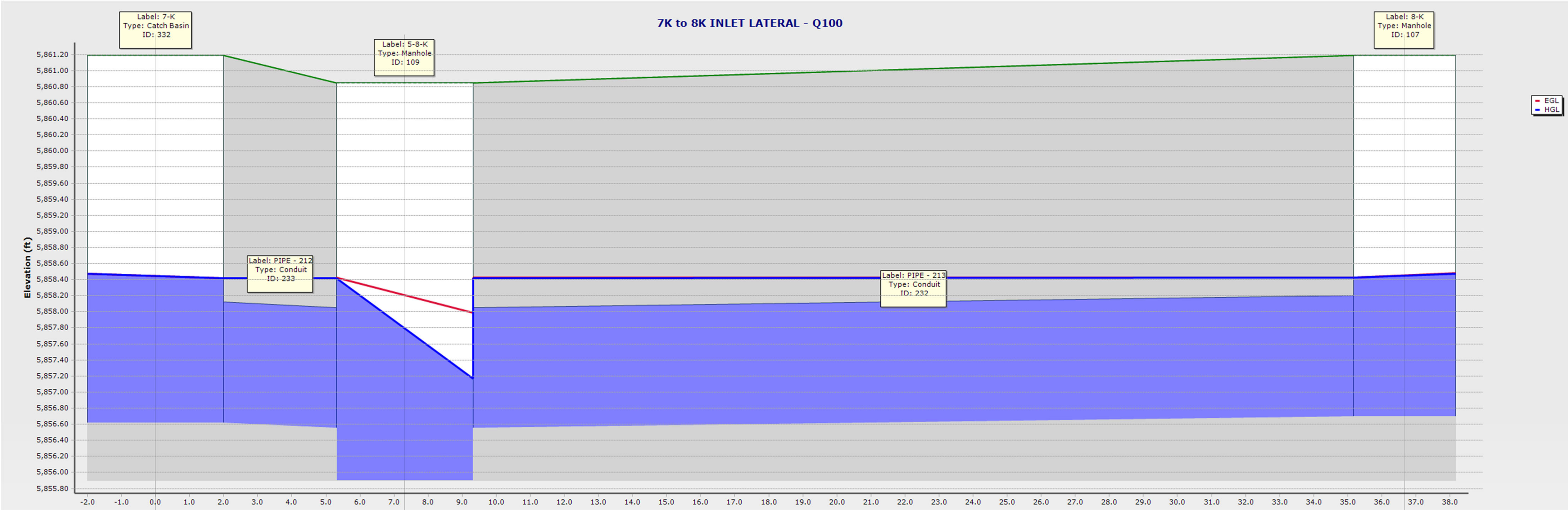
ID\Label	221 \ PIPE - 209	222 \ PIPE - 210	223 \ PIPE - 211	234 \ PIPE - 214
Link Length (ft)	33.2	60.2	80.2	69.0
Rise (in)\Material	18.0 \ RCP	18.0 \ RCP	18.0 \ RCP	18.0 \ RCP
Flow (cfs)	4.27	7.55	11.44	11.96
Slope (ft/ft)	-0.019	-0.019	-0.034	-0.019

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	5854.01
Station (ft)	0.0	33.2	93.4	173.6	242.6

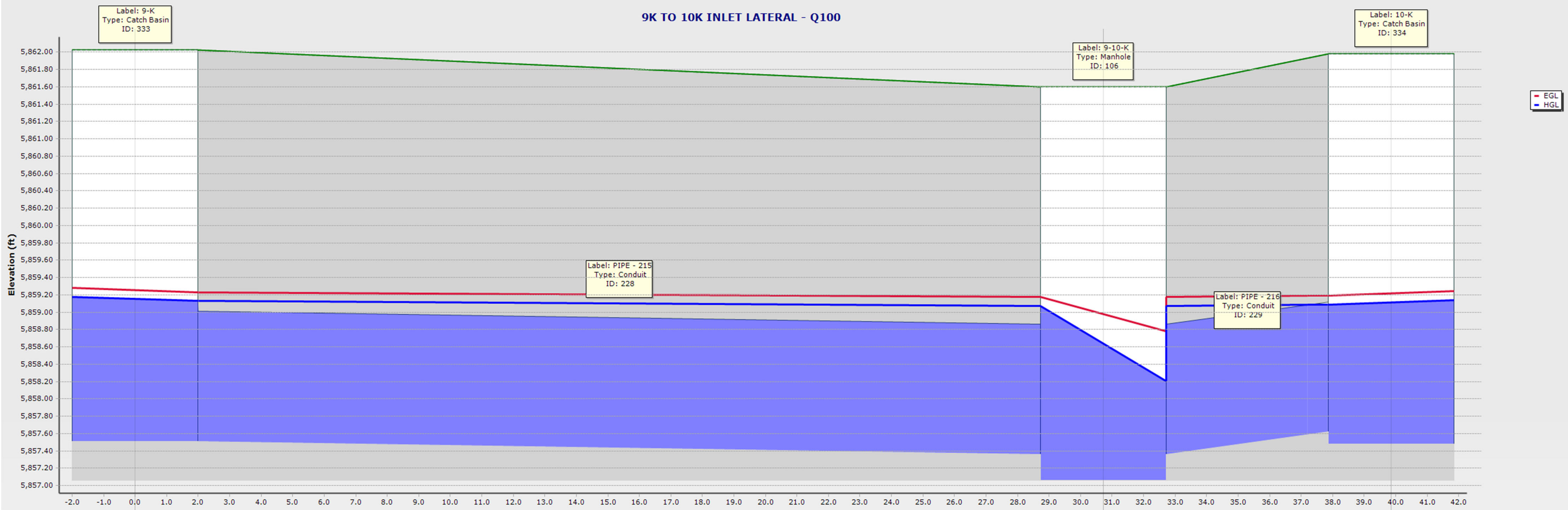
7-K-AREA TO MH-206 - Q100



ID\Label		362 \ PIPE 239		361 \ PIPE 240	
Link Length (ft)		155.0		17.1	
Rise (in)\Material		18.0 \ Concrete		18.0 \ Concrete	
Flow (cfs)		6.89		6.90	
Slope (ft/ft)		0.020		0.027	
ID\Label	98 \ MH - 206		359 \ MH-232		360 \ 7-K-AREA
Ground (ft)	5863.81		5869.25		5868.00
Invert (ft)	5859.24		5863.34		5864.11
Station (ft)	0.0		155.0		172.1

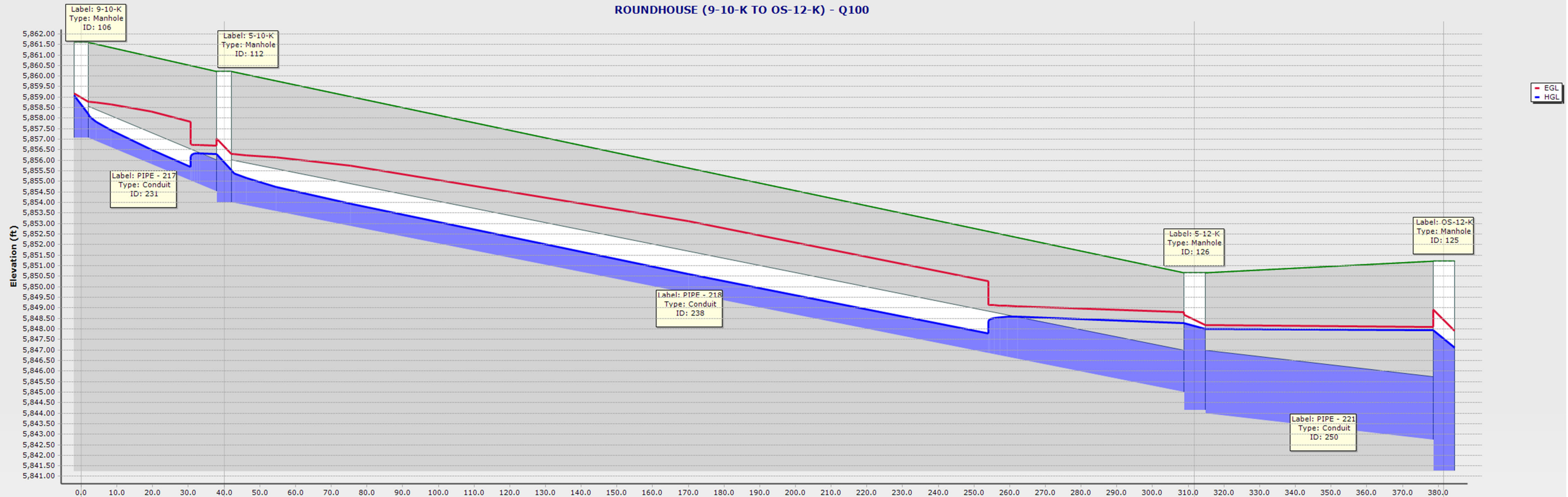


ID\Label		233 \ PIPE - 212		232 \ PIPE - 213	
Link Length (ft)		7.3		29.4	
Rise (in)\Material		18.0 \ RCP		18.0 \ RCP	
Flow (cfs)		0.09		0.98	
Slope (ft/ft)		-0.010		-0.005	
ID\Label	332 \ 7-K		109 \ 5-8-K		107 \ 8-K
Ground (ft)	5861.19		5860.85		5861.19
Invert (ft)	5856.62		5855.90		5856.70
Station (ft)	0.0		7.3		36.7



ID\Label		228 \ PIPE - 215		229 \ PIPE - 216	
Link Length (ft)		30.7		9.1	
Rise (in)\Material		18.0 \ RCP		18.0 \ RCP	
Flow (cfs)		4.54		4.54	
Slope (ft/ft)		-0.005		-0.028	
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		39.9

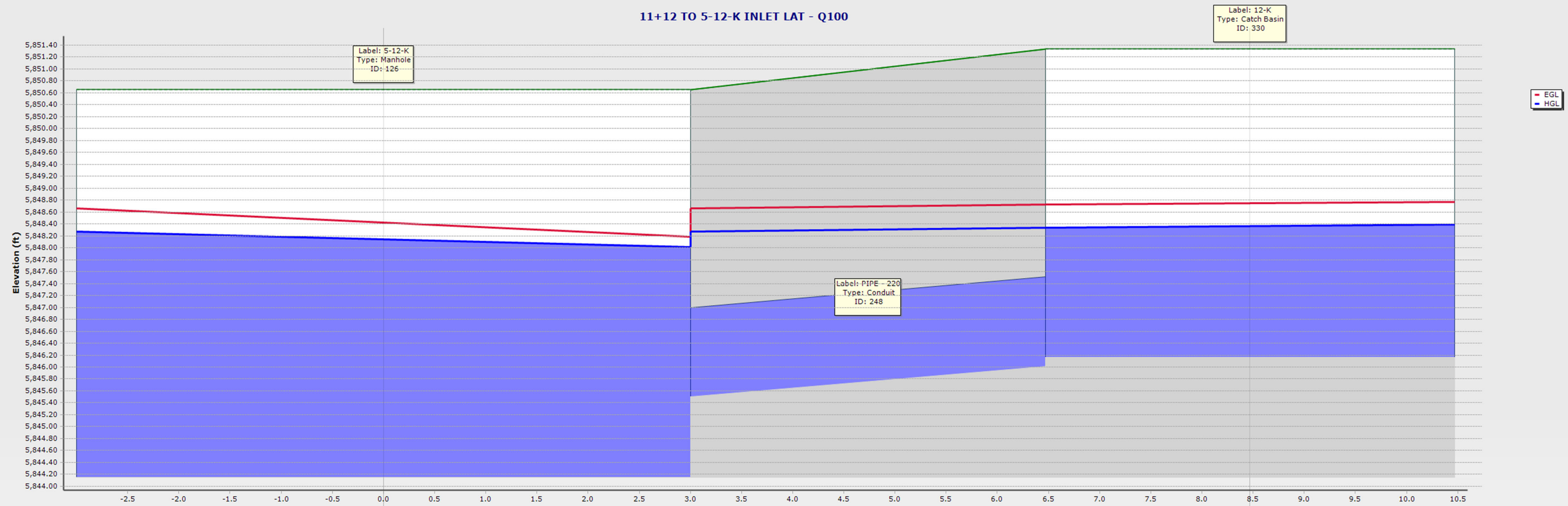
ROUNDHOUSE (9-10-K TO OS-12-K) - Q100



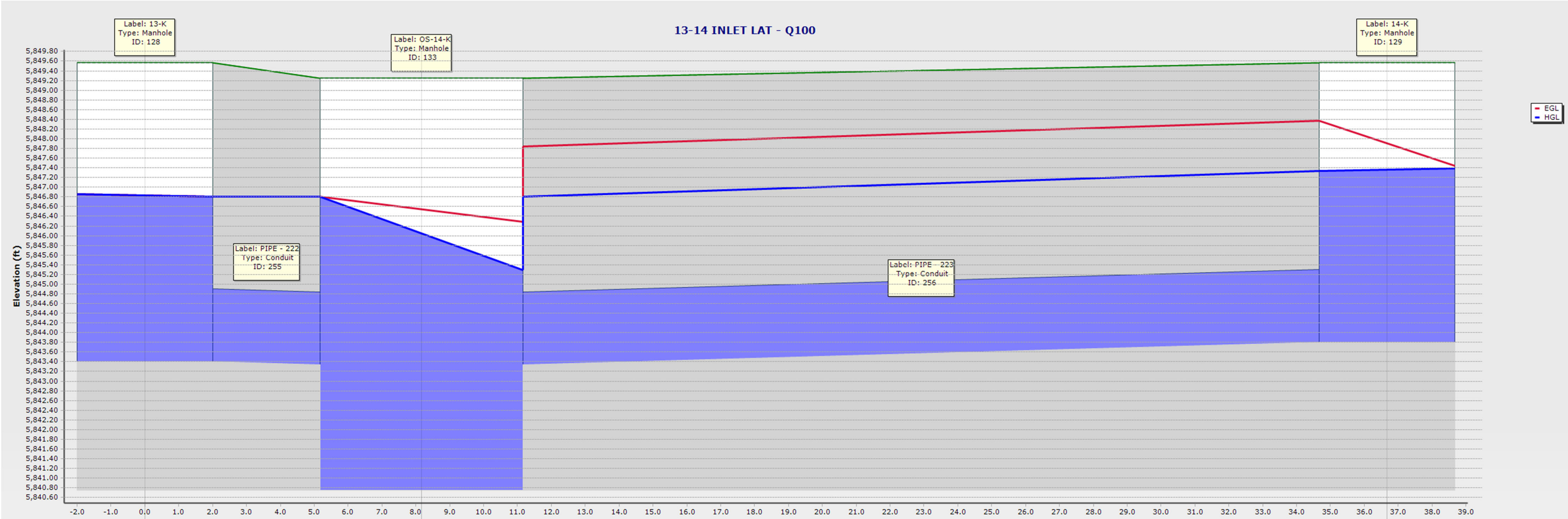
ID\Label	231 \ PIPE - 217	238 \ PIPE - 218	250 \ PIPE - 221
Link Length (ft)	40.0	271.8	69.8
Rise (in)\Material	18.0 \ RCP	24.0 \ RCP	36.0 \ RCP
Flow (cfs)	8.78	17.95	23.62
Slope (ft/ft)	-0.064	-0.033	-0.018

ID\Label	106 \ 9-10-K	112 \ 5-10-K	126 \ 5-12-K	125 \ OS-12-K
Ground (ft)	5861.60	5860.21	5850.65	5851.22
Invert (ft)	5857.06	5854.01	5844.15	5841.26
Station (ft)	0.0	40.0	311.8	381.6

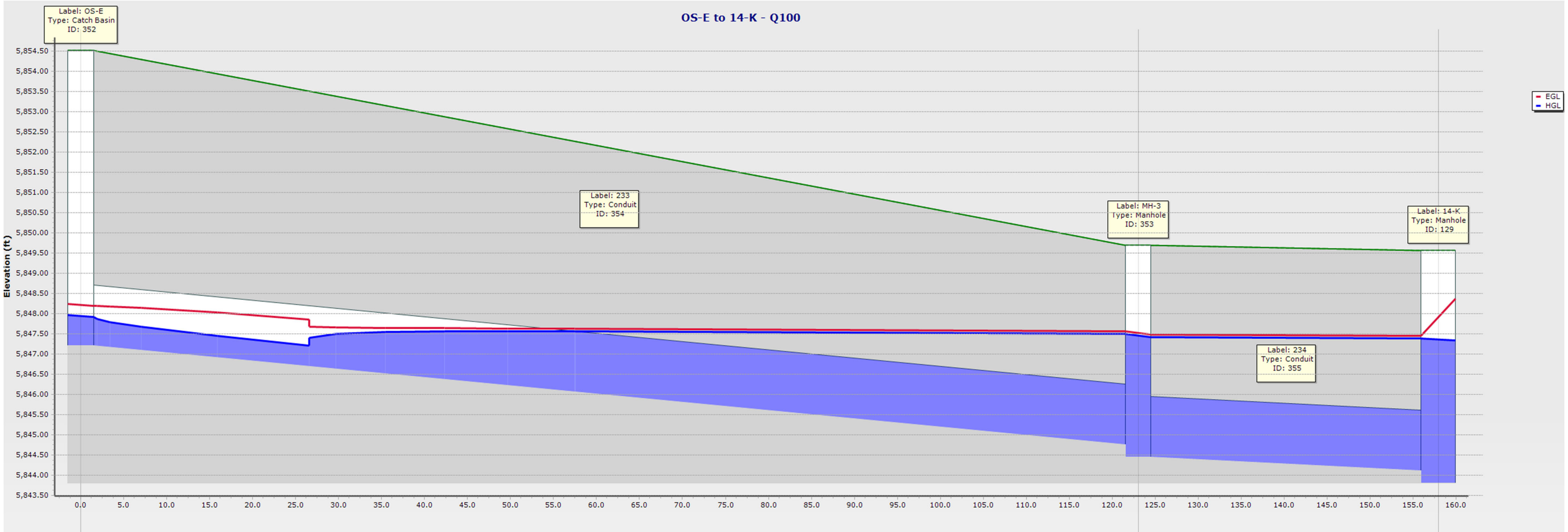
11+12 TO 5-12-K INLET LAT - Q100



	0.0		8.5
ID\Label		248 \ PIPE - 220	
Link Length (ft)		8.5	
Rise (in)\Material		18.0 \ RCP	
Flow (cfs)		8.81	
Slope (ft/ft)		-0.060	
ID\Label	126 \ 5-12-K		330 \ 12-K
Ground (ft)	5850.65		5851.33
Invert (ft)	5844.15		5846.16
Station (ft)	0.0		8.5



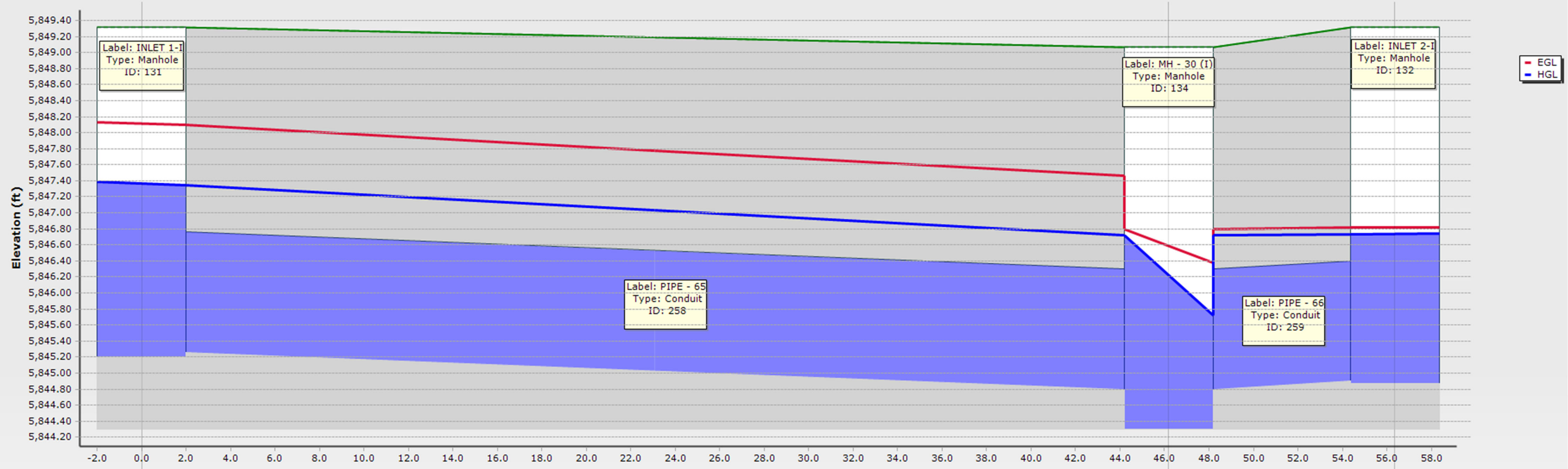
ID\Label		255 \ PIPE - 222		256 \ PIPE - 223	
Link Length (ft)		8.2		28.5	
Rise (in)\Material		18.0 \ RCP		18.0 \ RCP	
Flow (cfs)		0.69		14.38	
Slope (ft/ft)		-0.007		-0.016	
ID\Label	128 \ 13-K		133 \ OS-14-K		129 \ 14-K
Ground (ft)	5849.57		5849.24		5849.56
Invert (ft)	5843.40		5840.75		5843.81
Station (ft)	0.0		8.2		36.7



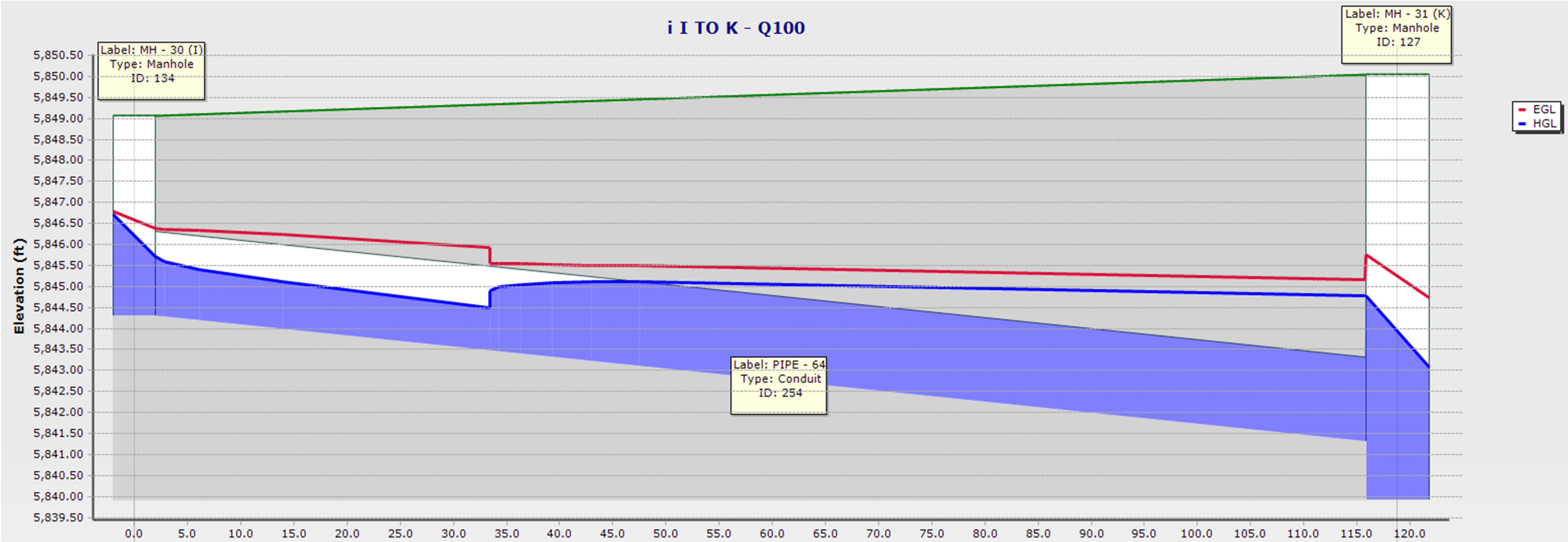
ID\Label	354 \ 233	355 \ 234
Link Length (ft)	123.0	34.9
se (in)\Material	18.0 \ Concrete	18.0 \ Concrete
Flow (cfs)	3.40	3.40
Slope (ft/ft)	0.020	0.010

ID\Label	352 \ OS-E	353 \ MH-3	129 \ 14-K
Ground (ft)	5854.52	5849.69	5849.56
Invert (ft)	5847.22	5844.46	5843.81
Station (ft)	0.0	123.0	157.9

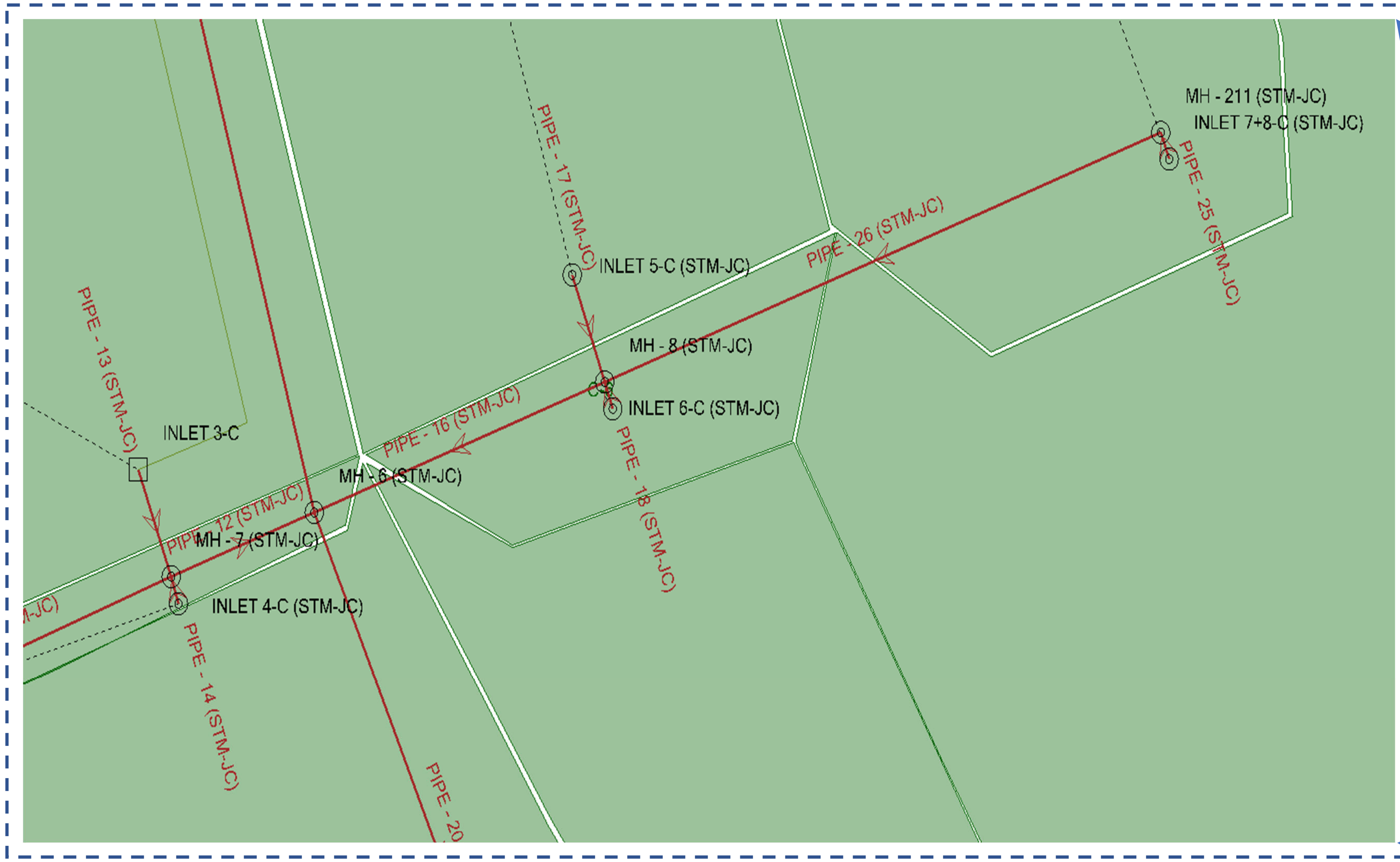
1-I to 2-I INLET LATERAL - Q100

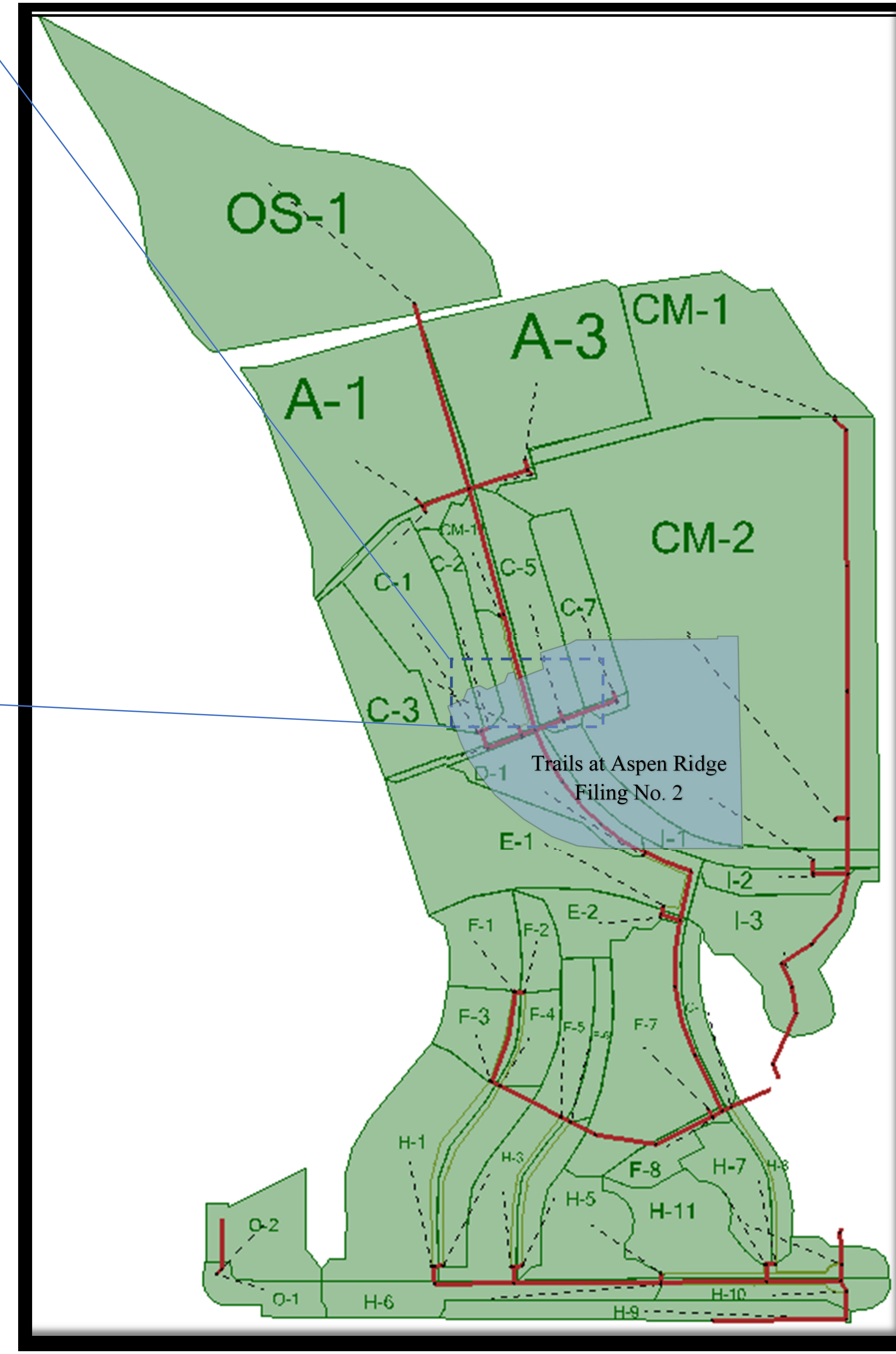


ID\Label		258 \ PIPE - 65		259 \ PIPE - 66	
Link Length (ft)		46.2		10.2	
Rise (in)\Material		18.0 \ RCP		18.0 \ RCP	
Flow (cfs)		12.26		4.05	
Slope (ft/ft)		-0.010		-0.010	
ID\Label	131 \ INLET 1-I		134 \ MH - 30 (I)		132 \ INLET 2-I
Ground (ft)	5849.31		5849.07		5849.31
Invert (ft)	5845.20		5844.30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



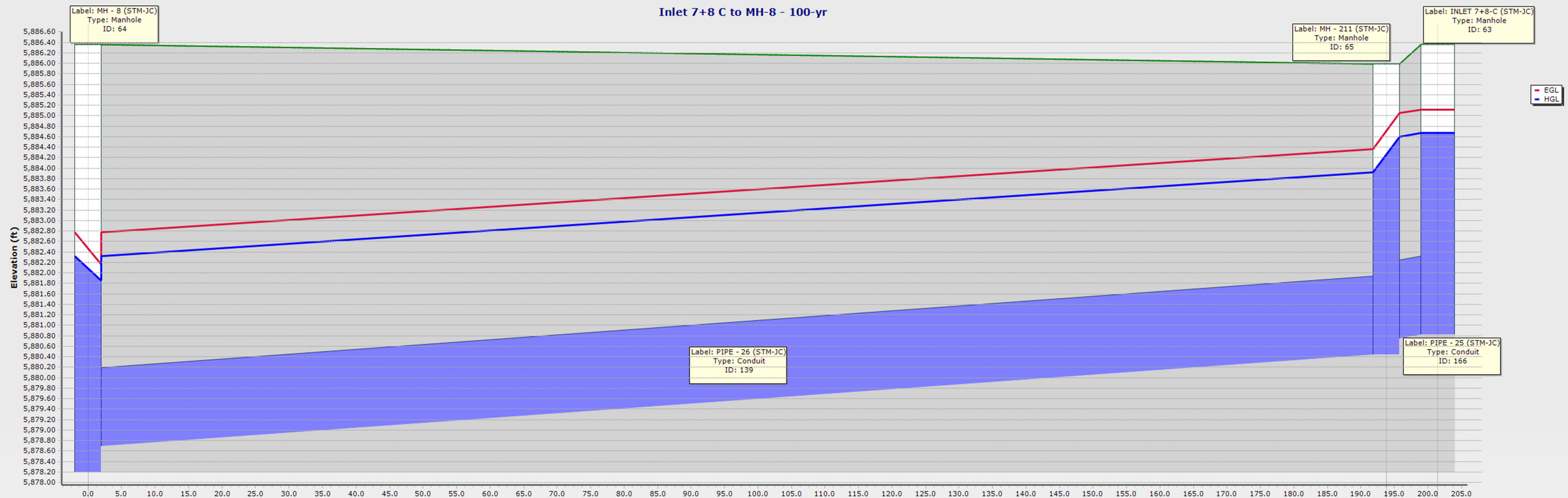
ID\Label		254 \ PIPE - 64	
Link Length (ft)		118.8	
Rise (in)\Material		24.0 \ RCP	
Flow (cfs)		15.50	
Slope (ft/ft)		-0.025	
ID\Label	134 \ MH - 30 (I)		127 \ MH - 31 (K)
Ground (ft)	5849.07		5850.04
Invert (ft)	5844.30		5839.92
Station (ft)	0.0		118.8





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. In Filing No. 2, due to road design, two inlets were reduced to one. Which is labeled 7+8-C in this drainage report.

Inlet 7+8 C to MH-8 - 100-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)		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

Q100 PIPE SUMMARY

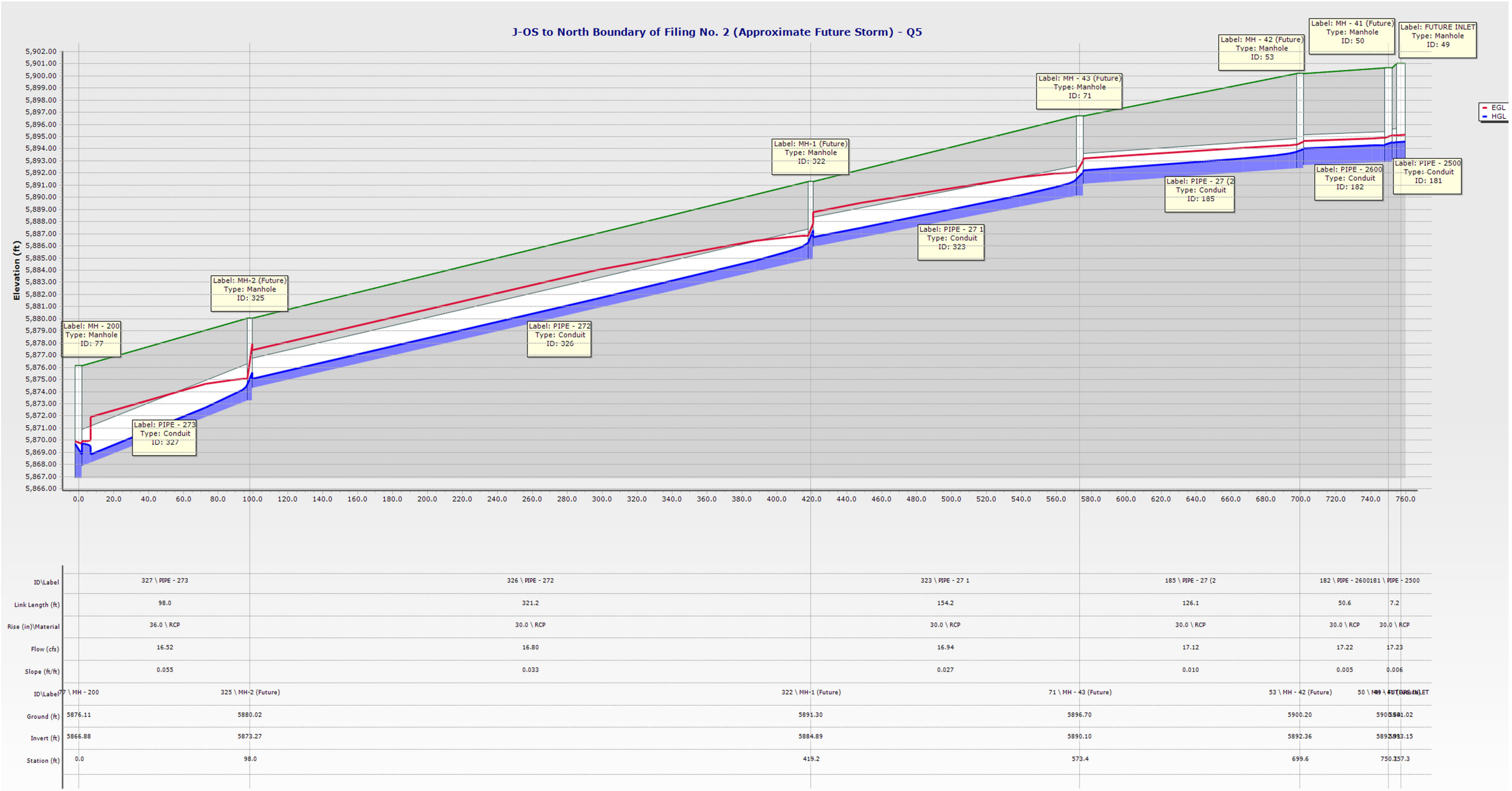
	Label	Start Node	Stop Node	Length (User Defined) (ft)	Diameter (in)	Notes	Manning's n	Flow (cfs)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Depth (Normal) / Rise (%)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
354: 233	233	OS-E	MH-3	123.0	18.0		0.013	3.40	14.85	22.9	32.5	6.82	5,847.22	5,844.76	0.020	5,847.92	5,847.51
355: 234	234	MH-3	14-K	34.9	18.0		0.013	3.40	10.52	32.3	39.1	1.92	5,844.46	5,844.11	0.010	5,847.44	5,847.40
185: PIPE - 27	PIPE - 27 (2	MH - 42 (Future)	MH - 43 (Future)	126.1	30.0	24" RCP	0.013	36.09	40.99	88.0	72.8	9.42	5,892.36	5,891.10	0.010	5,894.40	5,893.25
323: PIPE - 27	PIPE - 27 1	MH - 43 (Future)	MH-1 (Future)	154.2	30.0	24" RCP	0.013	35.82	67.77	52.9	51.7	14.00	5,890.10	5,885.89	0.027	5,892.13	5,888.02
252: PIPE - 63	PIPE - 63 (232)	OS-14-K	MH - 31 (K)	106.5	48.0	48" RCP	0.013	100.64	101.57	99.1	81.1	8.01	5,840.75	5,840.22	0.005	5,845.30	5,844.78
254: PIPE - 64	PIPE - 64	MH - 31 (K)	MH - 30 (I)	118.8	24.0	24" RCP	0.013	15.50	35.83	43.3	46.0	10.99	5,841.32	5,844.30	-0.025	5,845.72	5,844.78
258: PIPE - 65	PIPE - 65	MH - 30 (I)	INLET 1-I	46.2	18.0	18" RCP	0.013	12.26	10.48	117.0	(N/A)	6.94	5,844.80	5,845.26	-0.010	5,847.35	5,846.72
259: PIPE - 66	PIPE - 66	MH - 30 (I)	INLET 2-I	10.2	18.0	18" RCP	0.013	4.05	10.41	38.9	43.3	2.29	5,844.80	5,844.90	-0.010	5,846.73	5,846.72
253: PIPE - 67	PIPE - 67	MH - 31 (K)	MH - 32	279.6	48.0	48" RCP	0.013	110.31	143.63	76.8	65.7	12.60	5,839.92	5,837.12	0.010	5,843.09	5,839.75
262: PIPE - 68	PIPE - 68	MH - 32	MH - 33	123.1	48.0	48" RCP	0.013	109.50	143.63	76.2	65.4	12.58	5,836.12	5,834.89	0.010	5,839.79	5,839.20
263: PIPE - 69	PIPE - 69	MH - 33	MH - 34	88.3	48.0	48" RCP	0.013	109.15	213.02	51.2	50.7	17.05	5,833.88	5,831.94	0.022	5,837.04	5,834.21
272: PIPE - 70	PIPE - 70	MH - 34	INLET 5-I	90.1	48.0	48" RCP	0.013	108.97	208.12	52.4	51.4	16.75	5,830.94	5,829.05	0.021	5,834.10	5,831.34
273: PIPE - 71	PIPE - 71	INLET 5-I	MH - 35	190.5	48.0	48" RCP	0.013	119.98	203.11	59.1	55.3	16.83	5,828.05	5,824.24	0.020	5,831.35	5,826.55
278: PIPE - 72	PIPE - 72	MH - 35	O-1	56.1	48.0	48" RCP	0.013	119.54	201.16	59.4	55.5	16.69	5,820.68	5,819.58	0.020	5,823.97	5,822.15
365: PIPE - 20	PIPE - 200(1)	MH - 200	MH-235	82.6	36.0	24" RCP	0.013	66.13	93.98	70.4	61.9	14.40	5,866.88	5,865.24	0.020	5,869.48	5,868.57
366: PIPE - 20	PIPE - 200(2)	MH-235	OS-2-K (MH-201)	153.0	36.0	24" RCP	0.013	68.04	119.23	57.1	54.1	17.43	5,864.24	5,859.35	0.032	5,866.87	5,862.92
214: PIPE - 20	PIPE - 201	OS-2-K (MH-201)	OS-4-K (MH202)	146.6	36.0	36" RCP	0.013	72.83	116.84	62.3	57.2	17.43	5,858.35	5,853.85	0.031	5,861.04	5,855.65
235: PIPE - 20	PIPE - 202	OS-4-K (MH202)	OS-12-K	239.8	42.0	36" RCP	0.013	76.68	141.73	54.1	52.4	15.02	5,847.00	5,842.24	0.020	5,849.74	5,847.94
251: PIPE - 20	PIPE - 203	OS-12-K	OS-14-K	80.9	48.0	48" RCP	0.013	89.65	101.00	88.8	73.3	7.13	5,841.24	5,840.84	0.005	5,847.13	5,846.82
215: PIPE - 20	PIPE - 205	OS-2-K (MH-201)	2-K	49.9	18.0	24" RCP	0.013	5.90	16.23	36.4	41.7	8.46	5,860.85	5,862.04	-0.024	5,862.98	5,862.92
226: PIPE - 20	PIPE - 207	3-4-K (MH-205)	3+4-K	7.3	18.0	24" RCP	0.013	6.59	6.74	97.7	80.0	4.35	5,857.98	5,858.01	-0.004	5,859.36	5,859.34
230: PIPE - 20	PIPE - 208	OS-4-K (MH202)	3-4-K (MH-205)	22.0	18.0	24" RCP	0.013	6.58	34.18	19.2	29.7	14.94	5,855.35	5,857.68	-0.106	5,858.67	5,855.86
221: PIPE - 20	PIPE - 209	6-K	5-K	33.2	18.0	18" RCP	0.013	4.27	14.47	29.5	37.2	7.13	5,860.99	5,861.62	-0.019	5,862.41	5,861.80
222: PIPE - 21	PIPE - 210	MH - 206	6-K	60.2	18.0	24" RCP	0.013	7.55	14.51	52.0	51.2	8.30	5,859.54	5,860.69	-0.019	5,861.75	5,861.33
223: PIPE - 21	PIPE - 211	5-8-K	MH - 206	80.2	18.0	24" RCP	0.013	11.46	19.24	59.6	55.6	11.36	5,856.55	5,859.24	-0.034	5,860.53	5,858.42
233: PIPE - 21	PIPE - 212	5-8-K	7-K	7.3	18.0	18" RCP	0.013	0.09	10.27	0.9	6.7	0.05	5,856.55	5,856.62	-0.010	5,858.42	5,858.42
232: PIPE - 21	PIPE - 213	5-8-K	8-K	29.4	18.0	18" RCP	0.013	0.98	7.51	13.0	24.3	0.55	5,856.55	5,856.70	-0.005	5,858.43	5,858.42
234: PIPE - 21	PIPE - 214	5-10-K	5-8-K	69.0	18.0	24" RCP	0.013	11.98	14.64	81.8	68.8	9.24	5,854.51	5,855.85	-0.019	5,857.16	5,856.31
228: PIPE - 21	PIPE - 215	9-10-K	9-K	30.7	18.0	18" RCP	0.013	4.54	7.34	61.8	56.9	2.57	5,857.36	5,857.51	-0.005	5,859.13	5,859.07
229: PIPE - 21	PIPE - 216	9-10-K	10-K	9.1	18.0	18" RCP	0.013	4.54	17.73	25.6	34.5	8.39	5,857.36	5,857.62	-0.028	5,859.09	5,859.07
231: PIPE - 21	PIPE - 217	5-10-K	9-10-K	40.0	18.0	24" RCP	0.013	8.78	26.53	33.1	39.6	13.48	5,854.51	5,857.06	-0.064	5,858.21	5,856.31
238: PIPE - 21	PIPE - 218	5-12-K	5-10-K	271.8	24.0	36" RCP	0.013	17.97	41.19	43.6	46.2	12.66	5,845.00	5,854.01	-0.033	5,855.54	5,848.29
248: PIPE - 22	PIPE - 220	5-12-K	12-K	8.5	18.0	30" RCP	0.013	8.81	25.77	34.2	40.3	4.99	5,845.50	5,846.01	-0.060	5,848.35	5,848.29
250: PIPE - 22	PIPE - 221	OS-12-K	5-12-K	69.8	36.0	36" RCP	0.013	23.65	89.60	26.4	35.1	3.35	5,842.74	5,844.00	-0.018	5,848.03	5,847.94
255: PIPE - 22	PIPE - 222	OS-14-K	13-K	8.2	18.0	30" RCP	0.013	0.69	9.00	7.7	18.8	0.39	5,843.34	5,843.40	-0.007	5,846.82	5,846.82
256: PIPE - 22	PIPE - 223	OS-14-K	14-K	28.5	18.0	30" RCP	0.013	14.38	13.49	106.6	90.1	8.14	5,843.34	5,843.81	-0.016	5,847.35	5,846.82
326: PIPE - 27	PIPE - 272	MH-1 (Future)	MH-2 (Future)	321.3	30.0	24" RCP	0.013	35.61	74.57	47.7	48.7	15.02	5,884.89	5,874.27	0.033	5,886.92	5,875.49
327: PIPE - 27	PIPE - 273	MH-2 (Future)	MH - 200	98.0	36.0	24" RCP	0.013	35.20	141.19	24.9	34.0	16.59	5,873.27	5,868.88	0.045	5,875.20	5,871.12
181: PIPE - 25	PIPE - 2500	FUTURE INLET	MH - 41 (Future)	7.2	30.0	24" RCP	0.013	36.25	30.64	118.3	(N/A)	7.38	5,893.15	5,893.11	0.006	5,895.71	5,895.65
182: PIPE - 26	PIPE - 2600	MH - 41 (Future)	MH - 42 (Future)	50.6	30.0	24" RCP	0.013	36.23	28.83	125.6	(N/A)	7.38	5,892.91	5,892.66	0.005	5,895.30	5,894.84
362: PIPE 239	PIPE 239	MH-232	MH - 206	155.0	18.0		0.013	6.89	14.85	46.4	47.9	8.25	5,863.34	5,860.24	0.020	5,864.36	5,861.33
361: PIPE 240	PIPE 240	7-K-AREA	MH-232	17.1	18.0		0.013	6.90	17.41	39.6	43.8	9.28	5,864.11	5,863.64	0.027	5,865.13	5,864.96
368: PIPE 241	PIPE 241	1-K	MH-235	22.8	18.0		0.013	2.33	10.55	22.1	31.9	1.32	5,866.07	5,865.84	0.010	5,868.58	5,868.57
166: PIPE - 25 (STM-JC)	PIPE - 25 (STM-JC)	INLET 7+8-C (STM-JC)	MH - 211 (STM-JC)	7.7	18.0	18" RCP	0.013	9.53	10.50	90.7	74.6	5.39	5,880.82	5,880.74	0.010	5,884.67	5,884.60
192: PIPE - 26 (STM-JC)	PIPE - 26 (STM-JC)	MH - 14 (STM-JC)	MH - 13 (STM-JC)	68.3	30.0	30" RCP	0.013	18.30	29.00	63.1	57.6	3.73	5,848.65	5,848.31	0.005	5,851.66	5,851.53

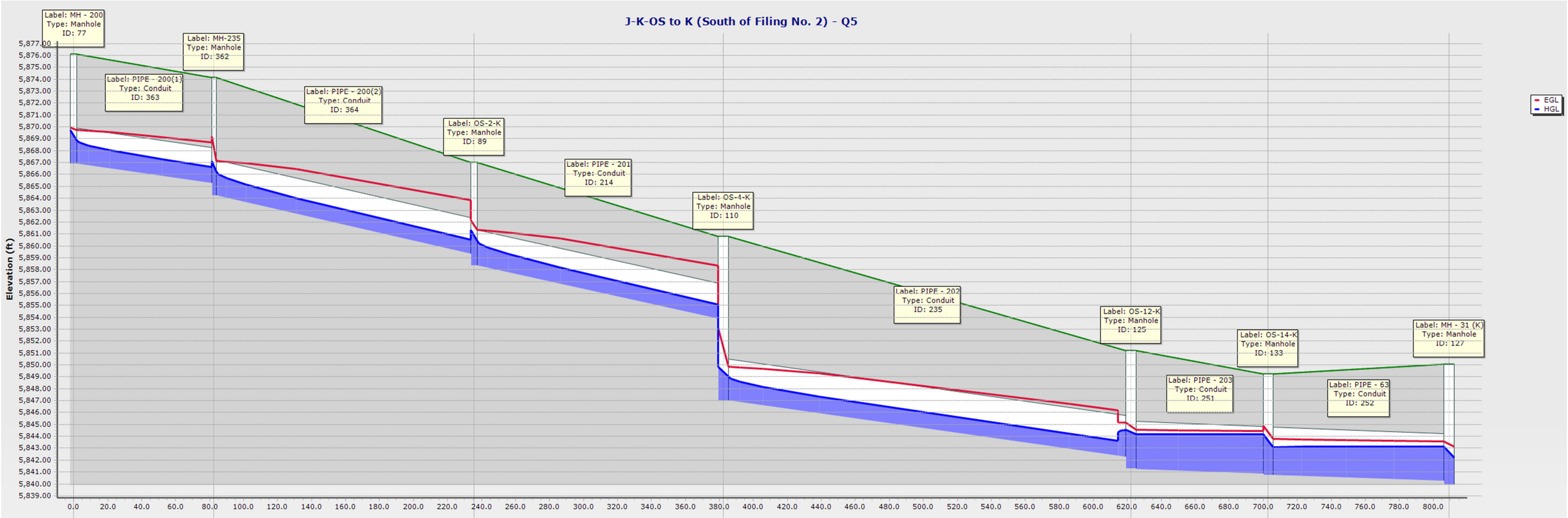
Q100 NODE SUMMARY

	ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Method	Headloss Coefficient (Standard)	Hydraulic Grade Line (In) (ft)	Inlet Type	Length (ft)	Width (ft)	Flow (Total Out) (cfs)
330: 12-K	330	12-K	5,851.33	5,851.33	5,846.16	Standard	0.050	5,848.39	Full Capture	4.00	10.00	8.81
331: 5-K	331	5-K	5,864.76	5,864.76	5,861.28	Standard	0.050	5,862.46	Percent Capture	4.00	10.00	4.27
332: 7-K	332	7-K	5,861.19	5,861.19	5,856.62	Standard	0.050	5,858.47	Percent Capture	4.00	10.00	0.09
333: 9-K	333	9-K	5,862.03	5,862.03	5,857.51	Standard	0.050	5,859.18	Percent Capture	4.00	10.00	4.54
334: 10-K	334	10-K	5,861.98	5,861.98	5,857.48	Standard	0.050	5,859.14	Percent Capture	4.00	10.00	4.54
352: OS-E	352	OS-E	5,854.52	5,854.52	5,847.22	Standard	0.050	5,847.97	Full Capture			3.40

	ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Headloss Coefficient (Standard)
133: OS-14-K	133	OS-14-K	5,849.24	5,849.24	5,840.75	100.64	4.55	5,846.82	5,845.30	Standard	1.520
125: OS-12-K	125	OS-12-K	5,851.22	5,851.22	5,841.26	89.65	5.88	5,847.94	5,847.13	Standard	1.020
110: OS-4-K (MH202)	110	OS-4-K (MH202)	5,860.81	5,860.81	5,849.30	76.68	0.44	5,851.17	5,849.74	Standard	1.020
89: OS-2-K (MH-201)	89	OS-2-K (MH-201)	5,867.01	5,867.01	5,858.35	72.83	2.69	5,862.92	5,861.04	Standard	1.020
364: MH-235	364	MH-235	5,872.77	5,872.77	5,864.24	68.04	2.63	5,868.57	5,866.87	Standard	1.020
359: MH-232	359	MH-232	5,869.25	5,869.25	5,863.34	6.89	1.02	5,864.96	5,864.36	Standard	1.320
353: MH-3	353	MH-3	5,849.69	5,849.69	5,844.46	3.40	2.98	5,847.51	5,847.44	Standard	1.322
325: MH-2 (Future)	325	MH-2 (Future)	5,880.02	5,880.02	5,873.27	35.20	1.93	5,876.05	5,875.20	Standard	1.020
322: MH-1 (Future)	322	MH-1 (Future)	5,891.30	5,891.30	5,884.89	35.61	2.03	5,888.02	5,886.92	Standard	1.020
98: MH - 206	98	MH - 206	5,863.81	5,863.81	5,859.24	11.46	1.29	5,861.33	5,860.53	Standard	1.020
77: MH - 200	77	MH - 200	5,876.11	5,876.11	5,867.88	66.13	1.60	5,871.12	5,869.48	Standard	1.020
71: MH - 43 (Future)	71	MH - 43 (Future)	5,896.70	5,896.70	5,890.10	35.82	2.03	5,893.25	5,892.13	Standard	1.020
53: MH - 42 (Future)	53	MH - 42 (Future)	5,900.20	5,900.20	5,892.36	36.09	2.04	5,894.84	5,894.40	Standard	0.400
50: MH - 41 (Future)	50	MH - 41 (Future)	5,900.64	5,900.64	5,892.91	36.23	2.39	5,895.65	5,895.30	Standard	0.400
153: MH - 35	153	MH - 35	5,831.98	5,831.98	5,820.68	119.54	3.29	5,824.70	5,823.97	Standard	0.400
146: MH - 34	146	MH - 34	5,841.45	5,841.45	5,830.94	108.97	3.16	5,834.18	5,834.10	Standard	0.050
138: MH - 33	138	MH - 33	5,844.06	5,844.06	5,833.88	109.15	3.16	5,839.20	5,837.04	Standard	1.320
137: MH - 32	137	MH - 32	5,845.00	5,845.00	5,836.12	109.50	3.67	5,839.85	5,839.79	Standard	0.050
127: MH - 31 (K)	127	MH - 31 (K)	5,850.04	5,850.04	5,839.92	110.31	3.18	5,844.78	5,843.09	Standard	1.020
134: MH - 30 (I)	134	MH - 30 (I)	5,849.07	5,849.07	5,844.30	15.50	1.42	5,846.72	5,845.72	Standard	1.520
148: INLET 5-I	148	INLET 5-I	5,840.33	5,840.33	5,828.05	119.98	3.30	5,832.08	5,831.35	Standard	0.400
132: INLET 2-I	132	INLET 2-I	5,849.31	5,849.31	5,844.87	4.05	1.86	5,846.78	5,846.73	Standard	0.050
131: INLET 1-I	131	INLET 1-I	5,849.31	5,849.31	5,845.20	12.26	2.15	5,847.40	5,847.35	Standard	0.050
49: FUTURE INLET	49	FUTURE INLET	5,901.02	5,901.02	5,893.15	36.25	2.56	5,895.76	5,895.71	Standard	0.050
129: 14-K	129	14-K	5,849.56	5,849.56	5,843.81	14.38	3.54	5,847.40	5,847.35	Standard	0.000
128: 13-K	128	13-K	5,849.57	5,849.57	5,843.40	0.69	3.42	5,846.87	5,846.82	Standard	0.000
106: 9-10-K	106	9-10-K	5,861.60	5,861.60	5,857.06	8.78	1.15	5,859.07	5,858.21	Standard	1.520
107: 8-K	107	8-K	5,861.19	5,861.19	5,856.70	0.98	1.73	5,858.48	5,858.43	Standard	0.050
360: 7-K-AREA	360	7-K-AREA	5,868.00	5,868.00	5,864.11	6.90	1.02	5,865.18	5,865.13	Standard	0.050
95: 6-K	95	6-K	5,864.76	5,864.76	5,860.63	7.55	1.12	5,861.80	5,861.75	Standard	0.050
109: 5-8-K	109	5-8-K	5,860.85	5,860.85	5,855.90	11.98	1.26	5,858.42	5,857.16	Standard	1.520
126: 5-12-K	126	5-12-K	5,850.65	5,850.65	5,844.15	23.65	3.88	5,848.29	5,848.03	Standard	1.520
112: 5-10-K	112	5-10-K	5,860.21	5,860.21	5,854.01	17.97	1.53	5,856.31	5,855.54	Standard	1.020
105: 3-4-K (MH-205)	105	3-4-K (MH-205)	5,861.67	5,861.67	5,857.54	6.58	1.13	5,859.34	5,858.67	Standard	1.520
101: 3+4-K	101	3+4-K	5,862.06	5,862.06	5,857.87	6.59	1.49	5,859.41	5,859.36	Standard	0.050
90: 2-K	90	2-K	5,866.95	5,866.95	5,862.06	5.90	0.92	5,863.03	5,862.98	Standard	0.050
367: 1-K	367	1-K	5,869.63	5,869.63	5,866.07	2.33	2.51	5,868.63	5,868.58	Standard	0.050
65: MH - 211 (STM-JC)	65	MH - 211 (STM-JC)	5,885.99	5,885.99	5,880.44	9.52	3.48	5,884.60	5,883.92	Standard	1.520
63: INLET 7+8-C (STM-JC)	63	INLET 7+8-C (STM-JC)	5,886.36	5,886.36	5,880.82	9.53	3.85	5,884.67	5,884.67	Standard	0.050

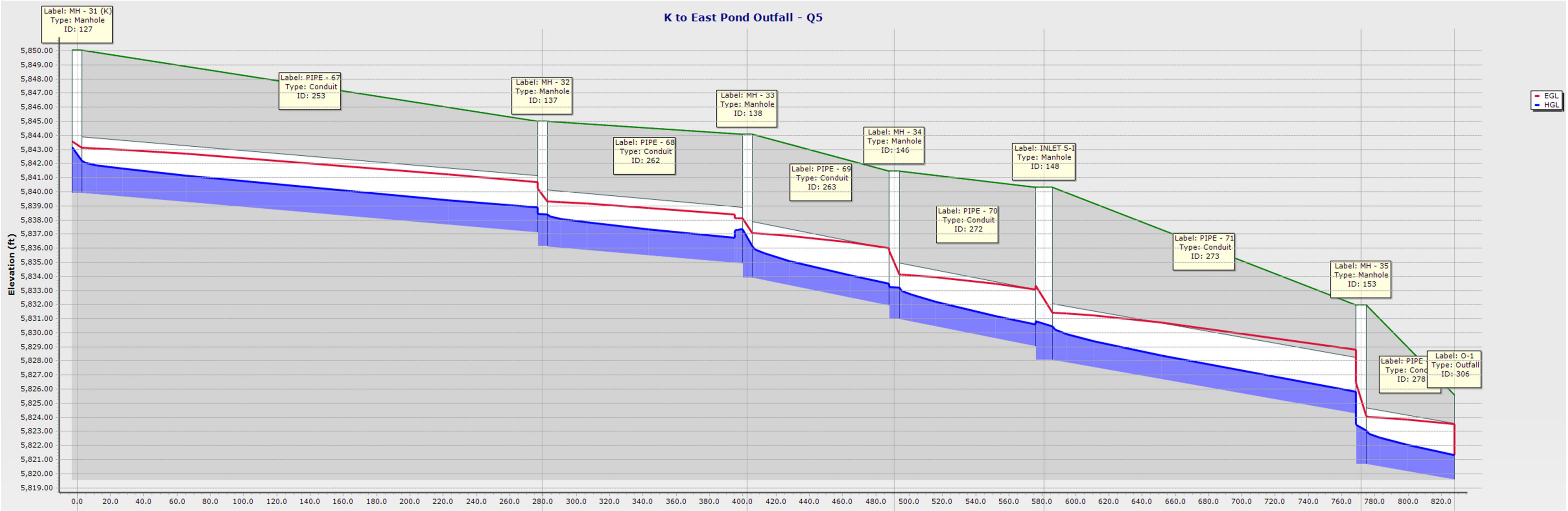
HGL Profiles: Q5





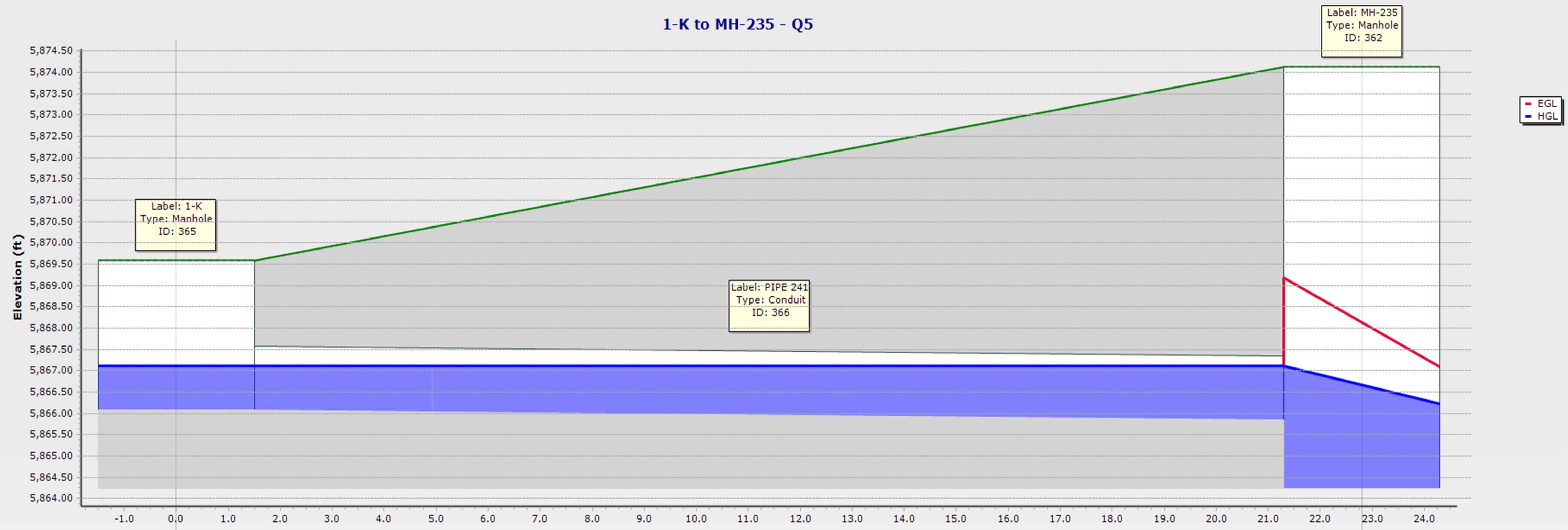
ID\Label	363 \ PIPE - 200(1)	364 \ PIPE - 200(2)	214 \ PIPE - 201	235 \ PIPE - 202	251 \ PIPE - 203	252 \ PIPE - 63
Link Length (ft)	82.6	153.0	146.6	239.8	80.9	106.5
Rise (in)\Material	36.0 \ RCP	36.0 \ RCP	36.0 \ RCP	42.0 \ RCP	48.0 \ RCP	48.0 \ RCP
Flow (cfs)	36.70	37.28	39.81	41.44	47.88	51.37
Slope (ft/ft)	0.020	0.032	0.031	0.020	0.005	0.005

ID\Label	77 \ MH - 200	362 \ MH-235	89 \ OS-2-K	110 \ OS-4-K	125 \ OS-12-K	133 \ OS-14-K	127 \ MH - 31 (K)
Ground (ft)	5876.11	5874.13	5867.01	5860.81	5851.22	5849.24	5850.04
Invert (ft)	5866.88	5864.24	5858.35	5847.00	5841.26	5840.75	5839.92
Station (ft)	0.0	82.6	235.6	382.2	622.0	702.9	809.4

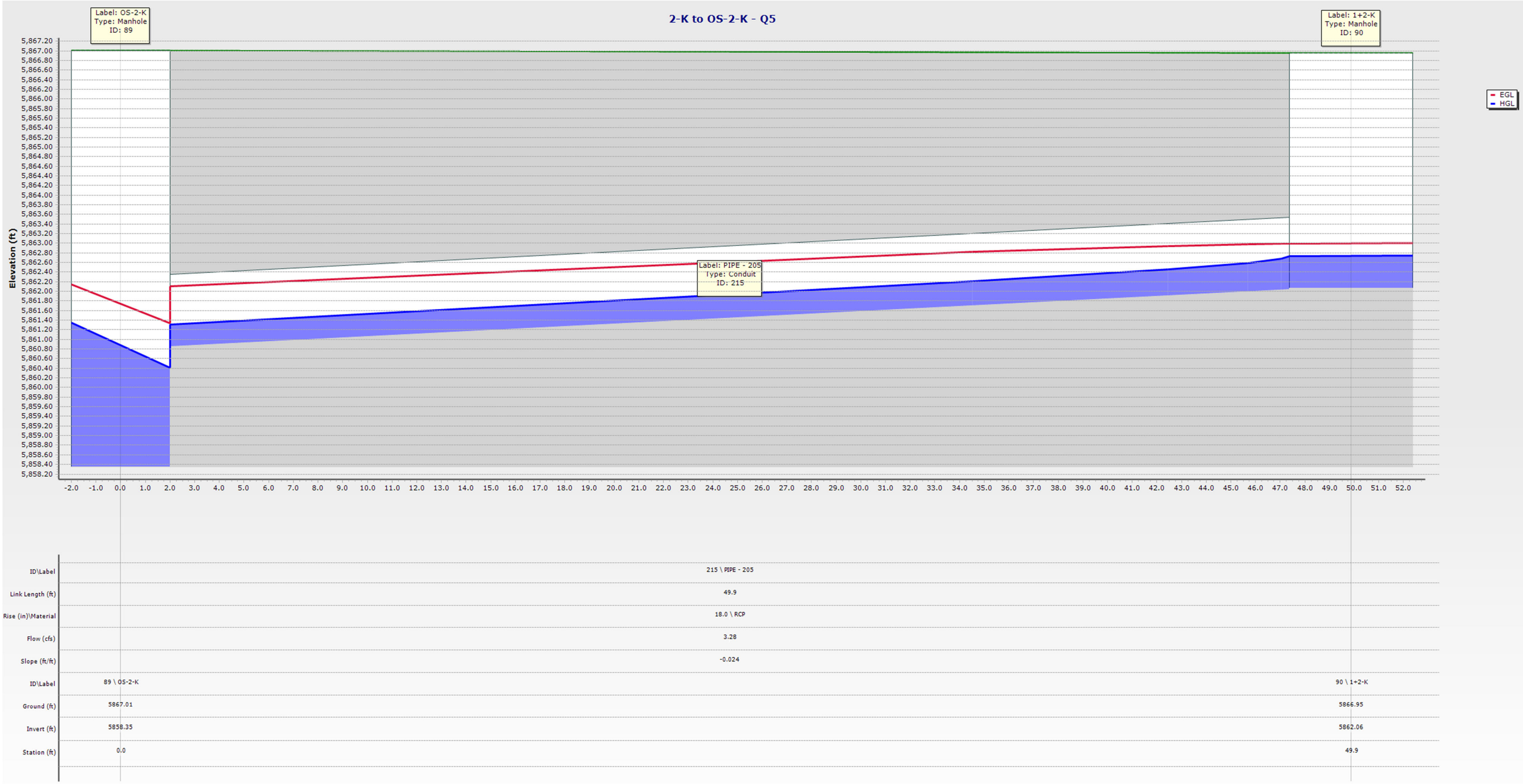


ID\Label	253 \ PIPE - 67	262 \ PIPE - 68	263 \ PIPE - 69	272 \ PIPE - 70	273 \ PIPE - 71	278 \ PIPE - 72
Link Length (ft)	279.6	123.1	88.3	90.1	190.5	56.1
Rise (in)\Material	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP	48.0 \ RCP
Flow (cfs)	57.08	56.55	56.32	56.19	62.63	62.33
Slope (ft/ft)	0.010	0.010	0.022	0.021	0.020	0.020

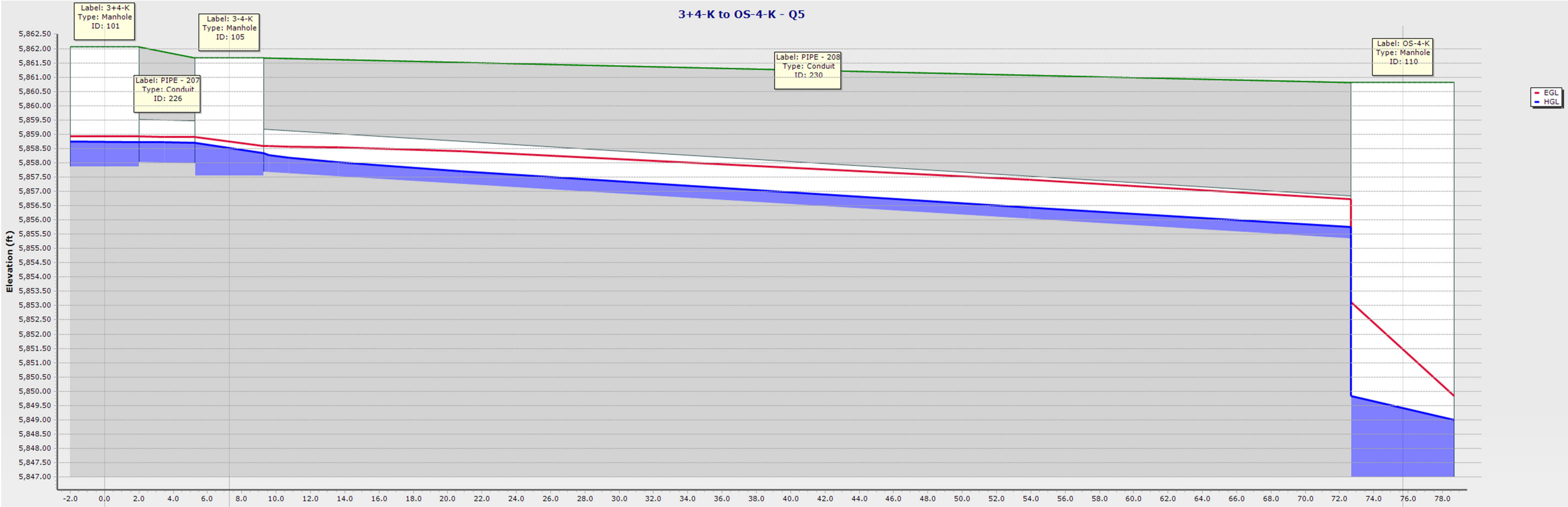
ID\Label	127 \ MH - 31 (K)	137 \ MH - 32	138 \ MH - 33	146 \ MH - 34	148 \ INLET 5-1	153 \ MH - 35	306 \ O-1
Ground (ft)	5850.04	5845.00	5844.06	5841.45	5840.33	5831.98	5825.60
Invert (ft)	5839.92	5836.12	5833.88	5830.94	5828.05	5820.68	5819.58
Station (ft)	0.0	279.6	402.8	491.0	581.2	771.7	827.7



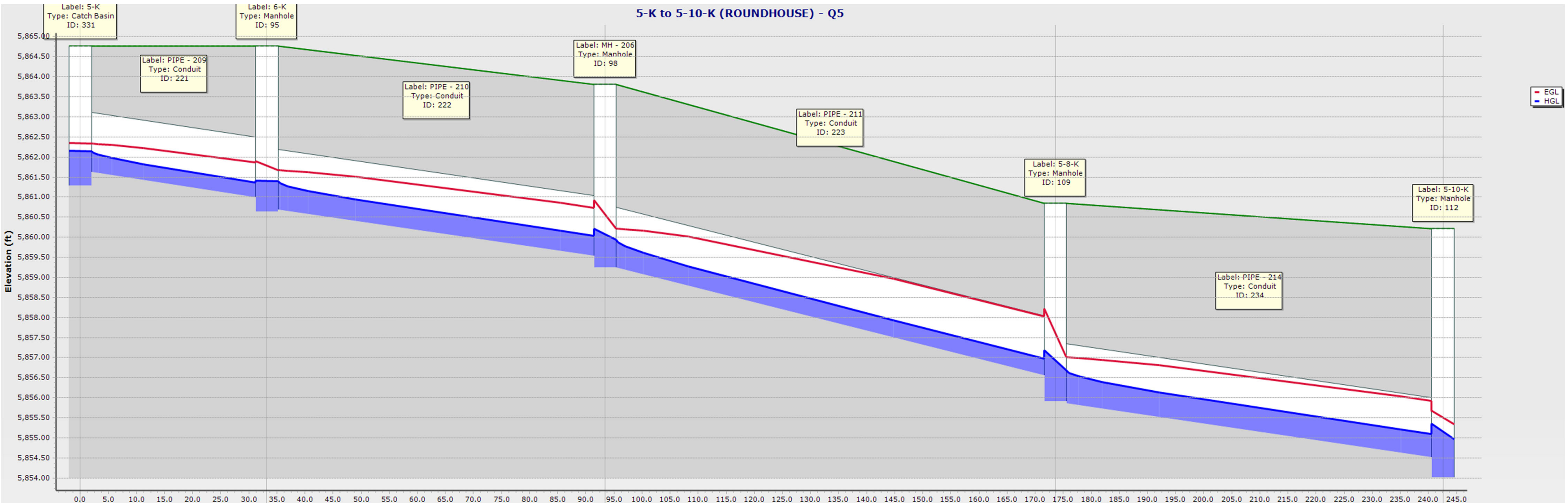
ID\Label		366 \ PIPE 241	
Link Length (ft)		22.8	
Rise (in)\Material		18.0 \ Concrete	
Flow (cfs)		0.78	
Slope (ft/ft)		0.010	
ID\Label	365 \ 1-K		362 \ MH-235
Ground (ft)	5869.58		5874.13
Invert (ft)	5866.07		5864.24
Station (ft)	0.0		22.8



2-K to OS-2-K - Q5
Label: OS-2-K
Type: Manhole
ID: 89
Label: 1+2-K
Type: Manhole
ID: 90
Label: PIPE - 205
Type: Conduit
ID: 215
EGL
HGL
Elevation (ft)
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



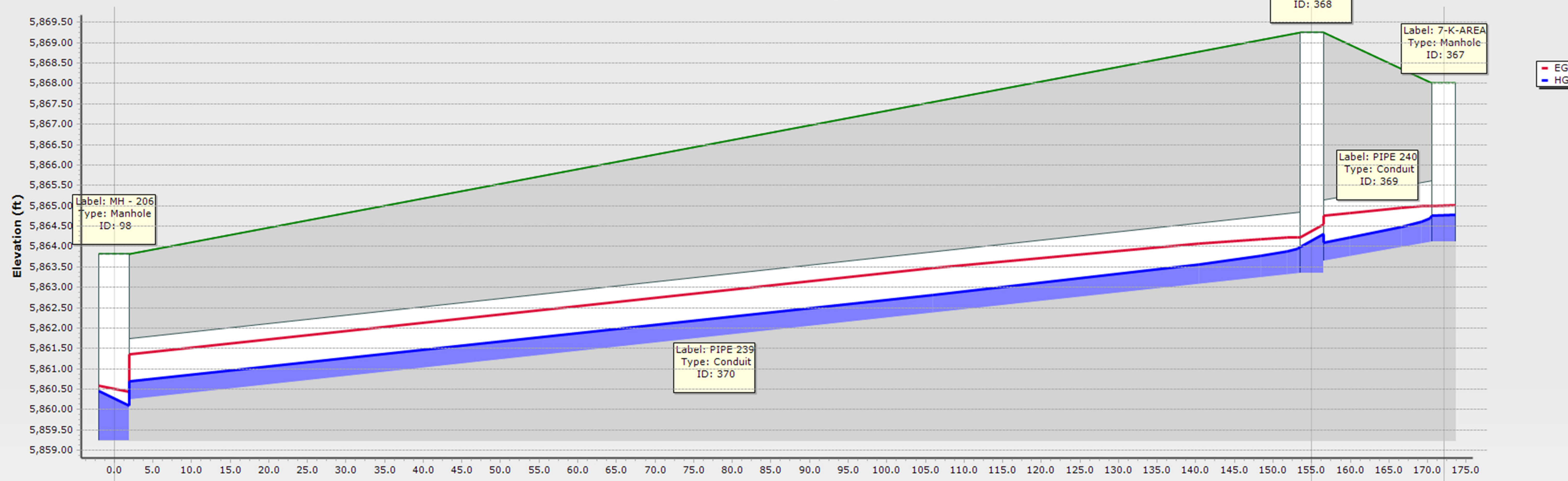
ID\Label		226 \ PIPE - 207		230 \ PIPE - 208	
Link Length (ft)		7.3		68.4	
Rise (in)\Material		18.0 \ RCP		18.0 \ RCP	
Flow (cfs)		2.95		2.95	
Slope (ft/ft)		-0.004		-0.034	
ID\Label	101 \ 3+4-K		105 \ 3-4-K		110 \ OS-4-K
Ground (ft)	5862.06		5861.67		5860.81
Invert (ft)	5857.87		5857.54		5847.00
Station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



ID\Label	221 \ PIPE - 209	222 \ PIPE - 210	223 \ PIPE - 211	234 \ PIPE - 214
Link Length (ft)	33.2	60.2	80.2	69.0
lise (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)	-0.019	-0.019	-0.034	-0.019

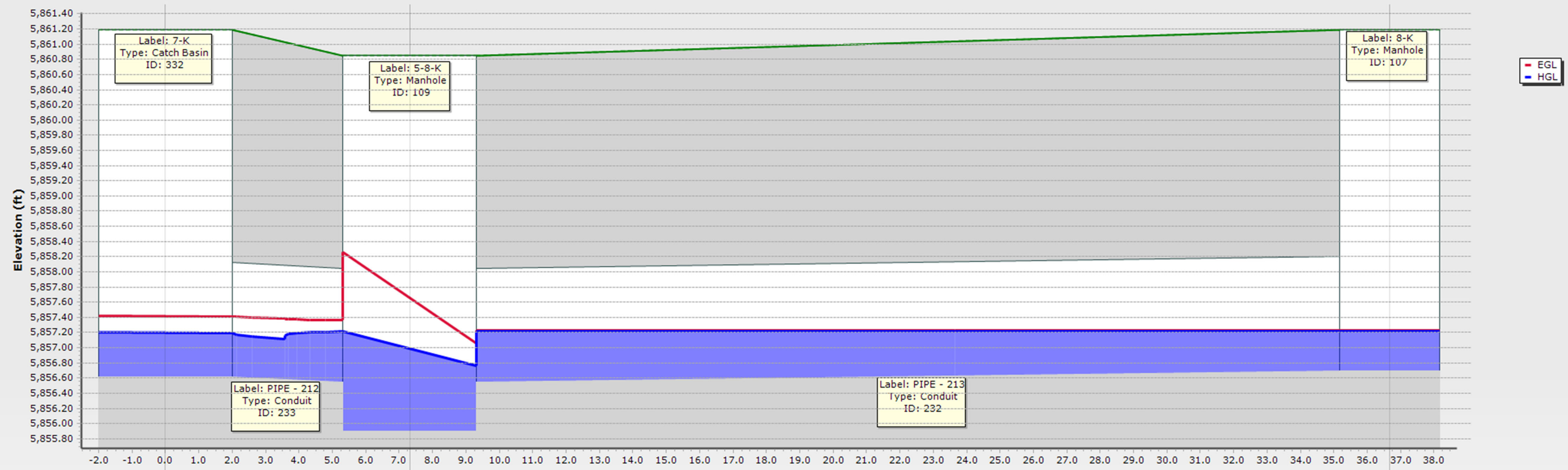
ID\Label	331 \ 5-K	95 \ 6-K	98 \ MH - 206	109 \ 5-8-K	112 \ 5-10-K
Ground (ft)	5864.76	5864.76	5863.81	5860.85	5860.21
Invert (ft)	5861.28	5860.63	5859.24	5855.90	5854.01
Station (ft)	0.0	33.2	93.4	173.6	242.6

7-K-AREA TO MH-206 - Q5



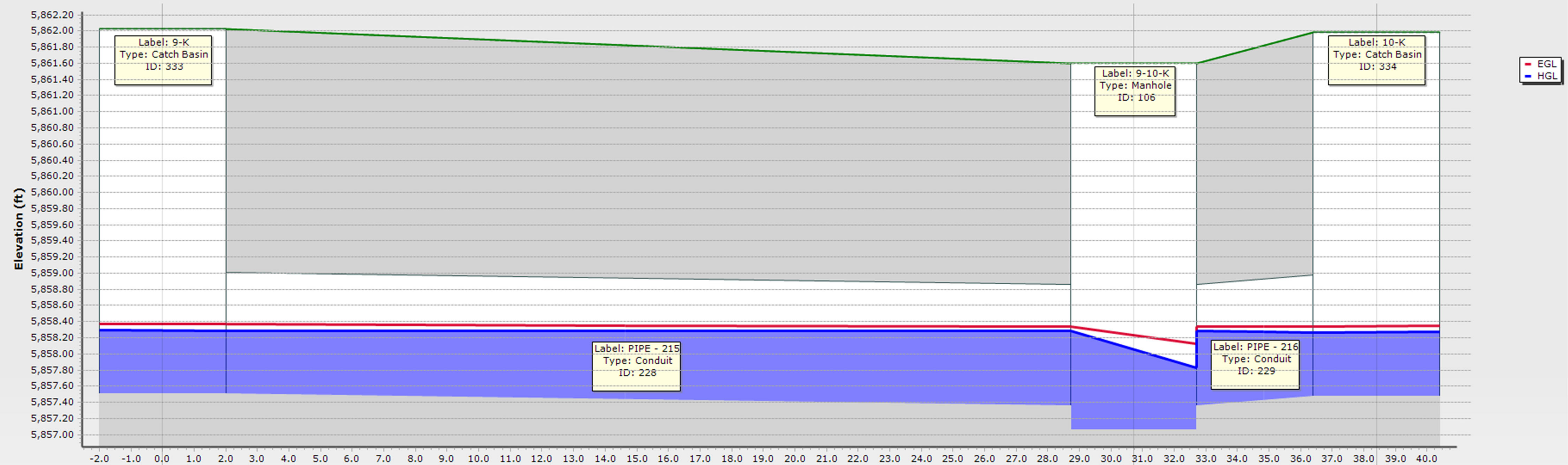
ID\Label		370 \ PIPE 239		369 \ PIPE 240	
Link Length (ft)		155.0		17.1	
Rise (in)\Material		18.0 \ Concrete		18.0 \ Concrete	
Flow (cfs)		2.90		2.90	
Slope (ft/ft)		0.020		0.027	
ID\Label	98 \ MH - 206		368 \ MH-232		367 \ 7-K-AREA
Ground (ft)	5863.81		5869.25		5868.00
Invert (ft)	5859.24		5863.34		5864.11
Station (ft)	0.0		155.0		172.1

7-K to 8-K INLET LATERAL - Q5

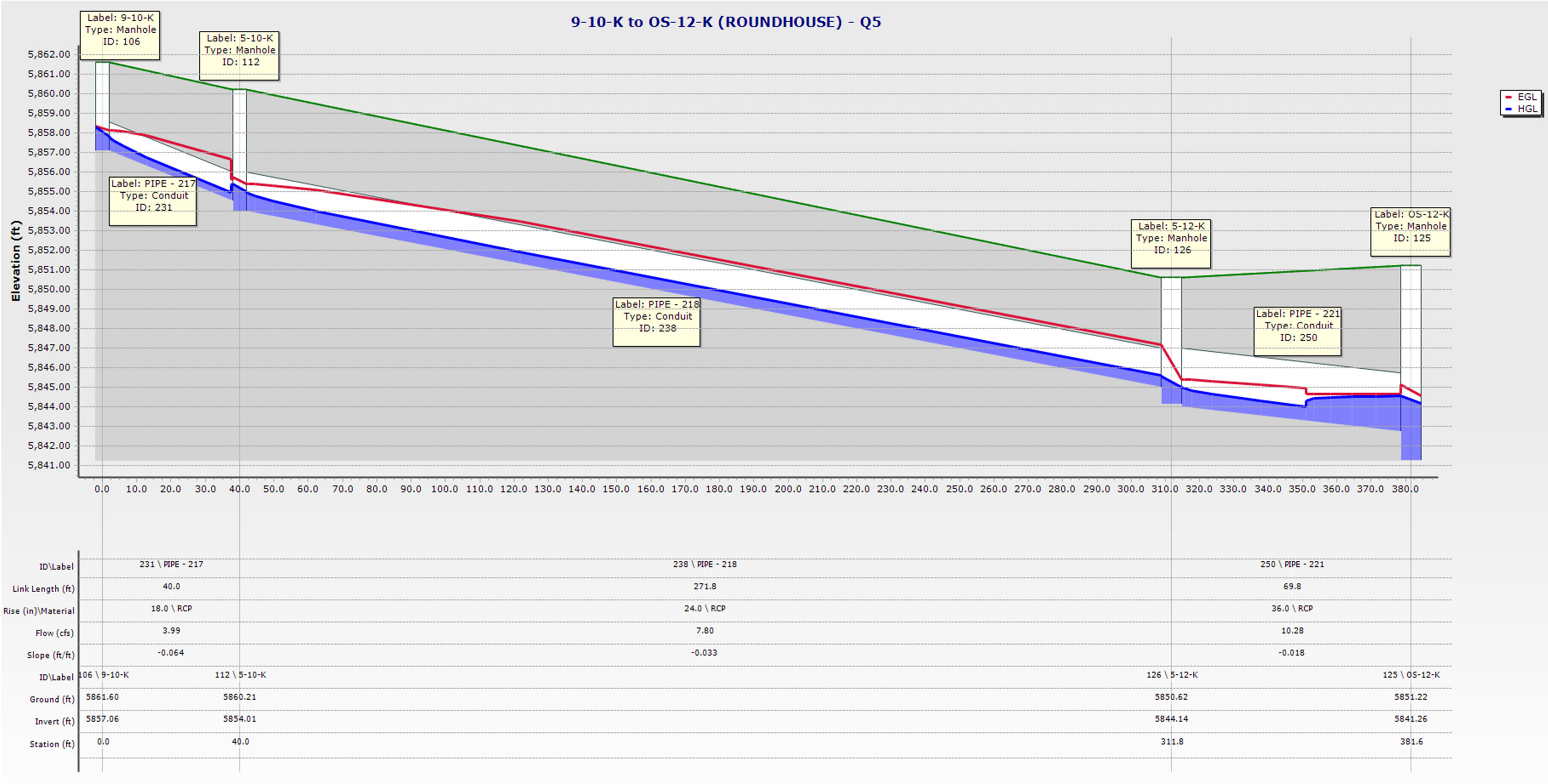


ID\Label		233 \ PIPE - 212		232 \ PIPE - 213	
Link Length (ft)		7.3		29.4	
Rise (in)\Material		18.0 \ RCP		18.0 \ RCP	
Flow (cfs)		2.31		0.46	
Slope (ft/ft)		-0.010		-0.005	
ID\Label	332 \ 7-K		109 \ 5-8-K		107 \ 8-K
Ground (ft)	5861.19		5860.85		5861.19
Invert (ft)	5856.62		5855.90		5856.70
Station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

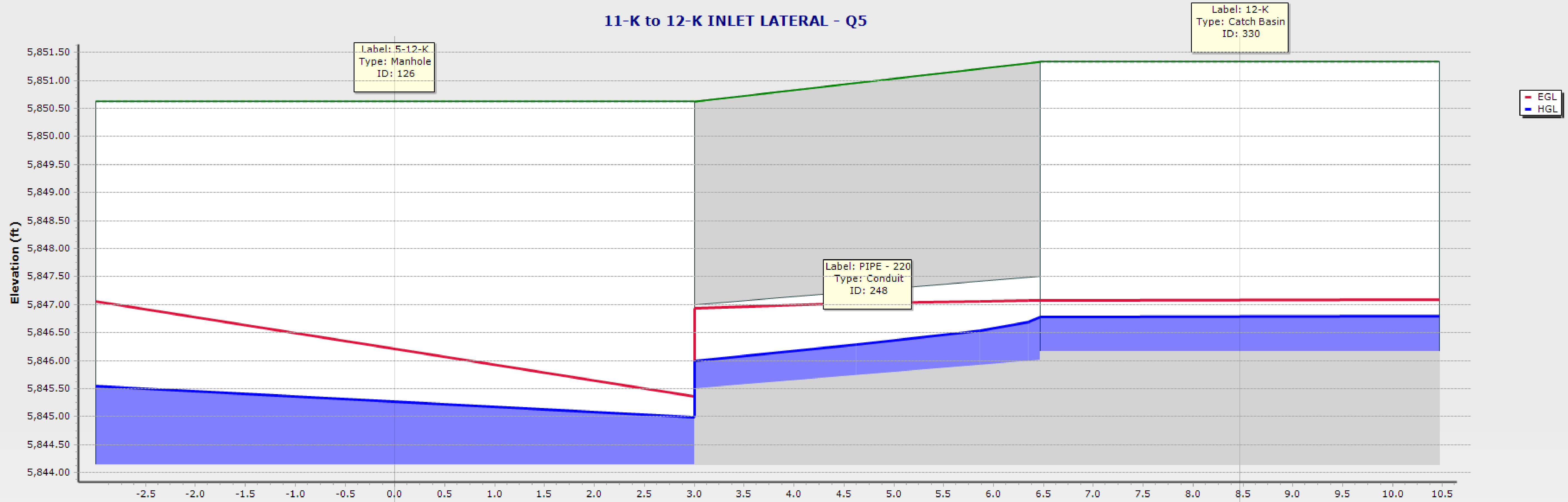
9-K to 10-K INLET LATERAL - Q5



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

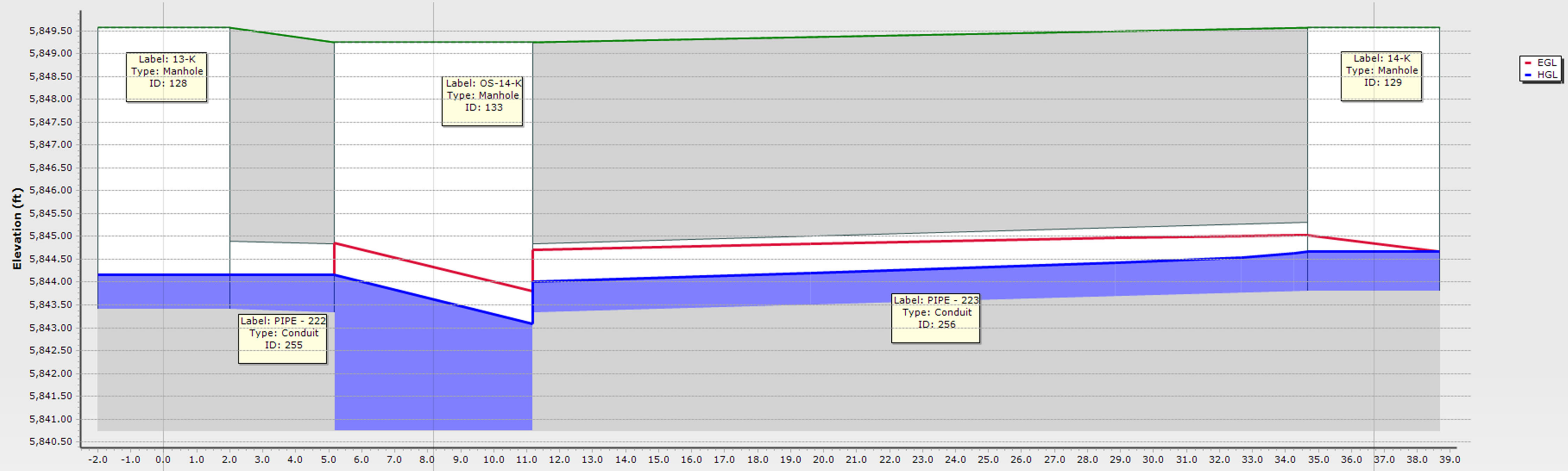

9-10-K to OS-12-K (ROUNDHOUSE) - Q5
Label: 9-10-K Type: Manhole ID: 106
Label: 5-10-K Type: Manhole ID: 112
Label: PIPE - 217 Type: Conduit ID: 231
Label: PIPE - 218 Type: Conduit ID: 238
Label: 5-12-K Type: Manhole ID: 126
Label: OS-12-K Type: Manhole ID: 125
Label: PIPE - 221 Type: Conduit ID: 250
EGL
HGL
Elevation (ft)
5,862.00 5,861.00 5,860.00 5,859.00 5,858.00 5,857.00 5,856.00 5,855.00 5,854.00 5,853.00 5,852.00 5,851.00 5,850.00 5,849.00 5,848.00 5,847.00 5,846.00 5,845.00 5,844.00 5,843.00 5,842.00 5,841.00
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0 370.0 380.0
ID\Label: 231 \ PIPE - 217; 238 \ PIPE - 218; 250 \ PIPE - 221
Link Length (ft): 40.0; 271.8; 69.8
Rise (in)\Material: 18.0 \ RCP; 24.0 \ RCP; 36.0 \ RCP
Flow (cfs): 3.99; 7.80; 10.28
Slope (ft/ft): -0.064; -0.033; -0.018
ID\Label: 106 \ 9-10-K; 112 \ 5-10-K; 126 \ 5-12-K; 125 \ OS-12-K
Ground (ft): 5861.60; 5860.21; 5850.62; 5851.22
Invert (ft): 5857.06; 5854.01; 5844.14; 5841.26
Station (ft): 0.0; 40.0; 311.8; 381.6

11-K to 12-K INLET LATERAL - Q5

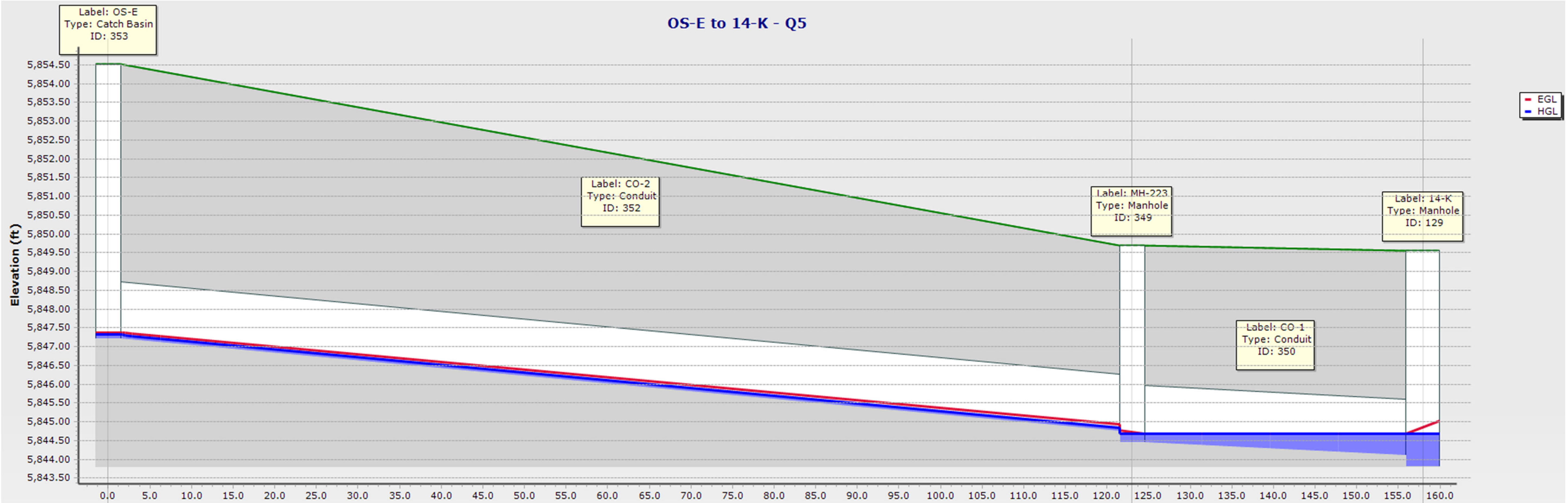


ID\Label		248 \ PIPE - 220	
Link Length (ft)		8.5	
Rise (in)\Material		18.0 \ RCP	
Flow (cfs)		4.00	
Slope (ft/ft)		-0.060	
ID\Label	126 \ 5-12-K		330 \ 12-K
Ground (ft)	5850.62		5851.33
Invert (ft)	5844.14		5846.16
Station (ft)	0.0		8.5

13-K to 14-K INLET LATERAL - Q5

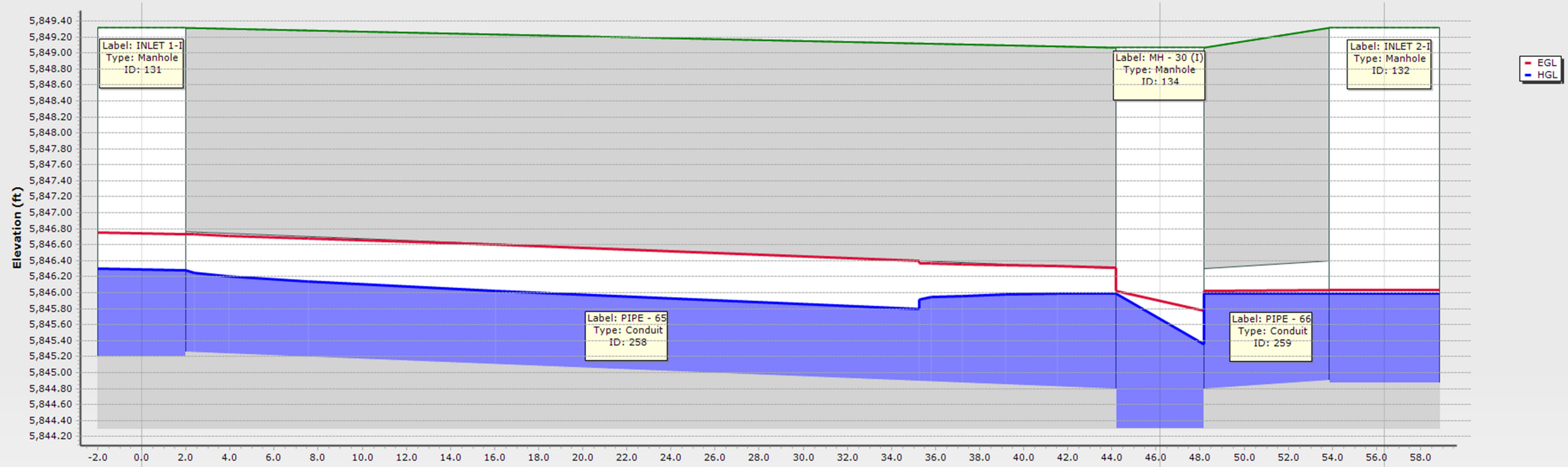


ID\Label	255 \ PIPE - 222	256 \ PIPE - 223	
Link Length (ft)	8.2	28.5	
Rise (in)\Material	18.0 \ RCP	18.0 \ RCP	
Flow (cfs)	0.34	5.07	
Slope (ft/ft)	-0.007	-0.016	
ID\Label	128 \ 13-K	133 \ OS-14-K	129 \ 14-K
Ground (ft)	5849.57	5849.24	5849.56
Invert (ft)	5843.40	5840.75	5843.81
Station (ft)	0.0	8.2	36.7



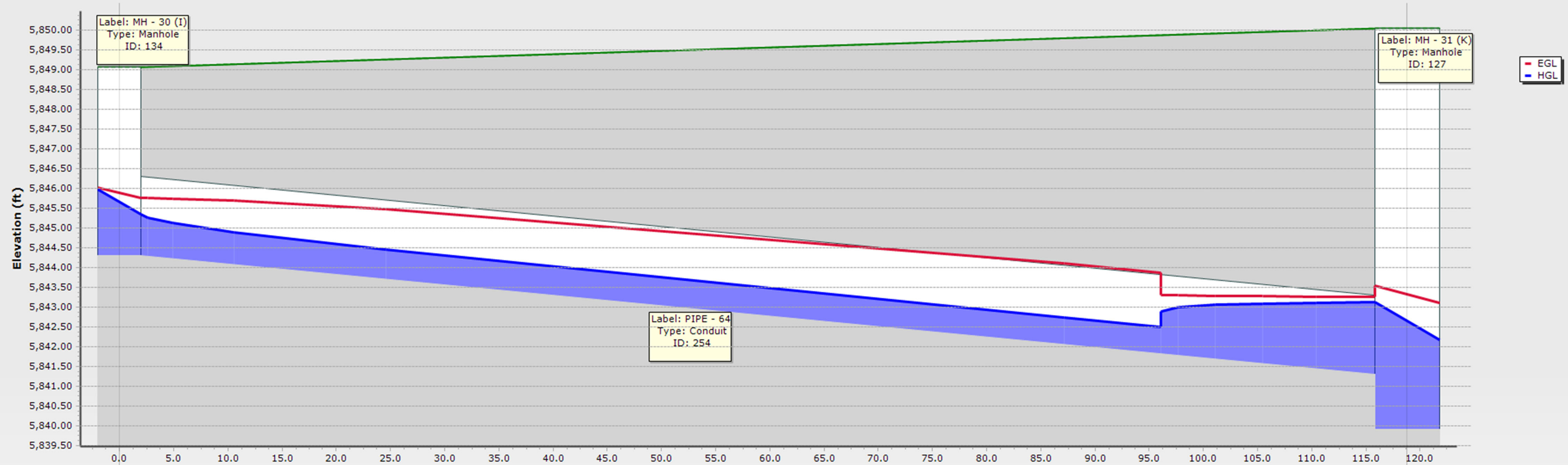
ID\Label		352 \ CO-2		350 \ CO-1	
Link Length (ft)		123.0		34.9	
Rise (in)\Material		18.0 \ Concrete		18.0 \ Concrete	
Flow (cfs)		0.09		0.09	
Slope (ft/ft)		0.020		0.010	
ID\Label	353 \ OS-E		349 \ MH-223		129 \ 14-K
Ground (ft)	5854.52		5849.69		5849.56
Invert (ft)	5847.22		5844.46		5843.81
Station (ft)	0.0		123.0		157.9

1-I to 2-I INLET LATERAL - Q5



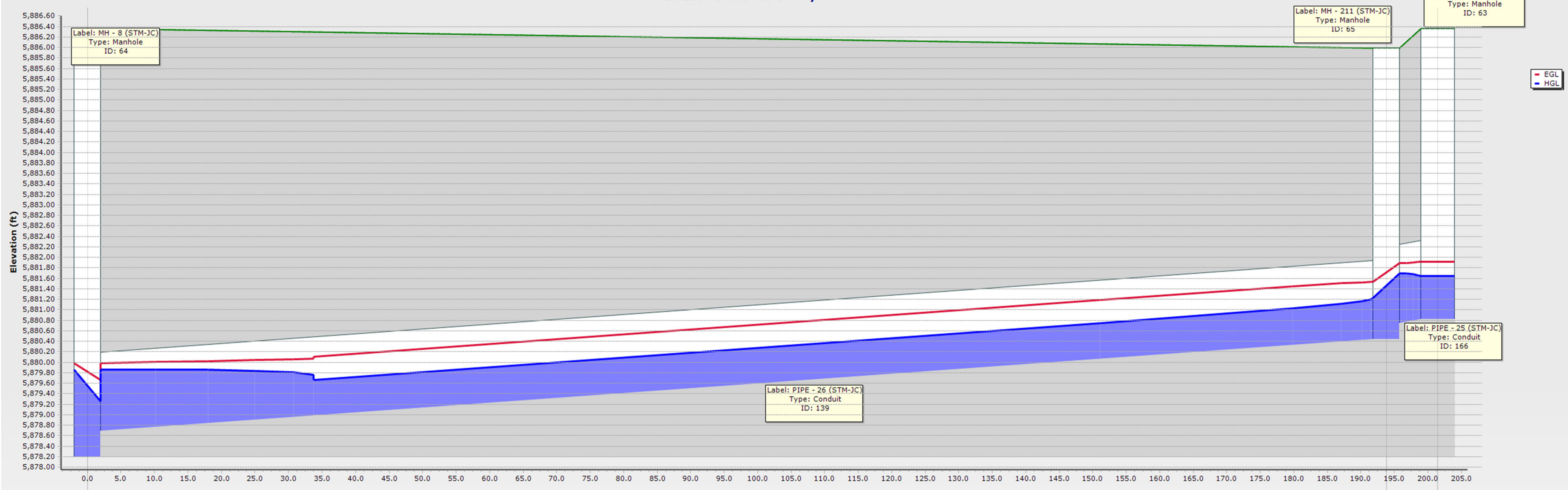
ID\Label		258 \ PIPE - 65		259 \ PIPE - 66	
Link Length (ft)		46.2		10.2	
Rise (in)\Material		18.0 \ RCP		18.0 \ RCP	
Flow (cfs)		6.89		2.27	
Slope (ft/ft)		-0.010		-0.010	
ID\Label	131 \ INLET 1-I		134 \ MH - 30 (I)		132 \ INLET 2-I
Ground (ft)	5849.31		5849.07		5849.31
Invert (ft)	5845.20		5844.30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

I to K (Legacy Hill Drive) - Q5



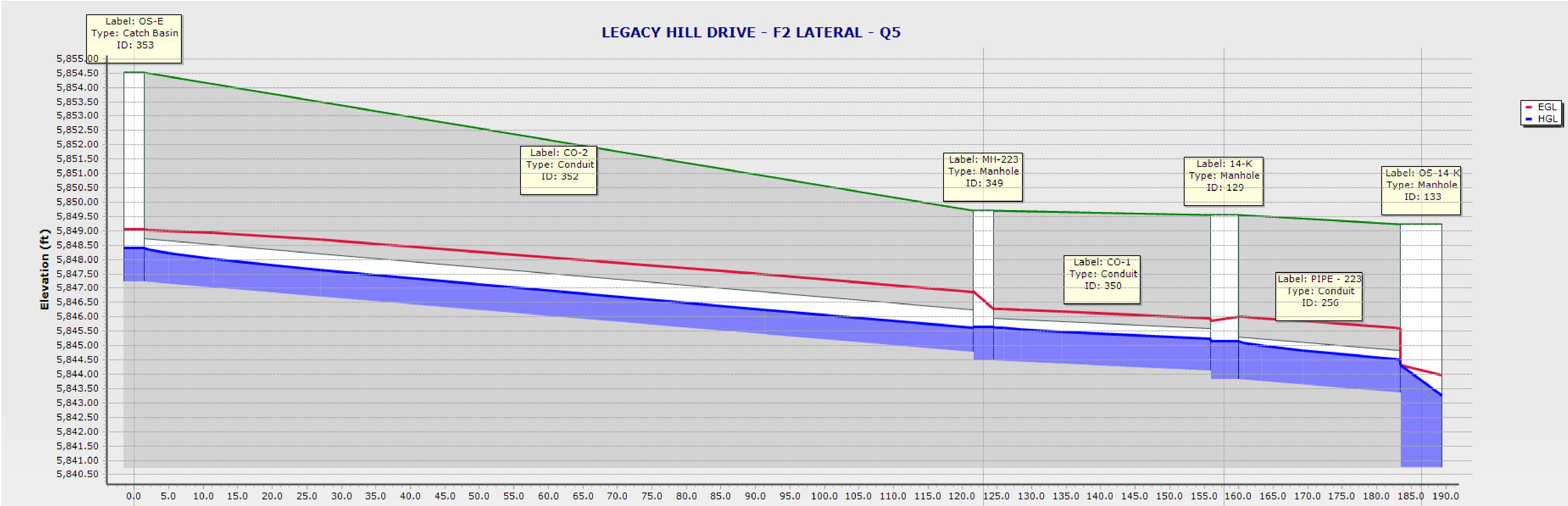
ID\Label	254 \ PIPE - 64	
Link Length (ft)	118.8	
Rise (in)\Material	24.0 \ RCP	
Flow (cfs)	8.71	
Slope (ft/ft)	-0.025	
ID\Label	134 \ MH - 30 (I)	127 \ MH - 31 (K)
Ground (ft)	5849.07	5850.04
Invert (ft)	5844.30	5839.92
Station (ft)	0.0	118.8

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



ID\Label	352 \ CO-2	350 \ CO-1	256 \ PIPE - 223
Link Length (ft)	123.0	34.9	28.5
Rise (in)\Material	18.0 \ Concrete	18.0 \ Concrete	18.0 \ RCP
Flow (cfs)	9.61	9.61	12.43
Slope (ft/ft)	0.020	0.010	-0.016

ID\Label	353 \ OS-E	349 \ MH-223	129 \ 14-K	133 \ OS-14-K
Ground (ft)	5854.52	5849.69	5849.56	5849.24
Invert (ft)	5847.22	5844.46	5843.81	5840.75
Station (ft)	0.0	123.0	157.9	186.4

Q5 PIPE SUMMARY

	Label	Start Node	Stop Node	Length (User Defined) (ft)	Diameter (in)	Notes	Manning's n	Flow (cfs)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Depth (Normal) / Rise (%)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
350: CO-1	CO-1	MH-223	14-K	34.9	18.0		0.013	0.09	10.52	0.9	6.6	1.82	5,844.46	5,844.11	0.010	5,844.67	5,844.68
352: CO-2	CO-2	OS-E	MH-223	123.0	18.0		0.013	0.09	14.85	0.6	5.6	2.31	5,847.22	5,844.76	0.020	5,847.33	5,844.84
185: PIPE - 27 (2	PIPE - 27 (2	MH - 42 (Future)	MH - 43 (Future)	126.1	30.0	24" RCP	0.013	17.12	40.99	41.8	45.1	7.98	5,892.36	5,891.10	0.010	5,893.76	5,892.23
323: PIPE - 27 1	PIPE - 27 1	MH - 43 (Future)	MH-1 (Future)	154.2	30.0	24" RCP	0.013	16.94	67.77	25.0	34.1	11.48	5,890.10	5,885.89	0.027	5,891.49	5,886.74
252: PIPE - 63	PIPE - 63	OS-14-K	MH - 31 (K)	106.5	48.0	48" RCP	0.013	51.37	101.57	50.6	50.3	8.11	5,840.75	5,840.22	0.005	5,843.10	5,843.14
254: PIPE - 64	PIPE - 64	MH - 31 (K)	MH - 30 (I)	118.8	24.0	24" RCP	0.013	8.71	35.83	24.3	33.6	9.41	5,841.32	5,844.30	-0.025	5,845.35	5,843.14
258: PIPE - 65	PIPE - 65	MH - 30 (I)	INLET 1-I	46.2	18.0	18" RCP	0.013	6.89	10.48	65.7	59.1	6.33	5,844.80	5,845.26	-0.010	5,846.28	5,845.99
259: PIPE - 66	PIPE - 66	MH - 30 (I)	INLET 2-I	10.2	18.0	18" RCP	0.013	2.27	10.41	21.8	31.7	4.71	5,844.80	5,844.90	-0.010	5,845.99	5,845.99
253: PIPE - 67	PIPE - 67	MH - 31 (K)	MH - 32	279.6	48.0	48" RCP	0.013	57.00	143.63	39.7	43.8	10.77	5,839.92	5,837.12	0.010	5,842.19	5,838.87
262: PIPE - 68	PIPE - 68	MH - 32	MH - 33	123.1	48.0	48" RCP	0.013	56.48	143.63	39.3	43.6	10.75	5,836.12	5,834.89	0.010	5,838.38	5,837.35
263: PIPE - 69	PIPE - 69	MH - 33	MH - 34	88.3	48.0	48" RCP	0.013	56.25	213.02	26.4	35.1	14.31	5,833.88	5,831.94	0.022	5,836.14	5,833.46
272: PIPE - 70	PIPE - 70	MH - 34	INLET 5-I	90.1	48.0	48" RCP	0.013	56.13	208.12	27.0	35.5	14.06	5,830.94	5,829.05	0.021	5,833.20	5,830.58
273: PIPE - 71	PIPE - 71	INLET 5-I	MH - 35	190.5	48.0	48" RCP	0.013	62.50	203.11	30.8	38.1	14.23	5,828.05	5,824.24	0.020	5,830.44	5,825.79
278: PIPE - 72	PIPE - 72	MH - 35	O-1	56.1	48.0	48" RCP	0.013	62.21	201.16	30.9	38.2	14.11	5,820.68	5,819.58	0.020	5,823.06	5,821.31
363: PIPE - 200(1)	PIPE - 200(1)	MH - 200	MH-235	82.6	36.0	24" RCP	0.013	36.70	93.98	39.1	43.4	12.48	5,866.88	5,865.24	0.020	5,868.85	5,866.62
364: PIPE - 200(2)	PIPE - 200(2)	MH-235	OS-2-K	153.0	36.0	24" RCP	0.013	37.28	119.23	31.3	38.4	14.91	5,864.24	5,859.35	0.032	5,866.23	5,861.35
214: PIPE - 201	PIPE - 201	OS-2-K	OS-4-K	146.6	36.0	36" RCP	0.013	39.81	116.84	34.1	40.2	14.96	5,858.35	5,853.85	0.031	5,860.40	5,855.08
235: PIPE - 202	PIPE - 202	OS-4-K	OS-12-K	239.8	42.0	36" RCP	0.013	41.44	141.74	29.2	37.0	12.79	5,847.00	5,842.24	0.020	5,849.00	5,844.56
251: PIPE - 203	PIPE - 203	OS-12-K	OS-14-K	80.9	48.0	48" RCP	0.013	47.91	101.00	47.4	48.5	7.93	5,841.24	5,840.84	0.005	5,844.19	5,844.16
215: PIPE - 205	PIPE - 205	OS-2-K	2-K	49.9	18.0	24" RCP	0.013	3.28	16.23	20.2	30.5	7.19	5,860.85	5,862.04	-0.024	5,862.73	5,861.31
226: PIPE - 207	PIPE - 207	3-4-K	3+4-K	7.3	18.0	24" RCP	0.013	2.95	6.74	43.8	46.3	3.69	5,857.98	5,858.01	-0.004	5,858.73	5,858.71
230: PIPE - 208	PIPE - 208	OS-4-K	3-4-K	68.4	18.0	24" RCP	0.013	2.95	19.39	15.2	26.4	7.92	5,855.35	5,857.68	-0.034	5,858.33	5,855.75
221: PIPE - 209	PIPE - 209	6-K	5-K	33.2	18.0	18" RCP	0.013	1.94	14.47	13.4	24.7	5.70	5,860.99	5,861.62	-0.019	5,862.14	5,861.36
222: PIPE - 210	PIPE - 210	MH - 206	6-K	60.2	18.0	24" RCP	0.013	3.42	14.52	23.6	33.0	6.72	5,859.54	5,860.69	-0.019	5,861.40	5,860.45
223: PIPE - 211	PIPE - 211	5-8-K	MH - 206	80.2	18.0	24" RCP	0.013	4.92	19.24	25.6	34.5	9.10	5,856.55	5,859.24	-0.034	5,860.09	5,857.07
233: PIPE - 212	PIPE - 212	5-8-K	7-K	7.3	18.0	18" RCP	0.013	0.04	10.27	0.4	4.5	1.40	5,856.55	5,856.62	-0.010	5,857.28	5,857.28
232: PIPE - 213	PIPE - 213	5-8-K	8-K	29.4	18.0	18" RCP	0.013	0.46	7.51	6.2	16.8	2.36	5,856.55	5,856.70	-0.005	5,857.28	5,857.28
234: PIPE - 214	PIPE - 214	5-10-K	5-8-K	69.0	18.0	24" RCP	0.013	5.17	14.64	35.3	41.0	7.57	5,854.51	5,855.85	-0.019	5,856.73	5,855.40
228: PIPE - 215	PIPE - 215	9-10-K	9-K	30.7	18.0	18" RCP	0.013	2.06	7.34	28.1	36.2	3.56	5,857.36	5,857.51	-0.005	5,858.29	5,858.28
229: PIPE - 216	PIPE - 216	9-10-K	10-K	9.1	18.0	18" RCP	0.013	2.06	17.75	11.6	23.0	6.70	5,857.36	5,857.62	-0.029	5,858.16	5,858.28
231: PIPE - 217	PIPE - 217	5-10-K	9-10-K	40.0	18.0	24" RCP	0.013	3.99	26.53	15.0	26.2	10.81	5,854.51	5,857.06	-0.064	5,857.82	5,855.40
238: PIPE - 218	PIPE - 218	5-12-K	5-10-K	271.8	24.0	36" RCP	0.013	7.82	41.19	19.0	29.5	10.09	5,845.00	5,854.01	-0.033	5,855.00	5,845.59
248: PIPE - 220	PIPE - 220	5-12-K	12-K	8.5	18.0	30" RCP	0.013	4.00	25.77	15.5	26.6	10.59	5,845.50	5,846.01	-0.060	5,846.77	5,846.00
250: PIPE - 221	PIPE - 221	OS-12-K	5-12-K	69.8	36.0	36" RCP	0.013	10.31	89.61	11.5	22.9	8.44	5,842.74	5,844.00	-0.018	5,845.02	5,844.56
255: PIPE - 222	PIPE - 222	OS-14-K	13-K	8.2	18.0	30" RCP	0.013	0.34	9.00	3.8	13.3	2.45	5,843.34	5,843.40	-0.007	5,844.16	5,844.16
256: PIPE - 223	PIPE - 223	OS-14-K	14-K	28.5	18.0	30" RCP	0.013	5.07	13.49	37.6	42.5	7.09	5,843.34	5,843.81	-0.016	5,844.68	5,844.00
326: PIPE - 272	PIPE - 272	MH-1 (Future)	MH-2 (Future)	321.3	30.0	24" RCP	0.013	16.80	74.57	22.5	32.3	12.27	5,884.89	5,874.27	0.033	5,886.28	5,875.08
327: PIPE - 273	PIPE - 273	MH-2 (Future)	MH - 200	98.0	36.0	24" RCP	0.013	16.52	156.44	10.6	21.9	14.38	5,873.27	5,867.88	0.055	5,874.57	5,869.73
181: PIPE - 2500	PIPE - 2500	FUTURE INLET	MH - 41 (Future)	7.2	30.0	24" RCP	0.013	17.23	30.64	56.2	53.6	6.42	5,893.15	5,893.11	0.006	5,894.55	5,894.54
182: PIPE - 2600	PIPE - 2600	MH - 41 (Future)	MH - 42 (Future)	50.6	30.0	24" RCP	0.013	17.22	28.83	59.7	55.7	6.13	5,892.91	5,892.66	0.005	5,894.31	5,894.05
370: PIPE 239	PIPE 239	MH-232	MH - 206	155.0	18.0		0.013	2.90	14.85	19.5	29.9	6.52	5,863.34	5,860.24	0.020	5,863.99	5,860.69
369: PIPE 240	PIPE 240	7-K-AREA	MH-232	17.1	18.0		0.013	2.90	17.41	16.7	27.6	7.30	5,864.11	5,863.64	0.027	5,864.76	5,864.31
366: PIPE 241	PIPE 241	1-K	MH-235	22.8	18.0		0.013	0.78	10.55	7.3	18.3	3.49	5,866.07	5,865.84	0.010	5,867.12	5,867.12
166: PIPE - 25 (STM-JC)	PIPE - 25 (STM-JC)	INLET 8-C (STM-JC)	MH - 211 (STM-JC)	7.7	18.0	18" RCP	0.013	4.17	10.50	39.7	43.8	5.60	5,880.82	5,880.74	0.010	5,881.65	5,881.70
139: PIPE - 26 (STM-JC)	PIPE - 26 (STM-JC)	MH - 211 (STM-JC)	MH - 8 (STM-JC)	193.8	18.0	24" RCP	0.013	4.17	9.99	41.7	45.1	5.40	5,880.44	5,878.69	0.009	5,881.23	5,879.87

Q5 NODE SUMMARY

	ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Method	Headloss Coefficient (Standard)	Hydraulic Grade Line (In) (ft)	Inlet Type	Length (ft)	Width (ft)	Flow (Total Out) (cfs)
330: 12-K	330	12-K	5,851.33	5,851.33	5,846.16	Standard	0.050	5,846.79	Full Capture	4.00	10.00	4.00
331: 5-K	331	5-K	5,864.76	5,864.76	5,861.28	Standard	0.050	5,862.15	Percent Capture	4.00	10.00	1.94
332: 7-K	332	7-K	5,861.19	5,861.19	5,856.62	Standard	0.050	5,857.27	Percent Capture	4.00	10.00	0.04
333: 9-K	333	9-K	5,862.03	5,862.03	5,857.51	Standard	0.050	5,858.29	Percent Capture	4.00	10.00	2.06
334: 10-K	334	10-K	5,861.98	5,861.98	5,857.48	Standard	0.050	5,858.17	Percent Capture	4.00	10.00	2.06
353: OS-E	353	OS-E	5,854.52	5,854.52	5,847.22	Standard	0.050	5,847.33	Full Capture			0.09

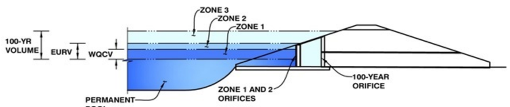
	ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Headloss Coefficient (Standard)
133: OS-14-K	133	OS-14-K	5,849.24	5,849.24	5,840.75	51.37	2.35	5,844.16	5,843.10	Standard	1.520
125: OS-12-K	125	OS-12-K	5,851.22	5,851.22	5,841.26	47.91	2.93	5,844.56	5,844.19	Standard	1.020
110: OS-4-K	110	OS-4-K	5,860.81	5,860.81	5,847.00	41.44	2.00	5,849.84	5,849.00	Standard	1.020
89: OS-2-K	89	OS-2-K	5,867.01	5,867.01	5,858.35	39.81	2.05	5,861.35	5,860.40	Standard	1.020
362: MH-235	362	MH-235	5,874.13	5,874.13	5,864.24	37.28	1.99	5,867.12	5,866.23	Standard	1.020
368: MH-232	368	MH-232	5,869.25	5,869.25	5,863.34	2.90	0.65	5,864.31	5,863.99	Standard	1.320
349: MH-223	349	MH-223	5,849.69	5,849.69	5,844.46	0.09	0.22	5,844.68	5,844.67	Standard	1.320
325: MH-2 (Future)	325	MH-2 (Future)	5,880.02	5,880.02	5,873.27	16.52	1.30	5,875.07	5,874.57	Standard	1.020
322: MH-1 (Future)	322	MH-1 (Future)	5,891.30	5,891.30	5,884.89	16.80	1.39	5,886.85	5,886.28	Standard	1.020
98: MH - 206	98	MH - 206	5,863.81	5,863.81	5,859.24	4.92	0.85	5,860.45	5,860.09	Standard	1.020
77: MH - 200	77	MH - 200	5,876.11	5,876.11	5,866.88	36.70	1.97	5,869.73	5,868.85	Standard	1.020
71: MH - 43 (Future)	71	MH - 43 (Future)	5,896.70	5,896.70	5,890.10	16.94	1.39	5,892.07	5,891.49	Standard	1.020
53: MH - 42 (Future)	53	MH - 42 (Future)	5,900.20	5,900.20	5,892.36	17.12	1.40	5,893.99	5,893.76	Standard	0.400
50: MH - 41 (Future)	50	MH - 41 (Future)	5,900.64	5,900.64	5,892.91	17.22	1.40	5,894.54	5,894.31	Standard	0.400
153: MH - 35	153	MH - 35	5,831.98	5,831.98	5,820.68	62.21	2.38	5,823.46	5,823.06	Standard	0.400
146: MH - 34	146	MH - 34	5,841.45	5,841.45	5,830.94	56.13	2.25	5,833.24	5,833.20	Standard	0.050
138: MH - 33	138	MH - 33	5,844.06	5,844.06	5,833.88	56.25	2.26	5,837.35	5,836.14	Standard	1.320
137: MH - 32	137	MH - 32	5,845.00	5,845.00	5,836.12	56.48	2.26	5,838.42	5,838.38	Standard	0.050
127: MH - 31 (K)	127	MH - 31 (K)	5,850.04	5,850.04	5,839.92	57.00	2.27	5,843.14	5,842.19	Standard	1.020
134: MH - 30 (I)	134	MH - 30 (I)	5,849.07	5,849.07	5,844.30	8.71	1.05	5,845.99	5,845.35	Standard	1.520
148: INLET 5-I	148	INLET 5-I	5,840.33	5,840.33	5,828.05	62.50	2.38	5,830.83	5,830.44	Standard	0.400
132: INLET 2-I	132	INLET 2-I	5,849.31	5,849.31	5,844.87	2.27	1.12	5,845.99	5,845.99	Standard	0.050
131: INLET 1-I	131	INLET 1-I	5,849.31	5,849.31	5,845.20	6.89	1.08	5,846.30	5,846.28	Standard	0.050
49: FUTURE INLET	49	FUTURE INLET	5,901.02	5,901.02	5,893.15	17.23	1.41	5,894.58	5,894.55	Standard	0.050
129: 14-K	129	14-K	5,849.56	5,849.56	5,843.81	5.07	0.87	5,844.68	5,844.68	Standard	0.000
128: 13-K	128	13-K	5,849.57	5,849.57	5,843.40	0.34	0.76	5,844.16	5,844.16	Standard	0.000
106: 9-10-K	106	9-10-K	5,861.60	5,861.60	5,857.06	3.99	0.76	5,858.28	5,857.82	Standard	1.520
107: 8-K	107	8-K	5,861.19	5,861.19	5,856.70	0.46	0.58	5,857.28	5,857.28	Standard	0.050
367: 7-K-AREA	367	7-K-AREA	5,868.00	5,868.00	5,864.11	2.90	0.65	5,864.77	5,864.76	Standard	0.050
95: 6-K	95	6-K	5,864.76	5,864.76	5,860.63	3.42	0.77	5,861.41	5,861.40	Standard	0.050
109: 5-8-K	109	5-8-K	5,860.85	5,860.85	5,855.90	5.17	0.83	5,857.28	5,856.73	Standard	1.520
126: 5-12-K	126	5-12-K	5,850.62	5,850.62	5,844.14	10.31	0.88	5,845.58	5,845.02	Standard	1.520
112: 5-10-K	112	5-10-K	5,860.21	5,860.21	5,854.01	7.82	0.99	5,855.40	5,855.00	Standard	1.020
105: 3-4-K	105	3-4-K	5,861.67	5,861.67	5,857.54	2.95	0.79	5,858.71	5,858.33	Standard	1.520
101: 3+4-K	101	3+4-K	5,862.06	5,862.06	5,857.87	2.95	0.86	5,858.74	5,858.73	Standard	0.050
90: 2-K	90	2-K	5,866.95	5,866.95	5,862.06	3.28	0.67	5,862.74	5,862.73	Standard	0.050
365: 1-K	365	1-K	5,869.58	5,869.58	5,866.07	0.78	1.05	5,867.12	5,867.12	Standard	0.050
65: MH - 211 (STM-JC)	65	MH - 211 (STM-JC)	5,885.99	5,885.99	5,880.44	4.17	0.78	5,881.70	5,881.23	Standard	1.520
63: INLET 8-C (STM-JC)	63	INLET 8-C (STM-JC)	5,886.36	5,886.36	5,880.82	4.17	0.83	5,881.65	5,881.65	Standard	0.050

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 =	160.87	acres
Watershed Length =	3,742	ft
Watershed Slope =	0.030	ft/ft
Watershed Imperviousness =	26.52%	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) =	1.879	acre-feet
Excess Urban Runoff Volume (EURV) =	4.271	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	3.310	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	4.883	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	7.634	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	13.271	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	16.974	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	21.799	acre-feet
500-yr Runoff Volume (P1 = 3.55 in.) =	35.422	acre-feet
Approximate 2-yr Detention Volume =	3.090	acre-feet
Approximate 5-yr Detention Volume =	4.585	acre-feet
Approximate 10-yr Detention Volume =	6.639	acre-feet
Approximate 25-yr Detention Volume =	7.805	acre-feet
Approximate 50-yr Detention Volume =	8.226	acre-feet
Approximate 100-yr Detention Volume =	9.897	acre-feet

Optional User Override 1-hr Precipitation

1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.55	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	1.879	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.392	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	5.626	acre-feet
Total Detention Basin Volume =	9.897	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
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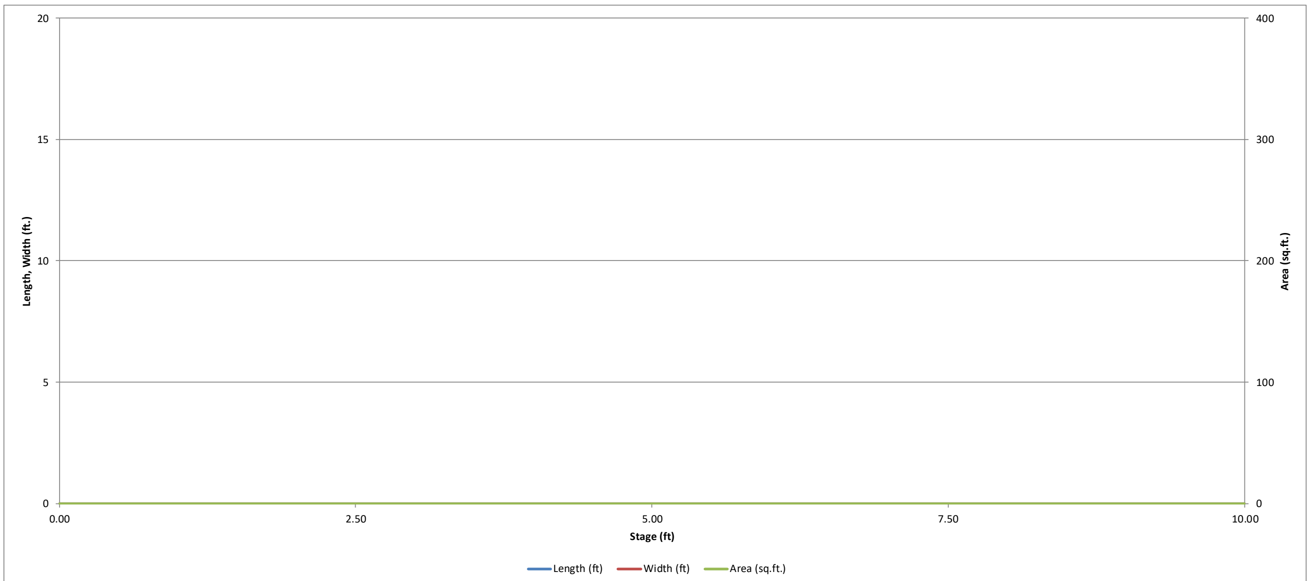
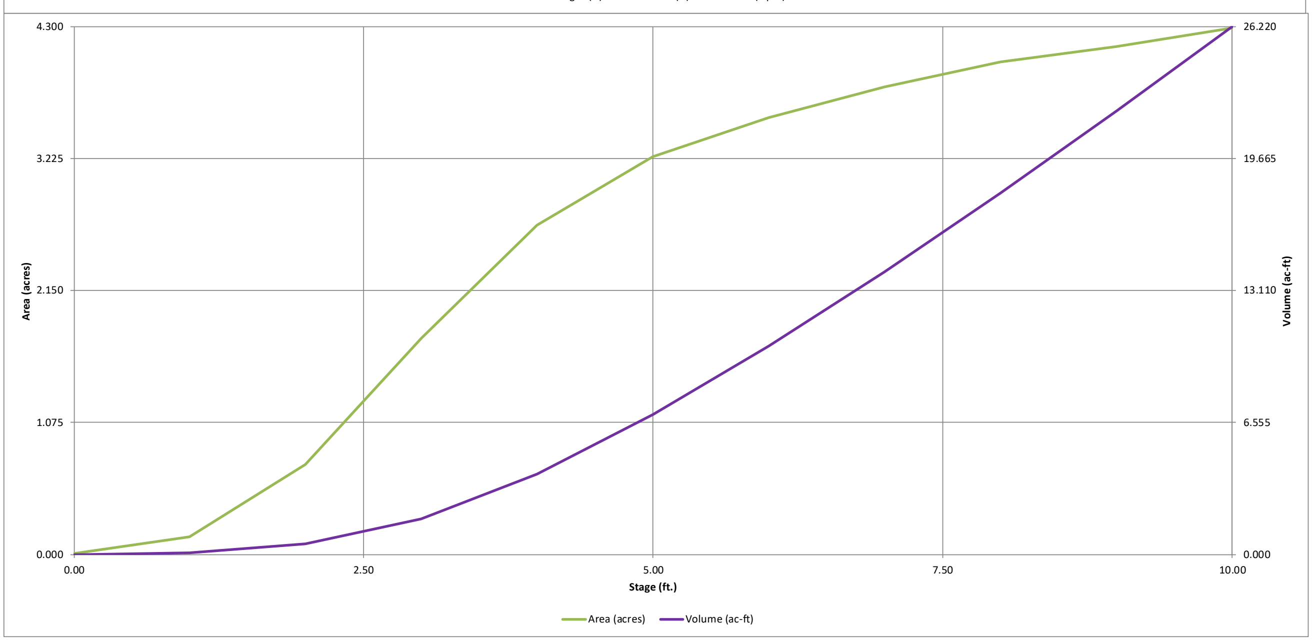
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



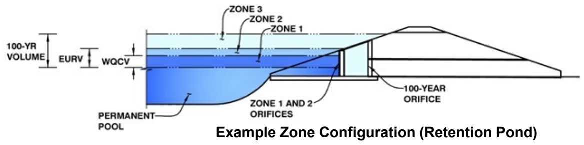


Detention Basin Outlet Structure Design

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	1.879	Orifice Plate
Zone 2 (EURV)	4.11	2.392	Rectangular Orifice
Zone 3 (100-year)	5.88	5.626	Weir&Pipe (Restrict)
		9.897	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 Diameter =	N/A	inches

Calculated Parameters for Underdrain

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

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	2.90	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	8.00	inches
Orifice Plate: Orifice Area per Row =	N/A	inches

Calculated Parameters for Plate

WQ Orifice Area CHECK CELLS AB84:BE84	N/A	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	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	
Invert of Vertical Orifice =	3.73	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	6.95	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	15.00	N/A	inches
Vertical Orifice Width =	24.00		inches

Calculated Parameters for Vertical Orifice

	Zone 2 Rectangular	Not Selected	
Vertical Orifice Area =	2.50	N/A	ft^2
Vertical Orifice Centroid =	0.63	N/A	feet

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

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	6.94	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	14.50	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	9.50	N/A	feet
Overflow Grate Open Area % =	75%	N/A	%, grate open area/total area
Debris Clogging % =	45%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	6.94	N/A	feet
Over Flow Weir Slope Length =	9.50	N/A	feet
Grate Open Area / 100-yr Orifice Area =	9.23	N/A	should be $\geq$ 4
Overflow Grate Open Area w/o Debris =	103.31	N/A	ft^2
Overflow Grate Open Area w/ Debris =	56.82	N/A	ft^2

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.50	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	48.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	40.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	11.19	N/A	ft^2
Outlet Orifice Centroid =	1.80	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	2.30	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	8.08	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	136.00	feet
Spillway End Slopes =	5.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

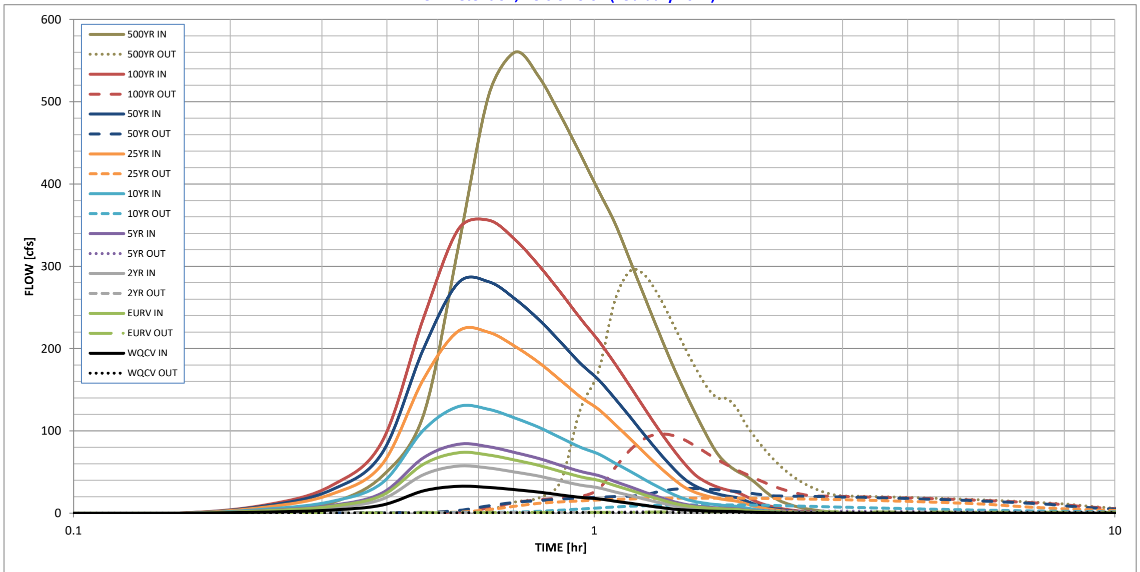
Spillway Design Flow Depth=	0.85	feet
Stage at Top of Freeboard =	9.93	feet
Basin Area at Top of Freeboard =	4.28	acres

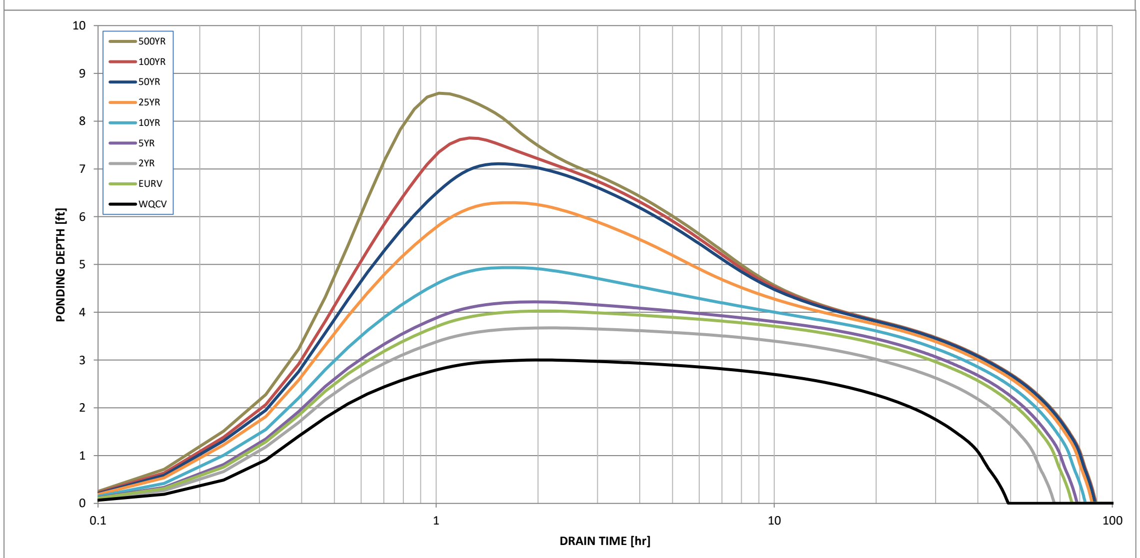
Routed Hydrograph Results

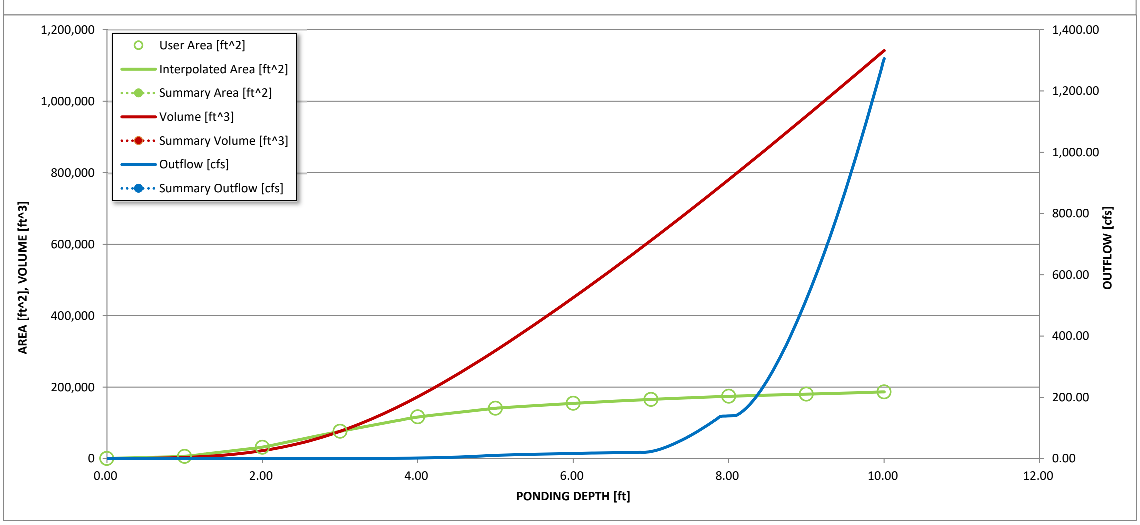
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.55
Calculated Runoff Volume (acre-ft) =	1.879	4.271	3.310	4.883	7.634	13.271	16.974	21.799	35.422
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	1.877	4.267	3.307	4.878	7.625	13.257	16.954	21.779	35.389
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.04	0.24	0.73	1.00	1.34	2.23
Predevelopment Peak Q (cfs) =	0.0	0.0	2.2	5.9	38.2	117.5	161.4	215.6	358.7
Peak Inflow Q (cfs) =	32.7	73.5	57.2	83.8	129.5	221.2	281.4	356.1	560.2
Peak Outflow Q (cfs) =	0.8	1.8	1.0	2.9	10.2	18.3	29.9	96.2	294.9
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	4.94	6.30	7.11	7.65	8.59
Area at Maximum Ponding Depth (acres) =	1.76	2.69	2.38	2.80	3.20	3.63	3.83	3.94	4.08
Maximum Volume Stored (acre-ft) =	1.756	4.029	3.141	4.578	6.709	11.374	14.394	16.490	20.268

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)





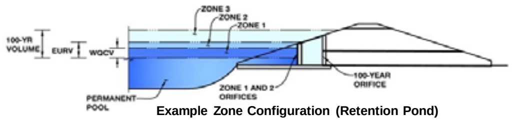


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Trails at Aspen Ridge Filing No. 2 - Offsite-East Side Onsite Detention

Basin ID: West Fork Jimmy Camp Creek - OS East Side



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB			
Watershed Area =	4.15	acres	Note: L / W Ratio > 8	
Watershed Length =	1,451	ft	L / W Ratio = 11.6	
Watershed Slope =	0.039	ft/ft		
Watershed Imperviousness =	65.00%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	100.0%	percent		
Percentage Hydrologic Soil Groups C/D =	0.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			
Water Quality Capture Volume (WQCV) =	0.088	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	0.294	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.244	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.326	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.419	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.539	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	0.627	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.741	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.55 in.) =	1.111	acre-feet	3.55	inches
Approximate 2-yr Detention Volume =	0.228	acre-feet		
Approximate 5-yr Detention Volume =	0.306	acre-feet		
Approximate 10-yr Detention Volume =	0.390	acre-feet		
Approximate 25-yr Detention Volume =	0.420	acre-feet		
Approximate 50-yr Detention Volume =	0.438	acre-feet		
Approximate 100-yr Detention Volume =	0.473	acre-feet		

Stage-Storage Calculation

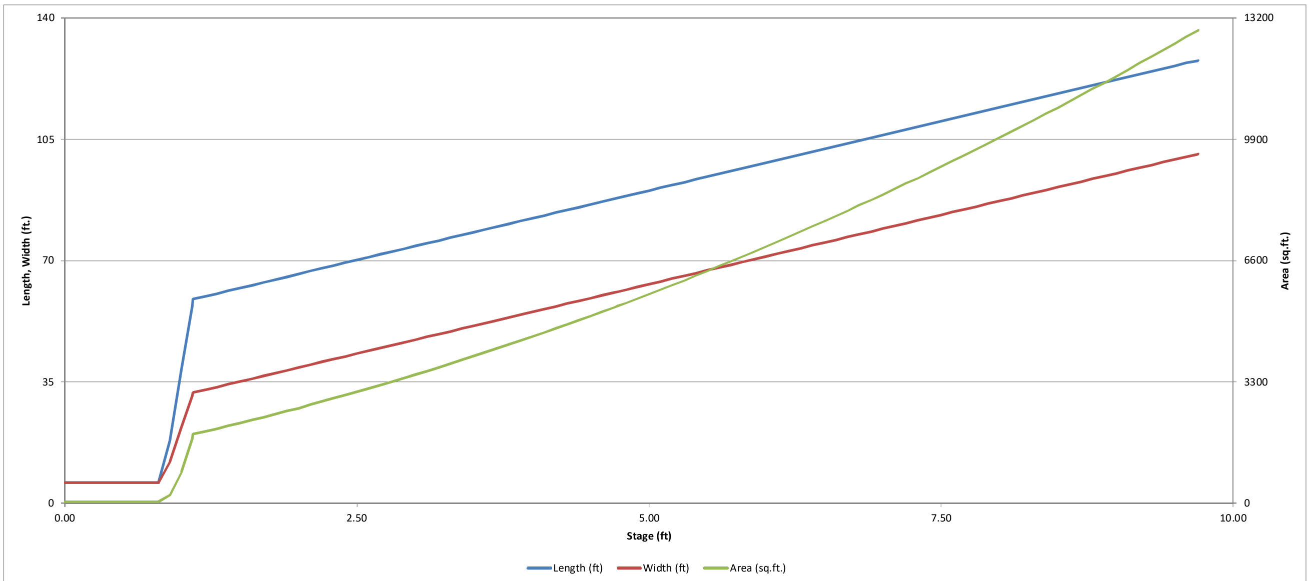
Zone 1 Volume (WQCV) =	0.088	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.207	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.179	acre-feet
Total Detention Basin Volume =	0.473	acre-feet
Initial Surcharge Volume (ISV) =	11	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	35	ft^2
Surcharge Volume Length (L_{ISV}) =	5.9	ft
Surcharge Volume Width (W_{ISV}) =	5.9	ft
Depth of Basin Floor (H_{FLOOR}) =	0.26	ft
Length of Basin Floor (L_{FLOOR}) =	58.8	ft
Width of Basin Floor (W_{FLOOR}) =	31.8	ft
Area of Basin Floor (A_{FLOOR}) =	1,873	ft^2
Volume of Basin Floor (V_{FLOOR}) =	187	ft^3
Depth of Main Basin (H_{MAIN}) =	4.91	ft
Length of Main Basin (L_{MAIN}) =	98.1	ft
Width of Main Basin (W_{MAIN}) =	71.1	ft
Area of Main Basin (A_{MAIN}) =	6,977	ft^2
Volume of Main Basin (V_{MAIN}) =	20,403	ft^3
Calculated Total Basin Volume (V_{total}) =	**0.473**	acre-feet

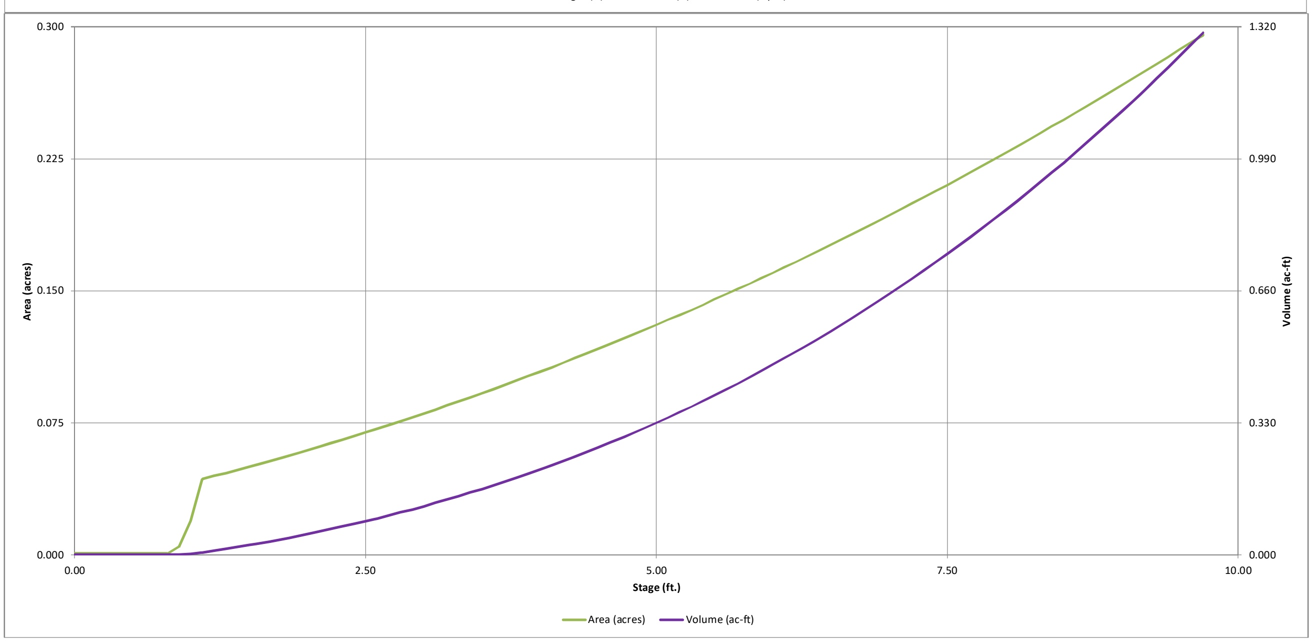
Depth Increment = 0.1 ft

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		5.9	5.9	35		0.001		
ISV	0.33		5.9	5.9	35		0.001	11	0.000
	0.40		5.9	5.9	35		0.001	14	0.000
	0.50		5.9	5.9	35		0.001	17	0.000
	0.60		5.9	5.9	35		0.001	21	0.000
	0.70		5.9	5.9	35		0.001	24	0.001
	0.80		5.9	5.9	35		0.001	27	0.001
	0.90		18.1	11.9	216		0.005	36	0.001
	1.00		38.5	21.9	844		0.019	85	0.002
Floor	1.09		56.9	30.9	1,758		0.040	200	0.005
	1.10		58.8	31.8	1,873		0.043	218	0.005
	1.20		59.6	32.6	1,946		0.045	409	0.009
	1.30		60.4	33.4	2,021		0.046	607	0.014
	1.40		61.2	34.2	2,096		0.048	813	0.019
	1.50		62.0	35.0	2,174		0.050	1,027	0.024
	1.60		62.8	35.8	2,252		0.052	1,248	0.029
	1.70		63.6	36.6	2,331		0.054	1,477	0.034
	1.80		64.4	37.4	2,412		0.055	1,714	0.039
	1.90		65.2	38.2	2,494		0.057	1,960	0.045
	2.00		66.0	39.0	2,578		0.059	2,213	0.051
	2.10		66.9	39.9	2,671		0.061	2,502	0.057
	2.20		67.7	40.7	2,757		0.063	2,773	0.064
	2.30		68.5	41.5	2,844		0.065	3,053	0.070
	2.40		69.3	42.3	2,933		0.067	3,342	0.077
	2.50		70.1	43.1	3,023		0.069	3,640	0.084
Zone 1 (WQCV)	2.57		70.7	43.7	3,087		0.071	3,854	0.088
	2.60		70.9	43.9	3,114		0.071	3,947	0.091
	2.70		71.7	44.7	3,207		0.074	4,263	0.098
	2.80		72.5	45.5	3,301		0.076	4,588	0.105
	2.90		73.3	46.3	3,396		0.078	4,923	0.113
	3.00		74.1	47.1	3,492		0.080	5,267	0.121
	3.10		74.9	47.9	3,590		0.082	5,621	0.129
	3.20		75.7	48.7	3,689		0.085	5,985	0.137
	3.30		76.5	49.5	3,789		0.087	6,359	0.146
	3.40		77.3	50.3	3,890		0.089	6,743	0.155
	3.50		78.1	51.1	3,993		0.092	7,137	0.164
	3.60		78.9	51.9	4,097		0.094	7,542	0.173
	3.70		79.7	52.7	4,202		0.096	7,957	0.183
	3.80		80.5	53.5	4,309		0.099	8,382	0.192
	3.90		81.3	54.3	4,417		0.101	8,819	0.202
	4.00		82.1	55.1	4,526		0.104	9,266	0.213
	4.10		82.9	55.9	4,636		0.106	9,724	0.223
	4.20		83.7	56.7	4,748		0.109	10,193	0.234
	4.30		84.5	57.5	4,861		0.112	10,673	0.245
	4.40		85.3	58.3	4,975		0.114	11,165	0.256
	4.50		86.1	59.1	5,091		0.117	11,668	0.268
	4.60		86.9	59.9	5,208		0.120	12,183	0.280
	4.70		87.7	60.7	5,326		0.122	12,710	0.292
Zone 2 (EURV)	4.73		87.9	61.0	5,361		0.123	12,870	0.295
	4.80		88.5	61.5	5,445		0.125	13,249	0.304
	4.90		89.3	62.3	5,566		0.128	13,799	0.317
	5.00		90.1	63.1	5,688		0.131	14,362	0.330
	5.10		90.9	63.9	5,811		0.133	14,937	0.343
	5.20		91.7	64.7	5,935		0.136	15,524	0.356
	5.30		92.5	65.5	6,061		0.139	16,124	0.370
	5.40		93.3	66.3	6,188		0.142	16,736	0.384
	5.50		94.1	67.1	6,317		0.145	17,361	0.399
	5.60		94.9	67.9	6,446		0.148	18,000	0.413
	5.70		95.7	68.7	6,577		0.151	18,651	0.428
	5.80		96.5	69.5	6,709		0.154	19,315	0.443
	5.90		97.3	70.3	6,843		0.157	19,993	0.459
Zone 3 (100-year)	6.00		98.1	71.1	6,977		0.160	20,684	0.475

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



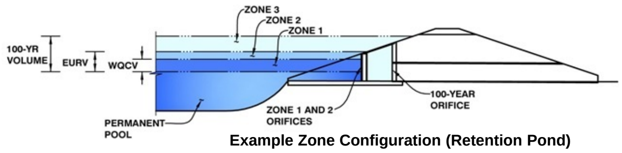


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Trails at Aspen Ridge Filing No. 2 - Offsite-East Side Onsite Detention

Basin ID: West Fork Jimmy Camp Creek - OS East Side



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.57	0.088	Orifice Plate
Zone 2 (EURV)	4.73	0.207	Circular Orifice
Zone 3 (100-year)	6.00	0.179	Weir&Pipe (Restrict)
		0.473	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 Diameter =	N/A	inches

Calculated Parameters for Underdrain

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

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	2.57	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	10.30	inches
Orifice Plate: Orifice Area per Row =	0.24	sq. inches (diameter = 9/16 inch)

Calculated Parameters for Plate

WQ Orifice Area per Row =	1.667E-03	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.86	1.71					
Orifice Area (sq. inches)	0.24	0.24	0.24					

	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 Circular	Not Selected	
Invert of Vertical Orifice =	2.57	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	4.73	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	1.34	N/A	inches

Calculated Parameters for Vertical Orifice

	Zone 2 Circular	Not Selected
Vertical Orifice Area =	0.01	N/A
Vertical Orifice Centroid =	0.06	N/A

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

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.73	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	6.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	4.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected
Height of Grate Upper Edge, H_t =	4.73	N/A
Over Flow Weir Slope Length =	4.00	N/A
Grate Open Area / 100-yr Orifice Area =	53.61	N/A
Overflow Grate Open Area w/o Debris =	16.80	N/A
Overflow Grate Open Area w/ Debris =	8.40	N/A

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.30	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	4.20		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plat

	Zone 3 Restrictor	Not Selected
Outlet Orifice Area =	0.31	N/A
Outlet Orifice Centroid =	0.21	N/A
Half-Central Angle of Restrictor Plate on Pipe =	1.01	N/A

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	5.60	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	3.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

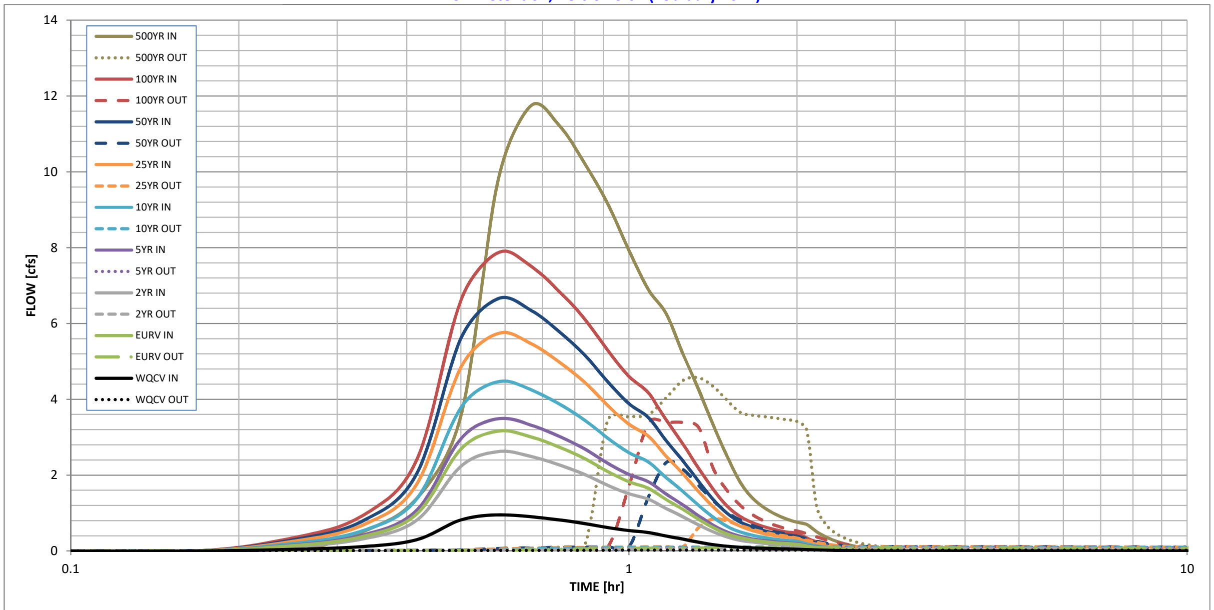
Spillway Design Flow Depth=	0.64	feet
Stage at Top of Freeboard =	7.24	feet
Basin Area at Top of Freeboard =	0.20	acres

Routed Hydrograph Results

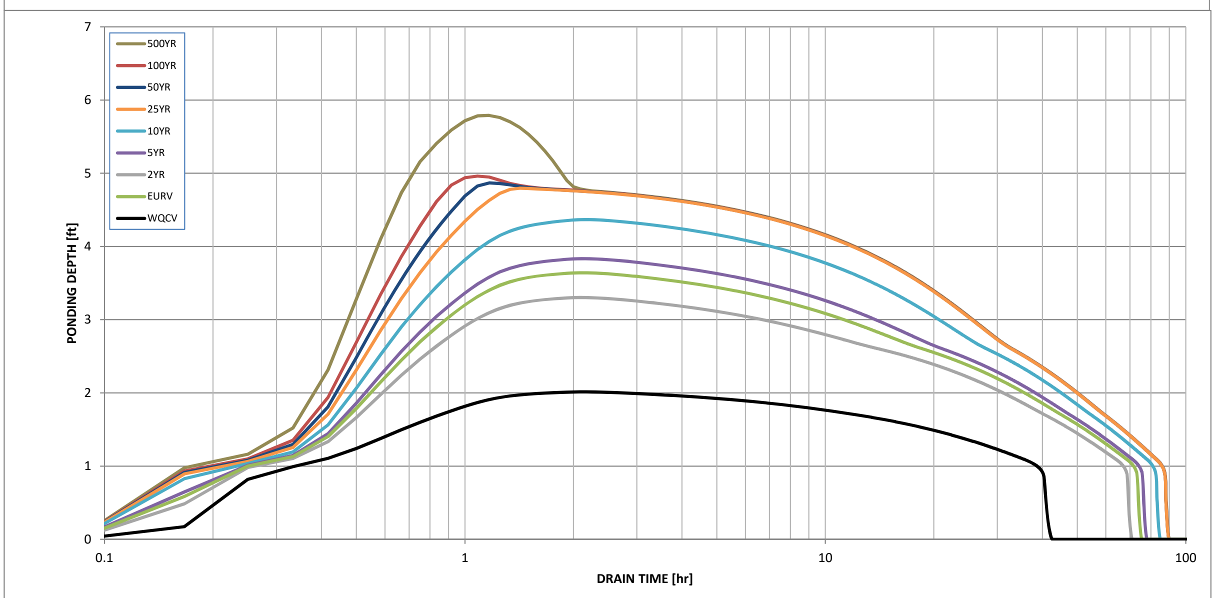
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52
Calculated Runoff Volume (acre-ft) =	0.088	0.294	0.244	0.326	0.419	0.539	0.627	0.741
OPTIONAL Override Runoff Volume (acre-ft) =								
Inflow Hydrograph Volume (acre-ft) =	0.056	0.189	0.156	0.208	0.268	0.345	0.401	0.475
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.02	0.14	0.50	0.69	0.94
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.1	0.6	2.1	2.9	3.9
Peak Inflow Q (cfs) =	1.0	3.2	2.6	3.5	4.5	5.7	6.7	7.9
Peak Outflow Q (cfs) =	0.0	0.1	0.1	0.1	0.1	0.9	2.3	3.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.5	0.2	0.4	0.8	0.9
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.0	0.1	0.2
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	39	68	65	70	75	78	77	75
Time to Drain 99% of Inflow Volume (hours) =	**41**	72	68	74	81	85	84	83
Maximum Ponding Depth (ft) =	2.01	3.64	3.30	3.83	4.37	4.80	4.87	4.96
Area at Maximum Ponding Depth (acres) =	0.06	0.10	0.09	0.10	0.11	0.12	0.13	0.13
Maximum Volume Stored (acre-ft) =	0.052	0.177	0.146	0.195	0.252	0.303	0.312	0.324

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)



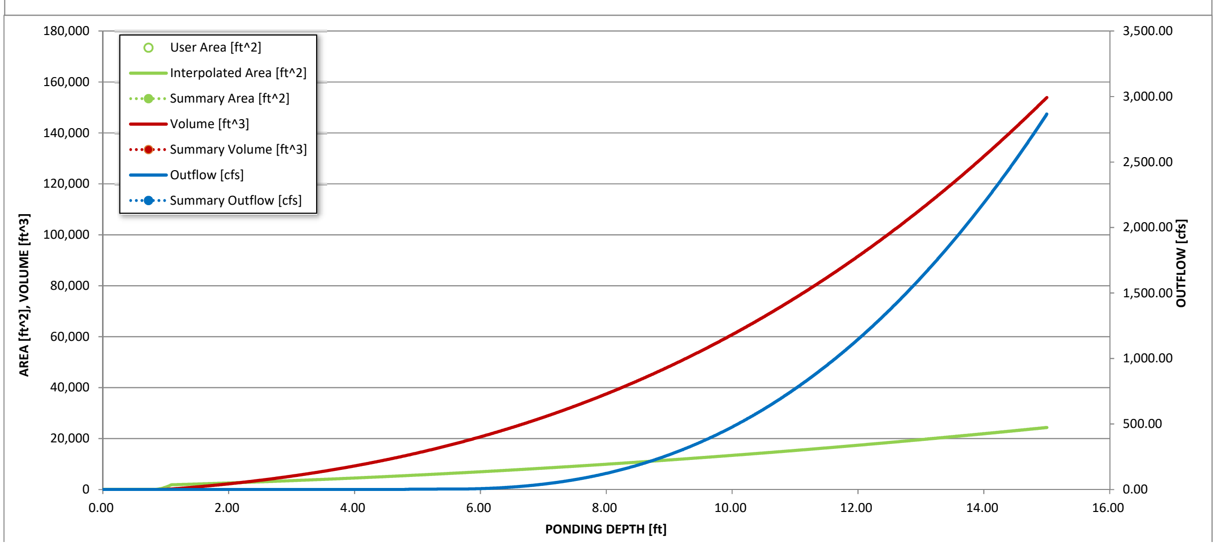
ft²
feet



feet
feet
should be ≥ 4
ft²
ft²

e

ft²
feet
radians



500 Year
3.55
1.111
0.712
1.57
6.5
11.7
4.6
0.7
Spillway
0.2
N/A
69
81
5.79
0.15
0.442

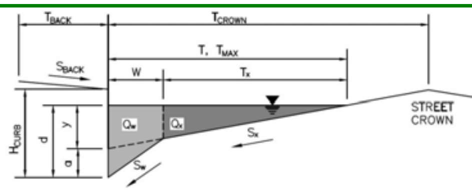
Version 4.05 Released March 2017

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**

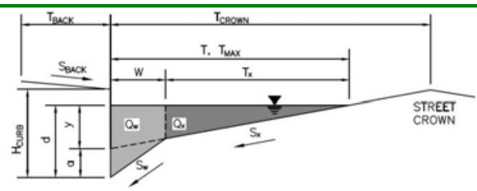
Version 4.05 Released March 2017

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)

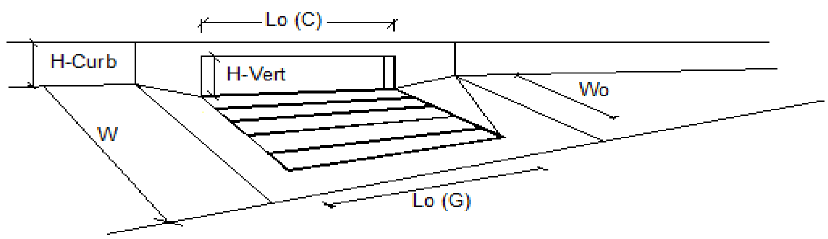
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		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	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
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)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	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**	**%**

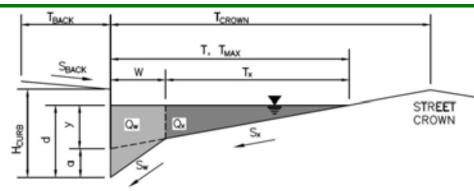
Version 4.05 Released March 2017

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

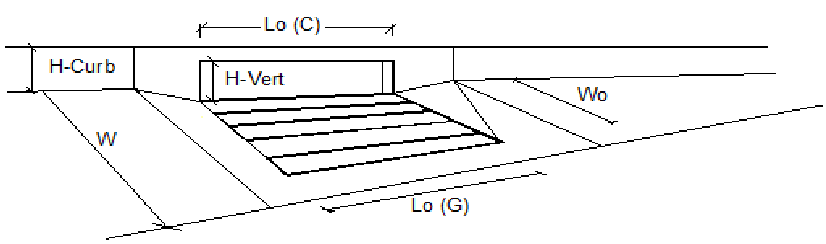
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**14.4**	**14.5**	**cfs**

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 (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 =**	**2.0**	**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**	**%**

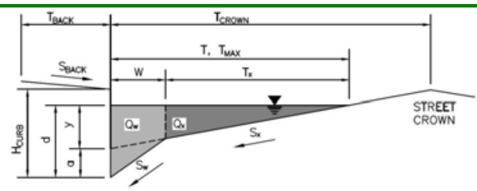
Version 4.05 Released March 2017

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

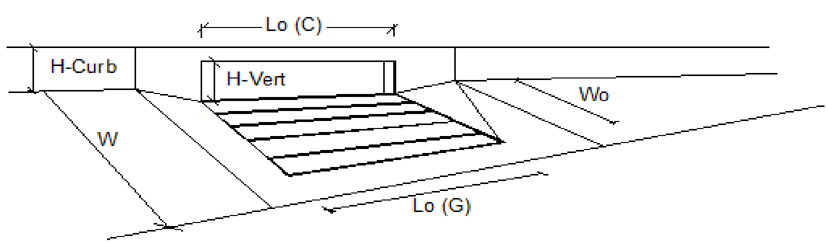
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**14.4**	**14.5**	**cfs**

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 (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 =**	**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**	**%**

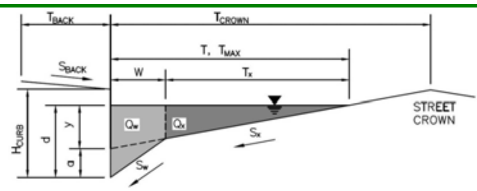
Version 4.05 Released March 2017

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

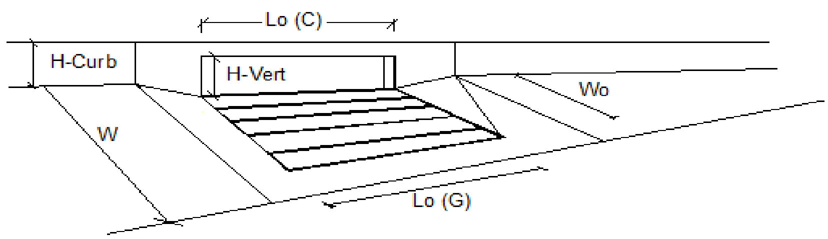
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**18.1**	**18.1**	**cfs**

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) — CDOT Type R Curb Opening

		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	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	

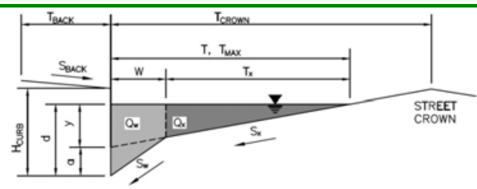
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	Q =	**2.9**	**6.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q_b =	**0.0**	**1.7**	**cfs**
Capture Percentage = Q_a/Q_o =	C% =	**100**	**79**	**%**

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



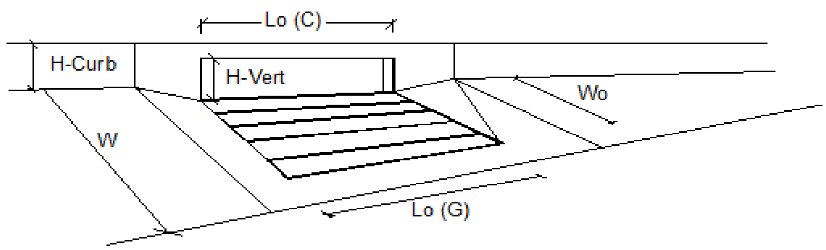
Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
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)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	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**	**%**

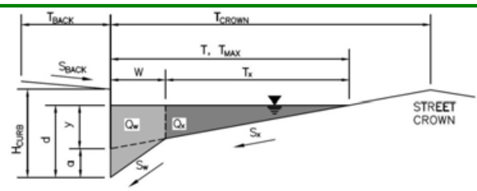
Version 4.05 Released March 2017

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



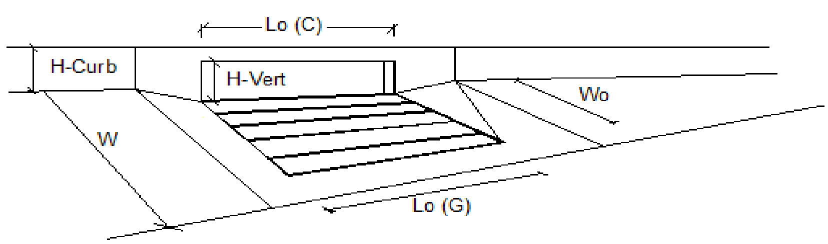
Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
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**	**%**

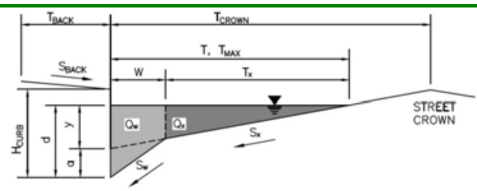
Version 4.05 Released March 2017

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	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

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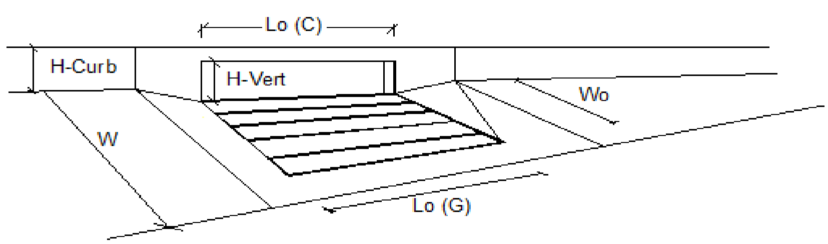


Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit 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**	**%**

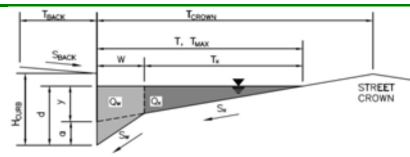
Version 4.05 Released March 2017

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: 11-K



Gutter Geometry (Enter data in the blue cells)

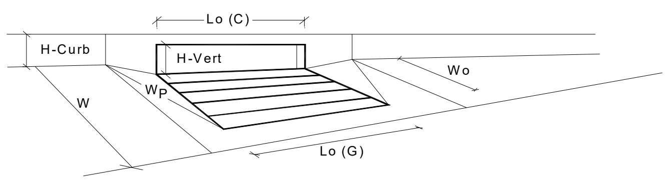
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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 (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.7	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

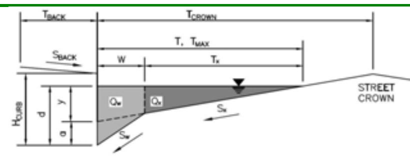
Version 4.05 Released March 2017

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: 12-K



Gutter Geometry (Enter data in the blue cells)

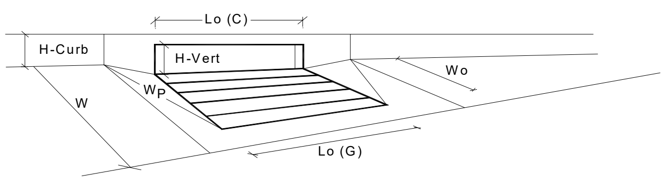
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	9.00	inches
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)	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} =	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

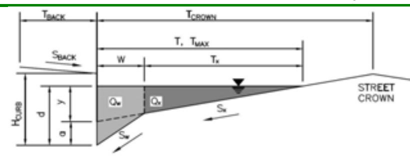
Version 4.05 Released March 2017

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)

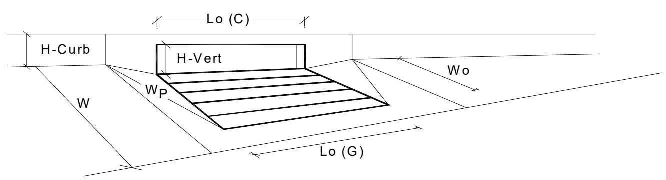
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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) 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

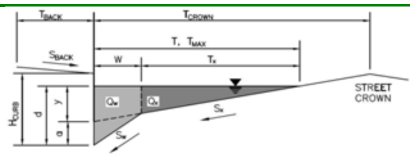
Version 4.05 Released March 2017

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



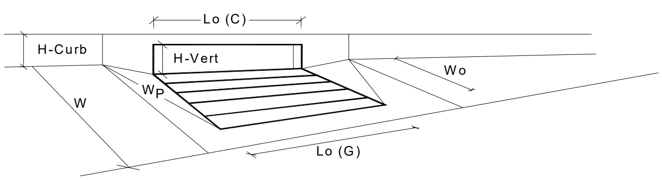
Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height 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)	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 =	**7.27**	**7.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.66	5.8	cfs

Channel Report

TAR F2-Bypass swale east of development

Triangular		**Highlighted**	
Side Slopes (z:1)	= 3.00, 18.50	Depth (ft)	= 0.33
Total Depth (ft)	= 2.00	Q (cfs)	= 4.000
		Area (sqft)	= 1.17
Invert Elev (ft)	= 1.00	Velocity (ft/s)	= 3.42
Slope (%)	= 3.90	Wetted Perim (ft)	= 7.16
N-Value	= 0.025	Crit Depth, Yc (ft)	= 0.39
		Top Width (ft)	= 7.09
Calculations		EGL (ft)	= 0.51
Compute by:	Known Q		
Known Q (cfs)	= 4.00		

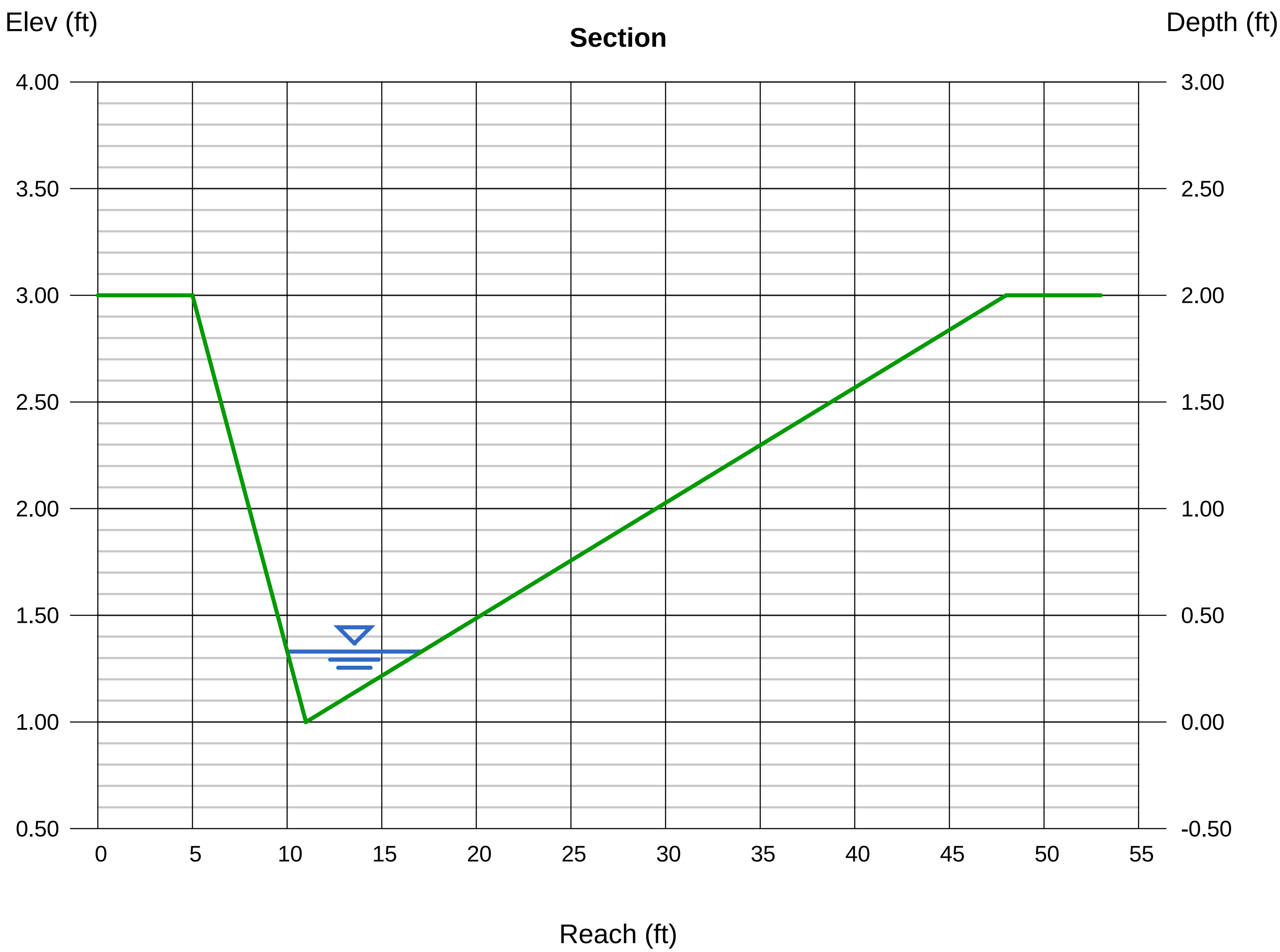
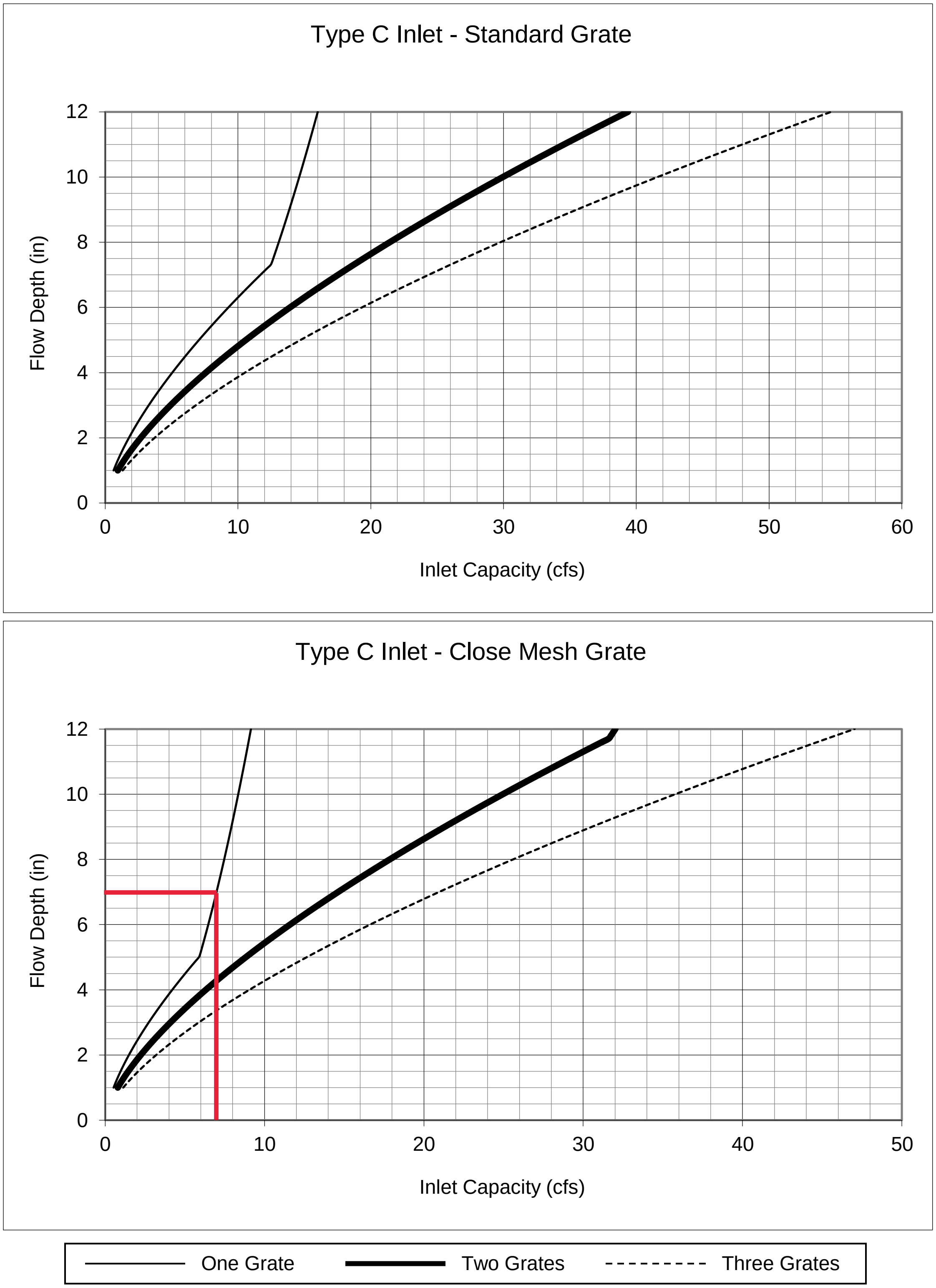


Figure 8-10. Inlet Capacity Chart Sump Conditions, Area (Type C) Inlet



Notes:
1. The standard inlet parameters must apply to use these charts.

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

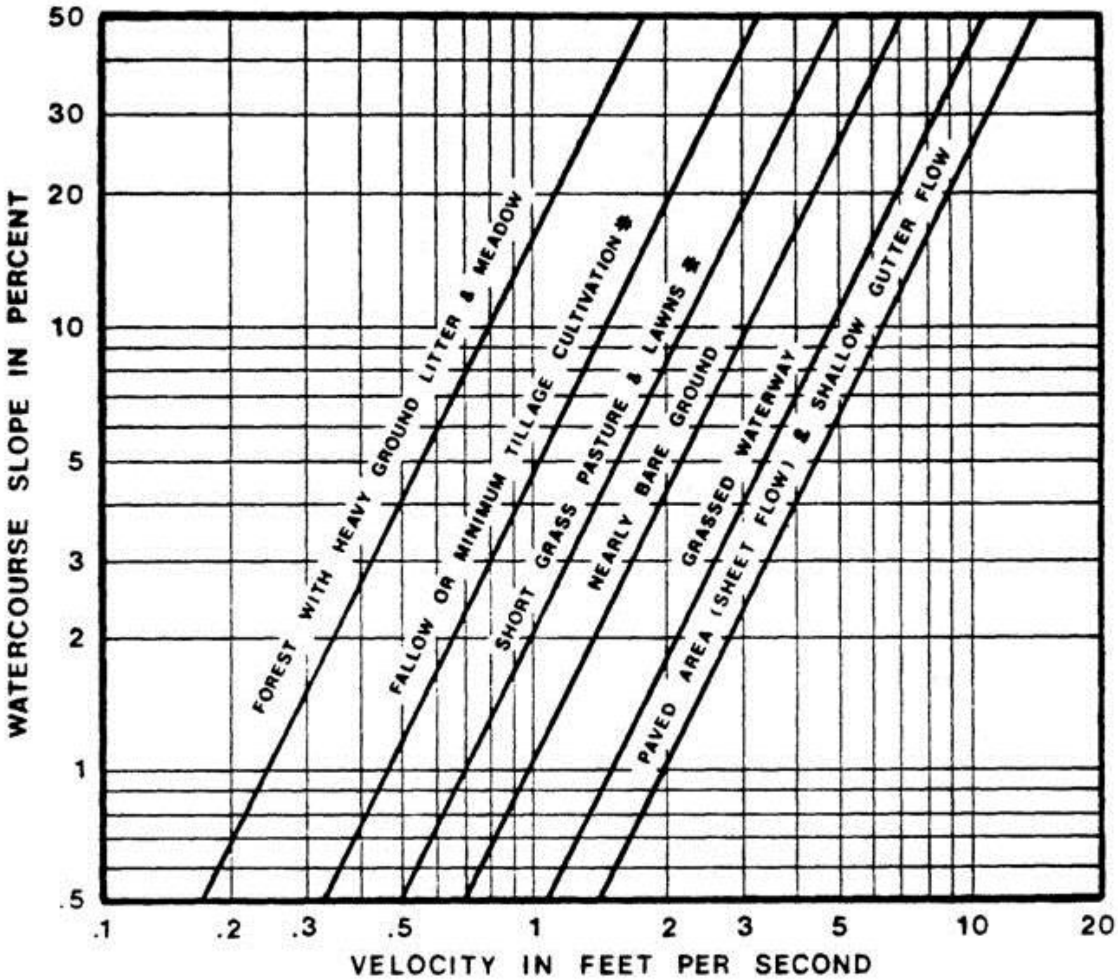
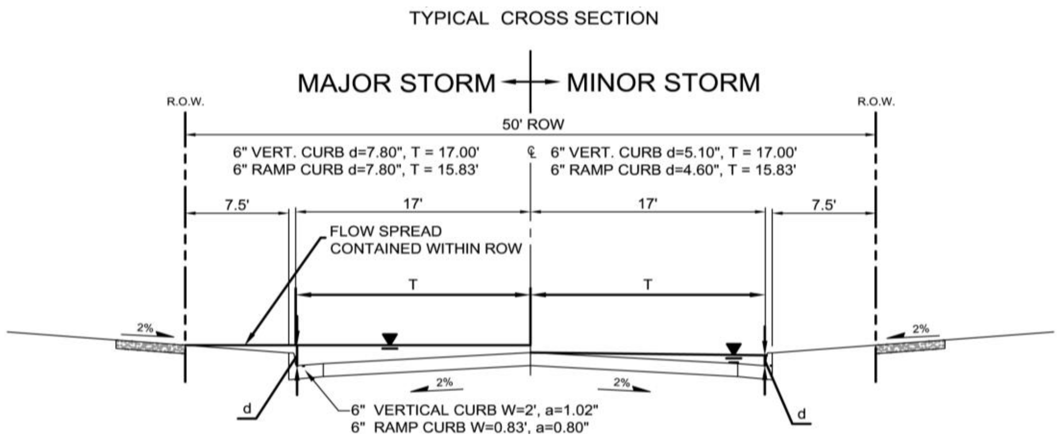
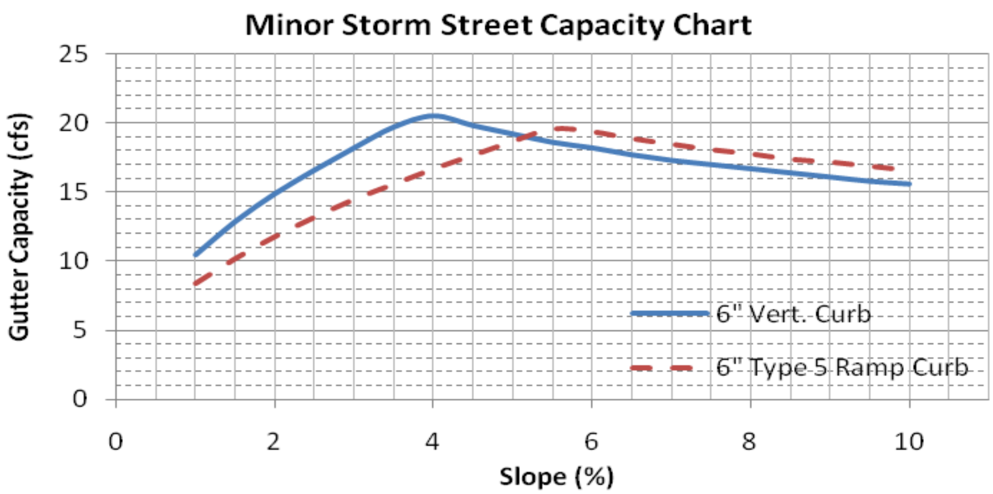
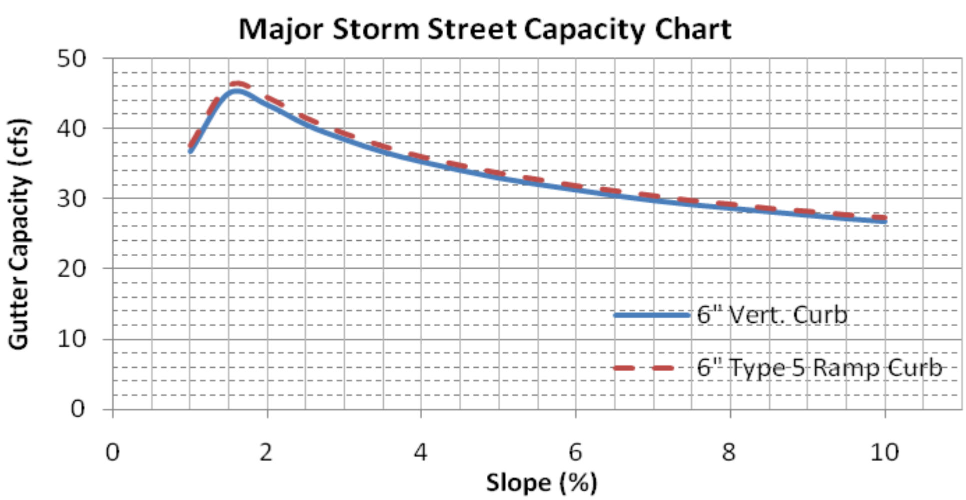


Figure 7-7. Street Capacity Charts Residential (Detached Sidewalk)

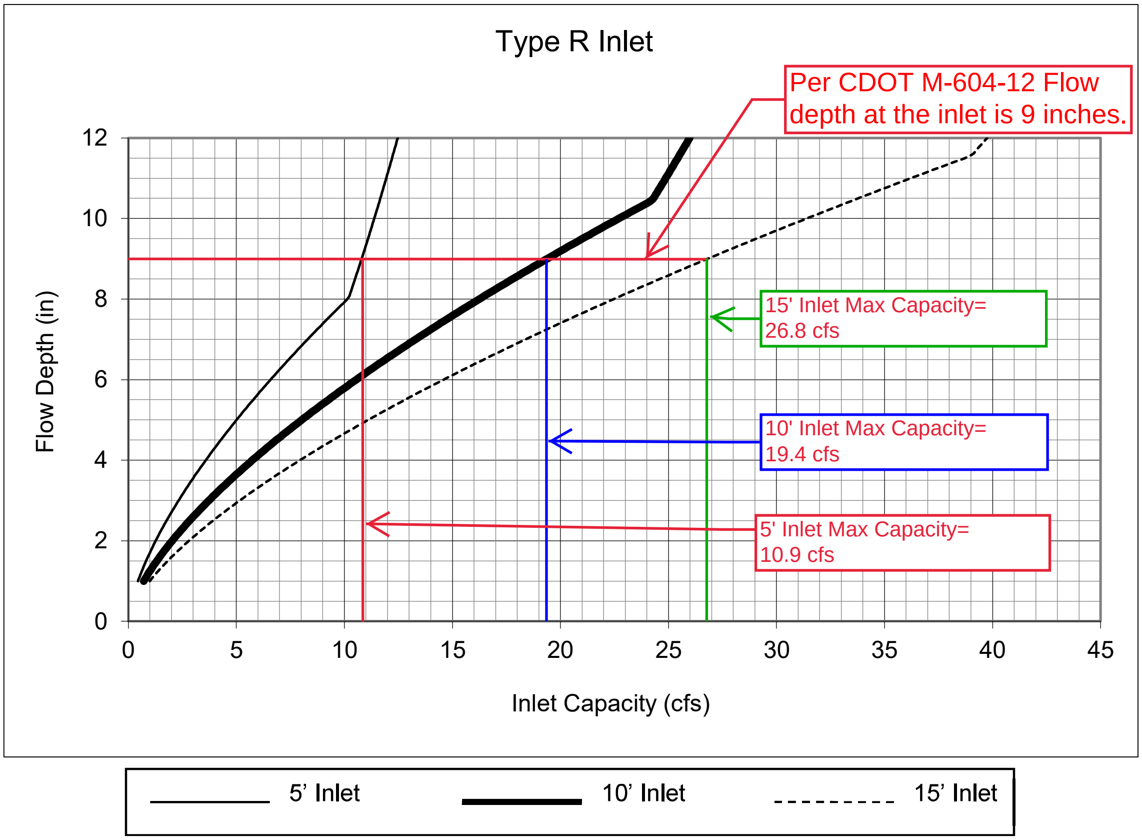






These charts shall only be used for the standard street sections as shown. The capacity shown is based on ½ the street section as calculated by the UD-Inlet spreadsheets. Minor storm capacities are based on no crown overtopping, curb height or maximum allowable spread widths. Major storm capacities are 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.

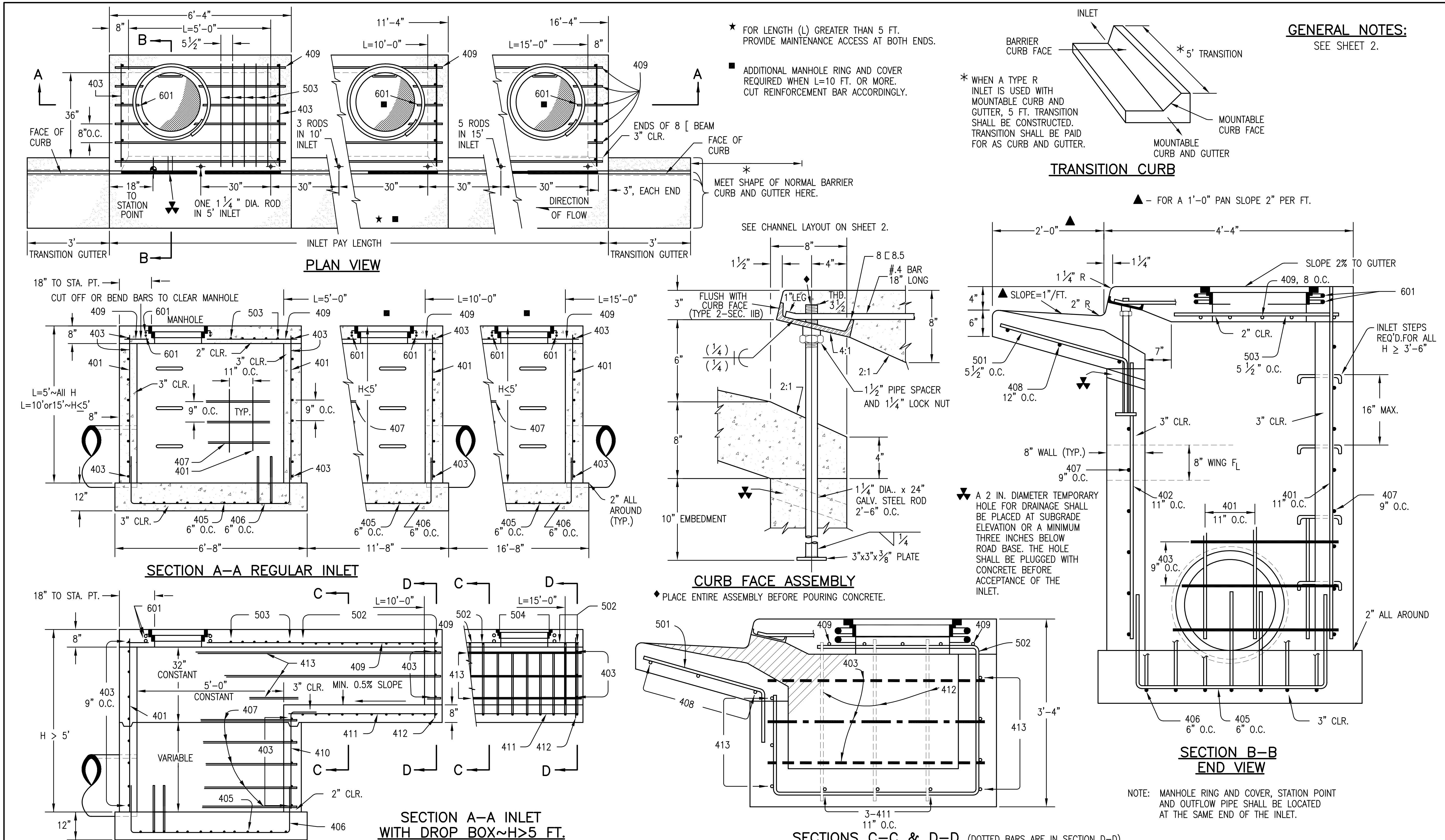
Figure 8-11. Inlet Capacity Chart Sump Conditions , Curb Opening (Type R) Inlet



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.



Computer File Information		Sheet Revisions	
Creation Date: 07/04/06	Initials: SJR	Date:	Comments
Last Modification Date: 07/04/06	Initials: LTA		
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Drawing File Name: 6040120102.dwg			
CAD Ver.: MicroStation V8 Scale: Not to Scale	Units: English		

Colorado Department of Transportation
4201 East Arkansas Avenue
Denver, Colorado 80222
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		INLETS: H ≤ 5 FT.				INLETS: H > 5 FT.			
				L = 5 FT.		L = 10 FT.		L = 15 FT.		L = 10 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 (INLETS: H ≤ 5 FT.) — DROP BOX INLETS (INLETS: H > 5 FT.)

* VARIABLE REFER TO TABLE TWO.

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

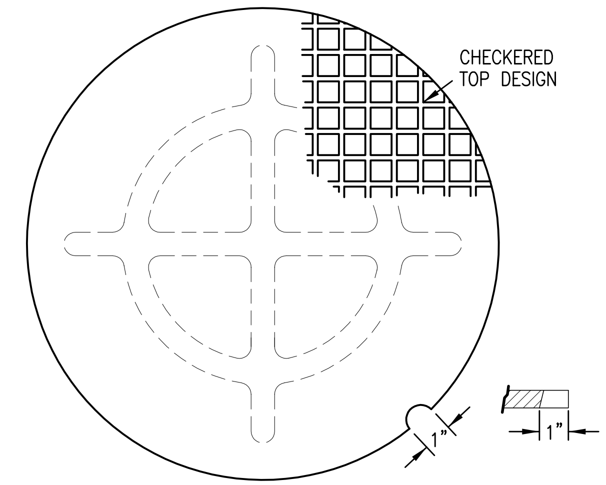
TABLE ONE ~ BAR LIST FOR CURB INLETS, TYPE "R"

"H"	LENGTH			NO. REQ'D. REGULAR		NO. REQ'D. DROP BOX		L = 5 FT.		L = 10 FT.		L = 15 FT.	
	401	402	410	403	407	403	407	CONC. CU. YDS.	STEEL LBS.	CONC. CU. YDS.	STEEL LBS.	CONC. CU. YDS.	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

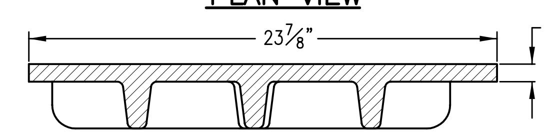
NOTES: FOR L=5 FT., L=10 FT., AND L=15 FT.
REGULAR INLETS: TOTAL QUANTITIES NEEDED ARE OUTSIDE THE HEAVY BLACK LINE.
DROP BOX INLETS: TOTAL QUANTITIES NEEDED ARE INSIDE THE HEAVY BLACK LINE.

STEEL WEIGHTS DO NOT INCLUDE STRUCTURAL STEEL CHANNEL.

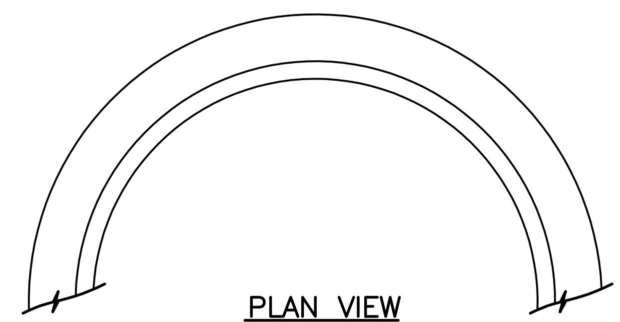
TABLE TWO ~ BARS AND QUANTITIES VARIABLE WITH "H"



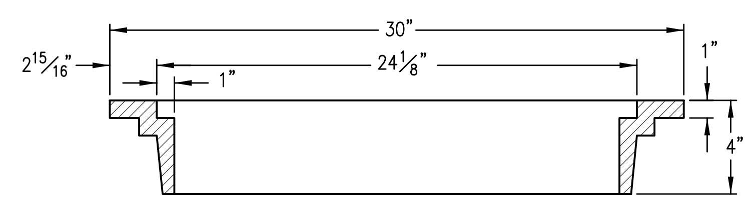
PLAN VIEW



ELEVATION VIEW
MANHOLE COVER (TYP.)



PLAN VIEW

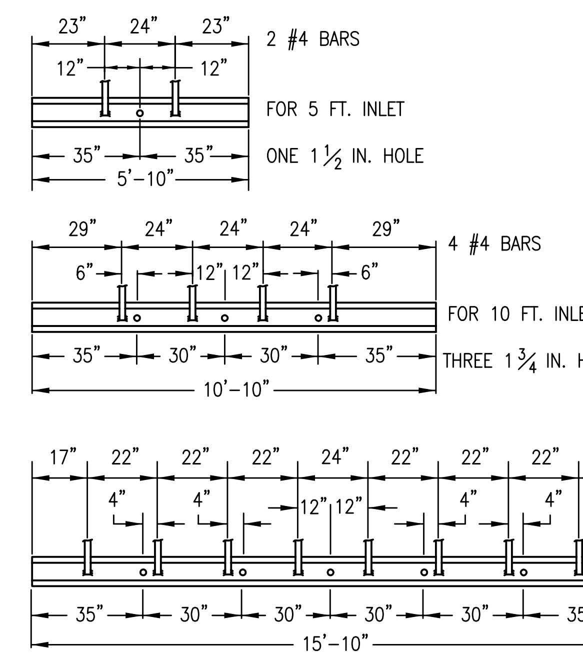


ELEVATION VIEW
MANHOLE RING (TYP.)

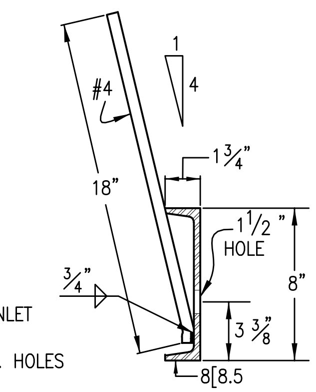
WEIGHTS: COVER = 125 LBS.
+ RING = 135 LBS.
TOTAL = 260 LBS.

GENERAL NOTES

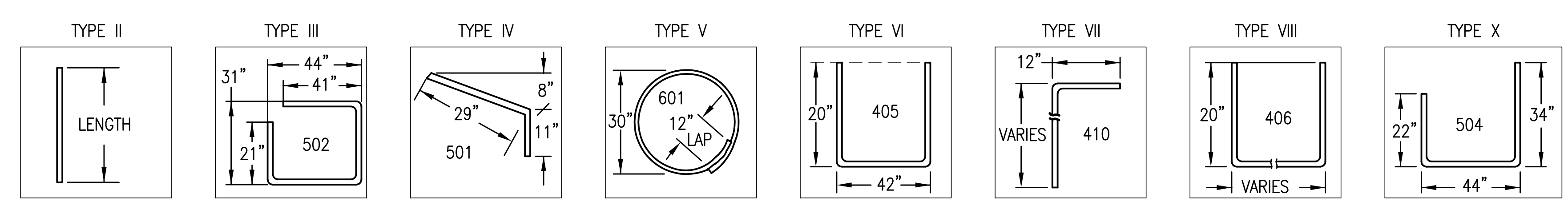
1. CONCRETE SHALL BE CLASS B. INLET MAY BE CAST-IN-PLACE OR PRECAST.
2. CONCRETE WALLS SHALL BE FORMED ON BOTH SIDES AND SHALL BE 8 IN. THICK.
3. INLET STEPS SHALL BE IN CONFORMANCE WITH AASHTO M 199.
4. CURB FACE ASSEMBLY SHALL BE GALVANIZED AFTER WELDING.
5. EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4 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.



CHANNEL LAYOUT DETAILS
SEE CURB FACE ASSEMBLY ON SHEET 1.



SECTION AT HOLE (TYP.)



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)

Colorado Department of Transportation
4201 East Arkansas Avenue
Denver, Colorado 80222
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

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

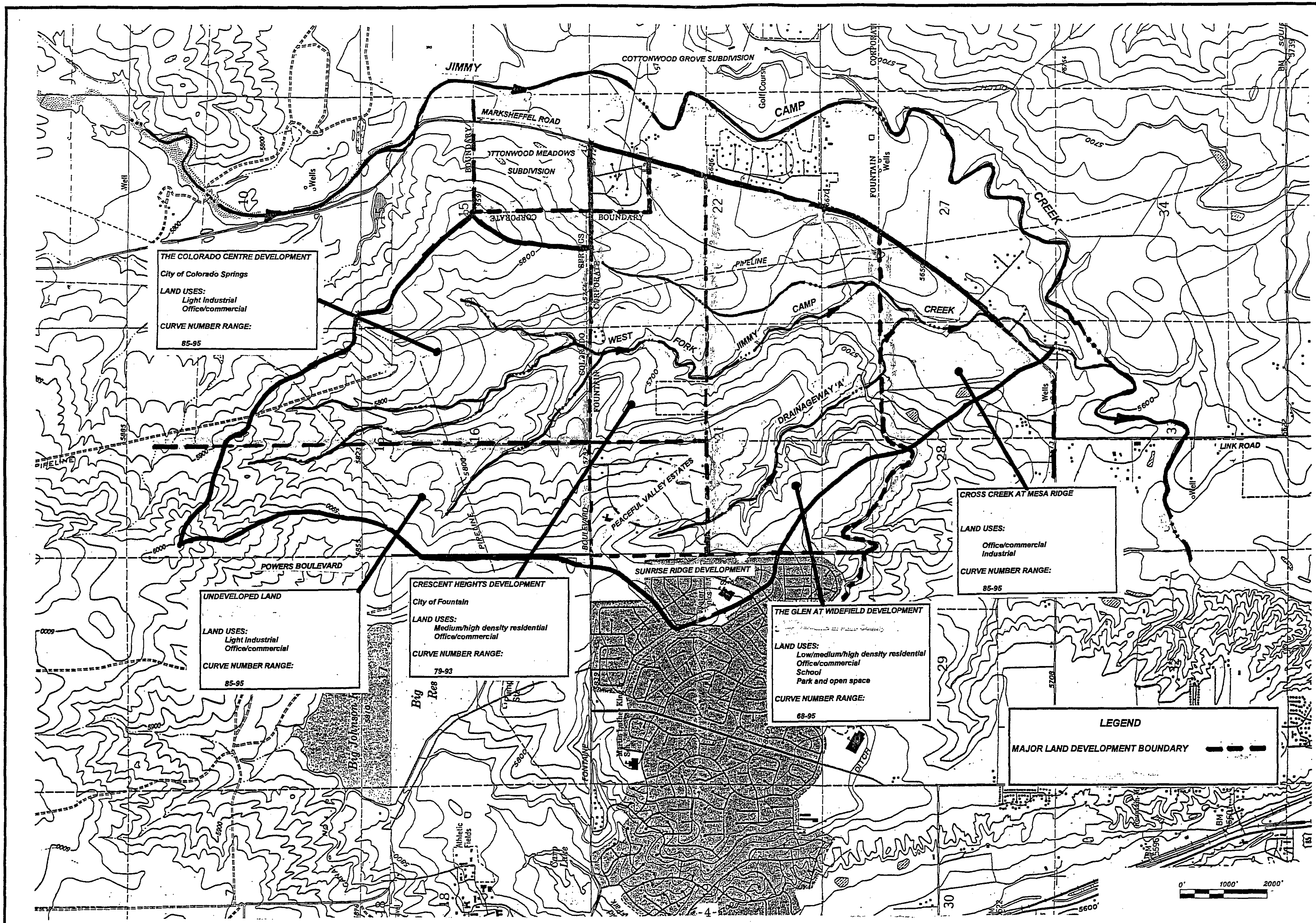
For the most part the main channels within the basin which pass through undeveloped areas and the right-of-way can be dedicated as part of the land development process. For those segments of the drainageway where floodplain preservation is the recommended plan, a combination of open space dedication (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.



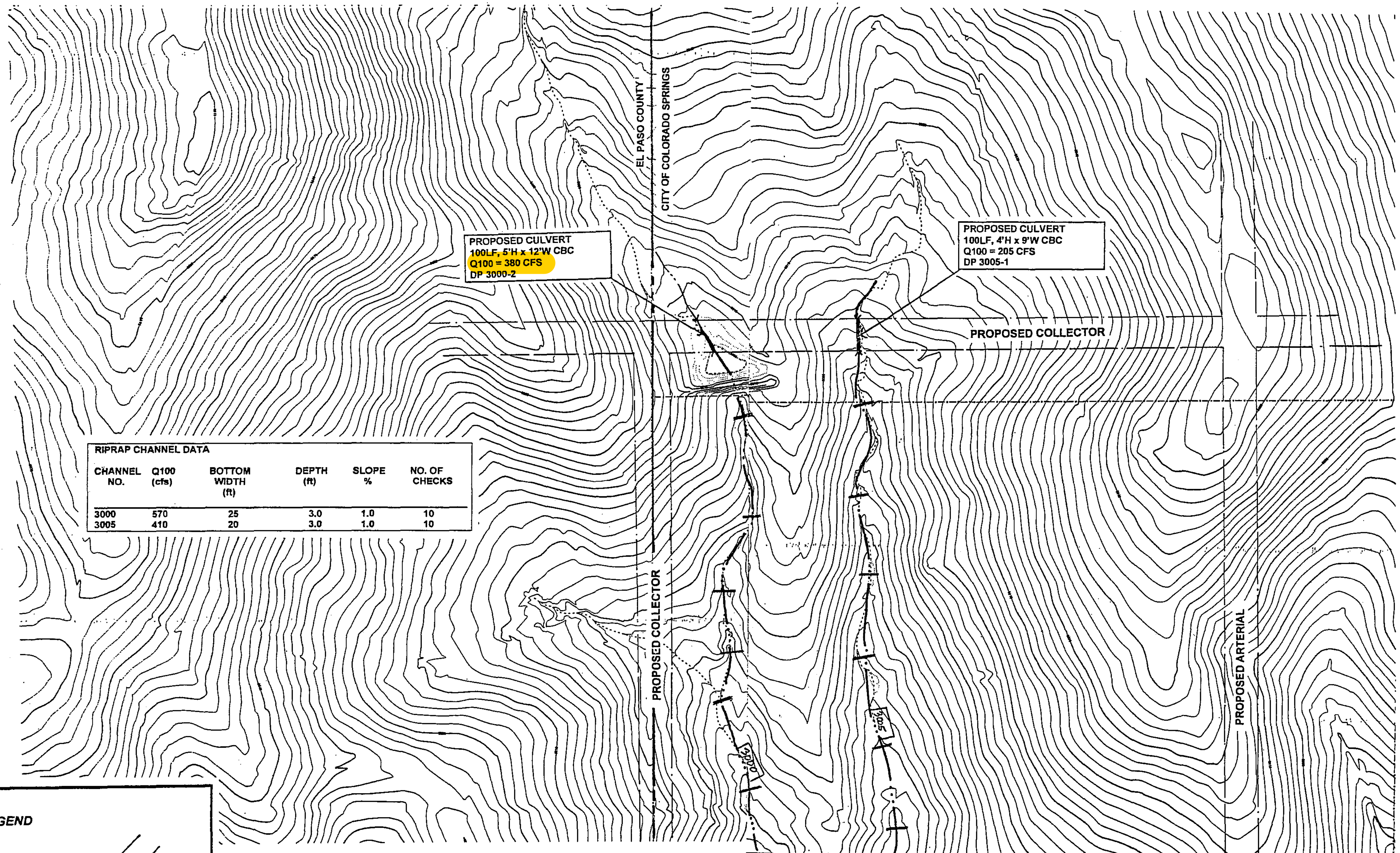
Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado
80904
(719) 630-7342

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

LEGEND

ROADWAY CROSSING

DRAINAGEWAY AND ROUTING ELEMENT NUMBER (3015)

DRAINAGEWAY GRADE CONTROL STRUCTURE

DESIGN POINT NUMBER (3021)

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

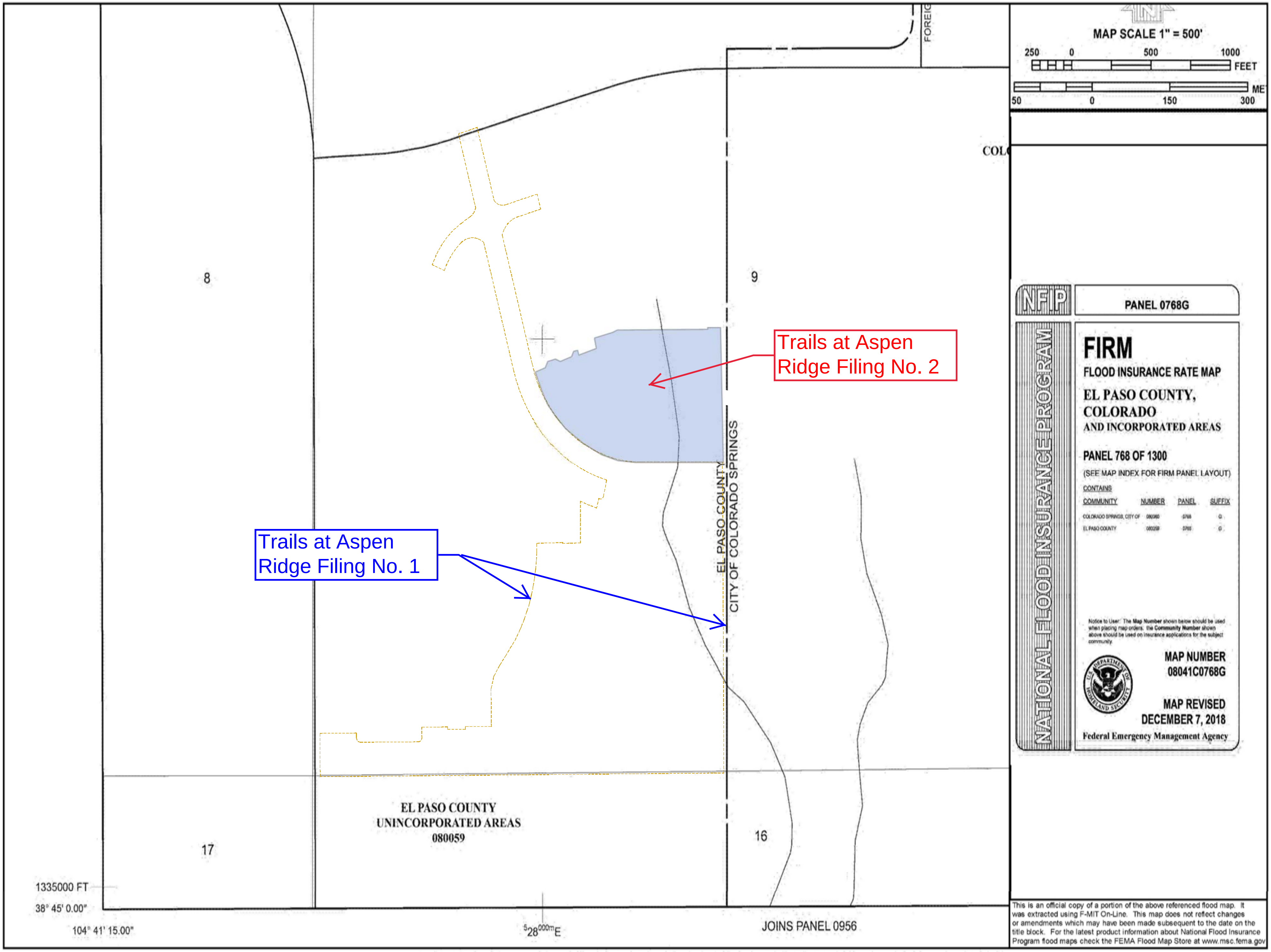
WEST FORK JIMMY CAMP CREEK DRAINAGE BASIN PLANNING STUDY

PRELIMINARY PLAN
EL PASO COUNTY, COLORADO

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

6

FIRMETTE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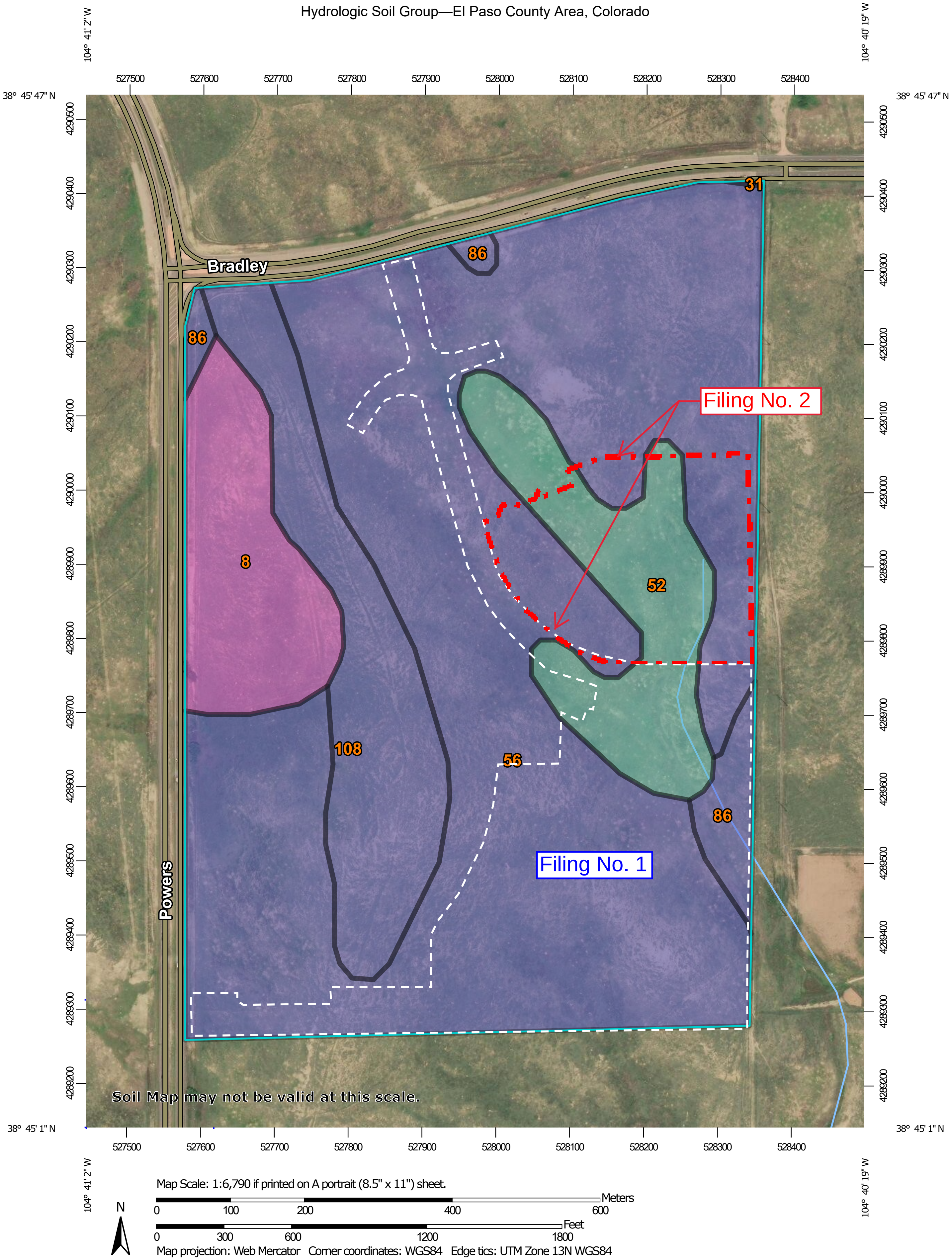
250 0 500 1000
FEET
50 0 150 300
8
9
16
17
Trails at Aspen Ridge Filing No. 2
Trails at Aspen Ridge Filing No. 1
EL PASO COUNTY
CITY OF COLORADO SPRINGS
EL PASO COUNTY
UNINCORPORATED AREAS
080059
1335000 FT
38° 45' 0.00"
104° 41' 15.00"
528000mE
JOINS PANEL 0956
NFIP
PANEL 0768G
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS
PANEL 768 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS
COMMUNITY NUMBER PANEL SUFFIX
MAP NUMBER
08041C0768G
MAP REVISED
DECEMBER 7, 2018
Federal Emergency Management Agency
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


104° 41' 2" W
104° 40' 19" W
38° 45' 47" N
38° 45' 1" N
527500
527600
527700
527800
527900
528000
528100
528200
528300
528400
4290500
4290400
4290300
4290200
4290100
4290000
4289900
4289800
4289700
4289600
4289500
4289400
4289300
4289200
Bradley
Powers
86
31
8
108
56
52
86
Filing No. 2
Filing No. 1
Soil Map may not be valid at this scale.
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.

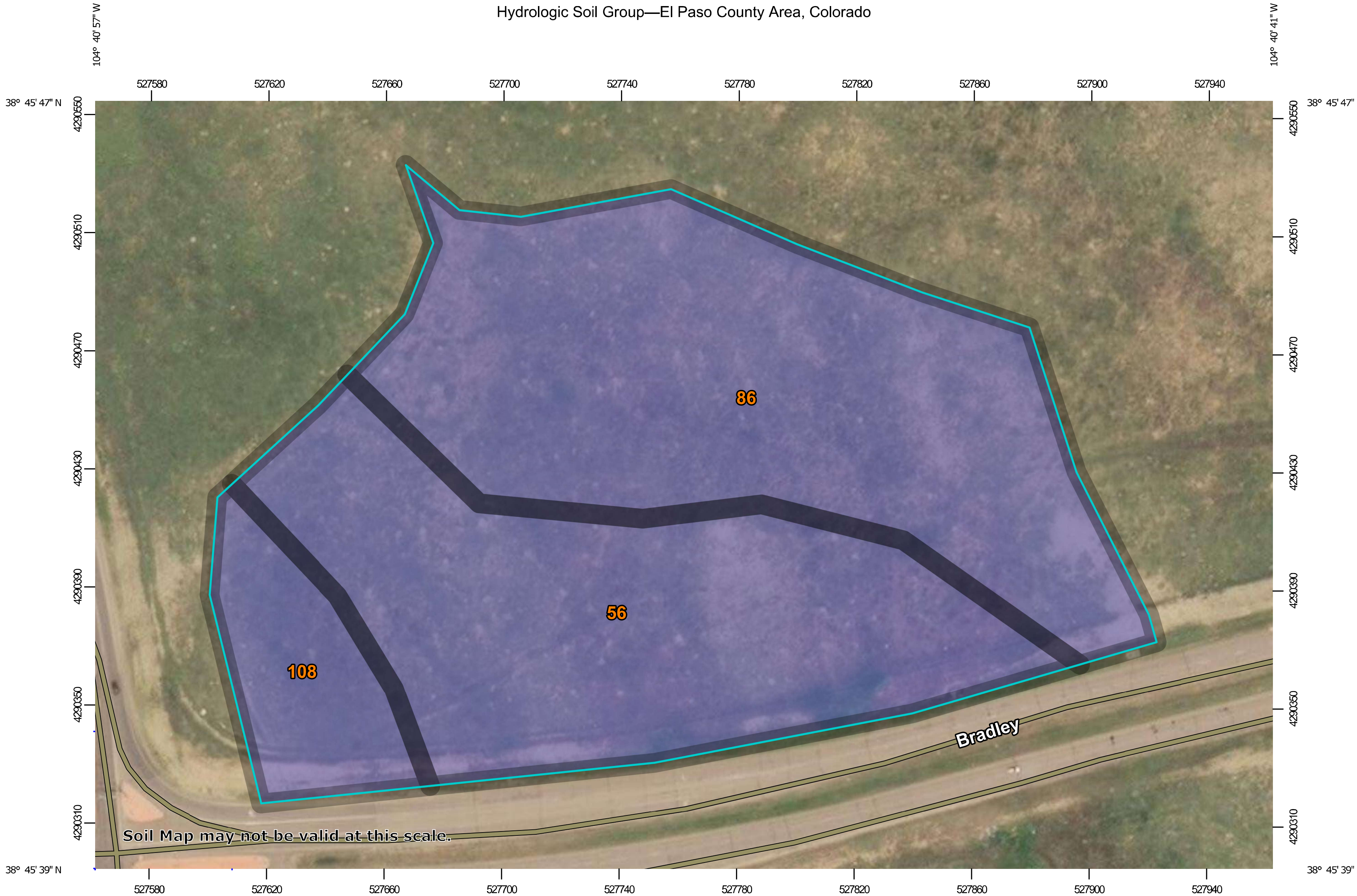
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

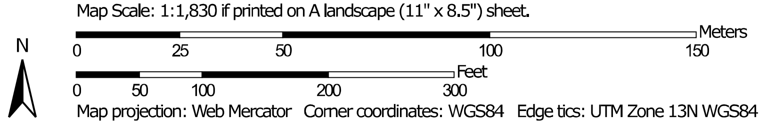
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



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



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.

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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:

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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

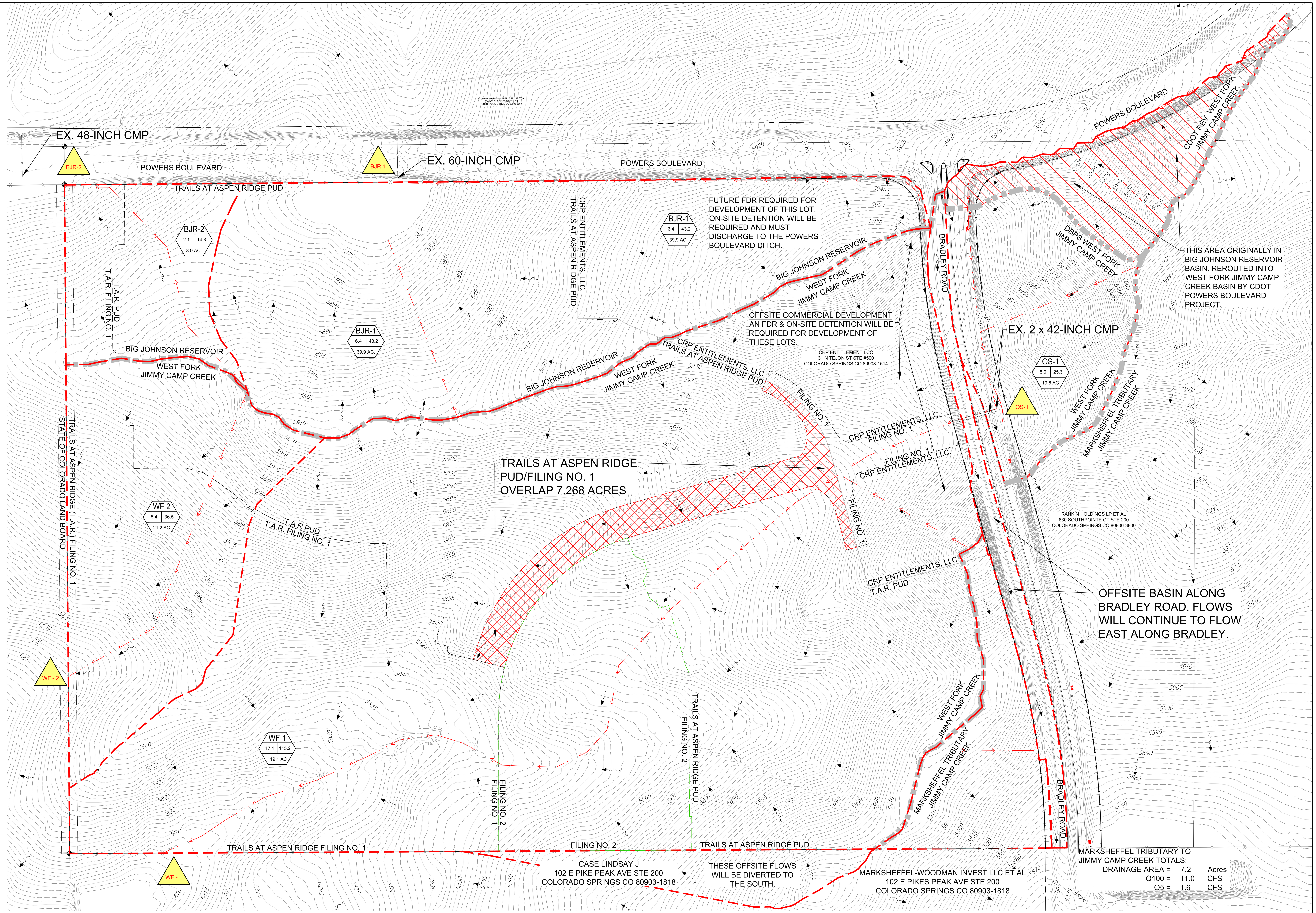
MAPS

Trails at Aspen Ridge Vicinity Map

811
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
- 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_F1
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

Trails at Aspen Ridge Filing No. 2 Proposed Conditions Sub-basin Summary			
Basin	**Area**	Q5	Q100
	acres	cfs	cfs
K-1	0.78	0.8	2.2
K-2	1.58	2.7	5.9
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	2.89	2.5	6.9
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	9.16	15.1	33.3
K-OS	11.46	15.5	34.2
K-OS UNDEVELOPED	30.11	5.8	38.7
OS-EAST SIDE	4.15	0.6	4.0

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-K	**0.78**	0.8	2.3			
2-K	**1.58**	2.7	5.9	-	-	OS-2-K
OS-2-K	**24.93**	-	-	39.8	72.8	OS-12-K
3+4-K	**1.23**	2.9	6.3	-	-	3-4-K
OS-4-K	**26.16**	-	-	41.4	76.7	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**	-	-	5.2	12.0	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**	-	-	7.8	18.0	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**	-	-	10.3	23.6	OS-12-K
OS-12-K	**35.56**	-	-	47.8	89.5	OS-14-K
13-K	**0.09**	0.3	0.6	-	-	OS-14-K
OS-E	**4.15**	3.1	3.4	-	-	14-K
14-K	**2.78**	5.0	11.0	5.1	11.0	OS-14-K
OS-14-K	**38.42**	-	-	51.3	100.5	K
K	**42.14**	-	-	56.9	110.2	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	8.7	15.5	M
I	**46.32**	-	-	62.4	119.8	M
M	**158.79**	-	-	**154.5**	**383.7**	East Pond Discharge
East Pond Discharge (Filing 1 & 2 Buildout)	**158.79**	-	-	2.9	96.2	Existing Swale

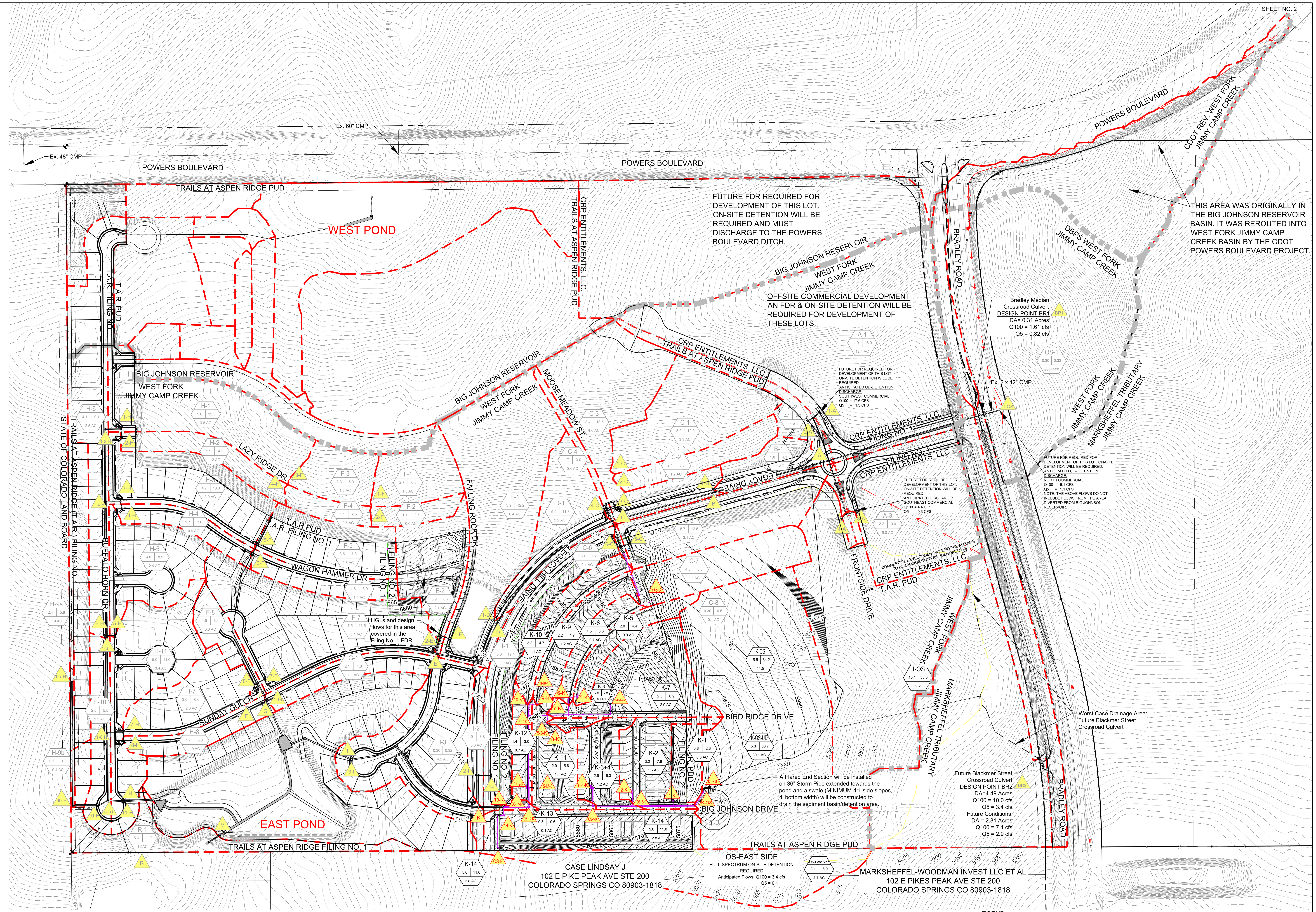


Table 3.12
Pond Summary Table

Major Basin	**Pond ID**	**Analysis Method**	**Contributing Basins**	**Approximate Detention Volumes**			**EX 5-YR (CFS)**	**PR 5-YR (CFS)**	**EX 100-YR (CFS)**	**PR 100-YR (CFS)**
				WQCV Ac.-Ft.	**EURV** Ac.-Ft.	**Q100** Ac.-Ft.				
West Fork Jimmy Camp Creek	East Pond	UD-Detention	OS-1, A, B, C, D, E, F, G, J, K, I, H, M, & OS-East Side	**F2**: 1.756	4.029	16.49	22.3	**2.9***	144.6	**96.2***
				FB: 4.833	6.581	18.001	22.3	**5.8**	144.6	**139.5**

*Only Filing No. 1 &2 Developed. For ultimate buildout see **MDDP for Waterview East and PDR for Trails at Aspen Ridge**

LEGEND

DESIGN POINT IDENTIFIER — FILING 1 / FILING 2
BASIN IDENTIFICATION / BASIN FLOWS / BASIN AREA (BASIN, Q5, Q100, AREA)
BASIN BOUNDARY
K-OS UNDEVELOPED BASIN BOUNDARY
DBPS BASIN BOUNDARY
EXISTING CONTOURS (5900)
PROPOSED CONTOURS (5870)

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

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\DR02-Filing 2 Basins.dwg
PCP: Matrix.ctb
PLOT DATE: Wed Feb 24, 2021 2:43pm

VERTICAL BENCHMARK:

BASIS OF BEARING:

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

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.

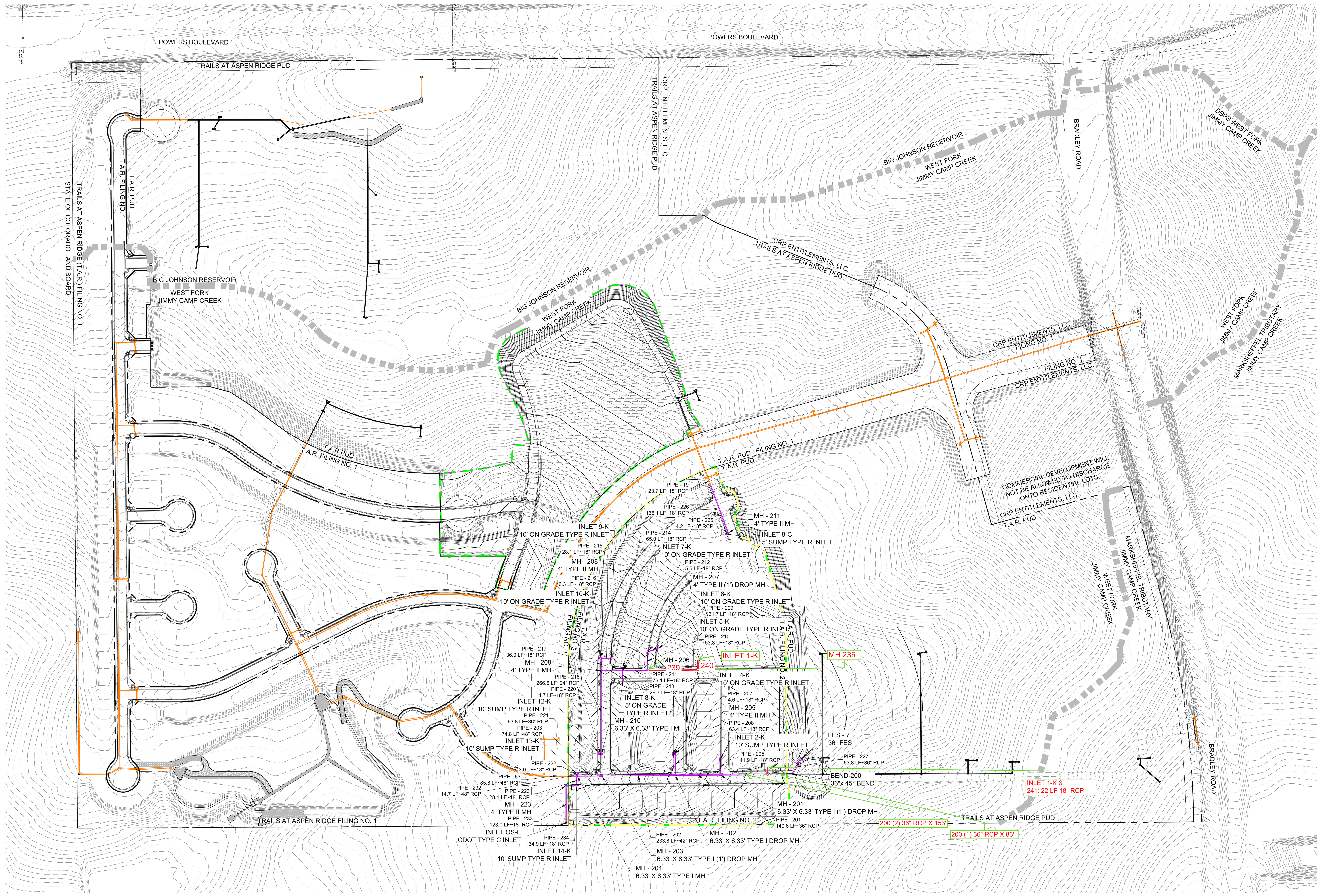
TRAILS AT ASPEN RIDGE FILING #2
FINAL DRAINAGE REPORT

DESIGNED BY: JTS
DRAWN BY: JTS
CHECKED BY:
SCALE
HORIZ:
VERT:
DATE ISSUED: FEBRUARY 2021
SHEET NO. 2 OF 3 SHEETS
DR-02

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	100.5	8
200 (1)	36	82.6	2	66.1	14.4
200 (2)	36	153	3.2	68	17.43
201	36	146.6	3.1	72.8	17.43
202	42	240	2	76.68	15.02
203	48	80.9	0.5	89.53	7.12
205	18	49.9	2.4	5.9	8.46
207	18	7.3	0.4	6.59	4.35
208	18	68.4	3.4	6.58	14.94
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	11.44	11.36
212	18	7.3	1	5.9	3.57
213	18	29.4	0.5	1	0.55
214	18	69	0.5	11.96	9.24
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	13.48
218	24	271.8	3.3	17.95	12.66
220	18	8.5	6	8.8	4.99
221	36	69.8	3.5	23.62	3.34
222	18	8.2	0.7	0.7	0.4
223	18	28.5	1.6	14.38	8.14
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	7	38.68 (K-OS-Undeveloped)	7.28
233	18	123	2	3.4	6.82
234	18	35	1	3.4	1.92
239	18	155	2	6.9	8.25
240	18	17.1	1.2	6.9	6.82
241	18	22.8	1	2.3	1.32

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-K	K-1	0.78	4x4	C	SUMP		0.78		2.25	9.00	SUMP
2-K	K-2	1.58	5	R	SUMP		2.68		5.90	10.90	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	2.89	10	R	ON-GRADE	0	2.51	1.7	7.00	5.30	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
7+8-C	C-7+8	2.25	5	R	SUMP		4.23		9.23	10.90	SUMP

GRAPHIC SCALE
(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-XREF
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\DR03-Filing-2.dwg
PCP: Matrix.ctb
PLOT DATE: Mon Feb 24, 2020 1:50pm

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: FEBRUARY 2020
SHEET NO. 3 OF 3 SHEETS

DR-03