

**UTILITY REPORT
HILLCAMP OFF-SITE UTILITY IMPROVEMENTS
LONE TREE, CO**

March 2026

Prepared For:

Rampart Range Metropolitan District No. 1

Prepared By:



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Merrick Project No. 100618

UTILITY REPORT

HILLCAMP OFF-SITE UTILITY IMPROVEMENTS

I hereby affirm that this report (plan) for the utility design of Hillcamp Off-site Improvements was prepared by me (or under my direct supervision) for the owners thereof in accordance with the provisions of the Parker Water & Sanitation District Standard Specifications. I understand that Parker Water & Sanitation District will not assume liability for water or sanitary sewer facilities designed by others.

Carson Besgrove
Registered Professional Engineer
State of Colorado No. 44849

UTILITY REPORT

HILLCAMP OFF-SITE UTILITY IMPROVEMENTS

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LIST OF ABBREVIATIONS

ADF	Average Daily Flow
ADD	Average Daily Demand
gpd	Gallons per Day
LF	Linear Foot
MDD	Maximum Daily Demand
PH	Peak Hour Demand
PWSD	Parker Water & Sanitation District
Pkwy	Parkway
PVC	Polyvinyl Chloride Pipe
RG	RidgeGate/Ridgegate
RRMD	Rampart Range Metropolitan District
SFE	Single Family Equivalent

I. GENERAL LOCATION AND DESCRIPTION

A. Site Location

The *Hillcamp Off-site Utility Improvements* are located within Sections 2, 22, 23 26, 27, and 35, Township 6 South, Range 67 West, 6th Principal Meridian, City of Lone Tree and City of Castle Pines, Douglas County, and State of Colorado. The Site is adjacent to Happy Canyon Creek, east and west of I-25, and south of RidgeGate Parkway. The Project consists of utility improvements to support future development within RidgeGate.

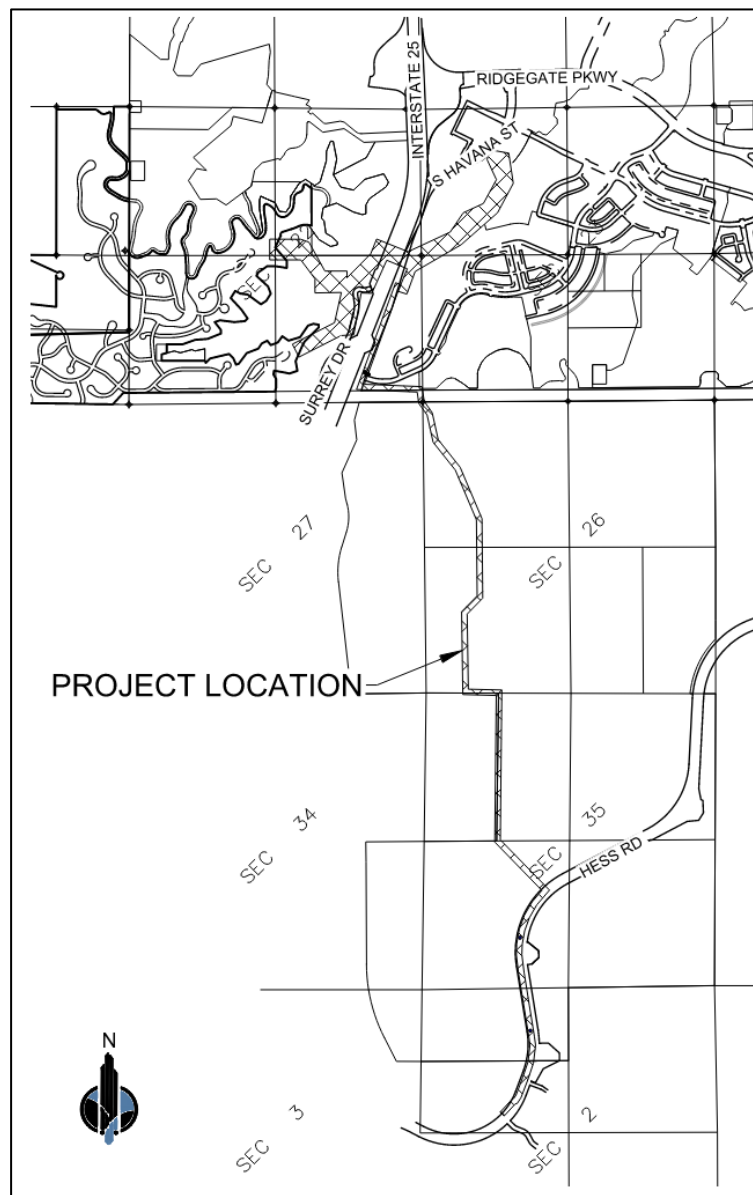


Figure 1-1: Project Vicinity Map

B. Proposed Project Description

The project consists of approximately 7,667 LF of sanitary sewer, approximately 26,221 LF of water main, and a water booster pump station. The proposed utility improvements will serve the future RidgeGate Hillcamp development (by others). Parker Water & Sanitation District (PWSD) will be the ultimate owner of the proposed utility improvements.

II. SANITARY SEWER SYSTEM

A. General Description

A memo was provided to Merrick that summarized the sanitary sewer demands for the Hillcamp development proposed by JR Engineering. This memo is provided in the appendix. According to the memo, 345 SFEs are anticipated from the Hillcamp development, split between two outfalls. These two sanitary sewer lines converge west of the proposed I-25 sewer crossing. A third sanitary line serves the proposed water booster pump station and converges with the main line east of the proposed I-25 sewer crossing. There is approximately 7,127 LF of new 8-inch PVC sanitary main, approximately 540 LF of new 6-inch PVC sanitary main, twenty-seven (27) 4-foot diameter manholes, and approximately 438 LF of steel casing pipe to be installed as part of the Hillcamp off-site sanitary sewer improvements. The proposed sanitary sewer pipe slopes range from one percent to 15 percent, and the proposed manhole depths range from 6-feet to 32-feet.

The proposed sanitary sewer improvements will connect to an existing PWSD 12-inch PVC pipe that ultimately discharges to the Happy Canyon Creek trunk line. The proposed improvements will eventually be owned and maintained by PWSD.

B. Sanitary Sewer Loading Design

Per the memo provided to Merrick by JR Engineering, the sanitary sewer demands were calculated based on the “Parker Water & Sanitation District 2020 Water & Wastewater Master Plan”. This includes an average daily flow (ADF) of 199 gpd/SFE and a peak factor of 3.2. Since the proposed water booster pump station sanitary line is anticipated to experience little

flows and on sparse occasion, sanitary sewer loading was not considered for this portion of the proposed sanitary lines.

C. Pipe Analysis

Each pipe in the proposed sanitary sewer system was designed to meet the PWSD's design standards and criteria as shown in Table 1. A Manning's roughness coefficient of 0.013 was used for the pipe analysis. The pipe analysis calculations are included in the appendix.

Table 1 – Sanitary Sewer Design Standards

Sewer Size (inch)	Minimum Slope (%)	Maximum Slope (%)	Minimum Velocity (ft/s)	Maximum Velocity (ft/s)	Maximum d/D Ratio
6	0.5	20.0	2.0	8.0	0.80
8	0.4	15.0	2.0	8.0	0.80

D. Sanitary Sewer Routing

The RidgeGate Hillcamp development (by others) is currently proposing two points of sanitary sewer outfall for their project that will tie into the proposed Hillcamp off-site sanitary sewer improvements described herein. Through email correspondence, JR Engineering stated that 98 SFEs will route to their southern outfall and the remaining 247 SFEs will route to their northern outfall. The two sanitary lines converge just west of the proposed I-25 crossing. A third sanitary line serves the proposed water booster pump station and converges with the main line east of the proposed I-25 sewer crossing. The proposed sanitary sewer continues along Happy Canyon Creek, where it ultimately ties into an existing PWSD 12-inch PVC main. The proposed sanitary sewer lines are tributary to the existing Happy Canyon Creek trunk line.

III. WATER DISTRIBUTION SYSTEM

A. System Description

A.1. Water Source

Water supply for the Hillcamp development is provided from two sources within the PWSD district boundaries, Zone 2 water supply and Zone 3 water supply. Redundant supply is

provided at the request of PSWD and was a condition of approval for the 2017 RidgeGate East Regional Master Plan (“2017 Regional Master Plan”). Zone 2 supply is connected from the RidgeGate development, and Zone 3 supply is from a transmission main connected at the north end of the Canyons development and routed through the future Freshfields development. The Zone 2 connection is pressurized by the Hillcamp Booster Pump Station (HCBPS), and the Zone 3 connection is gravity-fed. Both water sources can individually meet maximum demands and provide fire flow for the Hillcamp development.

Under normal operating conditions, the Hillcamp development is connected to both water supply sources, and Average Day Demands (ADD) and below are provided from Zone 3, while greater demands, such as Maximum Day Demand (MDD) and fire flow, are met from Zone 2. During high demand periods that are supplied by Zone 2, the HCBPS is anticipated to supply flow in excess of the Hillcamp development’s demand toward Zone 3. This additional supply helps balance PWSD’s Zone 3 water storage tanks, which already have trouble balancing hydraulic grade lines during high demand periods under pre-development conditions. This operational concept was developed in coordination with PSWD and was confirmed using a hydraulic model of the HCBPS and RidgeGate water supply network.

A.2. System Configuration

The Hillcamp Off-site Water Utility Improvements include four primary system components, listed in Table 2. Preliminary design information, such as approximate pressures and required pipe class are included in this report.

Table 2 – Off-site Water Utility Improvement Components

Name	Improvement Type	Description
Transmission Line E	Water Line	Water supply line from a connection at the Canyons development (Zone 3) to the base of Transmission Line D.
Hillcamp Booster Pump	Booster Station	Booster station to lift water from PWSD Zone 2 pressure zone to Hillcamp

Station (HCBPS)		
Transmission Lines C/D	Water Lines	Parallel pipes from I-25 crossing up to Hillcamp development. Conveys discharge from HCBPS & gravity supply from Zone 3.
Transmission Line A	Water Line	Water supply line from RidgeGate (Zone 2) to HCBPS

In total, the Hillcamp Off-site Water Utility Improvements include 260 LF of 6" DIP water main, 366 LF of 12" PVC water main, 3,474 LF of 12" DIP water main, 13,520 LF of 16" PVC water main, 8,601 LF of 16" DIP water main, 17 fire hydrants, 12 air release valve assemblies, and a booster pump station.

The system operates at an elevation and pressure equivalent to PWSD's Zone 3 pressure. It is also supplied by PWSD pressure Zone 2. Table 3 gives the development & pressure zone elevations.

Table 3 – Hillcamp Improvements Elevation Information

Location	Minium Elevation	Maximum Elevation
Hillcamp Development	6,290	6,335
Hillcamp Booster Station	6,080	
Pressure Zone 3	6,205	6,440
Canyons Tank (Zone 3)	6,570	6,592
Pressure Zone 2	6,000	6,205
Hess Tank (Zone 2)	6,303	6,324

B. Demand

Water demand for Hillcamp was determined based on an average day total demand (ADD) of

410 gallon / SFE / day, as established in the 2017 Regional Master Plan. A MDD peaking factor of 2.65 and peak hour factor of 2.21 were applied based on current peaking factors studied by the 2024 Water Master Plan.

Hillcamp includes 345 lots, which were assumed to include 1 SFE per lot. Design demands are indicated in Table 4.

Table 4 – Hillcamp Demand

Demand Name	Demand (GPD)
Average Daily Demand (ADD)	141,440
Maximum Daily Demand (MDD)	374,810
Peak Hour Demand (PH)	34,510 (gph)

Under max day demand conditions, the Hillcamp development demands an average maximum daily flow of 260 gpm and a peak hour flow of 575 gpm to Hillcamp. If Hillcamp is only supplied by the HCBPS (“Dead End to Hillcamp” operation) during MDD, this generally results in one to two mid-flow pumps operating through the course of the day.

Availability of fire flow was also verified by hydraulic modeling. Fire flow rates (see Table 5) were applied in addition to an MDD base demand. The 13 western lots in the Hillcamp development will include on-site sprinkler systems, so these lots only require the minimum fire flow rate. All other lots must receive the typical fire flow rate.

Table 5 – Hillcamp Fire Flow Demand

Fire Flow	Demand (GPM)
Minimum	1,875
Typical	2,500

Table 6 provides the flow capacity and pressures provided at select points in the Hillcamp development distribution system. Table 7 provides a description and elevation of the selected

analysis points. Merrick’s evaluation of fire flow capacity used pipeline routes and looping pattern for the Hillcamp distribution system provided by J.R. Engineering (October, 2024). Merrick modeled a skeletonized representation of the distribution network, which captured looped line location but did not include all cul-de-sac supply lines. Pipe sizes for looped distribution mains were assumed to be 12-inch diameter and 8-inch diameter pipes. The design distribution system network should be closely evaluated by J.R. Engineering based on the available fire flow pressure provided by Merrick’s Hillcamp water model. Minor modifications in pipe sizes and looped system pattern may be needed to provide fire flow at each lot, but Merrick is confident sufficient system pressure is available to supply fire flow to all lots in the development.

Table 6 – Summary of Fire Flow Capacity & Pressure Results

Operation Scenario	Zone 3 Supply Flow (gpm)	Zone 3 Supply Pressure (psi @ J-124)	HCBPS Discharge Flow (gpm)	HCBPS Discharge Pressure (psi @ J-126)	J-212 Pressure (psi)	J-215 Pressure (psi)	J-220 Pressure (psi)	J-236 Pressure (psi)	J-255 Pressure (psi)
Normal Operation	750	208	2,012	214	110	113	85	67	20
Dead End to Hillcamp	0	121	2,762	196	51	34	20	25	20 ⁽⁺⁾
Zone 3 Supply Only	2,762	173	0	103	44	69	28	25	20 ⁽⁺⁾

*** Modeled with Western Loop Transmission Line & Pump Station offline**

(+) Fire Flow not available at 8-inch preliminary design pipe size at node. Fire flow is available with 12” pipe size.

Table 7 – Fire flow node physical properties & description

Junction	Description	Approximate Elevation
J-124	Zone 3 Supply	6,070
J-126	HCBPS Discharge	6,070
J-212	HCBPS Supply connection to Hillcamp	6,298
J-215	Zone 3 Supply connection to Hillcamp	6,290
J-220	Highest Elevation in Hillcamp	6,335
J-236	Lowest performing node in Hillcamp Distribution network	6,320
J-255	Western Hillcamp Sprinklered Lots	6291

C. System Pressure

The hydraulic water system model for Hillcamp was developed based on pressure information provided by PWSD and their modeling consultant, Black & Veatch. Connection pressure information was provided for ADD, MDD, and Fire Flow demand conditions at 2 connection nodes on the north side of the Canyons development and one (1) connection node at the south end of RidgeGate City Center.

Table 8 provides pressures from two system operating conditions: (1) normal operating conditions and (2) HCBPS firm capacity operation.

Table 8 – Hillcamp Water System MDD Pressures

Operating Condition	Demand Condition	HCBPS Suction	HCBPS Discharge (J-126)	Hillcamp supply connection (J-212 / J-215)	Hillcamp Highest Elevation (J-220)	Hillcamp Lowest Elevation (J-255)
Normal	ADD	107	225	127	109	128
Normal	MDD	96	217	119	101	120
Normal	PH	94	223	120	102	121
Firm	MDD	99	253	142	124	143

Firm	Static*	99	255	145	127	146
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*Static demand condition indicates no demand is present within the Hillcamp development

D. Hydraulic Design

Hydraulic design of the off-site improvements was developed using a hydraulic model built in the WaterGEMS program. Further discussion of the modeling effort is provided in the *Water Modeling Technical Memo* by Merrick & Company (2026). Design parameters confirmed by the modeling effort are provided in this report.

D.1. Pipe Size & Pressure Rating

Pipes for the off-site water utility improvements were sized to meet the following requirements:

- Provide required fire flow to the development
- Limit pipe velocity under MDD conditions to < 5.0 fps.

Minimum pipe pressure rating was also evaluated based on operating pressures provided in Table as well as surge pressure analysis. A summary of the surge pressure analysis is provided in the appendices of the *Water Modeling Technical Memo* (Merrick, 2026).

Pipes at or below an elevation of 6290 ft. are required to be ductile iron pipe. Pipes above that elevation may be PVC material. Minimum required pipe pressure classes are provided in Table 9.

Table 9 – Hillcamp Minimum Pipe Pressure Class

Pipe Material	Pressure Class
Ductile Iron	350 psi
C900/C905 PVC	DR 25 (165 psi)

D.2. Booster Station Design

The Hillcamp Booster Pump Station includes five pumps controlled by variable frequency drives (VFDs): a 250 gpm jockey pump, two (2) 550 gpm mid-flow pumps, and two (2) duty redundant high flow pumps at 1,500 gpm. It also includes two (2) 500-gallon surge tanks, and two (2) 4-inch surge protection valves for surge pressure mitigation.

The selected pumps will provide a full range of flow from low flow and early development conditions to MDD and fire flow conditions. The surge protection components protect the water system in the case of power failure with operating pumps. Pump operation and surge protection were evaluated under various operating conditions, including:

- **Normal Operation** - Supply to Hillcamp from both Zone 2 (HCBPS) & Zone 3
- **Dead End to Hillcamp** - HCBPS Supply from Zone 2 to Hillcamp only
- **HCBPS Supply to Zone 3** - HCBPS Supply from Zone 2 to the Canyons Tank (no demand in Hillcamp)
- **Zone 3 Supply only** - Zone 3 Transmission Main supply to Hillcamp (HCBPS off)

Additional information about the hydraulic model development and analysis is available in the *Water Modeling Technical Memo* (Merrick, 2026).

D.3. Distribution System Design

The distribution system design is in progress and will be completed by J.R. Engineering.

IV. CONCLUSIONS

A. Compliance with Standards

The proposed water and sanitary sewer systems proposed with this project have been demonstrated to be in compliance with the standards set forth by the Parker Water & Sanitation District and the RidgeGate East Regional Master Plans for Water and Wastewater utilities.

REFERENCES

1. Black & Veatch. Parker Water & Sanitation District 2024 Master Plan Update. 2024.
2. Merrick & Company. RidgeGate East Regional Master Plans for Water and Wastewater Utilities. March, 2017.
3. Merrick & Company. Water Model Technical Memorandum. March, 2026.
4. Parker Water & Sanitation District. Engineering Department Standards and Specifications Manual. January, 2017.

Appendix A

Reference Materials

Mesa Tops Water Demands

To:

From: Kevin Rohrbough, P.E.

cc: Aaron Clutter, P.E.

Date: September 24, 2024

Re: Mesa Tops Site Plan & Demands

This Memorandum provides analysis of the water demands for the 343 lots and 8,000 square feet of commercial property in the proposed site plan for the Mesa Tops project. To provide water to the site, an eight inch main is proposed to loop throughout the site. This water distribution system will connect east of Interstate-25 to both the Ridgeway South West Village developments, as well as the Canyons development to the south. Table 3-3 from the "Parker Water & Sanitation District 2020 Water & Wastewater Master Plan" was used to determine the domestic water demands for the site. A single family equivalent (SFE) was determined to be an average of 3.2 persons, and there was determined to be 345 SFE within the site, accounting for lots and commercial property.. Domestic demand analysis below.

Potable Water Demands

Gallons Per Capita Per Day (GPCD) = 129 gallons/day/capita

1 SFE = 3.2 capita

8,000 square feet of commercial = 2 SFE

Average Day Demand (ADD) = GPCD x SFE x 3.2 persons per SFE

ADD = 129 GPCD x 345 SFE x 3.2 persons/SFE

ADD = 142,416 gpd

Maximum Day Factor (MDF) = 2.65

Maximum Day Demand (MDD) = ADD x MDF

MDD = 142,416 gpd x 2.65

MDD = 377,402.4 gpd

Peak Hour Factor = 5

Peak Hour Demand (PHD) = ADD x Peak Hour Factor

PHD = 142,416 gpd x 5

PHD = 712,080 gpd

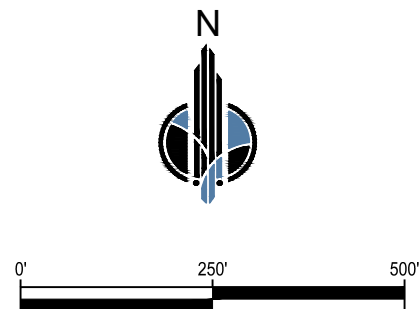
Sanitary Sewer Demands

Mesa Tops	Single Family Units =1 SFE	Avg. Daily Flow (199 gpd/SFE)	Average Daily Flow (MGD)	Average Daily Flow (cfs)	Average Daily Flow (gpm)	Peak Factor	Peak Flow (cfs)	Peak Design Flow (gpm)	Peak Design Flow (cfs)
Lots	343	68,257	0.0683	0.106	47.40	3.2	0.338	156.42	0.349
Commercial	2.0	398	0.0004	0.001	0.28	3.2	0.002	0.91	0.002
Total	345	68,655	0.0687	0.106	47.68	3.2	0.340	157.33	0.351

*Note: An Infiltration Contingency of 10% was assumed in the calculation of Peak Design Flows

Appendix B

Sanitary Sewer Exhibit



HILLCAMP OFF-SITE SANITARY SEWER
IMPROVEMENTS

DATE: 03/26/2026

SHEET: 1 OF 1

Appendix C

Sanitary Sewer Data and Calculations



Merrick & Company
 5970 Greenwood Plaza Blvd.
 Greenwood Village, CO 80111
 Ph: (303) 751-0741

Job Name: RidgeGate - Mesa Tops Sanitary Sewer
 Job Number: 100618
 Date: 3/26/2026
 By: MS

RidgeGate - Mesa Tops Sanitary Sewer
Land Use Densities

Land Use Category	Parks and Open Space (P/OS)	Single Family				Multi-Family	Mixed-Use/ Commercial (MU/COM)			Institution		TOD (MU/COM)
Land Use Subcategory	Parks and Open Space (P/OS)	Rural Residentail	Low Density Residential (LD RES)	Medium Density Residential (MD RES)	High Density Residential	Multi-Family (MF)	Residential	Office	Retail	School (SC)	Other (Util, Library,Park)	Retail/ Restaurants
Area	1 Acre	1 Acre	1 Acre	1 Acre	1 Acre	1 Acre	1 Acre	1 Acre	1 Acre	1 Acre	1 Acre	1 Acre
	=	=	=	=	=	=	=	=	=	=	=	=
Range		1 DU/Ac	3-6 DU/Ac	6-12 DU/Ac	12-25 DU/Ac	20-70 DU/Ac	Maximum of 40% of C/MU area can be residential, 30-70 DU/Acre	60% of total area, 25% office, 1.5 FAR	0.40 FAR			0.35 FAR
Density	1 Acre	1 DU	6 DU	12 DU	25 DU	70 DU	28 DU	9,801 SF	17,424 SF	1 Acre	1 Acre	15,246 SF
Single Family Equivalent (SFE)	0	1	1	1	1	0.67	0.67	0.0003	0.00025	1.7	2	0.00025
Units	SFE/Acre	SFE/DU				SFE/DU	SFE/DU	SFE/SF	SFE/SF	SFE/Acre	SFE/Acre	SFE/SF Net Floor Area
SFE/Acre	0.0	1.0	6.0	12.0	25.0	46.9	18.8	2.9	4.4	1.7	2.0	3.8
Notes			Sub Area Plan Page 22		Sub Area Plan Page 22	Sub Area Plan Page 22	Master Report Pg 7 (and PDD page 8)	From RidgeGate Master Plan	From RidgeGate Master Plan			



Merrick & Company
 5970 Greenwood Plaza Blvd.
 Greenwood Village, CO 80111
 Ph: (303) 751-0741

Job Name: RidgeGate - Mesa Tops Sanitary Sewer
 Job Number: 100618
 Date: 3/26/2026
 By:

RidgeGate - Mesa Tops Sanitary Sewer
SFE Calculations

	Parcel ID	Parcel Area (Acre)	Land Use (SFE)													
			Single Family Residential				MF Res	MU/COM			Institution		Custom			
			Rural Res	LD Res	MD Res	HD Res	MF Res	Res (C/MU)	Office	Retail	School	Other				
														Parcel SFEs	Confluence Point	Notes? See Below
			1.0	6.0	12.0	25.0	46.9	18.8	2.9	4.4	1.7	2.0	-			
Mesa Tops	North Outfall		245										2	247	2-N	
	South Outfall		98											98	2-S	

Notes:

1. SFEs are from the memo provided to Merrick by JR Engineering.

Confluence Point	Total SFEs
2-N	247
2-S	98

Total 345



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5970 Greenwood Plaza Blvd.
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Ph: (303) 751-0741

Job Name: RidgeGate - Mesa Tops Sanitary Sewer
Job Number: 100618
Date: 3/26/2026
By: MS

RidgeGate - Mesa Tops Sanitary Sewer

Flow Factors

Flow Factors	
Average Daily Flow (ADF)	199 gpd/SFE
Peak Hour Flow (PHF)	637 gpd/SFE

Peak Factor = 3.2 (from PWSD 2020 Water & Wastewater Master Plan, Table 6-3)



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Job Number: 100618
Date: 3/26/2026
By: MS

RidgeGate - Mesa Tops Sanitary Sewer

Confluence Point	Tributary Area (Ac)	Max Total SFEs in Tributary Area	Average Daily Flow (MGD)	Peak Hour Flow (MGD)	Average Daily Flow (cfs)	Peak Hour Flow (cfs)
2-N	0.0	247	0.049	0.16	0.076	0.244
2-S	0.0	98	0.020	0.06	0.030	0.097



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5970 Greenwood Plaza Blvd.
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Ph: (303) 751-0741

Job Name:
Job Number:
Date:
By:

RidgeGate - Mesa Tops Sanitary Sewer
100618
3/26/2026
MS

RidgeGate - Mesa Tops Sanitary Sewer

Infiltration/Inflow Analysis

PIPE ID	MANHOLE		U/S MANHOLE DEPTH	PIPE LENGTH (LF)	U/S MANHOLE DIA = 72"			PIPE DIA = 8"			PIPE DIA = 12"			PIPE DIA = 15"			PIPE DIA = 18"		
	U/S	D/S	U/S (FT)		INFILTRATION RATE (GAL/VERT FT/HR)	INFILTRATION (GAL/HR)	INFILTRATION (CFS)	INFILTRATION RATE (GAL/HR/100')	INFILTRATION (GAL/HR)	INFILTRATION (CFS)	INFILTRATION RATE (GAL/HR/100')	INFILTRATION (GAL/HR)	INFILTRATION (CFS)	INFILTRATION RATE (GAL/HR/100')	INFILTRATION (GAL/HR)	INFILTRATION (CFS)	INFILTRATION RATE (GAL/HR/100')	INFILTRATION (GAL/HR)	INFILTRATION (CFS)
104	104	103	25	583	0.12	3.00	0.0001	1.30	7.5777	0.0003	1.90	11.0751	0.0004	2.40	13.99	0.0005	2.80	16.32	0.0006
103	103	102	6	260	0.12	0.72	0.0000	1.30	3.3800	0.0001	1.90	4.9400	0.0002	2.40	6.24	0.0002	2.80	7.28	0.0003
102	102	101	7	144	0.12	0.84	0.0000	1.30	1.8720	0.0001	1.90	2.7360	0.0001	2.40	3.46	0.0001	2.80	4.03	0.0001
101	101	100	6	360	0.12	0.72	0.0000	1.30	4.6800	0.0002	1.90	6.8400	0.0003	2.40	8.64	0.0003	2.80	10.08	0.0004
100	100	61	9	260	0.12	1.08	0.0000	1.30	3.3800	0.0001	1.90	4.9400	0.0002	2.40	6.24	0.0002	2.80	7.28	0.0003
77	68	67	32	160	0.12	3.84	0.0001	1.30	2.0800	0.0001	1.90	3.0400	0.0001	2.40	3.84	0.0001	2.80	4.48	0.0002
76	67	66	21	380	0.12	2.52	0.0001	1.30	4.9400	0.0002	1.90	7.2200	0.0003	2.40	9.12	0.0003	2.80	10.64	0.0004
75	66	65	17	240	0.12	2.04	0.0001	1.30	3.1200	0.0001	1.90	4.5600	0.0002	2.40	5.76	0.0002	2.80	6.72	0.0002
74	65	64	10	225	0.12	1.20	0.0000	1.30	2.9250	0.0001	1.90	4.2750	0.0002	2.40	5.40	0.0002	2.80	6.30	0.0002
73	64	63	7	146	0.12	0.84	0.0000	1.30	1.8980	0.0001	1.90	2.7740	0.0001	2.40	3.50	0.0001	2.80	4.09	0.0002
72	63	62	10	300	0.12	1.20	0.0000	1.30	3.9000	0.0001	1.90	5.7000	0.0002	2.40	7.20	0.0003	2.80	8.40	0.0003
71	62	61	7	300	0.12	0.84	0.0000	1.30	3.9000	0.0001	1.90	5.7000	0.0002	2.40	7.20	0.0003	2.80	8.40	0.0003
70	61	60	21	321	0.12	2.52	0.0001	1.30	4.1730	0.0002	1.90	6.0990	0.0002	2.40	7.70	0.0003	2.80	8.99	0.0003
69	60	59	18	242	0.12	2.16	0.0001	1.30	3.1460	0.0001	1.90	4.5980	0.0002	2.40	5.81	0.0002	2.80	6.78	0.0003
68	59	58	30	375	0.12	3.60	0.0001	1.30	4.8750	0.0002	1.90	7.1250	0.0003	2.40	9.00	0.0003	2.80	10.50	0.0004
67	58	57	27	494	0.12	3.24	0.0001	1.30	6.4220	0.0002	1.90	9.3860	0.0003	2.40	11.86	0.0004	2.80	13.83	0.0005
66	57	56	18	320	0.12	2.16	0.0001	1.30	4.1600	0.0002	1.90	6.0800	0.0002	2.40	7.68	0.0003	2.80	8.96	0.0003
65	56	55	24	164	0.12	2.88	0.0001	1.30	2.1320	0.0001	1.90	3.1160	0.0001	2.40	3.94	0.0001	2.80	4.59	0.0002
64	55	54	23	400	0.12	2.76	0.0001	1.30	5.2000	0.0002	1.90	7.6000	0.0003	2.40	9.60	0.0004	2.80	11.20	0.0004
63	54	53	24	400	0.12	2.88	0.0001	1.30	5.2000	0.0002	1.90	7.6000	0.0003	2.40	9.60	0.0004	2.80	11.20	0.0004
62	53	52	26	400	0.12	3.12	0.0001	1.30	5.2000	0.0002	1.90	7.6000	0.0003	2.40	9.60	0.0004	2.80	11.20	0.0004
61	52	51	25	335	0.12	3.00	0.0001	1.30	4.3550	0.0002	1.90	6.3650	0.0002	2.40	8.04	0.0003	2.80	9.38	0.0003
60	51	EX 50	14	337	0.12	1.68	0.0001	1.30	4.3810	0.0002	1.90	6.4030	0.0002	2.40	8.09	0.0003	2.80	9.44	0.0004
59	EX 50	EX 43	19	238	0.12	2.28	0.0001	1.30	3.0940	0.0001	1.90	4.5220	0.0002	2.40	5.71	0.0002	2.80	6.66	0.0002



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Job Number: 100618
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By: MS

RidgeGate - Mesa Tops Sanitary Sewer

Total Flows

PIPE ID	MANHOLE		CONFLUENCE POINT	AVG. DAILY FLOW FROM TRIBUTARY PARCELS (CFS)	PEAK HOUR FLOW FROM TRIBUTARY PARCELS (CFS)	U/S MANHOLE I/I RATE (CFS)	INFILTRATION INFLOWS (CFS)				MAX AVG DAILY FLOW (CFS)				PEAK DAILY FLOW (CFS)			
	U/S	D/S					8" PIPE I/I	12" PIPE I/I	15" PIPE I/I	18" PIPE I/I	8" PIPE TOTAL FLOWS	12" PIPE TOTAL FLOWS	15" PIPE TOTAL FLOWS	18" PIPE TOTAL FLOWS	8" PIPE TOTAL FLOWS	12" PIPE TOTAL FLOWS	15" PIPE TOTAL FLOWS	18" PIPE TOTAL FLOWS
104	104	103	2-S	0.030	0.097	0.0001	0.0003	0.0004	0.0005	0.0006	0.0306	0.0308	0.0309	0.0309	0.0971	0.0973	0.0974	0.0974
103	103	102				0.0000	0.0001	0.0002	0.0002	0.0003	0.0308	0.0310	0.0311	0.0312	0.0973	0.0975	0.0976	0.0977
102	102	101				0.0000	0.0001	0.0001	0.0001	0.0001	0.0309	0.0311	0.0313	0.0314	0.0974	0.0976	0.0978	0.0979
101	101	100				0.0000	0.0002	0.0003	0.0003	0.0004	0.0311	0.0314	0.0316	0.0318	0.0976	0.0979	0.0981	0.0983
100	100	61				0.0000	0.0001	0.0002	0.0002	0.0003	0.0312	0.0316	0.0319	0.0321	0.0977	0.0981	0.0984	0.0986
77	68	67	2-N	0.076	0.244	0.0001	0.0001	0.0001	0.0001	0.0002	0.0764	0.0764	0.0765	0.0765	0.2440	0.2441	0.2441	0.2441
76	67	66				0.0001	0.0002	0.0003	0.0003	0.0004	0.0767	0.0768	0.0769	0.0770	0.2443	0.2444	0.2445	0.2446
75	66	65				0.0001	0.0001	0.0002	0.0002	0.0002	0.0769	0.0770	0.0772	0.0773	0.2445	0.2447	0.2448	0.2449
74	65	64				0.0000	0.0001	0.0002	0.0002	0.0002	0.0770	0.0773	0.0774	0.0776	0.2446	0.2449	0.2451	0.2452
73	64	63				0.0000	0.0001	0.0001	0.0001	0.0002	0.0771	0.0774	0.0776	0.0778	0.2447	0.2450	0.2452	0.2454
72	63	62				0.0000	0.0001	0.0002	0.0003	0.0003	0.0773	0.0776	0.0779	0.0781	0.2449	0.2453	0.2455	0.2457
71	62	61				0.0000	0.0001	0.0002	0.0003	0.0003	0.0775	0.0779	0.0782	0.0785	0.2451	0.2455	0.2458	0.2461
70	61	60	2	0.106	0.341	0.0001	0.0002	0.0002	0.0003	0.0003	0.1090	0.1098	0.1105	0.1110	0.3431	0.3439	0.3446	0.3451
69	60	59				0.0001	0.0001	0.0002	0.0002	0.0003	0.1092	0.1101	0.1108	0.1114	0.3433	0.3442	0.3449	0.3455
68	59	58				0.0001	0.0002	0.0003	0.0003	0.0004	0.1095	0.1105	0.1113	0.1119	0.3436	0.3446	0.3454	0.3460
67	58	57				0.0001	0.0002	0.0003	0.0004	0.0005	0.1099	0.1109	0.1118	0.1125	0.3440	0.3450	0.3459	0.3466
66	57	56				0.0001	0.0002	0.0002	0.0003	0.0003	0.1101	0.1112	0.1122	0.1129	0.3442	0.3453	0.3463	0.3470
65	56	55				0.0001	0.0001	0.0001	0.0001	0.0002	0.1103	0.1115	0.1124	0.1132	0.3444	0.3456	0.3465	0.3473
64	55	54				0.0001	0.0002	0.0003	0.0004	0.0004	0.1106	0.1118	0.1129	0.1137	0.3447	0.3459	0.3470	0.3478
63	54	53				0.0001	0.0002	0.0003	0.0004	0.0004	0.1109	0.1122	0.1134	0.1143	0.3450	0.3463	0.3475	0.3484
62	53	52				0.0001	0.0002	0.0003	0.0004	0.0004	0.1112	0.1126	0.1138	0.1148	0.3453	0.3467	0.3479	0.3489
61	52	51				0.0001	0.0002	0.0002	0.0003	0.0003	0.1115	0.1130	0.1142	0.1152	0.3456	0.3471	0.3483	0.3494
60	51	EX 50				0.0001	0.0002	0.0002	0.0003	0.0004	0.1117	0.1133	0.1146	0.1157	0.3458	0.3474	0.3487	0.3498
59	EX 50	EX 43				0.0001	0.0001	0.0002	0.0002	0.0002	0.1119	0.1135	0.1149	0.1160	0.3460	0.3476	0.3490	0.3501



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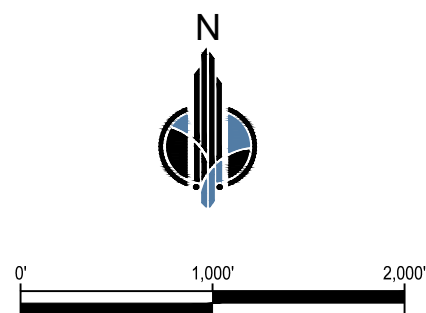
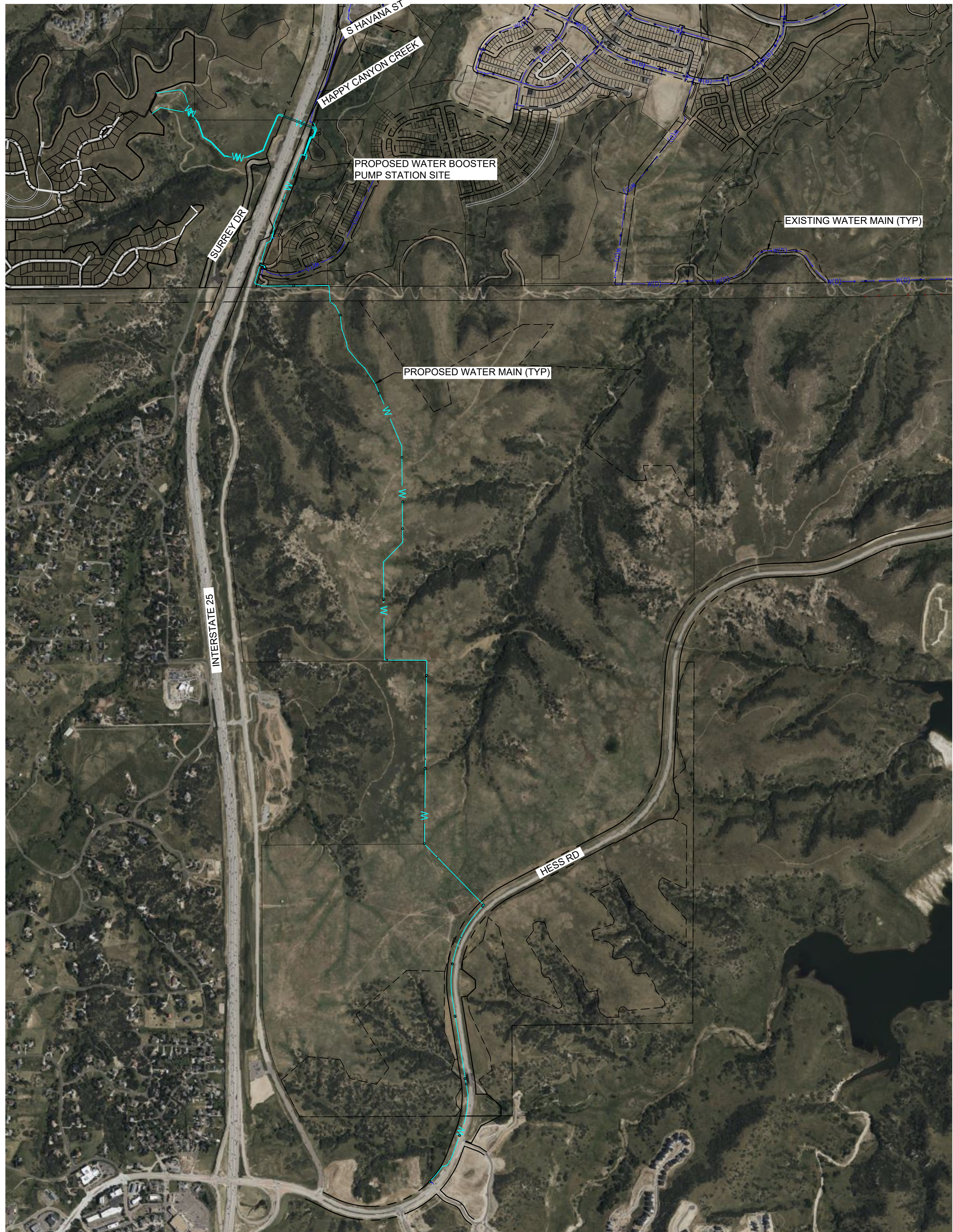
RidgeGate - Mesa Tops Sanitary Sewer

Pipe Sizing Analysis

PIPE ID	MANHOLE		PIPE DIAMETER (in)	SLOPE (%)	Q Capacity (CFS) when d/D = 0.8	MIN VELOCITY (fps)	MANNING'S n	TOTAL AVG. DAILY FLOW (CFS)	TOTAL PEAK HOUR FLOW (CFS)	MIN SLOPE (%)
	U/S	D/S								
104	104	103	8	14.92	4.57	2.00	0.013	0.031	0.097	2.36
103	103	102	8	3.88	2.33	2.00	0.013	0.031	0.097	2.36
102	102	101	8	5.35	2.74	2.00	0.013	0.031	0.097	2.36
101	101	100	8	14.81	4.56	2.00	0.013	0.031	0.098	2.36
100	100	61	8	2.58	1.90	2.00	0.013	0.031	0.098	2.36
77	68	67	8	6.63	3.05	2.00	0.013	0.076	0.244	1.10
76	67	66	8	14.00	4.43	2.00	0.013	0.077	0.244	1.09
75	66	65	8	1.33	1.37	2.00	0.013	0.077	0.244	1.09
74	65	64	8	8.71	3.49	2.00	0.013	0.077	0.245	1.09
73	64	63	8	10.84	3.90	2.00	0.013	0.077	0.245	1.09
72	63	62	8	8.52	3.46	2.00	0.013	0.077	0.245	1.09
71	62	61	8	7.80	3.31	2.00	0.013	0.077	0.245	1.09
70	61	60	8	1.00	1.18	2.00	0.013	0.109	0.343	0.81
69	60	59	8	1.00	1.18	2.00	0.013	0.109	0.343	0.81
68	59	58	8	4.12	2.40	2.00	0.013	0.109	0.344	0.81
67	58	57	8	5.00	2.65	2.00	0.013	0.110	0.344	0.81
66	57	56	8	1.57	1.48	2.00	0.013	0.110	0.344	0.81
65	56	55	8	1.00	1.18	2.00	0.013	0.110	0.344	0.81
64	55	54	8	1.00	1.18	2.00	0.013	0.111	0.345	0.80
63	54	53	8	1.00	1.18	2.00	0.013	0.111	0.345	0.80
62	53	52	8	1.00	1.18	2.00	0.013	0.111	0.345	0.80
61	52	51	8	1.00	1.18	2.00	0.013	0.111	0.346	0.80
60	51	EX 50	8	6.95	3.12	2.00	0.013	0.112	0.346	0.79
59	EX 50	50	8	1.36	1.38	2.00	0.013	0.112	0.346	0.79

Appendix D

Water Distribution System Exhibit



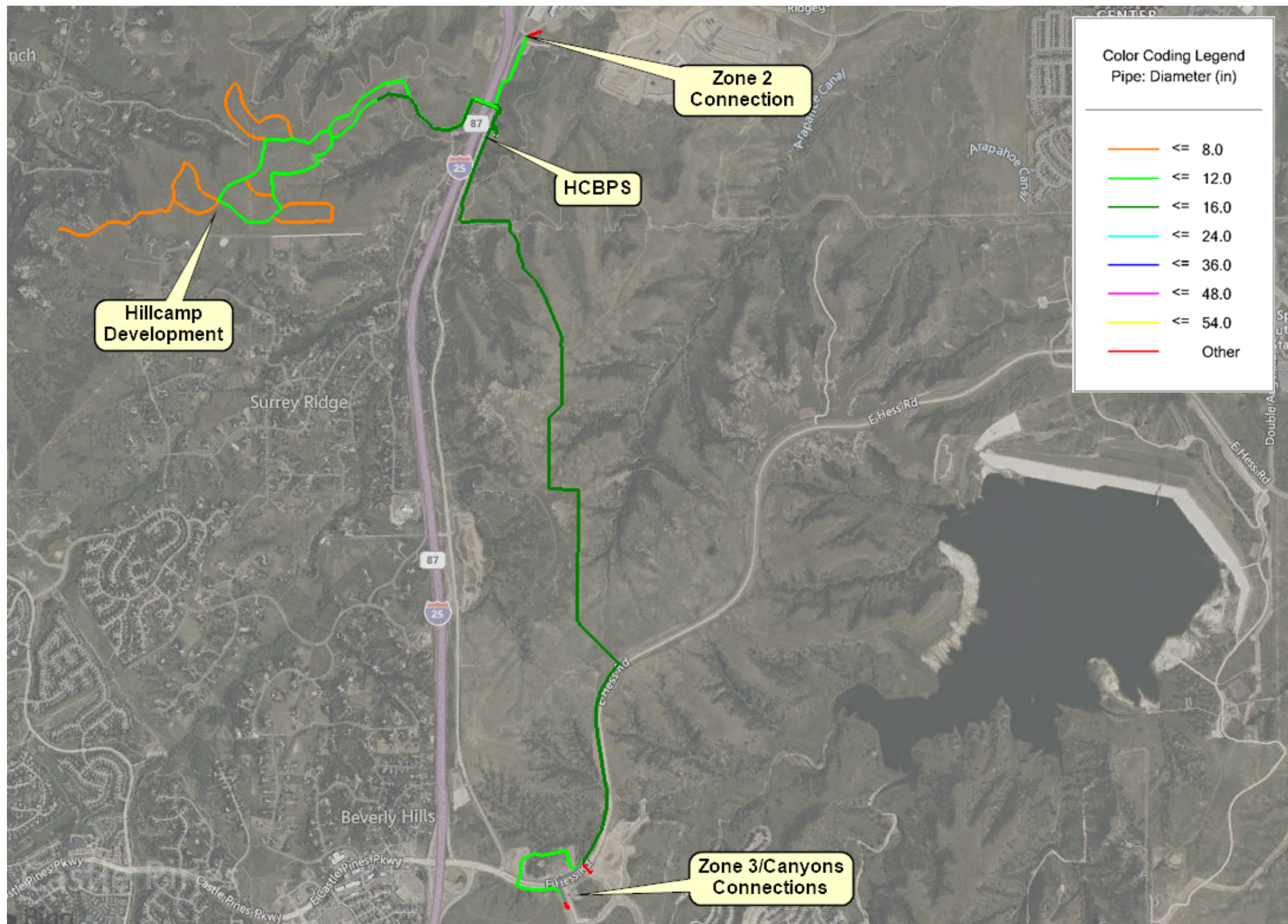
HILLCAMP OFF-SITE WATER UTILITY
IMPROVEMENTS

DATE: 03/26/2026

SHEET: 1 OF 1

Appendix E

Water Distribution System Data and Calculations and Results



Ridgegate - Hillcamp Development Sub-Model Piping Network

Calculation by: Fritz Doster
Date: 10/14/2025



Purpose: Calculate water demand for Ridge Gate Hill Camp development. Calculate water demand per junction based on parcels served. Input results into WaterGEMS model.

Notes:

- The Parcel maps & tables are from the 2024 PWSD Master Plan Update.
- Hill Camp map is based on current development planning.

Parcel No.	SF DU	SFE	MF DU (30 DU/AC)	SFE	MF DU (70 DU/AC)	SFE	Commercial Retail Area (Sq Ft)	SFE	Commercial Office Area (Sq Ft)	SFE	Total SFE	ADD - Metered (gpd)	ADD - Total (gpd)	MDD (gpd)	PHD (gpm)	No. of Junctions within Parcel	ADD - Metered / Junction (gpm)	ADD - Total / Junction (gpm)	MDD / Junction (gpm)	PHD / Junction (gpm)
4	0	0	0	0	576	259	150,533	32	967,712	174	465	165,540	190,650	476,625	662	11	10	12.04	30	60
5	0	0	87	35	136	61	199,235	43	31,625	6	145	51,620	59,450	148,625	206	2	18	20.64	52	103
6	0	0	249	100	388	175	570,536	122	90,561	16	413	147,028	169,330	423,325	588	5	20	23.52	58.80	118
7	0	0	0	0	462	208	570,200	122	0	0	330	117,480	135,300	338,250	470	4	20	23.49	59	117
12	968	968	437	175	0	0	0	0	100,676	18	1,161	413,316	476,010	1,190,025	1,653	19	15	17.40	43	87
13	483	483	460	184	0	0	0	0	53,004	10	677	241,012	277,570	693,925	964	8	21	24.09	60	120
14	736	736	0	0	0	0	0	0	72,763	13	749	266,644	307,090	767,725	1,066	7	26	30.47	76	152
15	540	540	0	0	0	0	0	0	53,317	10	550	195,800	225,500	563,750	783	4	34	39.15	98	196
16	633	633	603	241	0	0	0	0	69,469	13	887	315,772	363,670	909,175	1,263	4	55	63.14	158	316
17	186	186	0	0	0	0	380,710	81	26,789	5	272	96,832	111,520	278,800	387	3	22	25.81	65	129
18	0	0	435	174	0	0	0	0	5,018	1	175	62,300	71,750	179,375	249	2	22	24.91	62	125
20	261	261	0	0	0	0	0	0	0	0	261	92,916	107,010	267,525	372	2	32	37.16	93	186
28	0	0	0	0	0	0	0	0	392,040	71	71	25,276	29,110	72,775	101	1	18	20.22	50.54	101
29	0	0	0	0	0	0	0	0	78,408	14	14	4,984	5,740	14,350	20	1	3	3.99	10	20
Churches / Misc.	-	-	-	-	-	-	-	-	-	-	20	7,120	8,200	20,500	28					
Total	3,807	3,807	2,271	909	1,562	703	1,871,214	400	1,941,382	351	6,190	2,203,640	2,537,900	6,344,750	8,812					

References:

2017 RidgeGate Master Plan

UNIT DEMANDS/FLOW

For preparation of the 2014 Water and Wastewater Master Plan, Providence Infrastructure Consultants developed design flows applicable for master planning within the Parker Service Area. The unit demands are thought reasonable and should be used for the East RidgeGate development. An SFE is determined to average 2.7 persons.

Water

Average Daily Metered Demand	=	356 gal/SFE/day
Average Day Total Demand (includes 15% unaccounted-for water)	=	410 gal/SFE/day
	=	0.46 AF/yr
Maximum Day		1,025 gal/SFE/day
Peak Hour		2,050 gal/SFE/day

2024 PWSD Master Plan update:

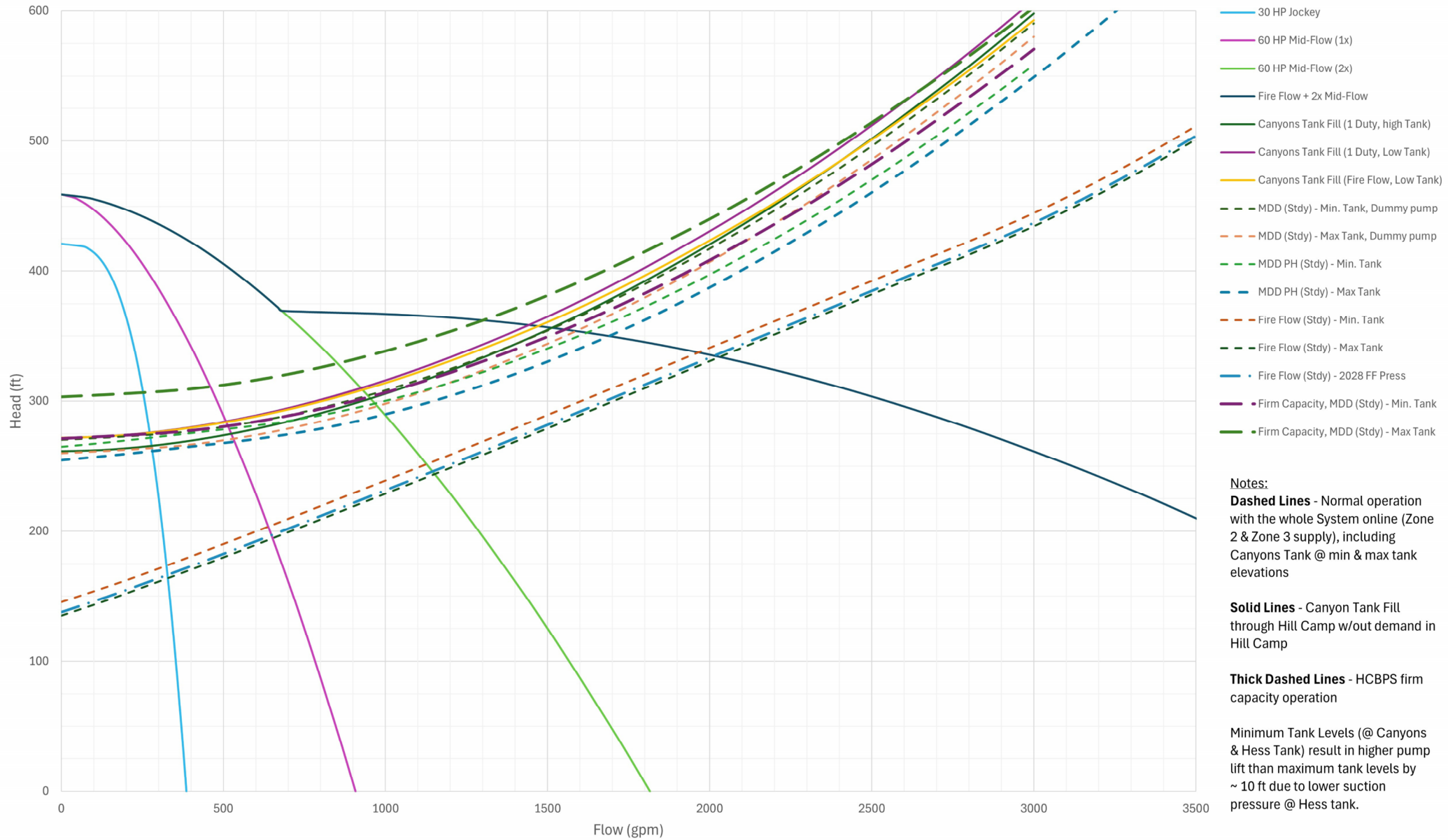
Table 3-8 Peaking Factor Summary

Peaking Factor	Value
MDD:ADD	2.21
MH:MDD	2.65

Table 4-23 LOS Criteria

Criteria	Value	Units	Description
Pressure Criteria ¹			
Minimum Pressure - Fire Flow Conditions	20	psi	Minimum operating pressure requirement at fire hydrants under fire flow conditions.
Minimum Pressure - MH Demand and MDD Conditions	40	psi	Minimum operating pressure goal when operating under MH demands and MDD as well as other typical operating conditions.
Velocity Criteria ²			
Maximum Velocity - MH Demand and MDD Conditions	5	ft/s	Maximum velocity goal when operating under MH demands and MDD as well as other typical operating conditions.
Fire Flow Requirements			
Residential (Less Than 3,600-sf)	1,000	gpm	Required fire flow for residential units with an area of less than 3,600-sf. Required duration of 3-hours based on AWWA M31.
Residential (3,600-sf to 7,700-sf)	1,750 to 2,250	gpm	Required fire flow for residential units with an area between 3,600-sf to 7,700-sf. Required duration of 3-hours based on AWWA M31.
Residential - Multifamily	2,500	gpm	Required fire flow for residential - multifamily units. Required duration of 3-hours based on AWWA M31.
Commercial / Industrial	3,000	gpm	Required fire flow for commercial and industrial units. Industrial users have been grouped with commercial users because their usage and facilities generally represent a "light industrial" user type. Required duration of 3-hours based on AWWA M31.
Footnotes:			
1. PWSD does not have any LOS goals for maximum pressure but reported that their distribution system experiences pressures between 180 psi and 300 psi, and they have limited availability to alleviate pressure. Maximum pressures were reviewed during the distribution system modeling.			
2. Through workshops with PWSD and BV, it was discussed that a maximum velocity of 15 ft/s under fire flow conditions is useful as a design criterion; however, this is not a useful criterion when evaluating the existing system, which has been modeled to allow velocities exceeding 15 ft/s.			

Hill Camp Booster Station System Curves



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