CENTERRA SOUTH FIRST SUBDIVISION
WATER & WASTEWATER
IMPACT DEMAND ANALYSIS REPORT

PREPARED FOR:

THE CITY OF LOVELAND

ON BEHALF OF:

MCWHINNEY

July 25, 2025

Prepared By:

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APPENDICES

SECTION 1: INTRODUCTION

1.1 BACKGROUND

Centerra South First Subdivision (Centerra South) is part of a mixed-use development located in Larimer County and the City of Loveland, CO. Centerra South is being developed by McWhinney and will be implemented in phases. Phase 1 is in the northern portion of the overall development and will contain commercial buildings and multi-family residential units.

Centerra South will receive water and wastewater service from the City of Loveland ("Loveland"). This Water & Wastewater Impact Demand Analysis Report will summarize the water and wastewater infrastructure required to provide service in accordance with Loveland's development standards.

1.2 LOCATION

Centerra South is located within Loveland at the southwest corner of the E. Eisenhower Blvd (Highway 34) and Rocky Mountain Avenue intersection. The development is bound on the north by E. Eisenhower Blvd, the west by the Hahns Peak Drive and the existing Chilson development, the east by Rocky Mountain Avenue, and the south by undeveloped land.

FIGURE 1-1: LOCATION MAP
(NOT TO SCALE)

1.3 PREVIOUS STUDIES

This report utilized information from the *Chilson-Stroh Farm Second Subdivision Amended Plat No. 2 Preliminary Water & Wastewater Impact Demand Analysis Report* dated July 2022 by LandOne Engineering, LLC and the Millennium GDP 11th Major Amendment Water and Wastewater Analysis memorandum dated April 7, 2025 by Merrick & Company.

SECTION 2: DEVELOPMENT SUMMARY

2.1 DEVELOPMENT COMPOSITION

The development boundary for Centerra South is shown in Figure 1-1. As stated previously, Phase 1 contains commercial buildings and multi-family residential units. Future phases of Centerra South will include additional commercial buildings and residential units.

The proposed Phase 1 development composition is provided in Table 2-1 and is shown in Figure 2-1:

Table 2-1: Proposed Phase 1 Development Summary

Phase	Development Type	Total SF	Total DUs
1	Grocery	37,000	n/a
1	Retail	77,752	n/a
1	Office	139,428	n/a
1	Restaurant	95,265	n/a
1	MF Residential	n/a	420
Totals		**349,445**	**420**

Table 2-2: Proposed Buildout Development Summary

Phase	Development Type	Total SF	Total DUs
1	Grocery	37,000	n/a
1 & Future	Retail	155,252	n/a
1	Office	139,428	n/a
`1	Restaurant	95,265	n/a
1 & Future	MF Residential	n/a	1,817
Future	SF Residential	n/a	183
Totals		**426,945**	**2,000**

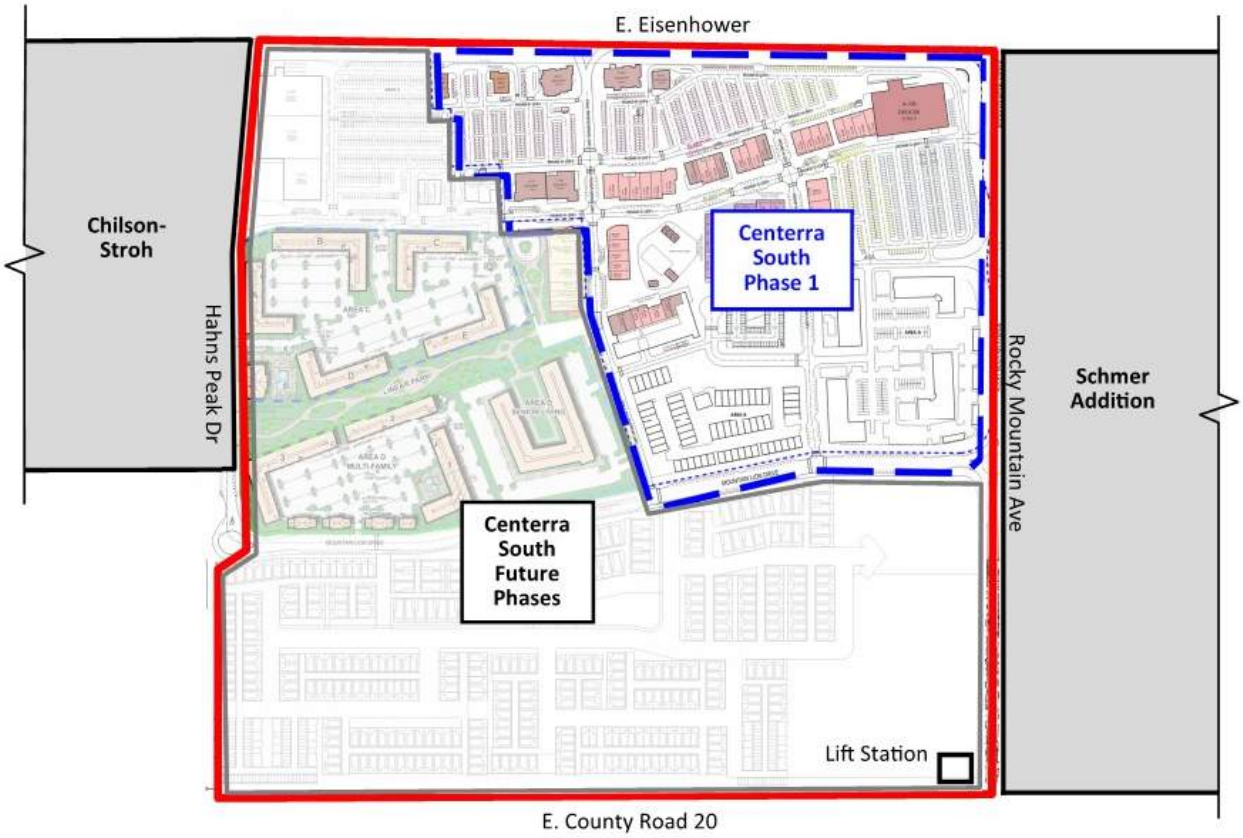


FIGURE 2-1: CENTERRA SOUTH PHASES
(NOT TO SCALE)

SECTION 3: WATER SYSTEM

3.1 WATER SYSTEM DESIGN CRITERIA

The water system within Centerra South will be designed in accordance with Loveland's *Water and Wastewater Development Standards, Chapter 4 Water Design Criteria*, 2024 Edition. Where criteria is not specifically stated in these standards, the design will conform to general industry practices. Provided below is the water system design criteria that was used to develop the proposed water system:

Table 3-1: Summary Water System Design Criteria

Description	Value
SF Residential Average Day Demand (ADD)	400 gpd/unit
MF Residential ADD	320 gpd/unit
Office ADD	0.20 gpd/sf
Retail/Grocery ADD	0.20 gpd/sf
Restaurant ADD	3.00 gpd/sf
Maximum Day Demand Factor	2.5 x ADD
Peak Hour Demand Factor	6.0 x ADD
Maximum system pressure	125 psi
Minimum system pressure	40 psi at PHD
Fire flow criteria	See section 3.4.3

3.2 WATER DEMAND

3.2.1 Potable Water Demands

Based on the development composition listed in Section 2-1 and the demand unit values, at buildout Centerra South will have an average daily water demand of 1,006,771 gallons per day ("gpd") and a maximum day demand of 2,023.87 gpm. Provided in Table 3-2A is a summary of the water demands for Centerra South.

Table 3-2A: Summary of Water Demands

Phase	Development Type	Average Day Demand (gpd)	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)
1	Grocery	7,400	12.85	30.83
1	Retail	15,550	27.00	64.79
1	Office	27,886	48.41	116.19
1	Restaurant	285,795	496.17	1,190.81
1	MF Residential	134,400	233.33	560.00
Phase 1 Totals		**471,031**	**817.76**	**1,962.63**
Future	Retail	15,500	26.91	64.58
Future	SF Residential	73,200	127.08	305.00
Future	MF Residential	447,040	776.11	1,862.67
Future	Irrigation (20 taps)	n/a	276.00	276.00
Future Totals		**535,740**	**930.10**	**2,232.25**
Buildout Totals		**1,006,771**	**2,023.87**	**4,470.88**

3.2.2 Future Areas

Following Phase 1, future phases of Centerra South will be situated primarily on the northwest and southern portions of the site. Future phases will consist of retail, single-family residential, and multi-family residential development, and are listed in Table 2-1. The demands from the future development were included in the water analysis.

3.2.3 Offsite Areas

To the east of Centerra South is the proposed Schmer Addition and it will connect to Centerra South's water system. The proposed development composition is estimated to consist of 290,894 sf of office/retail, a 123,000 sf grocery store, 124,669 sf of restaurants, 425 single-family units, and 488 multi-family units constructed in two phases. The buildout demands for both developments are summarized in Table 3-2B.

Table 3-2B: Summary of Offsite Buildout Water Demands

Area	Development Type	Average Day Demand (gpd)	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)
Schmer	Grocery	24,600	42.71	102.50
Schmer/Evergreen	Retail/Office	58,179	101.00	24.41
Schmer	Restaurant	374,007	649.32	1,558.36
Schmer	MF Residential	156,160	271.11	650.67
Schmer	SF Residential	170,000	295.14	708.33
Lift Station	Utility	200	0.35	0.83
Offsite Totals		**539,563**	**1,359.63**	**3,263.11**

3.3 EXISTING WATER SYSTEM INFRASTRUCTURE

3.3.1 Existing Pipelines

Centerra South will connect to two existing pipelines in the Chilson development to the west. One connection is to a 12-inch water line near Hahns Peak Drive and Mountain Lion Drive. The second connection is to an 8-inch water line located approximately 400 feet to the south of the 12-inch pipe.

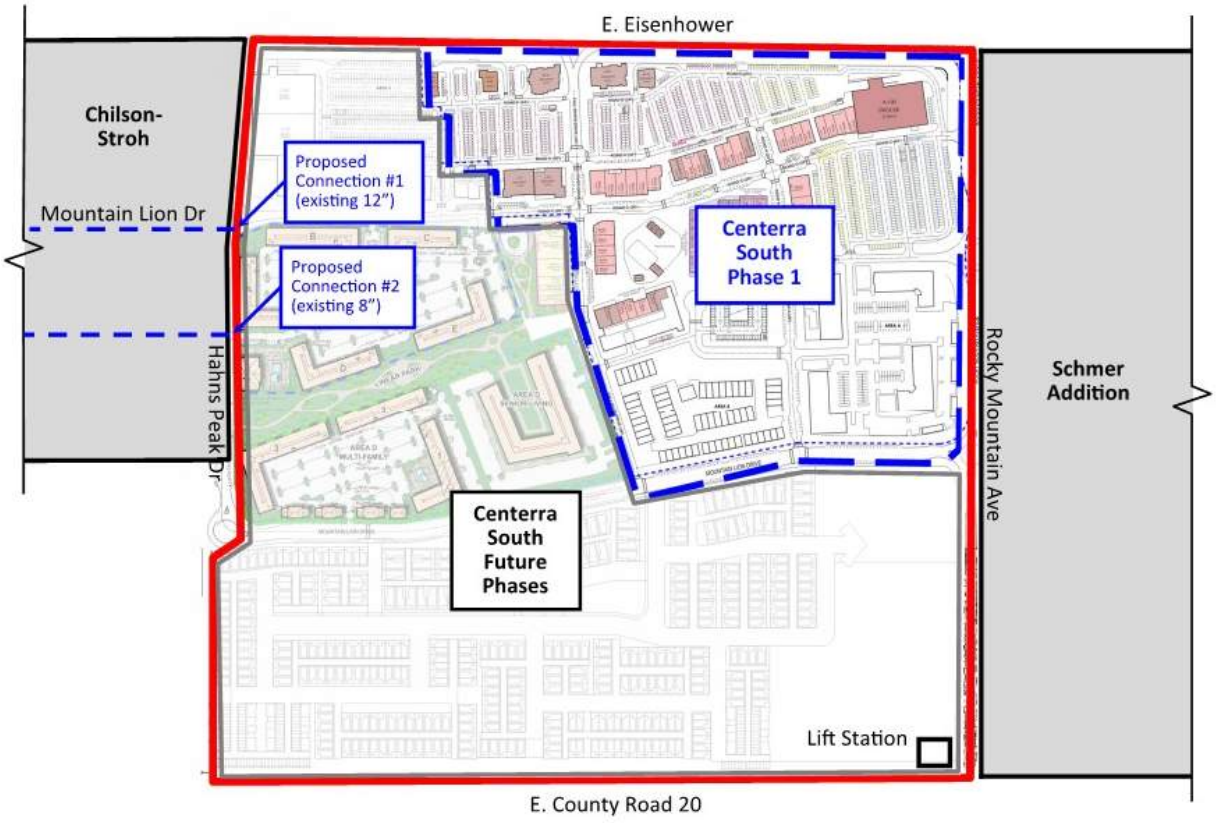


FIGURE 3-1: PROPOSED WATER CONNECTIONS
(NOT TO SCALE)

3.4 WATER MODEL

3.4.1 Methodology

A computer analysis using the Innovyze® software was performed on Centerra South. The water lines throughout the proposed water distribution system were evaluated.

Demands for each unit in the development were clustered to the nearest junction along the water lines. The following scenarios were evaluated by the model:

- Peak Hour Demand
- Maximum Day Demand plus Fire Flow

The final sizing of the proposed waterlines were based on the worst-case demand scenario – Maximum Day plus Fire Flow. The model utilized a Hazen-Williams coefficient of 130 for all pipes. The connection pressures listed in Table 3-4A are from the *Chilson-Stroh Farm Second Subdivision Amended Plat No. 2 Preliminary Water & Wastewater Impact Demand Analysis Report* dated July 2022 (included in Appendix B).

Table 3-4A: Water System Connection Point Pressures

No.	Location/Description	Junction	HGL (feet)
1	Hahns Peak Drive/Mountain Lion Ave.	FEED1	5100.0
2	South of Hahns Peak Drive/Mountain Lion Ave.	FEED2	5100.0

3.4.2 Future and Offsite Area Demands

The demands for the future areas (listed in section 3.2.2) were included in the water model. Additionally, demands for the future offsite Schmer development (listed in section 3.2.3) were included in the hydraulic analysis.

3.4.3 Fire Flow

A fire flow scenario was performed by the water model. It applies a fire flow demand at each fire hydrant location and determines the residual pressure at that point. A minimum of 20 psi residual pressure is required to "pass". Fire flows demands are applied during the maximum day demand scenario. The Loveland Fire Rescue Authority adopted 2021 International Fire Code, which allows for a reduction of 75% of the fire flow for commercial and multi-family dwellings that have an approved automatic fire sprinkler system (minimum fire flow is 1,500 gpm at 20 psi). All the structures in Centerra South will have approved fire sprinkler systems, thus a 1,500 gpm fire flow was applied at all fire hydrant junctions. The water model's fire flow scenario showed that all fire hydrant junctions in Centerra South passed with the lowest pressure of 47.36 psi at J62.

3.4.4 Summary of Results

A summary of the low pressures and high velocities are presented in Table 3-4B (detailed results are provided in Appendix B). The lowest water pressure during the PHD scenario is 53.71 psi and is within Loveland's criteria. The location of the lowest pressure is J62, which is located at the first

roundabout south of E. Eisenhower Blvd on Rocky Mountain Avenue.

Table 3-4B: Water System Model Results

Scenario	Lowest Pressure (psi)	Highest Velocity (fps)	Fire Flow Residual Pressure
PHD	53.71 (J62)	13.17 (P26)	n/a
MDD plus FF	47.36 (J62)	n/a	Pass

3.5 PROPOSED WATER SYSTEM INFRASTRUCTURE

Based on the water model analysis, the following infrastructure is required to maintain adequate pressures and velocities in the development.

3.5.1 Booster Pump Station

An on-site booster pump station is not proposed to provide pressure to Centerra South.

3.5.2 Distribution System

Within most of the development, 8-inch diameter C900 PVC pipelines will be installed. There are two 12-inch water lines and both will connect to the existing pipelines from the Chilson-Stroh 3rd Subdivision development. All of the pipelines will be located within public streets or dedicated easements. Figure B1 in Appendix B shows the proposed water distribution system.

3.5.3 Oversized Water Lines

There were no requests to oversize any of the water lines within Centerra South. The proposed 12" water main within Centerra South is to maintain velocities that comply with Loveland's standards.

SECTION 4: WASTEWATER SYSTEM

4.1 WASTEWATER SYSTEM DESIGN CRITERIA

The wastewater system within Centerra South will be designed in accordance with Loveland's *Water and Wastewater Development Standards, Chapter 5 Wastewater Design Criteria*, 2024 Edition. Where criteria is not specifically stated in these standards, the design will conform to general industry practices. Provided below is the wastewater system design criteria that was used to develop the proposed sanitary sewer system:

Table 4-1: Summary Wastewater System Design Criteria

Description	Value
SF Residential Average Daily Flow (ADF)	200 gpd/DU
MF Residential ADF	160 gpd/DU
Retail/Grocery ADF	0.10 gpd/sf
Office ADF	0.10 gpd/sf
Restaurant ADF	1.50 gpd/sf
Peaking Factor	3.0813
d/D Maximum (15-inch and smaller)	0.50
d/D Maximum (18-inch and larger)	0.75
Inflow/Infiltration	10% of ADF

The peaking factor of 3.018 is from the *Centerra South Lift Station Basis of Design Report*, dated August 16, 2023 by HDR.

4.2 WASTEWATER LOADING

4.2.1 Hydraulic Loading

Based on the development's composition and average wastewater loading from Table 4-1, the anticipated daily wastewater flow from Centerra South is 503,386 gpd. Centerra South is divided into two sanitary sewer basins: the Centerra South Lift Station and gravity via the Chilson-Stroh 3rd Subdivision development. Table 4-2A provides a breakdown of the flows per basin and Figure C1 in Appendix C shows the basin boundaries.

Table 4-2A: Phase 1 Summary of Hydraulic Loading per Basin

Basin	Average Flow (gpd)	Peak Flow + I/I (gpm)
Centerra South LS	235,516	520.31
Gravity via Chilson	0.00	0.00
Totals	**235,516**	**520.31**

Table 4-2B: Buildout Summary of Hydraulic Loading per Basin

Basin	Average Flow (gpd)	Peak Flow + I/I (gpm)
Centerra South LS	482,836	1,066.70
Gravity via Chilson	20,550	45.40
Totals	**503,386**	**1,112.10**

4.2.2 Offsite Areas

The Schmer and Evergreen developments are anticipated to have two connection points to the proposed sanitary sewer in Rocky Mountain Avenue. The Offsite North connection is located at the intersection of Rocky Mountain Avenue and Mountain Lion Drive and has an estimated peak flow of 465.88 gpm. The Offsite South connection is at manhole MH 01-2, which is just north of the Centerra South Lift Station, and has an estimated peak flow of 360.28 gpm.

Table 4-2C: Summary of Offsite Buildout Wastewater Loads

Offsite Area	Development Type	Connection Point	Average Day Flow (gpd)	Peak Hour Flow (gpm)
Schmer	Grocery	North	12,300	27.17
Schmer/Evergreen	Retail/Office	North	4,500	9.94
Schmer	Restaurant	North	187,004	413.14
Existing Home	Commercial	North	200	0.44
Existing Gas Station	Commercial	North	200	0.44
Existing Hotel	Commercial	North	6,675	14.75
Schmer	MF Residential	South	78,080	172.50
Schmer	SF Residential	South	85,000	187.79
Offsite Totals			**373,958**	**826.17**

4.3 EXISTING WASTEWATER SYSTEM INFRASTRUCTURE

4.3.1 Existing Sewer Lines

The portions of Centerra South that are able to discharge via gravity will flow into an existing 10-inch line that is approximately 400 feet south of Mountain Lion Drive at Hahns Peak Drive. This existing line is routed through the Chilson development to the west and eventually connects to the existing 30-inch outfall located along the south boundary of Chilson.

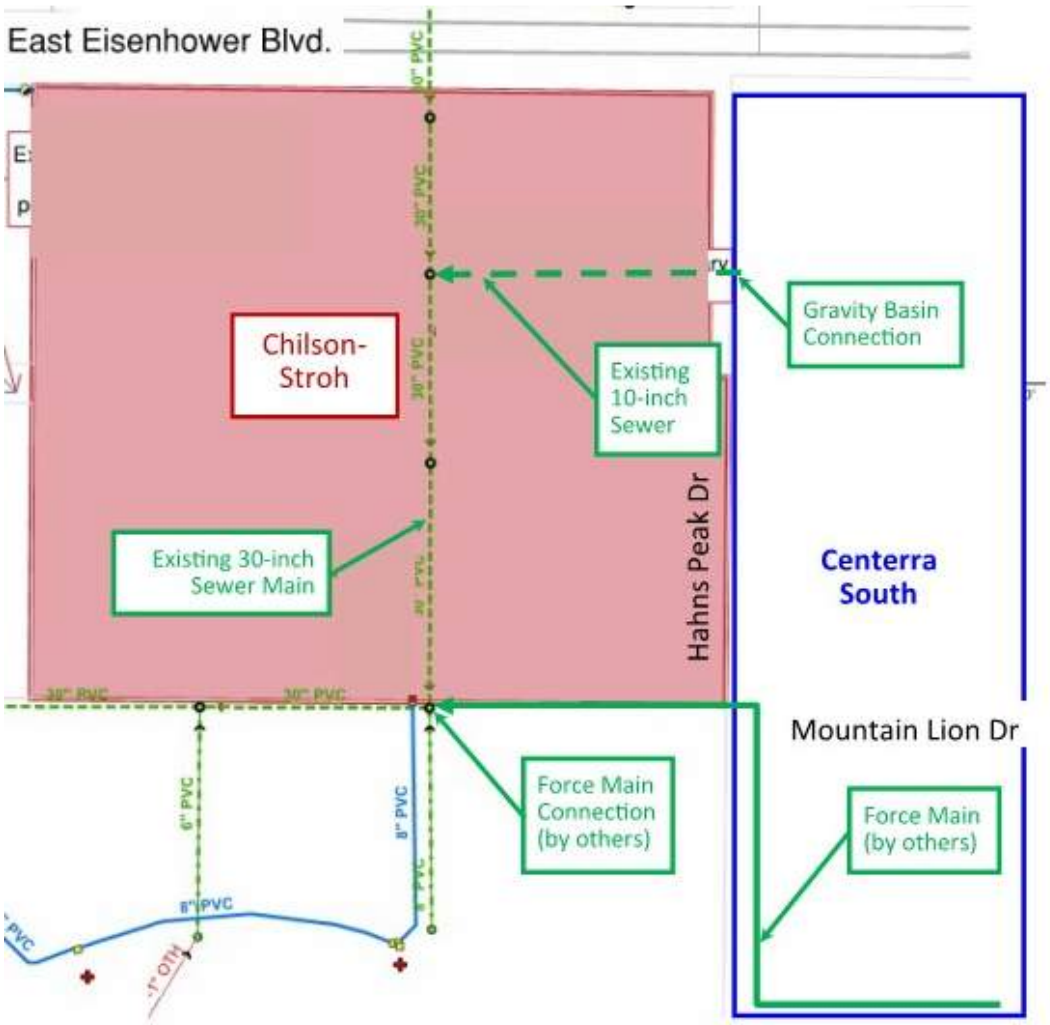


FIGURE 4-1: PROPOSED CONNECTIONS TO EXISTING SEWER
(NOT TO SCALE)

4.4 WASTEWATER ANALYSIS

4.4.1 Methodology

Calculations were performed on the sanitary sewer outfalls in Centerra South. The peaking factor was applied to the average day flows and the inflow/infiltration factor as added. The basins' totals were used to analyze each outfalls' carrying capacity. The analysis utilized a Manning's coefficient of 0.013.

4.4.2 Future Wastewater Loads

The wastewater loads from the future Centerra South phases were included in the analysis of the proposed collection system.

4.4.3 Summary of Results

This report evaluated the most downstream segment of several sewer lines. This is the "critical segment" of the proposed sewer line because it will convey all of the upstream flow and is assumed to have the flattest slope. Since the "critical segment" met Loveland's criteria, all other upstream sewer lines will meet the criteria because they will either have a higher slope and/or convey less flow. The results of the analysis for the most downstream segment for each of the two basins are provided below. More detailed results are provided in Appendix C.

Table 4-4: Sanitary Sewer Capacity

Basin	Peak Flow +I/I (gpm)	Pipeline Size (inch)	Slope (%)	Meets City's Slope Criteria?	d/D	City's d/D Criteria	Meets City's d/D Criteria?
Lift Station	1,892.87	18	0.50%	Yes	0.539	0.75	Yes
Gravity	45.40	8	0.40%	Yes	0.25	0.50	Yes

4.5 PROPOSED WASTEWATER SYSTEM INFRASTRUCTURE

4.5.1 Lift Stations

The majority of Centerra South will require a lift station to convey wastewater flows to Loveland's existing collection system. This lift station, designated the Centerra South Lift Station, and its force main outfall are currently in the design phase.

4.5.2 Collection Pipelines

The sanitary sewer lines within Centerra South are 8-inch, 12-inch, and 15-inch. The Lift Station Basin's flows will collect in a 15-inch pipe that exits on the south end of Rocky Mountain Avenue. This 15-inch pipe discharges to the proposed Centerra South Lift Station.

The Gravity Basin's flows with be conveyed by a future 8-inch sanitary sewer that discharges into an existing manhole south of the Hahns Peak Drive and Mountain Lion Drive intersection. This existing manhole connects to an existing 10-inch sewer line in the Chilson-Stroh 3rd Subdivision development.

4.5.3 Existing Downstream Collection System

Both the Chilson gravity system and the Centerra South Lift Station force main ultimately discharge into an existing 30-inch interceptor.

4.6 SANITARY SEWER UPSIZING

The proposed sanitary sewer line in Rocky Mountain Avenue is 18-inch diameter. A section of this pipeline, from MH 01-5 to MH 01-2, only needs to be 15-inch to accommodate the peak flows from Centerra South. However, a portion of the offsite Schmer development connects to MH 01-5. Due to these offsite flows, the sanitary sewer line from MH 01-5 to MH 01-2 was increased to 18-inches.

Table 4-6: Sanitary Sewer Capacity Comparison (MH 01-5 to MH 01-2)

Basin	Buildout Peak Flow +I/I (gpm)	Pipeline Size (inch)	Slope (%)	d/D	City's d/D Criteria	Meets City's d/D Criteria?
Lift Station no Offsite	870.26	15	0.50%	0.454	0.50	Yes
Lift Station w/ Offsite[1]	1,336.14	15	0.50%	0.587	0.50	No

Note:
1. This segment of the sanitary sewer was upsized to 18" resulting in a d/D of 0.44.

Appendix A
Development Summary

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Building Area and Unit Counts
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
4/4/25

Notes:
1. Composition is based on information sent by McWhinnery on 3/17/25, 3/24/25, 4/3/25, and 4/4/25.

Table A1-1: Centerra South Development Composition (Buildout)

A	B	C	D	E	F
No.	Area	Building	Type of Use	Units	Total Square Footage (sf)
1	Phase 1	A-100	Grocey	n/a	37,000 sf
2	Phase 1	B-100	Retail	n/a	1,500 sf
3	Phase 1	B-105	Retail	n/a	1,981 sf
4	Phase 1	B-110	Retail	n/a	1,500 sf
5	Phase 1	B-115	Retail	n/a	1,500 sf
6	Phase 1	B-120	Retail	n/a	1,500 sf
7	Phase 1	B-125	Retail	n/a	1,500 sf
8	Phase 1	B-130	Retail	n/a	1,500 sf
9	Phase 1	B-135	Retail	n/a	1,500 sf
10	Phase 1	C-100	Retail	n/a	3,001 sf
11	Phase 1	C-110	Retail	n/a	2,401 sf
12	Phase 1	D-100	Restaurant	n/a	6,091 sf
13	Phase 1	E-100	Restaurant	n/a	3,631 sf
14	Phase 1	E-105	Retail	n/a	2,161 sf
15	Phase 1	E-110	Retail	n/a	1,440 sf
16	Phase 1	E-115	Retail	n/a	1,440 sf
17	Phase 1	E-120	Restaurant	n/a	2,928 sf
18	Phase 1	E-125	Retail	n/a	1,440 sf
19	Phase 1	E-130	Retail	n/a	1,440 sf
20	Phase 1	E-135	Restaurant	n/a	3,631 sf
21	Phase 1	F-100	Retail	n/a	2,221 sf
22	Phase 1	F-105	Retail	n/a	1,921 sf
23	Phase 1	F-110	Retail	n/a	1,921 sf
24	Phase 1	F-115	Retail	n/a	1,801 sf
25	Phase 1	F-120	Retail	n/a	1,801 sf
26	Phase 1	F-125	Retail	n/a	2,521 sf
27	Phase 1	G1-100	Retail	n/a	2,821 sf
28	Phase 1	G1-105	Retail	n/a	1,200 sf
29	Phase 1	G1-110	Retail	n/a	1,380 sf
30	Phase 1	G1-115	Retail	n/a	1,260 sf
31	Phase 1	G1-120	Retail	n/a	1,380 sf
32	Phase 1	G1-200	Office	n/a	22,857 sf
33	Phase 1	G2-100	Retail	n/a	2,101 sf
34	Phase 1	G2-110	Retail	n/a	2,221 sf
35	Phase 1	G2-115	Retail	n/a	1,440 sf
36	Phase 1	G2-120	Retail	n/a	1,440 sf
37	Phase 1	G2-200	Office	n/a	13,714 sf
38	Phase 1	H-100	Restaurant	n/a	4,217 sf
39	Phase 1	H-110	Retail	n/a	1,560 sf

A	B	C	D	E	F
No.	Area	Building	Type of Use	Units	Total Square Footage (sf)
40	Phase 1	H-120	Retail	n/a	1,200 sf
41	Phase 1	H-130	Retail	n/a	1,020 sf
42	Phase 1	H-140	Restaurant	n/a	6,091 sf
43	Phase 1	H-200	Office	n/a	102,857 sf
44	Phase 1	J-100	Restaurant	n/a	10,191 sf
45	Phase 1	J-110	Restaurant	n/a	10,659 sf
46	Phase 1	K-100	Retail	n/a	1,861 sf
47	Phase 1	K-105	Retail	n/a	1,500 sf
48	Phase 1	K-110	Retail	n/a	1,500 sf
49	Phase 1	K-115	Retail	n/a	1,320 sf
50	Phase 1	K-120	Retail	n/a	1,200 sf
51	Phase 1	K-125	Retail	n/a	4,111 sf
52	Phase 1	K-130	Retail	n/a	3,241 sf
53	Phase 1	K-140	Retail	n/a	1,620 sf
54	Phase 1	K-150	Restaurant	n/a	3,532 sf
55	Phase 1	K-160	Restaurant	n/a	3,532 sf
56	Phase 1	PD-A1	Restaurant	n/a	3,983 sf
57	Phase 1	PD-B1	Restaurant	n/a	10,074 sf
58	Phase 1	PD-C1	Restaurant	n/a	9,956 sf
59	Phase 1	PD-D1	Retail	n/a	2,281 sf
60	Phase 1	PD-E1	Retail	n/a	2,101 sf
61	A & B (future)	n/a	MF Residential	420	n/a
62	C (future)	n/a	MF Residential	350	n/a
63	D (future)	n/a	MF Residential	595	n/a
64	E (future)	L-100	Retail	n/a	30,000 sf
65	E (future)	L-110	Retail	n/a	30,000 sf
66	E (future)	L-115	Retail	n/a	17,500 sf
67	Phase 1	M-110	Restaurant	n/a	3,280 sf
68	Phase 1	M-120	Restaurant	n/a	4,100 sf
69	Phase 1	PD-G1	Restaurant	n/a	4,685 sf
70	Phase 1	PD-G2	Restaurant	n/a	4,685 sf
71	Southwest (future)	n/a	MF Residential	327	n/a
72	Southeast (future)	n/a	MF Residential	125	n/a
73	South (future)	n/a	SF Residential	183	n/a
Buildout Totals				**2,000**	**426,945 sf**
Phase 1 Totals				**420**	**349,445 sf**

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Offsite Building Area and Unit Counts
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

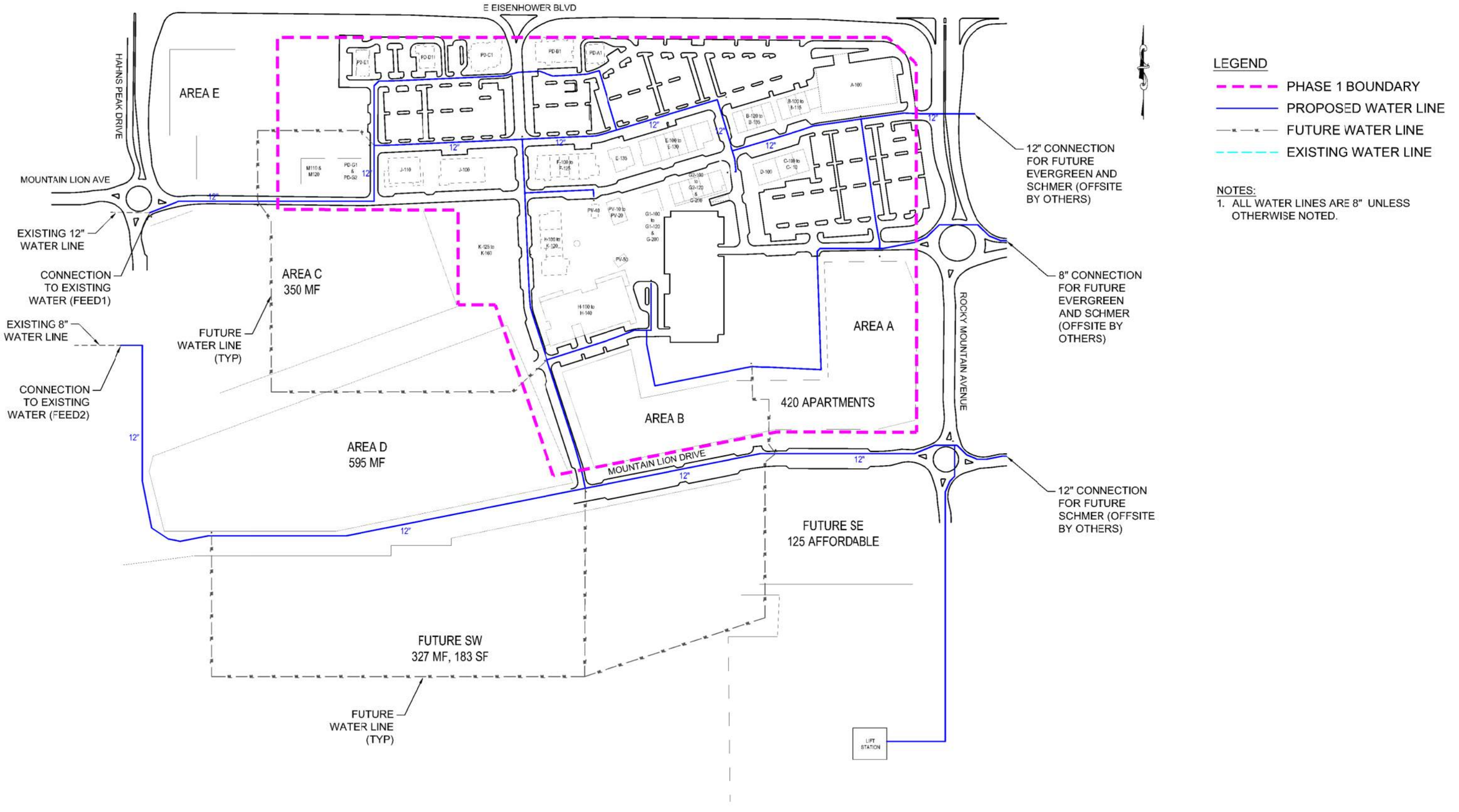
FINAL
4/4/25

Notes:
1. Composition is based on the Schmer Farm WW Flow Estimates revised 1/31/25.

Table A2-1: Offsite Development Composition (Buildout)

A	B	C	D	F
No.	Area	Land Use	Building Square Footage (sf)	Units (DU/rooms)
1	Existing Hotel	Hotel	46,448 sf	89 rooms
2	Existing Gas Station	Retail	1,998 sf	n/a
3	Schmer - Existing Farmhouse	SF Residential	n/a	1 DU
4	Future Evergreen	Retail/Office	45,000 sf	n/a
5	Future Evergreeen	Grocery	123,000 sf	n/a
6	Future Evergreeen	Restaurants	15,000 sf	n/a
7	Future Schmer	Retail/Office	245,894 sf	n/a
8	Future Schmer	Restaurants	109,669 sf	n/a
9	Future Schmer	MF Residential	n/a	488 DU
10	Future Schmer	SF Residential	n/a	425 DU

Appendix B
Water Exhibit, Water Calculations and Model Results



MSK consulting
7157 S. Andes Circle
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303-903-0918

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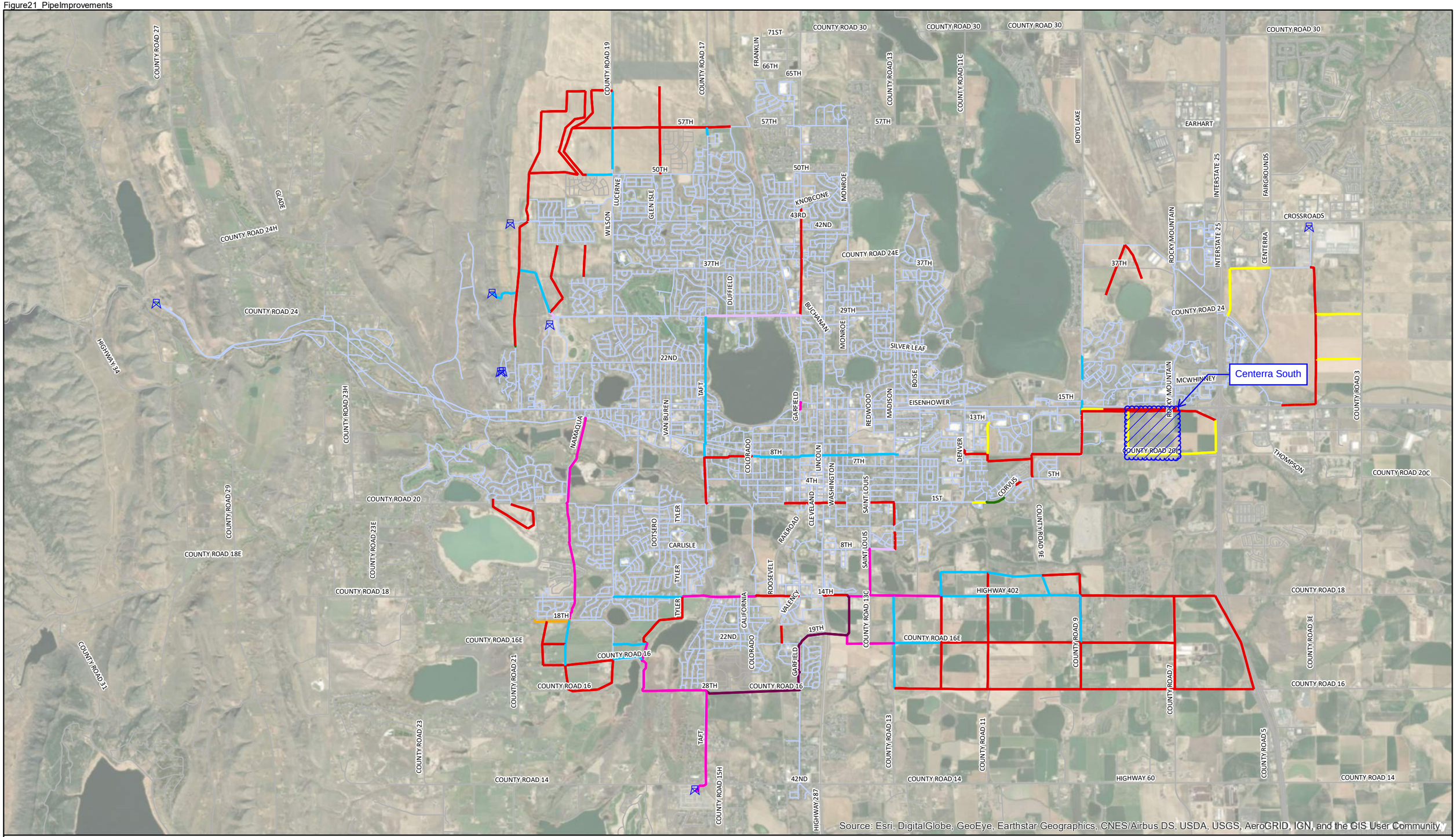
CENTERRA SOUTH DEVELOPMENT

CENTERRA SOUTH FILING 1 W&WWIDA

FIGURE B1 - WATER SYSTEM

MAY 2025 | SCALE: 1"=300'

Figure21_PipeImprovements



LEGEND

Diameter (in)		
8; 10	18	36
12	20	42
16	24	48
	30	

N

0 2,500 5,000 10,000 Feet

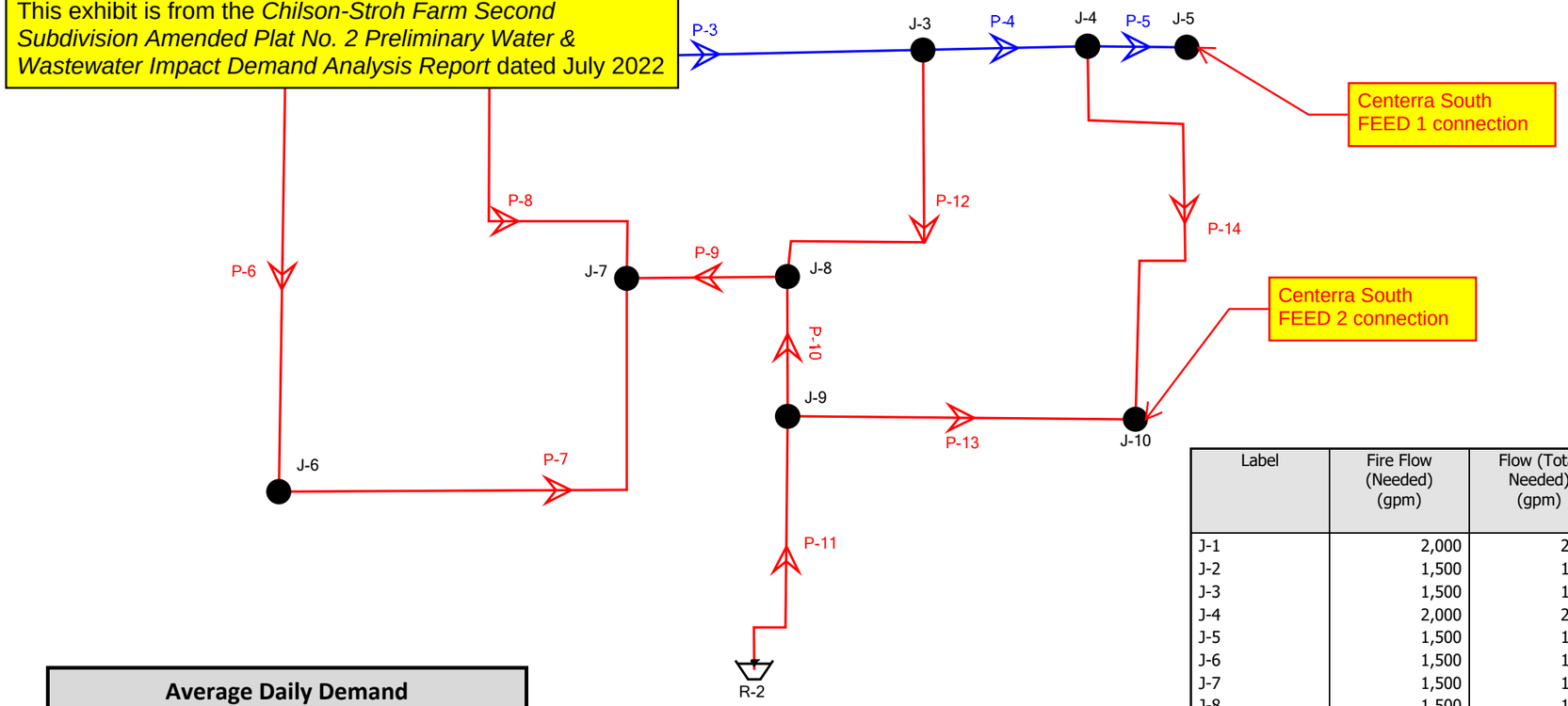
FIGURE 21
Recommended Pipeline Improvements by Diameter for Buildout (66 mgd)

Date: 10/8/2019

Demands of Commercial and Residential areas have been distributed amongst junctions to more accurately represent the system.

Basis for Connecting Pressure HGLs

This exhibit is from the *Chilson-Stroh Farm Second Subdivision Amended Plat No. 2 Preliminary Water & Wastewater Impact Demand Analysis Report* dated July 2022



Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	5,100.20	317	5,100.20
R-2	5,100.20	136	5,100.20

Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	4,940.51	0	5,100.11	69
J-2	4,937.79	61	5,100.07	70
J-3	4,935.08	0	5,100.04	71
J-4	4,934.12	61	5,100.03	72
J-5	4,933.85	0	5,100.03	72
J-6	4,935.73	70	5,100.03	71
J-7	4,931.99	99	5,100.03	73
J-8	4,933.44	35	5,100.03	72
J-9	4,931.71	23	5,100.05	73
J-10	4,932.47	104	5,100.00	72

Fire Flow Report

Label	Fire Flow (Needed) (gpm)	Flow (Total Needed) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Junction w/ Minimum Pressure (System)	Velocity of Maximum Pipe (ft/s)	Pipe w/ Maximum Velocity
J-1	2,000	2,000			J-2	5.43	P-1
J-2	1,500	1,561			J-1	4.08	P-1
J-3	1,500	1,500			J-1	3.93	P-1
J-4	2,000	2,061	20	69	J-1	4.90	P-1
J-5	1,500	1,500	20	70	J-1	4.26	P-5
J-6	1,500	1,570	20	67	J-1	5.63	P-6
J-7	1,500	1,599	20	71	J-1	4.48	P-9
J-8	1,500	1,535	20	70	J-1	4.05	P-11
J-9	1,500	1,523	20	71	J-1	4.89	P-11
J-10	1,500	1,604	20	69	J-1	5.67	P-13

HGLs used at FEED1 and FEED2

Average Daily Demand		
Apartment Buildings =	320	gpd/DU
Clubhouse =	3	gpd/SF
Maintenance =	0.2	gpd/SF
Irrigation =	45	gpm
Lot 2 Commercial Area =	0.2	gpd/SF

Max Daily Demand

Junction	Apartment Building (gpm)	Clubhouse (gpm)	Maintenance (gpm)	Irrigation (gpm)	Commercial Area (gpm)	Total (gpm)
J-1	0	0	0	0	0	0
J-2	0	0	0	0	61	61
J-3	0	0	0	0	0	0
J-4	0	0	0	0	61	61
J-5	0	0	0	0	0	0
J-6	70	0	0	0	0	70
J-7	70	29	0	0	0	99
J-8	35	0	0	0	0	35
J-9	23	0	0	0	0	23
J-10	58	0	0.5	45	0	104

Peaking Factor =	2.5

Apartment Buildings per Junction	
J-1	0
J-2	0
J-3	0
J-4	0
J-5	0
J-6	6
J-7	6
J-8	3
J-9	2
J-10	5

Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Headloss (ft)
P-1	299	R-1	J-1	12.0	PVC	130.0	317	0.90	0.303	0.09
P-2	243	J-1	J-2	12.0	PVC	130.0	240	0.68	0.181	0.04
P-3	517	J-2	J-3	12.0	PVC	130.0	122	0.35	0.051	0.03
P-4	196	J-3	J-4	12.0	PVC	130.0	103	0.29	0.037	0.01
P-5	118	J-4	J-5	12.0	PVC	130.0	0	0.00	0.000	0.00
P-6	512	J-1	J-6	8.0	PVC	130.0	77	0.49	0.158	0.08
P-7	667	J-6	J-7	8.0	PVC	130.0	7	0.05	0.002	0.00
P-8	427	J-2	J-7	8.0	PVC	130.0	57	0.36	0.090	0.04
P-9	192	J-7	J-8	8.0	PVC	130.0	-35	0.22	0.036	0.01
P-10	167	J-9	J-8	8.0	PVC	130.0	50	0.32	0.073	0.01
P-11	340	R-2	J-9	8.0	PVC	130.0	136	0.87	0.454	0.15
P-12	431	J-3	J-8	8.0	PVC	130.0	19	0.12	0.012	0.01
P-13	414	J-9	J-10	8.0	PVC	130.0	62	0.40	0.108	0.04
P-14	608	J-4	J-10	8.0	PVC	130.0	41	0.26	0.051	0.03

07/26/2021

Chilson-Stroh Farm Third Subdivision

Exhibit G: Potable Water Fire Flow + Maximum Daily Demand Analysis and Results

LAND ONE engineering
970-632-2311

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Water Demands
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
5/13/25

Notes:
1. Composition is based on information sent by McWhinnery on 3/17/25, 3/24/25, 4/3/25, and 4/4/25.
2. Demands and peaking factors are based on the COL Water and Wastewater Development Standards, 2024 edition.

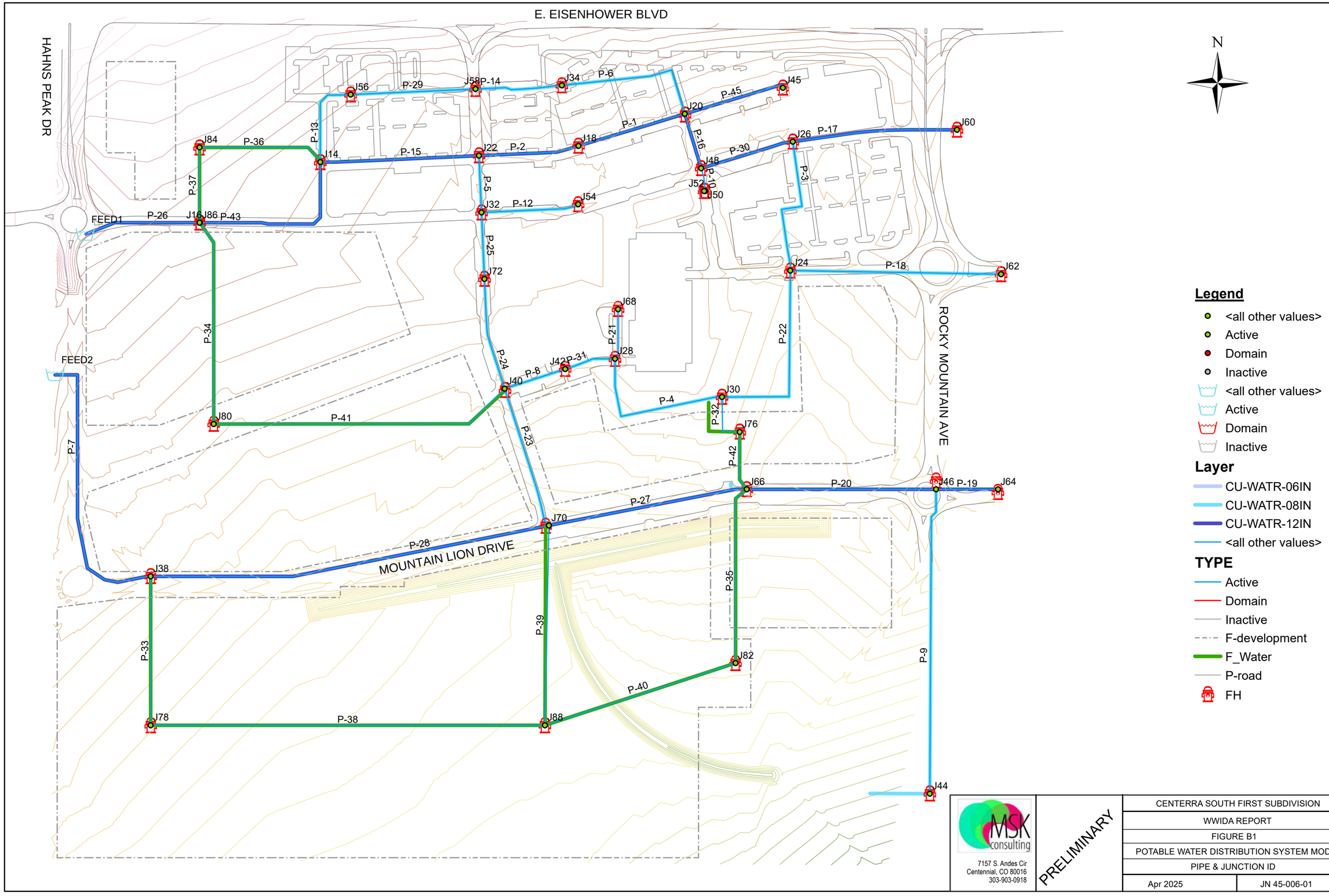
Assumptions:

SF Residential Demand:	400 gpd/unit
MF Residential Demand:	320 gpd/unit
Office Water Demand:	0.20 gpd/sf
Retail Water Demand:	0.20 gpd/sf
Restaurant Water Demand:	3.00 gpd/sf
Hotel Water Demand:	75 gpd/room
Industrial Water Demand:	1,200 gpd/acre
Institutional Water Demand:	800 gpd/acre
Irrigation Water Demand:	801 gpd/acre
Max. Day Demand Factor:	2.5 times ADD
Peak Hour Demand Factor:	6.0 times ADD

Table B1-1: Centerra South Water Demands

A	B	C	D	E	F	G	H	I	J	K
No.	Area	Building	Type of Use	Units or Gross Acres	Total Square Footage (sf)	Average Daily Demand (ADD) (gpd)	Average Daily Demand (ADD) (gpm)	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)	Demand Junction ID in Water Model
1	Phase 1	A-100	Grocey	n/a	37,000 sf	7,400	5.14	12.85	30.83	J26
2	Phase 1	B-100	Retail	n/a	1,500 sf	300	0.21	0.52	1.25	J26
3	Phase 1	B-105	Retail	n/a	1,981 sf	396	0.28	0.69	1.65	J26
4	Phase 1	B-110	Retail	n/a	1,500 sf	300	0.21	0.52	1.25	J26
5	Phase 1	B-115	Retail	n/a	1,500 sf	300	0.21	0.52	1.25	J26
6	Phase 1	B-120	Retail	n/a	1,500 sf	300	0.21	0.52	1.25	J48
7	Phase 1	B-125	Retail	n/a	1,500 sf	300	0.21	0.52	1.25	J48
8	Phase 1	B-130	Retail	n/a	1,500 sf	300	0.21	0.52	1.25	J48
9	Phase 1	B-135	Retail	n/a	1,500 sf	300	0.21	0.52	1.25	J48
10	Phase 1	C-100	Retail	n/a	3,001 sf	600	0.42	1.04	2.50	J48
11	Phase 1	C-110	Retail	n/a	2,401 sf	480	0.33	0.83	2.00	J48
12	Phase 1	D-100	Restaurant	n/a	6,091 sf	18,273	12.69	31.72	76.14	J48
13	Phase 1	E-100	Restaurant	n/a	3,631 sf	10,893	7.56	18.91	45.39	J20
14	Phase 1	E-105	Retail	n/a	2,161 sf	432	0.30	0.75	1.80	J20
15	Phase 1	E-110	Retail	n/a	1,440 sf	288	0.20	0.50	1.20	J20
16	Phase 1	E-115	Retail	n/a	1,440 sf	288	0.20	0.50	1.20	J20
17	Phase 1	E-120	Restaurant	n/a	2,928 sf	8,785	6.10	15.25	36.60	J20
18	Phase 1	E-125	Retail	n/a	1,440 sf	288	0.20	0.50	1.20	J20
19	Phase 1	E-130	Retail	n/a	1,440 sf	288	0.20	0.50	1.20	J20
20	Phase 1	E-135	Restaurant	n/a	3,631 sf	10,893	7.56	18.91	45.39	J18
21	Phase 1	F-100	Retail	n/a	2,221 sf	444	0.31	0.77	1.85	J22
22	Phase 1	F-105	Retail	n/a	1,921 sf	384	0.27	0.67	1.60	J22
23	Phase 1	F-110	Retail	n/a	1,921 sf	384	0.27	0.67	1.60	J22
24	Phase 1	F-115	Retail	n/a	1,801 sf	360	0.25	0.63	1.50	J22
25	Phase 1	F-120	Retail	n/a	1,801 sf	360	0.25	0.63	1.50	J22
26	Phase 1	F-125	Retail	n/a	2,521 sf	504	0.35	0.88	2.10	J22
27	Phase 1	G1-100	Retail	n/a	2,821 sf	564	0.39	0.98	2.35	J68
28	Phase 1	G1-105	Retail	n/a	1,200 sf	240	0.17	0.42	1.00	J68
29	Phase 1	G1-110	Retail	n/a	1,380 sf	276	0.19	0.48	1.15	J68
30	Phase 1	G1-115	Retail	n/a	1,260 sf	252	0.18	0.44	1.05	J68
31	Phase 1	G1-120	Retail	n/a	1,380 sf	276	0.19	0.48	1.15	J68
32	Phase 1	G1-200	Office	n/a	22,857 sf	4,571	3.17	7.94	19.05	J68
33	Phase 1	G2-100	Retail	n/a	2,101 sf	420	0.29	0.73	1.75	J48
34	Phase 1	G2-110	Retail	n/a	2,221 sf	444	0.31	0.77	1.85	J48
35	Phase 1	G2-115	Retail	n/a	1,440 sf	288	0.20	0.50	1.20	J48
36	Phase 1	G2-120	Retail	n/a	1,440 sf	288	0.20	0.50	1.20	J48
37	Phase 1	G2-200	Office	n/a	13,714 sf	2,743	1.90	4.76	11.43	J48
38	Phase 1	H-100	Restaurant	n/a	4,217 sf	12,650	8.79	21.96	52.71	J40
39	Phase 1	H-110	Retail	n/a	1,560 sf	312	0.22	0.54	1.30	J40
40	Phase 1	H-120	Retail	n/a	1,200 sf	240	0.17	0.42	1.00	J40

A	B	C	D	E	F	G	H	I	J	K
No.	Area	Building	Type of Use	Units or Gross Acres	Total Square Footage (sf)	Average Daily Demand (ADD) (gpd)	Average Daily Demand (ADD) (gpm)	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)	Demand Junction ID in Water Model
41	Phase 1	H-130	Retail	n/a	1,020 sf	204	0.14	0.35	0.85	J40
42	Phase 1	H-140	Restaurant	n/a	6,091 sf	18,273	12.69	31.72	76.14	J40
43	Phase 1	H-200	Office	n/a	102,857 sf	20,571	14.29	35.71	85.71	J40
44	Phase 1	J-100	Restaurant	n/a	10,191 sf	30,572	21.23	53.08	127.38	J22
45	Phase 1	J-110	Restaurant	n/a	10,659 sf	31,978	22.21	55.52	133.24	J14
46	Phase 1	K-100	Retail	n/a	1,861 sf	372	0.26	0.65	1.55	J72
47	Phase 1	K-105	Retail	n/a	1,500 sf	300	0.21	0.52	1.25	J72
48	Phase 1	K-110	Retail	n/a	1,500 sf	300	0.21	0.52	1.25	J72
49	Phase 1	K-115	Retail	n/a	1,320 sf	264	0.18	0.46	1.10	J72
50	Phase 1	K-120	Retail	n/a	1,200 sf	240	0.17	0.42	1.00	J72
51	Phase 1	K-125	Retail	n/a	4,111 sf	822	0.57	1.43	3.43	J72
52	Phase 1	K-130	Retail	n/a	3,241 sf	648	0.45	1.13	2.70	J72
53	Phase 1	K-140	Retail	n/a	1,620 sf	324	0.23	0.56	1.35	J72
54	Phase 1	K-150	Restaurant	n/a	3,532 sf	10,595	7.36	18.39	44.14	J72
55	Phase 1	K-160	Restaurant	n/a	3,532 sf	10,595	7.36	18.39	44.14	J72
56	Phase 1	PD-A1	Restaurant	n/a	3,983 sf	11,948	8.30	20.74	49.78	J34
57	Phase 1	PD-B1	Restaurant	n/a	10,074 sf	30,221	20.99	52.47	125.92	J58
58	Phase 1	PD-C1	Restaurant	n/a	9,956 sf	29,869	20.74	51.86	124.45	J58
59	Phase 1	PD-D1	Retail	n/a	2,281 sf	456	0.32	0.79	1.90	J56
60	Phase 1	PD-E1	Retail	n/a	2,101 sf	420	0.29	0.73	1.75	J56
61	Phase 1	n/a	MF Residential	420	n/a	134,400	93.33	233.33	560.00	J76
62	C (future)	n/a	MF Residential	350	n/a	112,000	77.78	194.44	466.67	J80
63	D (future)	n/a	MF Residential	595	n/a	190,400	132.22	330.56	793.33	J80
64	E (future)	L-100	Retail	n/a	30,000 sf	6,000	4.17	10.42	25.00	J84
65	E (future)	L-110	Retail	n/a	30,000 sf	6,000	4.17	10.42	25.00	J84
66	E (future)	L-115	Retail	n/a	17,500 sf	3,500	2.43	6.08	14.58	J84
67	Phase 1	M-110	Restaurant	n/a	3,280 sf	9,839	6.83	17.08	41.00	J14
68	Phase 1	M-120	Restaurant	n/a	4,100 sf	12,299	8.54	21.35	51.25	J14
69	Phase 1	PD-G1	Restaurant	n/a	4,685 sf	14,056	9.76	24.40	58.57	J14
70	Phase 1	PD-G2	Restaurant	n/a	4,685 sf	14,056	9.76	24.40	58.57	J14
71	Southwest (future)	n/a	MF Residential	327	n/a	104,640	72.67	181.67	436.00	J78/J88
72	Southeast (future)	n/a	MF Residential	125	n/a	40,000	27.78	69.44	166.67	J82
73	South (future)	n/a	SF Residential	183	n/a	73,200	50.83	127.08	305.00	J78/J88
74	All	n/a	Irrigation	14.4 ac	n/a	n/a	n/a	276.00	276.00	various
75	Offsite	Schmer/Evergr	Office/Retail	n/a	290,894 sf	58,179	40.40	101.00	242.41	J60/J62/J64
76	Offsite	Schmer	Grocey	n/a	123,000 sf	24,600	17.08	42.71	102.50	J60/J62/J65
77	Offsite	Schmer	Restaurant	n/a	124,669 sf	374,007	259.73	649.32	1,558.36	J60/J62/J66
78	Offsite	Schmer	MF Residential	488	n/a	156,160	108.44	271.11	650.67	J60/J62/J67
79	Offsite	Schmer	SF Residential	425	n/a	170,000	118.06	295.14	708.33	J60/J62/J68
80	Offsite (Lift Station)	Lift Station	Utility	n/a	1,000 sf	200	0.14	0.35	0.83	J44
Totals (Centerra South Buildout)				**2,000**	**426,945 sf**	**1,006,771**	**699.15**	**2,023.87**	**4,470.88**	
Totals (Centerra South Phase 1)				**420**	**349,445 sf**	**471,031**	**327.10**	**817.76**	**1,962.63**	
Totals (Offsite)				**913**	**539,563 sf**	**783,146**	**543.85**	**1,359.63**	**3,263.11**	



Legend

- <all other values>
- Active
- Domain
- Inactive

<all other values>
Active
Domain
Inactive

Layer

- CU-WATR-06IN
- CU-WATR-08IN
- CU-WATR-12IN
- <all other values>

TYPE

- Active
- Domain
- Inactive
- F-development
- F_Water
- P-road
- FH

MSK consulting
7157 S. Andes Cir
Centennial, CO 80016
303-903-0918

PRELIMINARY

CENTERRA SOUTH FIRST SUBDIVISION	
WWIDA REPORT	
FIGURE B1	
POTABLE WATER DISTRIBUTION SYSTEM MODEL	
PIPE & JUNCTION ID	
Apr 2025	JN 45-006-01

McWhinney
Centerra South First Subdivision
Water Model Junction Report
Model Run Date: 4/09/2025

ADD= 400 gpd/SFE
0.278 gpm/SFE
MDD= 2.5 x ADD
PHD= 6.0 x ADD

Min. pressure: **53.71**

Table B2-1: Water Model Junction Report

PHD OUTPUT = 7,734 gpm

ID (Char)	Description (Char)	Phase (Int)	Elevation (ft)	Irrigation (gpm)	Demand (gpm)	Head (ft)	Pressure (psi)
J14	FH	1	4,929.03		342.62	5,076.98	64.11
J16	FH	1	4,930.29		0.00	5,084.66	66.89
J18	FH	1	4,926.07	13.80	59.19	5,069.69	62.23
J20	FH	1	4,925.39		88.60	5,067.81	61.71
J22	FH	1	4,927.67		137.54	5,071.51	62.33
J24	FH	1	4,924.11	13.80	13.80	5,061.52	59.54
J26	FH	1	4,924.77	13.80	50.04	5,064.49	60.54
J28	P-Junction	1	4,924.70	13.80	13.80	5,066.69	61.53
J30	FH	1	4,924.42		0.00	5,064.70	60.78
J32	P-Junction	1	4,926.00	13.80	13.80	5,070.58	62.65
J34	FH	1	4,929.47	13.80	63.58	5,069.31	60.59
J38	FH	1	4,923.00	13.80	13.80	5,082.45	69.09
J40	FH	1	4,925.00	13.80	231.51	5,068.37	62.12
J42	P-Junction	1	4,924.00		0.00	5,067.44	62.15
J44	P-Junction	1	4,906.00		0.83	5,064.50	68.68
J45	FH	1	4,925.39		0.00	5,067.81	61.71
J46	FH	1	4,922.00		0.00	5,064.50	61.75
J48	P-Junction	1	4,925.00	13.80	116.87	5,066.48	61.3
J50	P-Junction	1	4,924.40		0.00	5,066.48	61.56
J52	FH	1	4,924.50		0.00	5,066.48	61.52
J54	P-Junction	1	4,926.00		0.00	5,070.58	62.65
J56	FH	1	4,930.25	13.80	17.45	5,074.10	62.33
J58	P-Junction	1	4,929.50	13.80	264.17	5,070.40	61.05
J60	FH	1	4,925.69		1087.43	5,063.02	59.5
J62	FH (Schmer)	1	4,924.00		1087.43	5,047.96	53.71
J64	FH (Schmer)	1	4,921.00		1087.43	5,063.95	61.94
J66	FH (Schmer)	1	4,921.00	13.80	13.80	5,066.19	62.91
J68	FH	1	4,926.00		25.75	5,066.69	60.96
J70	FH	1	4,918.00	13.80	13.80	5,069.60	65.69
J72	FH	1	4,926.00		101.92	5,069.53	62.19
J76	F-Junction	2	4,922.73	13.80	573.80	5,064.72	61.53
J78	F-Junction	2	4,920.13	13.80	384.30	5,075.49	67.32
J80	F-Junction	2	4,925.40	13.80	1273.80	5,068.29	61.91
J82	F-Junction	2	4,916.34	13.80	180.47	5,066.77	65.18
J84	F-Junction	2	4,932.58	13.80	78.38	5,081.51	64.53
J86	P-Junction	1	4,930.29	13.80	13.80	5,084.69	66.9
J88	F-Junction	2	4,914.66	13.80	384.30	5,068.76	66.77

McWhinney
Centerra South First Subdivision
Water Model Pipe Report
Model Run Date: 4/09/2025

Max. Velocity: 13.17 ft/sec

Table B2-2: Water Model Pipe Report

							PHD OUTPUT				
ID (Char)	Description (Char)	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P-1	P-WL	J18	J20	334.81	12	130	1,535.64	4.36	1.88	5.61	Open
P-10	P-WL	J48	J50	69.69	8	130	0	0	0	0	Open
P-11	P-WL	J50	J52	3	8	130	0	0	0	0	Open
P-12	P-WL	J54	J32	296.53	8	130	0	0	0	0	Open
P-13	P-WL	J56	J14	280.46	8	130	-732.65	4.68	2.88	10.27	Open
P-14	P-WL	J34	J58	262.34	8	130	-451.03	2.88	1.1	4.18	Open
P-15	P-WL	J22	J14	478.91	12	130	-2,254.33	6.4	5.47	11.42	Open
P-16	P-WL	J20	J48	171.1	12	130	1,834.49	5.2	1.33	7.8	Open
P-17	P-WL	J26	J60	497.46	12	130	1,087.43	3.08	1.47	2.96	Open
P-18	P-WL	J24	J62	635.84	8	130	1,087.43	6.94	13.56	21.33	Open
P-19	P-WL	J46	J64	187.17	12	130	1,087.43	3.08	0.55	2.96	Open
P-2	P-WL	J18	J22	302.97	12	130	-1,594.83	4.52	1.82	6.02	Open
P-20	P-WL	J66	J46	571.05	12	130	1,088.26	3.09	1.69	2.96	Open
P-21	P-WL	J28	J68	158.32	8	130	25.75	0.16	0	0.02	Open
P-22	P-WL	J30	J24	582.03	8	130	521.08	3.33	3.18	5.46	Open
P-23	P-WL	J40	J70	436.22	8	130	-364.6	2.33	1.23	2.82	Open
P-24	P-WL	J72	J40	338.63	8	130	406.24	2.59	1.17	3.44	Open
P-25	P-WL	J32	J72	200.42	8	130	508.16	3.24	1.04	5.21	Open
P-26	Feed1	FEED1	J86	351.82	12	130	4,642.43	13.17	15.31	43.52	Open
P-27	P-WL	J70	J66	607.25	12	130	1,534.52	4.35	3.4	5.6	Open
P-28	P-WL	J38	J70	1,216.03	12	130	2,162.08	6.13	12.85	10.57	Open
P-29	P-WL	J58	J56	376.9	8	130	-715.2	4.56	3.7	9.82	Open
P-3	P-WL	J24	J26	445.48	8	130	-580.15	3.7	2.97	6.66	Open
P-30	P-WL	J48	J26	288.22	12	130	1,717.62	4.87	1.99	6.9	Open
P-31	P-WL	J42	J28	155.77	8	130	486.18	3.1	0.75	4.81	Open
P-32	F-WL	J30	J76	155.46	8	130	-74.45	0.48	0.02	0.15	Open
P-33	F-WL	J38	J78	448.27	8	130	915.70	5.84	6.96	15.52	Open
P-34	F-WL	J16	J80	619.46	8	130	1,220.65	7.79	16.37	26.42	Open
P-35	F-WL	J66	J82	539.18	8	130	-215.79	1.38	0.58	1.07	Open
P-36	F-WL	J14	J84	385.05	8	130	-788.51	5.03	4.53	11.76	Open
P-37	F-WL	J84	J86	226.39	8	130	-866.89	5.53	3.17	14.02	Open
P-38	F-WL	J78	J88	1,189.24	8	130	531.4	3.39	6.74	5.66	Open
P-39	F-WL	J88	J70	601.63	8	130	-249.16	1.59	0.84	1.39	Open
P-4	P-WL	J28	J30	485.77	8	130	446.63	2.85	1.99	4.11	Open
P-40	F-WL	J82	J88	604.45	8	130	-396.26	2.53	1.99	3.29	Open
P-41	F-WL	J80	J40	920.74	8	130	-53.15	0.34	0.07	0.08	Open
P-42	F-WL	J76	J66	179.68	8	130	-648.25	4.14	1.47	8.18	Open
P-43	P-WL	J14	J16	538.58	12	130	-2,541.10	7.21	7.68	14.26	Open
P-44	P-WL	J86	J16	0.86	12	130	3,761.75	10.67	0.03	29.48	Open
P-45	P-WL	J20	J45	316.48	12	130	0.00	0	0	0	Open
P-5	P-WL	J22	J32	171	8	130	521.96	3.33	0.94	5.48	Open
P-6	P-WL	J20	J34	473.36	8	130	-387.45	2.47	1.49	3.16	Open
P-7	Feed2	FEED2	J38	856.17	12	130	3,091.58	8.77	17.55	20.5	Open
P-8	P-WL	J40	J42	192.16	8	130	486.18	3.1	0.92	4.8	Open
P-9	P-WL	J44	J46	922.34	8	130	-0.83	0.01	0	0	Open

McWhinney

Centerra South First Subdivision

Water Model Fire Flow Report

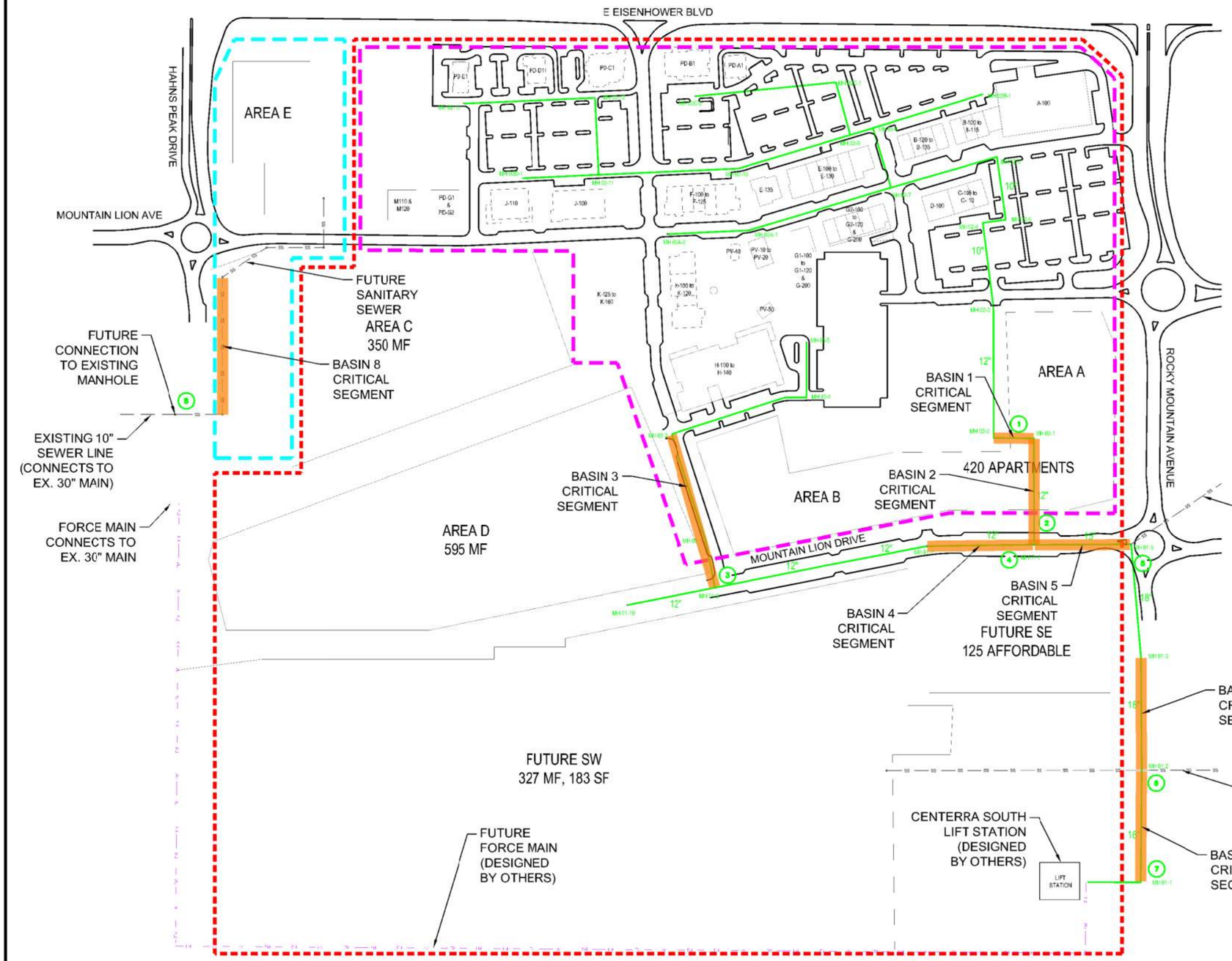
Model Run Date: 4/09/2025

Min. pressure: 47.36 ft/sec

Table B3-3: Water Model Fire Flow Report

ID (Char)	Description (Char)	Elevation (ft)	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Hydrant Available Flow (gpm)	Hydrant Pressure at Available Flow (psi)	Pass /Fail
J14	FH	4,929.03	142.76	71.93	5,095.03	1,500.00	68.91	11,742.11	20	Pass
J16	FH	4,930.29	0	72.1	5,096.68	1,500.00	70.07	15,782.31	20	Pass
J18	FH	4,926.07	32.71	72.53	5,093.47	1,500.00	68.34	9,002.34	20	Pass
J20	FH	4,925.39	36.92	72.66	5,093.07	1,500.00	68.03	8,367.04	20	Pass
J22	FH	4,927.67	57.31	72.01	5,093.86	1,500.00	68.41	10,032.24	20	Pass
J24	FH	4,924.11	13.8	72.66	5,091.79	1,500.00	64.7	5,374.35	20	Pass
J26	FH	4,924.77	28.9	72.63	5,092.39	1,500.00	67.08	7,223.90	20	Pass
J30	FH	4,924.42	0	72.8	5,092.44	1,500.00	67.35	7,036.54	20	Pass
J34	FH	4,929.47	34.54	71.01	5,093.36	1,500.00	64.22	5,382.48	20	Pass
J38	FH	4,923.00	13.8	75.05	5,096.21	1,500.00	72.07	12,014.06	20	Pass
J40	FH	4,925.00	104.51	72.89	5,093.21	1,500.00	68.69	8,631.47	20	Pass
J45	FH	4,925.39	0	72.66	5,093.07	1,500.00	67.3	6,992.56	20	Pass
J46	FH	4,922.00	0	73.84	5,092.42	1,500.00	67.29	6,175.28	20	Pass
J52	FH	4,924.50	0	72.92	5,092.80	1,500.00	66.7	6,168.75	20	Pass
J56	FH	4,930.25	15.32	71.12	5,094.38	1,500.00	65.45	6,113.36	20	Pass
J60	FH	4,925.69	453.09	72.11	5,092.10	1,500.00	64.79	6,149.44	20	Pass
J62	FH	4,924.00	453.09	71.54	5,089.11	1,500.00	47.36	2,922.01	20	Pass
J64	FH	4,921.00	453.09	74.23	5,092.31	1,500.00	67.01	6,220.87	20	Pass
J66	FH	4,921.00	13.8	74.42	5,092.76	1,500.00	69.89	8,457.17	20	Pass
J68	FH	4,926.00	10.73	72.29	5,092.85	1,500.00	63.66	4,520.96	20	Pass
J70	FH	4,918.00	13.8	76.03	5,093.47	1,500.00	72.24	9,938.59	20	Pass
J72	FH	4,926.00	42.47	72.55	5,093.45	1,500.00	67.56	6,900.87	20	Pass

Appendix C
Wastewater Exhibit and Wastewater Calculations



LEGEND

- PHASE 1 BOUNDARY
- PROPOSED SEWER LINE
- FUTURE SEWER LINE
- EXISTING SEWER LINE
- LIFT STATION BASIN
- GRAVITY BASIN
- (1) SANITARY SEWER DESIGN POINT
- SEWER BASIN CRITICAL SEGMENT

NOTES:
1. ALL SANITARY SEWER LINES ARE 8" UNLESS OTHERWISE NOTED.

MSK consulting
7157 S. Andes Circle
Centennial, CO 80016
303-903-0918

FINAL

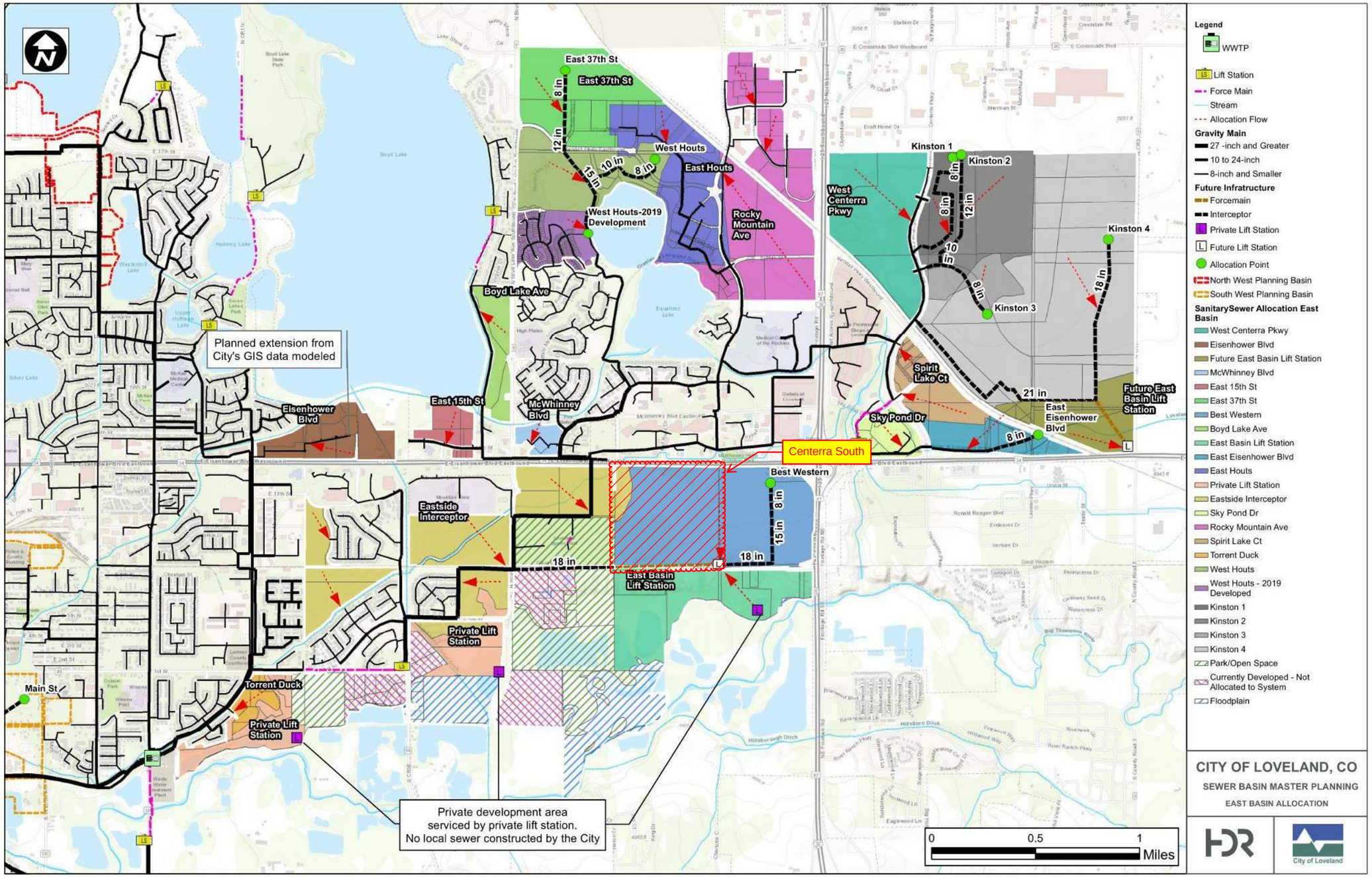
CENTERRA SOUTH DEVELOPMENT

CENTERRA SOUTH FILING 1 W&WWIDA

FIGURE C1 - SANITARY SEWER SYSTEM

MAY 2025 | SCALE: 1"=300'

Figure 6 East Basin Planning Area



Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Sewer Loads
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
5/13/25

Notes:
1. Composition is based on information sent by McWhinnery on 3/17/25, 3/24/25, 4/3/25, and 4/4/25.
2. Flow per Unit and peaking factors are based on the COL Centerra South Lift Station BDR.

Assumptions:

SF Residential Sewer Load:	200	gpd/unit
MF Residential Sewer Load:	160	gpd/unit
Office Sewer Load:	0.10	gpd/sf
Retail/Grocery Sewer Load:	0.10	gpd/sf
Restaurant Sewer Load:	1.50	gpd/sf
Hotel Sewer Load:	75	gpd/room
Industrial Sewer Load:	1,200	gpd/acre
Institutional Sewer Load:	800	gpd/acre
Population Factor:	2.5	persons/unit (not used)
Peaking Factor:	3.0813	times ADF (per COL)
Inflow/Infiltration:	10%	of ADF

Table C1-1: Centerra South and Offsite Wastewater Loading

A	B	C	D	E	F	G	H	I	J	K
No.	Area	Building	Type of Use	DU	Total Square Footage (sf)	Average Daily Flow (gpd)	Average Daily Flow (gpm)	Inflow/ Infiltration (gpm)	Peak Hour Flow + I/I (gpm)	Basin
1	Phase 1	A-100	Grocey	n/a	37,000 sf	3,700	2.57	0.26	8.17	Lift Station
2	Phase 1	B-100	Retail	n/a	1,500 sf	150	0.10	0.01	0.33	Lift Station
3	Phase 1	B-105	Retail	n/a	1,981 sf	198	0.14	0.01	0.44	Lift Station
4	Phase 1	B-110	Retail	n/a	1,500 sf	150	0.10	0.01	0.33	Lift Station
5	Phase 1	B-115	Retail	n/a	1,500 sf	150	0.10	0.01	0.33	Lift Station
6	Phase 1	B-120	Retail	n/a	1,500 sf	150	0.10	0.01	0.33	Lift Station
7	Phase 1	B-125	Retail	n/a	1,500 sf	150	0.10	0.01	0.33	Lift Station
8	Phase 1	B-130	Retail	n/a	1,500 sf	150	0.10	0.01	0.33	Lift Station
9	Phase 1	B-135	Retail	n/a	1,500 sf	150	0.10	0.01	0.33	Lift Station
10	Phase 1	C-100	Retail	n/a	3,001 sf	300	0.21	0.02	0.66	Lift Station
11	Phase 1	C-110	Retail	n/a	2,401 sf	240	0.17	0.02	0.53	Lift Station
12	Phase 1	D-100	Restaurant	n/a	6,091 sf	9,136	6.34	0.63	20.18	Lift Station
13	Phase 1	E-100	Restaurant	n/a	3,631 sf	5,447	3.78	0.38	12.03	Lift Station
14	Phase 1	E-105	Retail	n/a	2,161 sf	216	0.15	0.02	0.48	Lift Station
15	Phase 1	E-110	Retail	n/a	1,440 sf	144	0.10	0.01	0.32	Lift Station
16	Phase 1	E-115	Retail	n/a	1,440 sf	144	0.10	0.01	0.32	Lift Station
17	Phase 1	E-120	Restaurant	n/a	2,928 sf	4,393	3.05	0.31	9.70	Lift Station
18	Phase 1	E-125	Retail	n/a	1,440 sf	144	0.10	0.01	0.32	Lift Station
19	Phase 1	E-130	Retail	n/a	1,440 sf	144	0.10	0.01	0.32	Lift Station
20	Phase 1	E-135	Restaurant	n/a	3,631 sf	5,447	3.78	0.38	12.03	Lift Station
21	Phase 1	F-100	Retail	n/a	2,221 sf	222	0.15	0.02	0.49	Lift Station
22	Phase 1	F-105	Retail	n/a	1,921 sf	192	0.13	0.01	0.42	Lift Station
23	Phase 1	F-110	Retail	n/a	1,921 sf	192	0.13	0.01	0.42	Lift Station
24	Phase 1	F-115	Retail	n/a	1,801 sf	180	0.13	0.01	0.40	Lift Station
25	Phase 1	F-120	Retail	n/a	1,801 sf	180	0.13	0.01	0.40	Lift Station
26	Phase 1	F-125	Retail	n/a	2,521 sf	252	0.18	0.02	0.56	Lift Station
27	Phase 1	G1-100	Retail	n/a	2,821 sf	282	0.20	0.02	0.62	Lift Station
28	Phase 1	G1-105	Retail	n/a	1,200 sf	120	0.08	0.01	0.27	Lift Station
29	Phase 1	G1-110	Retail	n/a	1,380 sf	138	0.10	0.01	0.30	Lift Station
30	Phase 1	G1-115	Retail	n/a	1,260 sf	126	0.09	0.01	0.28	Lift Station
31	Phase 1	G1-120	Retail	n/a	1,380 sf	138	0.10	0.01	0.30	Lift Station
32	Phase 1	G1-200	Office	n/a	22,857 sf	2,286	1.59	0.16	5.05	Lift Station
33	Phase 1	G2-100	Retail	n/a	2,101 sf	210	0.15	0.01	0.46	Lift Station
34	Phase 1	G2-110	Retail	n/a	2,221 sf	222	0.15	0.02	0.49	Lift Station
35	Phase 1	G2-115	Retail	n/a	1,440 sf	144	0.10	0.01	0.32	Lift Station
36	Phase 1	G2-120	Retail	n/a	1,440 sf	144	0.10	0.01	0.32	Lift Station
37	Phase 1	G2-200	Office	n/a	13,714 sf	1,371	0.95	0.10	3.03	Lift Station
38	Phase 1	H-100	Restaurant	n/a	4,217 sf	6,325	4.39	0.44	13.97	Lift Station
39	Phase 1	H-110	Retail	n/a	1,560 sf	156	0.11	0.01	0.34	Lift Station
40	Phase 1	H-120	Retail	n/a	1,200 sf	120	0.08	0.01	0.27	Lift Station
41	Phase 1	H-130	Retail	n/a	1,020 sf	102	0.07	0.01	0.23	Lift Station
42	Phase 1	H-140	Restaurant	n/a	6,091 sf	9,136	6.34	0.63	20.18	Lift Station
43	Phase 1	H-200	Office	n/a	102,857 sf	10,286	7.14	0.71	22.72	Lift Station

A	B	C	D	E	F	G	H	I	J	K
No.	Area	Building	Type of Use	DU	Total Square Footage (sf)	Average Daily Flow (gpd)	Average Daily Flow (gpm)	Inflow/ Infiltration (gpm)	Peak Hour Flow + I/I (gpm)	Basin
44	Phase 1	J-100	Restaurant	n/a	10,191 sf	15,286	10.62	1.06	33.77	Lift Station
45	Phase 1	J-110	Restaurant	n/a	10,659 sf	15,989	11.10	1.11	35.32	Lift Station
46	Phase 1	K-100	Retail	n/a	1,861 sf	186	0.13	0.01	0.41	Lift Station
47	Phase 1	K-105	Retail	n/a	1,500 sf	150	0.10	0.01	0.33	Lift Station
48	Phase 1	K-110	Retail	n/a	1,500 sf	150	0.10	0.01	0.33	Lift Station
49	Phase 1	K-115	Retail	n/a	1,320 sf	132	0.09	0.01	0.29	Lift Station
50	Phase 1	K-120	Retail	n/a	1,200 sf	120	0.08	0.01	0.27	Lift Station
51	Phase 1	K-125	Retail	n/a	4,111 sf	411	0.29	0.03	0.91	Lift Station
52	Phase 1	K-130	Retail	n/a	3,241 sf	324	0.23	0.02	0.72	Lift Station
53	Phase 1	K-140	Retail	n/a	1,620 sf	162	0.11	0.01	0.36	Lift Station
54	Phase 1	K-150	Restaurant	n/a	3,532 sf	5,297	3.68	0.37	11.70	Lift Station
55	Phase 1	K-160	Restaurant	n/a	3,532 sf	5,297	3.68	0.37	11.70	Lift Station
56	Phase 1	PD-A1	Restaurant	n/a	3,983 sf	5,974	4.15	0.41	13.20	Lift Station
57	Phase 1	PD-B1	Restaurant	n/a	10,074 sf	15,110	10.49	1.05	33.38	Lift Station
58	Phase 1	PD-C1	Restaurant	n/a	9,956 sf	14,935	10.37	1.04	32.99	Lift Station
59	Phase 1	PD-D1	Retail	n/a	2,281 sf	228	0.16	0.02	0.50	Lift Station
60	Phase 1	PD-E1	Retail	n/a	2,101 sf	210	0.15	0.01	0.46	Lift Station
61	Phase 1	n/a	MF Residential	420	n/a	67,200	46.67	4.67	148.46	Lift Station
62	C (future)	n/a	MF Residential	270	n/a	43,200	30.00	3.00	95.44	Lift Station
63	C (future)	n/a	MF Residential	80	n/a	12,800	8.89	0.89	28.28	Gravity
64	D (future)	n/a	MF Residential	595	n/a	95,200	66.11	6.61	210.32	Lift Station
65	E (future)	L-100	Retail	n/a	30,000 sf	3,000	2.08	0.21	6.63	Gravity
66	E (future)	L-110	Retail	n/a	30,000 sf	3,000	2.08	0.21	6.63	Gravity
67	E (future)	L-115	Retail	n/a	17,500 sf	1,750	1.22	0.12	3.87	Gravity
68	Phase 1	M-110	Restaurant	n/a	3,280 sf	4,920	3.42	0.34	10.87	Lift Station
69	Phase 1	M-120	Restaurant	n/a	4,100 sf	6,150	4.27	0.43	13.59	Lift Station
70	Phase 1	PD-G1	Restaurant	n/a	4,685 sf	7,028	4.88	0.49	15.53	Lift Station
71	Phase 1	PD-G2	Restaurant	n/a	4,685 sf	7,028	4.88	0.49	15.53	Lift Station
72	Southwest (future)	n/a	MF Residential	327	n/a	52,320	36.33	3.63	115.59	Lift Station
73	Southeast (future)	n/a	MF Residential	125	n/a	20,000	13.89	1.39	44.18	Lift Station
74	South (future)	n/a	SF Residential	183	n/a	36,600	25.42	2.54	80.86	Lift Station
75	Offsite	Existing Hotel	Hotel	89	46,448 sf	6,675	4.64	0.46	14.75	Lift Station
76	Offsite	Existing Gas Station	Retail	n/a	1,998 sf	200	0.14	0.01	0.44	Lift Station
77	Offsite	Schmer - Existing	SF Residential	1	n/a	200	0.14	0.01	0.44	Lift Station
78	Offsite	Future Evergreen	Retail/Office	n/a	45,000 sf	4,500	3.13	0.31	9.94	Lift Station
79	Offsite	Future Evergreeen	Grocery	n/a	123,000 sf	12,300	8.54	0.85	27.17	Lift Station
80	Offsite	Future Evergreeen	Restaurants	0	15,000 sf	22,500	15.63	1.56	49.71	Lift Station
81	Offsite	Future Schmer	Restaurants	n/a	109,669 sf	164,504	114.24	11.42	363.43	Lift Station
82	Offsite	Future Schmer	MF Residential	488	n/a	78,080	54.22	5.42	172.50	Lift Station
83	Offsite	Future Schmer	SF Residential	425	n/a	85,000	59.03	5.90	187.79	Lift Station
Centerra South Buildout Total				**2,000**	**426,945 sf**	**503,386**	**349.57**	**34.96**	**1,112.10**	
Centerra South Lift Station Basin Buildout Total				**1,920**	**349,445 sf**	**482,836**	**335.30**	**33.53**	**1,066.70**	
Centerra South Gravity Basin Buildout Total				**80**	**77,500 sf**	**20,550**	**14.27**	**1.43**	**45.40**	
Centerra South Phase 1 Total				**420**	**349,445 sf**	**235,516**	**163.55**	**16.36**	**520.31**	
Offsite Total				**1,003**	**341,115 sf**	**373,958**	**259.69**	**25.97**	**826.17**	
Offsite Lift Station Basin Total (north connection)				**90**	**341,115 sf**	**210,878**	**146.44**	**14.64**	**465.88**	
Offsite Lift Station Basin Total (south connection)				**913**	**0 sf**	**163,080**	**113.25**	**11.33**	**360.28**	
Lift Station Basin Buildout Total (Centerra South and Offsite)				**2,923**	**690,560 sf**	**856,794**	**595.00**	**59.50**	**1,892.87**	
Gravity Basin Buildout Total (Centerra South and Offsite)				**80**	**77,500 sf**	**20,550**	**14.27**	**1.43**	**45.40**	

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Sewer Loads
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
5/13/25

Notes:
1. Development composition is based on information sent by McWhinnery on 3/17/25, 3/24/25, 4/3/25, and 4/4/25.
2. Demands and peaking factors are based on the COL Centerra South Lift Station BDR dated August 16, 2023

Table C2-1A: Lift Station Basin Sanitary Sewer Sizes

A	B	C	D	E	F	G	H	I	J	K
DESIGN POINT	Upstream MH	Downstream MH	Contributing Areas	Peak Flows (gpm)	Pipe Size (in)	Slope (%)	Max d/D	Calc'd d/D	Capacity at Max d/D (gpm)	Meets Criteria (Y/N)
1	MH 02-4	MH 02-2	Phase 1	227.34	10	0.50%	0.50	0.39	349	Yes
2	MH 02-2	MH 01-6	Phase 1	375.80	12	0.50%	0.50	0.40	567	Yes
3	MH 01-10	MH 01-9	Areas C, D, and E	386.92	12	0.50%	0.50	0.40	567	Yes
4	MH 01-9	MH 01-6	Areas C thru E, Bldgs G, H, K	450.27	12	0.50%	0.50	0.44	567	Yes
5	MH 01-6	MH 01-5	Phase 1, Areas C thru E, Bldgs G, H, K	826.07	15	0.50%	0.50	0.44	1,028	Yes
6	MH 01-5	MH 01-2	Phase 1, Areas A thru D, Bldgs G, H, K, Future SE, Future SW, Offsite North	1,336.14	18	0.50%	0.75	0.44	3,048	Yes
7	MH 01-2	LS	Entire LS Basin (including all Offsite)	1,892.87	18	0.50%	0.75	0.539	3,048	Yes

Table C2-1B: Gravity Basin Sanitary Sewer Sizes

A	B	C	D	E	F	G	H	I	J	K
DESIGN POINT	Upstream MH	Downstream MH	Contributing Parcels	Peak Flows (gpm)	Pipe Size (in)	Min Slope (%)	Max d/D	Calc'd d/D	Capacity at Max d/D (gpm)	Meets Criteria (Y/N)
8	TBD	Ex MH	Portions of Area C and E	45.40	8	0.40%	0.50	0.25	172	Yes

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Sewer Loads (no offsite)
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
5/20/25

Notes:
1. Development composition is based on information sent by McWhinnery on 3/17/25, 3/24/25, 4/3/25, and 4/4/25.
2. Demands and peaking factors are based on the COL Centerra South Lift Station BDR dated August 16, 2023

Table C2-2: Lift Station Basin Sanitary Sewer Sizes (No offsite flows)

A	B	C	D	E	F	G	H	I	J	K
DESIGN POINT	Upstream MH	Downstream MH	Contributing Areas	Peak Flows (gpm)	Pipe Size (in)	Slope (%)	Max d/D	Calc'd d/D	Capacity at Max d/D (gpm)	Meets Criteria (Y/N)
1	MH 02-4	MH 02-2	Phase 1	227.34	10	0.50%	0.50	0.39	349	Yes
2	MH 02-2	MH 01-6	Phase 1	375.80	12	0.50%	0.50	0.40	567	Yes
3	MH 01-10	MH 01-9	Areas C, D, and E	386.92	12	0.50%	0.50	0.40	567	Yes
4	MH 01-9	MH 01-6	Areas C thru E, Bldgs G, H, K	450.27	12	0.50%	0.50	0.44	567	Yes
5	MH 01-6	MH 01-5	Phase 1, Areas C thru E, Bldgs G, H, K	826.07	15	0.50%	0.50	0.44	1,028	Yes
6	MH 01-5	MH 01-2	Phase 1, Areas A thru D, Bldgs G, H, K, Future SE, Future SW	870.26	15	0.50%	0.50	0.45	1,028	Yes
7	MH 01-2	LS	Entire LS Basin	1,066.70	18	0.50%	0.75	0.386	3,078	Yes

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Lift Station Basin: 10-inch for Phase 1
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
4/12/25

Notes:
1. Criteria is based on the COL Water and Wastewater Development Standards, 2024 edition.

Upstream MH: MH 02-4
Downstream MH: MH 02-2

Inputs:

Peak flow + I/I:	227.34	gpm
Slope:	0.005	[lowest slope in this segment]
Manning's Coeff:	0.0130	
Pipe Diameter:	10 in	
	0.8 ft	
Hydraulic Radius R:	0.42 ft	

Table C3-1: Lift Station Basin, Buildout, Phase 1 12" Sanitary Sewer Capacity

d/D	Depth (ft)	Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Slope (ft/ft)	Slope (%)	Velocity (fps)	Flow (cfs)	Flow (mgd)	Flow (gpm)
d/D= 0.10	0.08	0.028	0.536	0.053	0.005	0.50%	1.14	0.0	0.0	15
d/D= 0.20	0.17	0.078	0.773	0.100	0.005	0.50%	1.75	0.1	0.1	61
d/D= 0.30	0.25	0.138	0.966	0.142	0.005	0.50%	2.21	0.3	0.2	137
d/D= 0.393	0.33	0.199	1.129	0.176	0.005	0.50%	2.55	0.5	0.3	227
d/D= 0.40	0.33	0.204	1.141	0.179	0.005	0.50%	2.57	0.5	0.3	235
d/D= 0.50	0.42	0.273	1.309	0.208	0.005	0.50%	2.85	0.8	0.5	349

Excess capacity in 10-inch, assuming a d/D of 0.5: 121 gpm

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Lift Station Basin: 12-inch for Phase 1
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
4/12/25

Notes:
1. Criteria is based on the COL Water and Wastewater Development Standards, 2024 edition.

Upstream MH: MH 02-2
Downstream MH: MH 01-6

Inputs:

Peak flow + I/I:	375.80	gpm
Slope:	0.005	[lowest slope in this segment]
Manning's Coeff:	0.0130	
Pipe Diameter:	12 in	
	1.0 ft	
Hydraulic Radius R:	0.50 ft	

Table C3-2: Lift Station Basin, Buildout, Phase 1 12" Sanitary Sewer Capacity

d/D	Depth (ft)	Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Slope (ft/ft)	Slope (%)	Velocity (fps)	Flow (cfs)	Flow (mgd)	Flow (gpm)
d/D= 0.10	0.10	0.041	0.644	0.064	0.005	0.50%	1.29	0.1	0.0	24
d/D= 0.20	0.20	0.112	0.927	0.121	0.005	0.50%	1.98	0.2	0.1	99
d/D= 0.30	0.30	0.198	1.159	0.171	0.005	0.50%	2.50	0.5	0.3	222
d/D= 0.396	0.40	0.290	1.362	0.213	0.005	0.50%	2.89	0.8	0.5	376
d/D= 0.40	0.40	0.293	1.369	0.214	0.005	0.50%	2.90	0.9	0.6	382
d/D= 0.50	0.50	0.393	1.571	0.250	0.005	0.50%	3.22	1.3	0.8	567

Excess capacity in 12-inch, assuming a d/D of 0.5: 191 gpm

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Lift Station Basin: 12-inch for Future Areas
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
4/12/25

Notes:
1. Criteria is based on the COL Water and Wastewater Development Standards, 2024 edition.

Upstream MH: MH 01-10
Downstream MH: MH 01-9

Inputs:

Peak flow + I/I:	386.92	gpm
Slope:	0.005	[lowest slope in this segment]
Manning's Coeff:	0.0130	
Pipe Diameter:	12 in	
	1.0 ft	
Hydraulic Radius R:	0.50 ft	

Table C3-3: Lift Station Basin, Buildout, Future Areas 12" Sanitary Sewer Capacity

d/D	Depth (ft)	Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Slope (ft/ft)	Slope (%)	Velocity (fps)	Flow (cfs)	Flow (mgd)	Flow (gpm)
d/D= 0.10	0.10	0.041	0.644	0.064	0.005	0.50%	1.29	0.1	0.0	24
d/D= 0.20	0.20	0.112	0.927	0.121	0.005	0.50%	1.98	0.2	0.1	99
d/D= 0.30	0.30	0.198	1.159	0.171	0.005	0.50%	2.50	0.5	0.3	222
d/D= 0.40	0.40	0.293	1.369	0.214	0.005	0.50%	2.90	0.9	0.6	382
d/D= 0.403	0.40	0.296	1.375	0.215	0.005	0.50%	2.91	0.9	0.6	387
d/D= 0.50	0.50	0.393	1.571	0.250	0.005	0.50%	3.22	1.3	0.8	567

Excess capacity in 12-inch, assuming a d/D of 0.5: 180 gpm

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Lift Station Basin: 12-inch for Future Areas
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
4/12/25

Notes:
1. Criteria is based on the COL Water and Wastewater Development Standards, 2024 edition.

Upstream MH: MH 01-9
Downstream MH: MH 01-6

Inputs:

Peak flow + I/I:	450.27	gpm
Slope:	0.005	[lowest slope in this segment]
Manning's Coeff:	0.0130	
Pipe Diameter:	12 in	
	1.0 ft	
Hydraulic Radius R:	0.50 ft	

Table C3-4: Lift Station Basin, Buildout, Future Areas 12" Sanitary Sewer Capacity

d/D	Depth (ft)	Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Slope (ft/ft)	Slope (%)	Velocity (fps)	Flow (cfs)	Flow (mgd)	Flow (gpm)
d/D= 0.10	0.10	0.041	0.644	0.064	0.005	0.50%	1.29	0.1	0.0	24
d/D= 0.20	0.20	0.112	0.927	0.121	0.005	0.50%	1.98	0.2	0.1	99
d/D= 0.30	0.30	0.198	1.159	0.171	0.005	0.50%	2.50	0.5	0.3	222
d/D= 0.40	0.40	0.293	1.369	0.214	0.005	0.50%	2.90	0.9	0.6	382
d/D= 0.438	0.44	0.331	1.447	0.229	0.005	0.50%	3.03	1.0	0.6	450
d/D= 0.50	0.50	0.393	1.571	0.250	0.005	0.50%	3.22	1.3	0.8	567

Excess capacity in 12-inch, assuming a d/D of 0.5: 117 gpm

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Lift Station Basin: 15-inch in "Mountain Lion Ave"
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
4/12/25

Notes:
1. Criteria is based on the COL Water and Wastewater Development Standards, 2024 edition.

Upstream MH: MH 01-6
Downstream MH: MH 01-5

Inputs:

Peak flow + I/I:	826.07	gpm
Slope:	0.005	[lowest slope in this segment]
Manning's Coeff:	0.0130	
Pipe Diameter:	15 in	
	1.3 ft	
Hydraulic Radius R:	0.63 ft	

Table C3-5: Lift Station Basin Buildout "Mountain Lion Ave" Sanitary Sewer Capacity

d/D	Depth (ft)	Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Slope (ft/ft)	Slope (%)	Velocity (fps)	Flow (cfs)	Flow (mgd)	Flow (gpm)
d/D= 0.25	0.31	0.240	1.309	0.183	0.005	0.50%	2.62	0.6	0.4	282
d/D= 0.30	0.38	0.310	1.449	0.214	0.005	0.50%	2.90	0.9	0.6	403
d/D= 0.40	0.50	0.458	1.712	0.268	0.005	0.50%	3.37	1.5	1.0	693
d/D= 0.441	0.55	0.522	1.816	0.287	0.005	0.50%	3.53	1.8	1.2	826
d/D= 0.45	0.56	0.536	1.838	0.291	0.005	0.50%	3.56	1.9	1.2	856
d/D= 0.50	0.63	0.614	1.963	0.313	0.005	0.50%	3.73	2.3	1.5	1,028

Excess capacity in 15-inch, assuming a d/D of 0.5: 202 gpm

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Lift Station Basin: 18-inch in Rocky Mountain Avenue (with offsite)
Date: July 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
7/25/25

Notes:
1. Criteria is based on the COL Water and Wastewater Development Standards, 2024 edition.

Upstream MH: MH 01-5
Downstream MH: MH 01-2

Inputs:

Peak flow + I/I:	1336.14	gpm
Slope:	0.005	[lowest slope in this segment]
Manning's Coeff:	0.0130	
Pipe Diameter:	18 in	
	1.5 ft	
Hydraulic Radius R:	0.75 ft	

Note:
This table shows the resulting d/D for this sewer segment with a diameter of 18 inches. At buildout with offsite flows the segment does meet the d/D criteria.

Compare these results to Table C3-6C that show this segment does not meet the d/D criteria if it is a 15-inch and includes offsite flows.

Table C3-6A: Lift Station Basin Buildout Rocky Mountain Avenue Sanitary Sewer Capacity

d/D	Depth (ft)	Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Slope (ft/ft)	Slope (%)	Velocity (fps)	Flow (cfs)	Flow (mgd)	Flow (gpm)
d/D= 0.25	0.38	0.345	1.571	0.220	0.005	0.50%	2.95	1.0	0.7	458
d/D= 0.35	0.53	0.551	1.899	0.290	0.005	0.50%	3.55	2.0	1.3	879
d/D= 0.40	0.60	0.660	2.054	0.321	0.005	0.50%	3.80	2.5	1.6	1,126
d/D= 0.440	0.66	0.748	2.175	0.344	0.005	0.50%	3.98	3.0	1.9	1,336
d/D= 0.50	0.75	0.884	2.356	0.375	0.005	0.50%	4.21	3.7	2.4	1,671
d/D= 0.75	1.13	1.422	3.142	0.453	0.005	0.50%	4.78	6.8	4.4	3,048

Excess capacity in 18-inch, assuming a d/D of 0.75: 1,712 gpm

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Lift Station Basin: 15-inch in Rocky Mountain Avenue (no offsite)
Date: July 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
7/25/25

Notes:
1. Criteria is based on the COL Water and Wastewater Development Standards, 2024 edition.

Upstream MH: MH 01-5
Downstream MH: MH 01-2

Note:
This table shows the resulting d/D for this sewer segment with a diameter of 15 inches. At buildout without offsite flows the segment does meet the d/D criteria.

Inputs:

Peak flow + I/I:	870.26	gpm
Slope:	0.005	[lowest slope in this segment]
Manning's Coeff:	0.0130	
Pipe Diameter:	15 in	
	1.3 ft	
Hydraulic Radius R:	0.63 ft	

Table C3-6B: Lift Station Basin Buildout Rocky Mountain Avenue Sanitary Sewer Capacity

d/D	Depth (ft)	Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Slope (ft/ft)	Slope (%)	Velocity (fps)	Flow (cfs)	Flow (mgd)	Flow (gpm)
d/D= 0.25	0.31	0.240	1.309	0.183	0.005	0.50%	2.62	0.6	0.4	282
d/D= 0.35	0.44	0.383	1.583	0.242	0.005	0.50%	3.15	1.2	0.8	540
d/D= 0.40	0.50	0.458	1.712	0.268	0.005	0.50%	3.37	1.5	1.0	693
d/D= 0.45	0.56	0.536	1.838	0.291	0.005	0.50%	3.56	1.9	1.2	856
d/D= 0.454	0.57	0.542	1.849	0.293	0.005	0.50%	3.58	1.9	1.3	870
d/D= 0.50	0.63	0.614	1.963	0.313	0.005	0.50%	3.73	2.3	1.5	1,028

Excess capacity in 15-inch, assuming a d/D of 0.5: 158 gpm

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Lift Station Basin: 15-inch in Rocky Mountain Avenue (with offsite)
Date: July 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
7/25/25

Notes:
1. Criteria is based on the COL Water and Wastewater Development Standards, 2024 edition.

Upstream MH: MH 01-5
Downstream MH: MH 01-2

Inputs:

Peak flow + I/I:	1336.14	gpm
Slope:	0.005	[lowest slope in this segment]
Manning's Coeff:	0.0130	
Pipe Diameter:	15 in	
	1.3 ft	
Hydraulic Radius R:	0.63 ft	

Note:
This table shows the resulting d/D for this sewer segment with a diameter of 15 inches. At buildout with offsite flows the segment does not meet the d/D criteria.

It demonstrates that this segment must be upsized to 18-inch (see Table C3-6A) to meet the d/D criteria because of the offsite flows.

Table C3-6C: Lift Station Basin Buildout Rocky Mountain Avenue Sanitary Sewer Capacity

d/D	Depth (ft)	Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Slope (ft/ft)	Slope (%)	Velocity (fps)	Flow (cfs)	Flow (mgd)	Flow (gpm)
d/D= 0.25	0.31	0.240	1.309	0.183	0.005	0.50%	2.62	0.6	0.4	282
d/D= 0.35	0.44	0.383	1.583	0.242	0.005	0.50%	3.15	1.2	0.8	540
d/D= 0.40	0.50	0.458	1.712	0.268	0.005	0.50%	3.37	1.5	1.0	693
d/D= 0.45	0.56	0.536	1.838	0.291	0.005	0.50%	3.56	1.9	1.2	856
d/D= 0.50	0.63	0.614	1.963	0.313	0.005	0.50%	3.73	2.3	1.5	1,028
d/D= 0.587	0.73	0.749	2.183	0.343	0.005	0.50%	3.97	3.0	1.9	1,336

Excess capacity in 15-inch, assuming a d/D of 0.5: -308 gpm

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Lift Station Basin: 18-inch to Lift Station (with offsite)
Date: July 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
7/25/25

Notes:
1. Criteria is based on the COL Water and Wastewater Development Standards, 2024 edition.

Upstream MH: MH 01-2
Downstream MH: LS

Inputs:

Peak flow + I/I:	1892.87	gpm
Slope:	0.005	[lowest slope in Rocky Mtn Ave]
Manning's Coeff:	0.0130	
Pipe Diameter:	18 in	
	1.5 ft	
Hydraulic Radius R:	0.75 ft	

Note:
This table shows the resulting d/D for this sewer segment with a diameter of 18 inches. At buildout with offsite flows the segment does meet the d/D criteria.

Compare these results to Table C3-7B that show this segment does not meet the d/D criteria if it is a 15-inch and does not include offsite flows.

Table C3-7A: Lift Station Basin Buildout Rocky Mountain Avenue Sanitary Sewer Capacity

d/D	Depth (ft)	Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Slope (ft/ft)	Slope (%)	Velocity (fps)	Flow (cfs)	Flow (mgd)	Flow (gpm)
d/D= 0.25	0.38	0.345	1.571	0.220	0.005	0.50%	2.95	1.0	0.7	458
d/D= 0.35	0.53	0.551	1.899	0.290	0.005	0.50%	3.55	2.0	1.3	879
d/D= 0.45	0.68	0.771	2.206	0.350	0.005	0.50%	4.02	3.1	2.0	1,392
d/D= 0.50	0.75	0.884	2.356	0.375	0.005	0.50%	4.21	3.7	2.4	1,671
d/D= 0.539	0.81	0.971	2.473	0.393	0.005	0.50%	4.35	4.2	2.7	1,893
d/D= 0.75	1.13	1.422	3.142	0.453	0.005	0.50%	4.78	6.8	4.4	3,048

Excess capacity in 18-inch, assuming a d/D of 0.75: 1,155.10 gpm

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Lift Station Basin: 15-inch to Lift Station (no offsite)
Date: July 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
7/25/25

Notes:
1. Criteria is based on the COL Water and Wastewater Development Standards, 2024 edition.

Upstream MH: MH 01-2
Downstream MH: LS

Inputs:

Peak flow + I/I:	1066.70	gpm
Slope:	0.0051	[lowest slope in Rocky Mtn Ave]
Manning's Coeff:	0.0130	
Pipe Diameter:	15 in	
	1.3 ft	
Hydraulic Radius R:	0.63 ft	

Note:
This table shows the resulting d/D for this sewer segment with a diameter of 15 inches. At buildout without offsite flows the segment does not meet the d/D criteria.

It demonstrates that this segment must be upsized to 18-inch (see Table C3-7A) to meet the d/D criteria even without offsite flows.

Table C3-7B: Lift Station Basin Buildout Rocky Mountain Avenue Sanitary Sewer Capacity

d/D	Depth (ft)	Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Slope (ft/ft)	Slope (%)	Velocity (fps)	Flow (cfs)	Flow (mgd)	Flow (gpm)
d/D= 0.25	0.31	0.240	1.309	0.183	0.005	0.51%	2.64	0.6	0.4	284
d/D= 0.30	0.38	0.310	1.449	0.214	0.005	0.51%	2.93	0.9	0.6	407
d/D= 0.35	0.44	0.383	1.583	0.242	0.005	0.51%	3.18	1.2	0.8	546
d/D= 0.40	0.50	0.458	1.712	0.268	0.005	0.51%	3.40	1.6	1.0	700
d/D= 0.50	0.63	0.614	1.963	0.313	0.005	0.51%	3.77	2.3	1.5	1,038
d/D= 0.508	0.64	0.626	1.984	0.316	0.005	0.51%	3.80	2.4	1.5	1,067

Excess capacity in 15-inch, assuming a d/D of 0.50: -28.71 gpm

Centerra South 1st Subdivision for McWhinney
W&WIDA Report
Gravity Basin: Future 8-inch
Date: May 2025
MSK Project #: 45-006-01
Calc'd by: DLT

FINAL
5/13/25

Notes:
1. Criteria is based on the COL Water and Wastewater Development Standards, 2024 edition.

Upstream MH: TBD
Downstream MH: Ex MH

Inputs:

Peak flow + I/I:	45.4	gpm
Slope:	0.004	[Min slope for 8" sewer]
Manning's Coeff:	0.0130	
Pipe Diameter:	8 in	
	0.7 ft	
Hydraulic Radius R:	0.33 ft	

Table C3-8: Gravity Basin Buildout Future Sanitary 8" Sewer Capacity

d/D	Depth (ft)	Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Slope (ft/ft)	Slope (%)	Velocity (fps)	Flow (cfs)	Flow (mgd)	Flow (gpm)
d/D= 0.10	0.07	0.018	0.429	0.042	0.004	0.40%	0.88	0.0	0.0	7
d/D= 0.20	0.13	0.050	0.618	0.080	0.004	0.40%	1.35	0.1	0.0	30
d/D= 0.245	0.16	0.066	0.691	0.096	0.004	0.40%	1.52	0.1	0.1	45
d/D= 0.37	0.25	0.119	0.877	0.136	0.004	0.40%	1.92	0.2	0.1	102
d/D= 0.40	0.27	0.130	0.913	0.143	0.004	0.40%	1.98	0.3	0.2	116
d/D= 0.50	0.33	0.175	1.047	0.167	0.004	0.40%	2.20	0.4	0.2	172

Excess capacity in 8-inch, assuming a d/D of 0.5: 127 gpm