WATER & SANITATION REPORT

FOR

CENTURA PARKER NHC

June 01, 2023

Prepared For:

CENTURA HEALTH
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Registered Professional Engineer
State of Colorado No. 33854

ENGINEER'S STATEMENT

This Utility Report for the design of CENTURA PARKER NHC was prepared by me or under my direct supervision in accordance with the provisions of the Parker Water and Sanitation District (District) Standards and Specifications for the responsible parties thereof. I understand that the district does not and shall not assume liability for utility facilities designed by others.

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Jason Carr, P.E.
Registered Professional Engineer
State of Colorado No. 33854

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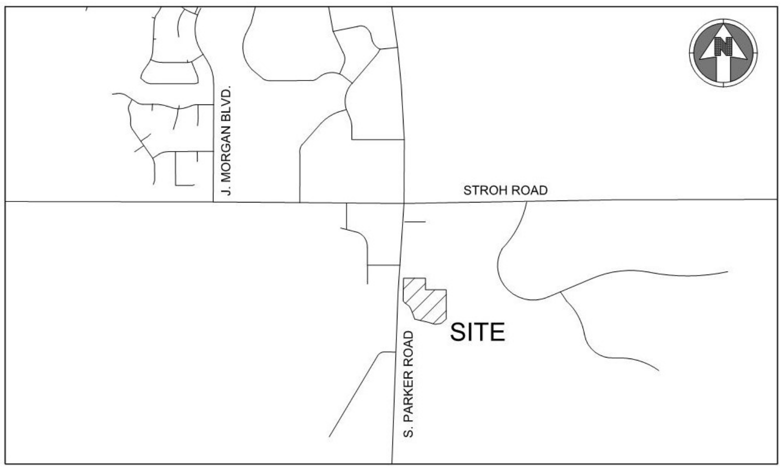
I. General Location And Site Condition

A. Location

The proposed Centura Parker NHC (Project) is located southeast of the intersection of Stroh Road and S. Parker Road. More specifically, the Project is located on Filing No. 1, Lots 6-14. The parcel is in the northeast 1/4 of Section 3, Township 3 South, Range 66 West of the Sixth Principal Meridian in the Town of Parker, Douglas County, and State of Colorado.

Locally, the Project is located in a moderately developed area. Parker Road and retail development is located to the west, open space and large Lot single family development is located to the east. Kinney Creek and open space/undeveloped areas located to the west of the site. See the vicinity map below.



Vicinity Map

B. Description of Property

The project site is 4.08 acres in size and is currently undeveloped. The proposed Centura Parker NHC (Project) is located southeast of the intersection of Stroh Road and S. Parker Road. More specifically, the Project is located on Filing No. 1, Lots 6-14 of Parker Point Subdivision. The parcel is in the northeast 1/4 of Section 3, Township 3 South, Range 66 West of the Sixth Principal Meridian in the Town of Parker, Douglas County, and State of Colorado.

The Project is within the limits of the approved "Final Utility Study for Parker Pointe" prepared in September 2017 by Perception Design Group, and the proposed use is consistent with the Master Utility Study.

C. Existing Utility Conditions

Existing Water

Existing 8" water mains are on the east side of the site loop within the property and north to Stroh Road. There are two existing hydrants east of the proposed building.

Existing Sanitary Sewer

An existing 8" sanitary main crosses S. Parker Road from the west and is stubbed into the subject property. The main is a gravity main that drains to the north and is aligned along Stroh Ranch Court.

II. SITE UTILITY DESIGN

A. PROPOSED DEVELOPMENT

The Project includes the construction of two-story neighborhood health center, surface parking lot, walking trails, utilities, drainage infrastructure, and associated landscaping and hardscape improvements. The facility will provide primary care, radiology, laboratory space, pharmacy, and general support spaces.

B. PROPOSED DOMESTIC WATER

From the existing 8-inch main, domestic water and fire sprinkler services will be tapped and service the proposed building. One On-site fire hydrants will also be tapped from the existing 8-inch main north of the building along the access road. The existing hydrant on the east side of the property will be relocated to a landscape island.

Site irrigation will be provided from a tap off the domestic service line past the meter and backflow meter. On-site landscaping will be irrigated by a private irrigation system installed on site. The on-site landscaping area will be privately owned and maintained by the Owner.

C. FIRE FLOW DEMANDS

Fire flow demands are calculated based on 2015 IFC Criteria with Town of Parker edits. The following summarizes the fire flow demand. See calculations in the Appendix.

Construction Type: 2B

Occupancy Groups: B

Fire Flow Calculation Area: 30,120 SF

Minimum Number of Hydrants: 2

Fire Flow Demand: 1,875 GPM

Fully Sprinklered Building Fire Flow System Demand: 250 GPM.

D. PROPOSED SANITARY SERVICES

Sanitary sewer service will be provided for the proposed building by a single 6-inch service line. A sanitary sewer service line will exit the building and connect to the existing main in the site.

The sanitary sewer design for the Project has been prepared in accordance with the district's Master Study, Sanitary Sewer Facilities. The property is within the limits of the "Final Utility Study for Parker Pointe" prepared in September 2017 by Perception Design Group, and the sanitary sewer design has been prepared in accordance with Parker Water and Sanitation District guidelines.

Commercial Demands = 273 GPD / AC

Peak Factor = 3.2

Table 1 – Sanitary Sewer Demand Calculations

Demand Scenario	Demand (GPD)	Demand (CFS)
Average Day Flow	1,114	0.002
Peak Day Flow	3,565	0.0064

Pipe capacity is sufficient for the design flow. A 6-inch PVC service line at 2% will provide the required capacity. Full flow condition results in a pipe velocity of 5.25 ft/s.

III. CONCLUSION

The proposed water and sanitary sewer will operate within the District Standards.

IV. CONCLUSION REFERENCES

1. Parker Water and Sanitation District. Parker Water and Sanitation District 2014 Water and Wastewater Master Plan.

2. “Final Utility Study for Parker Pointe” September 2017 by Perception Design Group.

A: DISTRICT FIGURES AND DATA

A graphical representation of the projected average water demand provided in Table 3-3 is shown in Figure 3-3, "Historical and Forecasted Averaged Day Demands." As a comparison, a "best fit" straight line projection is shown based on the historical demands. The historical straight line projections also correlated to a single family rate of growth of 470 Du/year. It can be seen that the projected demand rises slightly above this line as would be expected due to the proposed start of the Ridgegate, Canyons and Freshfields developments along the I-25 corridor.

For water system master planning maximum day (MD) and peak hour (PH) water demands are required. While the MD demand is used to size treatment plant and storage tank capacities, PH demand is used to properly size pump stations and distribution pipelines. Peaking factors were calculated based on 2012 and 2013 water demand data. The calculated MD factor was 2.4 and the corresponding PH factor was 4.8. Since limited data was available for an extensive assessment of these factors, an MD factor of 2.5 and a PH factor of 5.0 were assumed. These factors match those used in the 2009 PWSD Water and Wastewater Master Plan.

A summary of the MP peaking factors are provided in Table 3-4, "Peaking Factors." Peak water demand projections are shown in Table 3-5, "Projected Peak Water Demands."

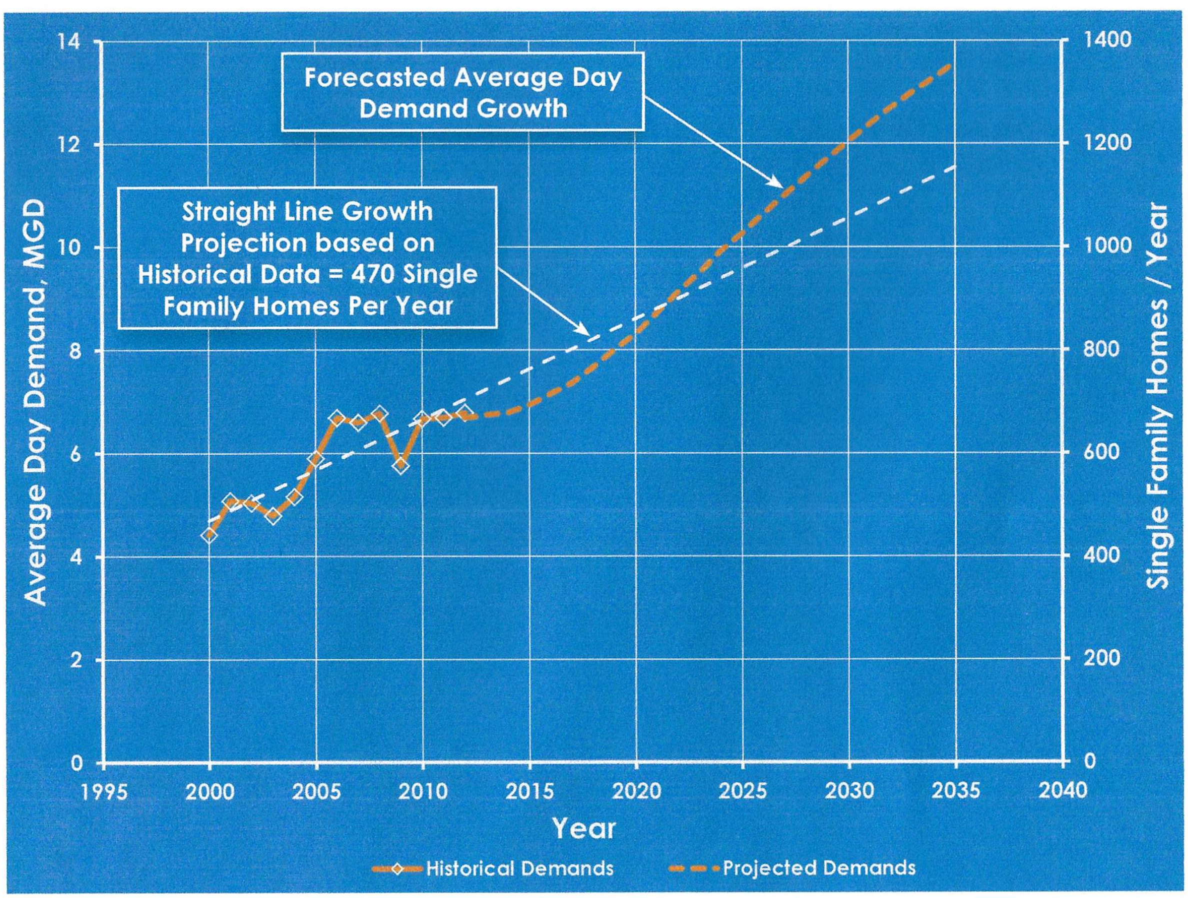
Table 3-4
Peaking Factors

Condition	Peaking Factor
Maximum Day (MD)	2.5
Peak Hour (PH)	5.0

3.6 Diurnal Flow Characteristics

For modeling the PWSD water distribution system and evaluating system storage requirements, an accurate diurnal flow curve is needed. A diurnal flow curve represents how the demands in the system vary during a 24-hour period. To develop this curve, data from 2012 and 2013 was used to represent the current trends in water use. Typical summer and winter diurnal curves were developed and are provided in Figure 3-4, "Summer and Winter

Figure 3-3
Historical and Forecasted Average Day Demands



Section 5

Water Distribution System Evaluation

5.1 Purpose of the Section

This Section describes the existing water distribution system and the improvements needed to support the build-out populations and development described in previous Sections. The improvements are based upon existing and future system analysis with a computer hydraulic model using Innovyze InfoWater® software. This Section will review the analysis results for the following key issues:

- Peak hour demands and fire flow for the existing system.
- WISE participant flows conveyed through the existing PWSD system.
- Future water distribution system piping, storage, and boost pump station requirements.
- Determination of the system improvements needed by Phase for 2020, 2025, 2035 and build-out.

This Section will touch on the future supply sources from the existing wells and the Rueter-Hess Water Purification Facility (RHWPF) currently under construction. However, a complete evaluation of the existing and future water supply sources (including wells) will be covered in detail in Section 7, "Water Supply System Evaluation." This Section will also identify the future capital projects needed to support the water distribution system growth. The costs for these improvements will be presented in Section 9, "Summary of Recommended Capital Improvements."

5.2 Description of Existing Water Distribution System

The PWSD existing water distribution system consists of three (3) main pressure zones and a multifaceted network of storage tanks, groundwater wells, booster pump stations, and transmission mains. A map of the existing water system facilities is shown in Figure 5-1, "PWSD Existing Water Distribution System." Figure 5-1 presents the major transmission mains in the system and does not include all the smaller distribution system piping within the District or the pipe diameters for clarity on the figure. The piping shown in Figure 5-1 also reflects the pipe network used in the water model. A map of the District's existing water distribution system, including all pipe sizes, is provided in Appendix 5A. A detailed description of the existing water distribution system facilities are provided in the following sections.

5.2.1 Pressure Zones

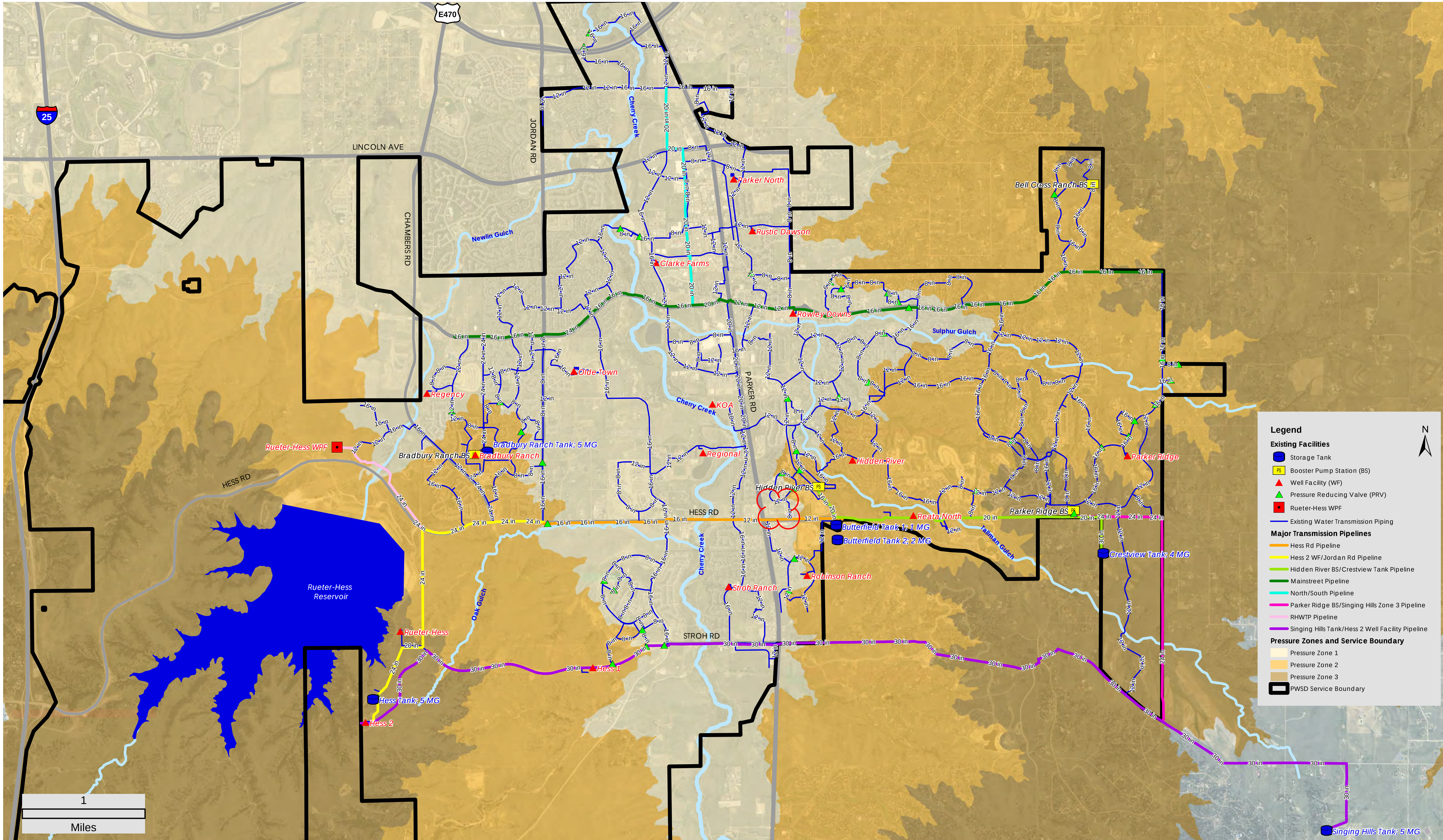
The PWSD current service area has varying topography and is centered on the middle reach of the Cherry Creek watershed basin. As a result, the PWSD system has developed into three (3) pressure zones, with Zone 1 being the lowest elevation immediately along Cherry Creek followed by Zones 2 then Zone 3 as ground elevations increase. Pressure Zones 2 and 3 are further divided into East and West portions due to the Cherry Creek Valley being located through the middle of the service area. The Zone 2 East and West portions are not directly connected hydraulically across the Cherry Creek Valley. Zone 3, however, is hydraulically connected with a 30" east-west pipeline along Stroh Road that joins the Zone 3 East and West portions. Elevation ranges and hydraulic grade lines for these pressure zones are shown in Table 5-1, "Pressure Zone Summary." The pressure zone areas are depicted on Figure 5-1.

Table 5-1
Pressure Zone Summary

Pressure Zone	Ground Elevation Range	Minimum Hydraulic Grade Line[1]	Maximum Hydraulic Grade Line
	ft	ft	ft
1	5,780 – 6,000	6,103.0[2]	6,128.5
2[3]	6,000 – 6,205	6,315.0	6,324.0
3	6,205 – 6,440	6,581.0	6,592.0

Notes:
[1] The minimum hydraulic grade line represents the storage tanks being approximately ½ their full depth.
[2] Based on the ½ full depths of the Butterfield Tanks.
[3] Zone 2 is separated into an East and West side and is not directly hydraulically connected.

Figure 5-1
PWSD Existing Water Distribution System



multifamily irrigation taps, and irrigated rights-of-way (ROW) and medians. These demands were distributed among the Irrigated, Single Family, Multifamily, Commercial and Public Facility land uses based on land use acreages. The Irrigated land use was assumed to be strictly irrigated parks, sodded with Kentucky Bluegrass which requires approximately 26" of irrigation per growing season (year) to produce an acceptable quality turf. (Refer to Appendix 5F for supplemental information on Kentucky Bluegrass irrigation requirements.) Based on these assumptions, an annual irrigation demand was calculated and assigned only to the Irrigated land use (parks). The Irrigated land use demand was then deducted from the total irrigation customer class demand, where the remaining customer class demand was assumed to equal the irrigation demands for the commercial and multifamily irrigation taps and irrigated ROW and medians. The remaining customer class demands were distributed among Single Family, Multifamily, Commercial, and Public Facility based on land use acreage. A summary of the existing average day demands by land use are provided in Table 5-9, "Existing Average Day Demand by Land Use." These values were used in conjunction with the various land uses, shown in Section 2, Figure 2-6, to determine model input demands.

There is no specific land use that currently exists within the PWSD service area that is similar to the City Center (High Density) land use proposed in the Ridgegate Development. This land use area is shown on Figure 2-6 in Section 2. As a result, there is no comparable water demand data available upon which to make future demand estimates. The Ridgegate developer has provided PWSD with water rights for 12,000 dwelling units (DUs); therefore, this number was used to calculate the development water demands. Based on DU projections provided by the developer for the planned Ridgegate Development presented in Section 2, Figure 2-4, water demands for the City Center area were calculated using 4,370 DUs. The remaining dwelling units (7,630 DUs) are for residential and mixed use areas outside of the City Center.

Table 5-9
Existing Average Day Demand by Land Use

Land Use Type	Demand GPD/acre
Right-of-Way	0
Commercial	677
Public Facility	677
Open Space	0
Irrigated	1,930
Single Family	2,074
Single Family Large	446
Single Family Estate	749
Single Family Rural	115
Single Family Well & Septic	0
Mutifamily	3,384

5.3.5 Modeled Scenarios and Settings

Steady-state and extended period simulations were conducted on the existing and build-out water systems, respectively. Steady state analyses were run to simulate worst case conditions within the existing system to identify system deficiencies, whereas, an extended period simulation was performed on the build-out system to size future infrastructure. A list of the modeled scenarios are provided in Table 5-10, "Modeled Scenarios." A general summary of the model settings used to execute the model

Table 5-10
Modeled Scenarios

Scenario	Condition	Simulation Type	Evaluation
Peak Hour	Existing	Steady State	Worst case operating scenario; identify system deficiencies for pressure and pipe velocities
Maximum Day + Fire Flow	Existing	Steady State	Fire flow analysis; identify system deficiencies for residual pressure, ability to supply required fire flow, pipe velocities
Maximum Day	Build-Out	Extended Period	24-hour Maximum Day diurnal curve including Peak Hour; identify pipe sizing, storage tank volumes, pump station sizing, evaluate system performance

Table 6-3
Wastewater Collection System Evaluation Parameters

Parameter	Value
Flow Parameters	
Average Day Flows	Existing – 2.95 MGD
	Build-out – 8.79 MGD
Maximum Month Flows	Existing – 3.54 MGD
	Build-out – 10.55 MGD
Peak Flows (10-Year Storm Frequency)	Existing – 9.44 MGD
	Build-out – 28.13 MGD
Peaking Factor (10-Year Storm Frequency)	3.2
Base Infiltration	Included as part of the Average Day Flows
Gravity Flow Pipe Parameters	
Minimum Pipe Size	8 inch
Minimum Pipe Depth	8 feet
Manning's Roughness Coefficient[1]	0.013
Maximum Flow in Pipe[3], d/D d = depth of flow; D = pipe diameter	0.80
Maximum Pipe Velocity[1]	10 ft/s
Force Main Parameters	
Hazen-William C Factor[2]	120
Maximum Pipe Velocity During Peak Flows[2]	8 ft/s

Notes:
[1] ASCE. Manual No. 60 – Gravity Sanitary Sewer Design and Construction, 1982. (Appendix 6C)
[2] Jones, G., et al. Pumping Station Design, Third Revision, 2008. (Appendix 6C)
[3] CDPHE, WQCD. WPC-DR-1 State of Colorado Design Criteria for Domestic Wastewater Treatment Works, September 14, 2012. (Appendix 6C)

6.3.2 Software

InfoSewer® is the modeling software used to analyze the hydraulic performance of the PWSD wastewater collection system. The model includes a network of pipes, manholes and lift stations represented by wet wells, pumps, and force mains. For the purposes of this Master Plan and to determine future capital improvement needs, a skeletonized model was developed based on the pipes shown in Figure 6-1. The skeletonized model used major collector and interceptor pipelines, typically 12" diameter and larger, with some smaller 8" mains necessary for flow allocation.

6.3.3 Flow Categories

Flows in the PWSD wastewater collection system can be divided into the following three (3) categories for modeling purposes:

- **Average day (AD)** flows are the total wastewater flows generated in a year divided by the number of days in a year (365). AD flows, or base flows, are contributed to the collection system from residential, commercial, institutional, and industrial sources.

- **Base Infiltration** is groundwater entering the sewer system through defective pipe joints and cracked pipes on a continuous basis when there is not a wet weather event occurring.

- **Infiltration and Inflow (I/I)** are peak flows, or wet weather flows, that result from precipitation events. Rainfall induced wet weather infiltration is precipitation that flows through the ground before entering the sewer system through cracked pipes and defective joints. Inflow is storm water that enters the collection system through surface means such as manhole lids and leaking seals and joints in manholes. In some systems the inflow can also enter through storm or roof drain connections.

Peak flows were analyzed based on storm return frequency (or probability) and were presented in Section 4. Various rainfall frequencies were evaluated. Based on discussion and review of this analysis with PWSD, it was decided that the 10-year storm return frequency peak flows would be used for evaluating the collection system for planning and design purposes.

6.3.4 Flows by Land Use

Determining the wastewater flows by land use and drainage basin area is important for developing the model input flows and their distribution across the wastewater collection system. Wastewater flows based on land use were generated from the average daily water demand projections by customer classification presented in Section 5, Table 5-8. The water demands for Single Family, Multifamily, and Commercial classifications were multiplied by the wastewater to water GPCD ratio (69 GPCD/137 GPCD = 0.5) and normalized to equal the average day projected wastewater flows provided in Section 4, Table 4-6. Wastewater flows for the Single Family category were further apportioned to the Single Family, Single Family Large, Single Family Estate, and Single Family Rural land uses based on a weighting for lot size. Public Facilities were considered commercial uses and were assigned the same flow contributions as the Commercial land use. A summary of the existing average day wastewater flows by land use are provided in Table 6-4, "Existing Average Day Wastewater Flows by Land Use." These values were used in conjunction with the various land uses, shown in Section 2, Figure 2-6, to determine model input flows.

Table 6-4
Existing Average Day Wastewater Flows by Land Use

Land Use Type	Flow Loading GPD/Acre
Right-of-Way	0
Commercial	273
Public Facility	273
Open Space	0
Irrigated	0
Single Family	1,076
Single Family Large	430
Single Family Estate	258
Single Family Rural	65
Single Family Well & Septic	0
Multifamily	1,729

There is no specific land use that currently exists within the PWSD service area that is similar to the City Center (High Density) land use proposed in the Ridgegate Development. This land use area is shown on Figure 2-6 in Section 2. As a result, there is no comparable wastewater flow data available upon which to make future flow estimates. The Ridgegate developer has provided PWSD with water rights for 12,000 dwelling units (DUs); therefore, this number was used to calculate the development wastewater flows. Based on DU projections provided by the developer for the planned Ridgegate Development presented in Section 2, Figure 2-4, wastewater flows for the City Center area were calculated using 4,370 DUs. The remaining dwelling units (7,630 DUs) are for residential and mixed use areas outside of the City Center.

6.3.5 Modeled Scenarios and Settings

Steady state model simulations were conducted on the existing and build-out wastewater collection system. A steady state scenario was analyzed using the 10-year storm return frequency peak flows to simulate worst case conditions within the wastewater collection system for identifying existing system deficiencies and sizing future system facilities. A summary of the model scenarios are provided in Table 6-5, "Modeled Scenarios." A general summary of the model settings used to execute the model simulations are provided in Table 6-6, "Model Settings." Refer to Appendix 6D for supplemental information on the model facility settings.

6.3.6 Wastewater Flow Allocation

Wastewater flows were added to the model using the Load Allocator Module and Polygon Intersection Method within the InfoSewer® software. The Polygon Intersection Method calculated the flows between the demand polygon and the land use polygon. The demand polygon is a compilation of smaller demand polygons that are designated to the individual manhole nodes in the model. A general demand polygon was created by the Load Allocator using the basin areas provided in Figure 6-1. Manual adjustments were made to the general demand polygon so that the polygon boundaries further aligned with the development areas shown on Section 1, Figure 1-2.

B: DEMAND CALCULATIONS

APPENDIX B

FIRE-FLOW REQUIREMENTS FOR BUILDINGS

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION B101 GENERAL

B101.1 Scope. The procedure for determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with this appendix. This appendix does not apply to structures other than buildings.

SECTION B102 DEFINITIONS

B102.1 Definitions. For the purpose of this appendix, certain terms are defined as follows:

FIRE-FLOW. The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138 kPa) residual pressure, that is available for fire fighting.

FIRE-FLOW CALCULATION AREA. The floor area, in square feet (m^2), used to determine the required fire flow.

SECTION B103 MODIFICATIONS

B103.1 Decreases. The fire chief is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

B103.2 Increases. The fire chief is authorized to increase the fire-flow requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall not be more than twice that required for the building under consideration.

B103.3 Areas without water supply systems. For information regarding water supplies for fire-fighting purposes in rural and suburban areas in which adequate and reliable water supply systems do not exist, the *fire code official* is authorized to utilize NFPA 1142 or the *International Wildland-Urban Interface Code.*

SECTION B104 FIRE-FLOW CALCULATION AREA

B104.1 General. The fire-flow calculation area shall be the total floor area of all floor levels within the *exterior walls*, and under the horizontal projections of the roof of a building, except as modified in Section B104.3.

B104.2 Area separation. Portions of buildings which are separated by *fire walls* without openings, constructed in accordance with the *International Building Code,* are allowed to be considered as separate fire-flow calculation areas.

B104.3 Type IA and Type IB construction. The fire-flow calculation area of buildings constructed of Type IA and Type IB construction shall be the area of the three largest successive floors.

Exception: Fire-flow calculation area for open parking garages shall be determined by the area of the largest floor.

SECTION B105 FIRE-FLOW REQUIREMENTS FOR BUILDINGS

B105.1 One- and two-family dwellings, Group R-3 and R-4 buildings and townhouses. The minimum fire-flow and flow duration requirements for one- and two-family *dwellings*, Group R-3 and R-4 buildings and townhouses shall be as specified in Tables B105.1(1) and B105.1(2).

B105.2 Buildings other than one- and two-family dwellings, Group R-3 and R-4 buildings and townhouses. The minimum fire-flow and flow duration for buildings other than one- and two-family *dwellings*, Group R-3 and R-4 buildings and townhouses shall be as specified in Tables B105.2 and B105.1(2).

TABLE B105.1(1)
REQUIRED FIRE-FLOW FOR ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

FIRE-FLOW CALCULATION AREA (square feet)	AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE-FLOW (gallons per minute)	FLOW DURATION (hours)
0-3,600	No automatic sprinkler system	1,000	1
3,601 and greater	No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2) at the required fire-flow rate
0-3,600	Section 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*	500	$^1/_2$
3,601 and greater	Section 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*	$^1/_2$ value in Table B105.1(2)	1

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m.

TABLE B105.1(2)
REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.
a. Types of construction are based on the *International Building Code*.
b. Measured at 20 psi residual pressure.

TABLE B105.2
REQUIRED FIRE-FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE-FLOW (gallons per minute)	FLOW DURATION (hours)
No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2)
Section 903.3.1.1 of the *International Fire Code*	25% of the value in Table B105.1(2)[a]	Duration in Table B105.1(2) at the reduced flow rate
Section 903.3.1.2 of the *International Fire Code*	25% of the value in Table B105.1(2)[b]	Duration in Table B105.1(2) at the reduced flow rate

For SI: 1 gallon per minute = 3.785 L/m.
a. The reduced fire-flow shall be not less than 1,000 gallons per minute.
b. The reduced fire-flow shall be not less than 1,500 gallons per minute.

3750 GPM *0.5 =1875 GPM

B105.3 Water supply for buildings equipped with an automatic sprinkler system. For buildings equipped with an approved *automatic sprinkler system*, the water supply shall be capable of providing the greater of:

1. The *automatic sprinkler system* demand, including hose stream allowance.
2. The required fire-flow.

SECTION B106
REFERENCED STANDARDS

ICC	IBC—15	International Building Code	B104.2,
ICC	IFC—15	International Fire Code	Tables B105.1(1) and B105.2
ICC	IWUIC—15	International Wildland-Urban Interface Code	B103.3
ICC	IRC—15	International Residential Code	Table B105.1(1)
NFPA	1142—12	Standard on Water Supplies for Suburban and Rural Fire Fighting	B103.3

APPENDIX C

FIRE HYDRANT LOCATIONS AND DISTRIBUTION

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION C101 GENERAL

C101.1 Scope. In addition to the requirements of Section 507.5.1 of the *International Fire Code*, fire hydrants shall be provided in accordance with this appendix for the protection of buildings, or portions of buildings, hereafter constructed or moved into the jurisdiction.

SECTION C102 NUMBER OF FIRE HYDRANTS

C102.1 Minimum number of fire hydrants for a building. The number of fire hydrants available to a building shall be not less than the minimum specified in Table C102.1.

SECTION C103 FIRE HYDRANT SPACING

C103.1 Hydrant spacing. Fire apparatus access roads and public streets providing required access to buildings in accordance with Section 503 of the *International Fire Code* shall be provided with one or more fire hydrants, as determined by Section C102.1. Where more than one fire hydrant is required, the distance between required fire hydrants shall be in accordance with Sections C103.2 and C103.3.

C103.2 Average spacing. The average spacing between fire hydrants shall be in accordance with Table C102.1.

> **Exception:** The average spacing shall be permitted to be increased by 10 percent where existing fire hydrants provide all or a portion of the required number of fire hydrants.

C103.3 Maximum spacing. The maximum spacing between fire hydrants shall be in accordance with Table C102.1.

SECTION C104 CONSIDERATION OF EXISTING FIRE HYDRANTS

C104.1 Existing fire hydrants. Existing fire hydrants on public streets are allowed to be considered as available to meet the requirements of Sections C102 and C103. Existing fire hydrants on adjacent properties are allowed to be considered as available to meet the requirements of Sections C102 and C103 provided that a fire apparatus access road extends between properties and that an easement is established to prevent obstruction of such roads.

TABLE C102.1
REQUIRED NUMBER AND SPACING OF FIRE HYDRANTS

FIRE-FLOW REQUIREMENT (gpm)	MINIMUM NUMBER OF HYDRANTS	AVERAGE SPACING BETWEEN HYDRANTS[a, b, c, f, g] (feet)	MAXIMUM DISTANCE FROM ANY POINT ON STREET OR ROAD FRONTAGE TO A HYDRANT[d, f, g]
1,750 or less	1	500	250
2,000-2,250	2	450	225
2,500	3	450	225
3,000	3	400	225
3,500-4,000	4	350	210
4,500-5,000	5	300	180
5,500	6	300	180
6,000	6	250	150
6,500-7,000	7	250	150
7,500 or more	8 or more[e]	200	120

For SI: 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m.

a. Reduce by 100 feet for dead-end streets or roads.

b. Where streets are provided with median dividers that cannot be crossed by fire fighters pulling hose lines, or where arterial streets are provided with four or more traffic lanes and have a traffic count of more than 30,000 vehicles per day, hydrant spacing shall average 500 feet on each side of the street and be arranged on an alternating basis.

c. Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at spacing not to exceed 1,000 feet to provide for transportation hazards.

d. Reduce by 50 feet for dead-end streets or roads.

e. One hydrant for each 1,000 gallons per minute or fraction thereof.

f. A 50-percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Fire Code*.

g. A 25-percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.2 or 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*.

SECTION C105
REFERENCED STANDARDS

ICC	IFC—15	International Fire Code	C101.1, C103.1, Table C102.1
ICC	IRC—15	International Residential Code	Table C102.1

PROJECT: PARKER NHC

PROJECT NUMBER :22057

DATE:05/10/2023

CALCS BY : ESI

REVIEWED BY : JDC

CALCULATIONS : SANITARY PEAK FLOW

PARKER NHC

Gross Building Square Footage Assumptions:

Property Area= 4.08 Acres

Flow Factor (PARKER TABLE 6.4)

273 GPD/AC

Proposed Flow Calculations:

Average Flow= Building GSF * Building Use Flow Factor

= 1,114 GPD

= 0.002 **cfs**

Peak Factor= 3.2 (PARKER TABLE 6.3)

Peak Flow= Average Flow * Peak Factor

= **0.0064 cfs**

Sanitary Service Line Pipe Capacity Calculations:

Required Sewer Capacity: 0.007 cfs **

Proposed Sanitary Service Line:

6" PVC @ 2% : **1.03** **cfs** → **Sufficient Capacity**

Note: Average and peak tributary runoff flows within adjacent sanitary sewer main are unknown. Parker Water and Sanitation District Reviewer to confirm the capacity of the existing sanitary sewer main is sufficient for the proposed development.

**Peak flow capacity to be 86% required sewer capacity

Worksheet for 6" PVC @ 2%

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.010
Channel Slope	2.000 %
Normal Depth	0.5 ft
Diameter	6.0 in
Discharge	1.03 ft³/s

Results

Discharge	1.03 ft³/s
Normal Depth	0.5 ft
Flow Area	0.2 ft²
Wetted Perimeter	1.6 ft
Hydraulic Radius	0.1 ft
Top Width	0.00 ft
Critical Depth	0.5 ft
Percent Full	100.0 %
Critical Slope	1.733 %
Velocity	5.25 ft/s
Velocity Head	0.43 ft
Specific Energy	0.93 ft
Froude Number	(N/A)
Maximum Discharge	1.11 ft³/s
Discharge Full	1.03 ft³/s
Slope Full	2.000 %
Flow Type	Subcritical

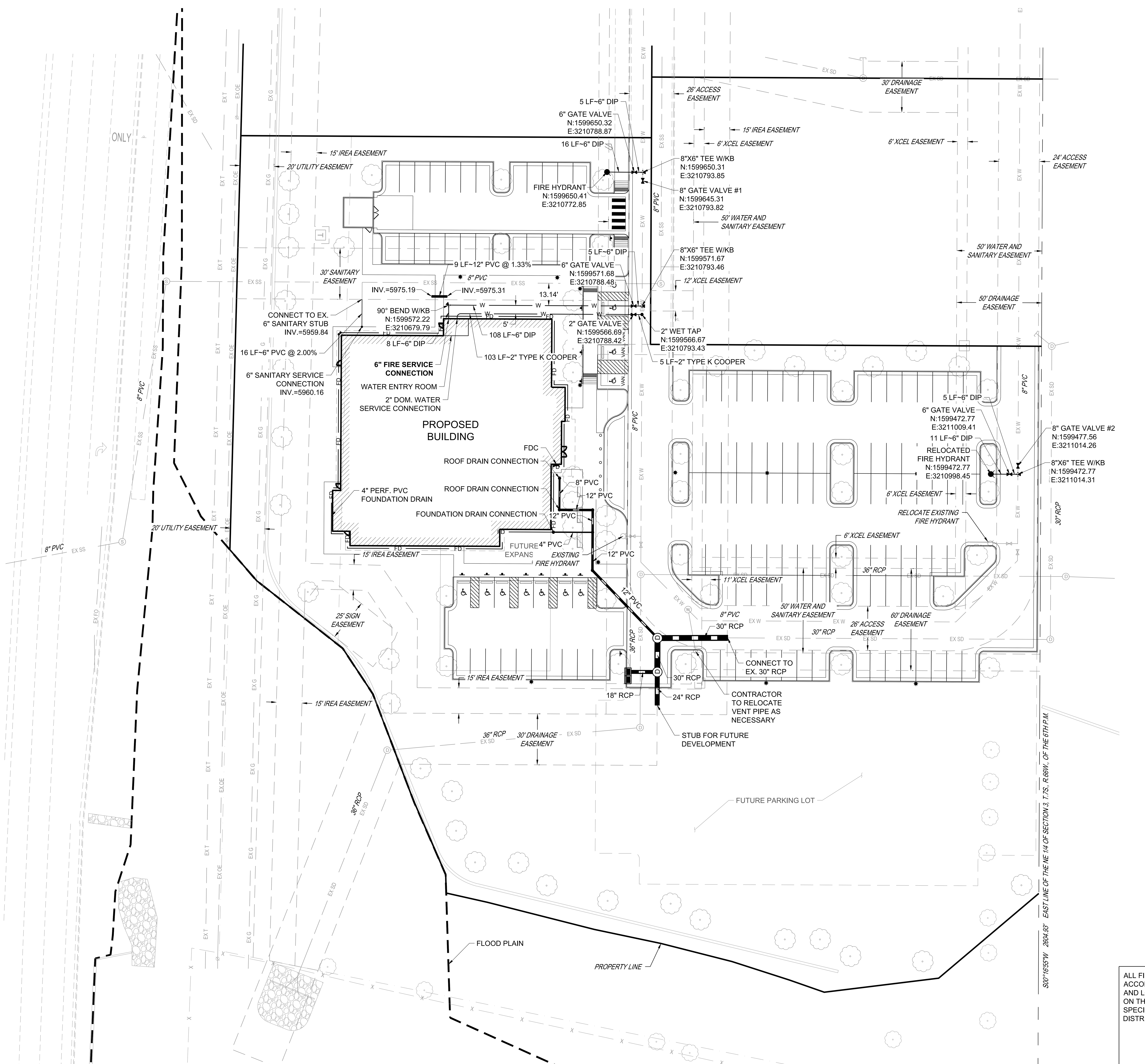
GVF Input Data

Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.5 ft
Critical Depth	0.5 ft
Channel Slope	2.000 %
Critical Slope	1.733 %

C: OVELALL UTILITY MAP



SCALE: 1" = 30'

NOTES:

1. SEE SHEET C-001 FOR CIVIL NOTES AND LEGEND.

ALL FIRE HYDRANTS SHALL BE INSTALLED ACCORDING TO DISTRICT STANDARDS. THE NUMBER AND LOCATIONS OF THE FIRE HYDRANTS AS SHOWN ON THE OVERALL UTILITY PLAN ARE CORRECT AS SPECIFIED BY THE SOUTH METRO FIRE PROTECTION DISTRICT

(SIGNATURE OF FIRE CHIEF OR DESIGNATED REPRESENTATIVE)

DATE SIGNED____________________

THE DISTRICT INSPECTOR MUST BE NOTIFIED AT LEAST 48 HOURS PRIOR TO START OF CONSTRUCTION. CALL PARKER WATER AND SANITATION DISTRICT AT 303-841-4627. THE DISTRICT WILL PROVIDE PERIODIC INSPECTIONS OF THE 24 HOUR NOTICE TO THE INSPECTOR IS REQUIRED FOR SCHEDULING INSPECTIONS. ANY WORK ACCOMPLISHED WITHOUT THE APPROVAL OF THE INSPECTOR WILL BE SUBJECT TO REJECTION.

REVIEWED FOR CONFORMANCE TO PARKER WATER AND SANITATION DISTRICT STANDARDS.

BY:____________________
(DISTRICT REPRESENTATIVE)

DATE:____________________

APPROVED FOR CONSTRUCTION:
PARKER WATER AND SANITATION DISTRICT

BY:____________________
(DISTRICT ENGINEER)

DATE:____________________

S.A. MIRO INC.
CONSULTING ENGINEERS
4582 South Ulster Street
Suite 750, Denver, CO 80237
303-741-3737
www.samiro.com

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

DATE	DESCRIPTION	NO.

PROJECT: CENTURA PARKER NHC
PARKER, CO 80134

DRAWING TITLE: UTILITY PLAN

FILE PATH: C:\Users\ssm\ACCDocs\S. A. Miro, Inc\Civil\Jobs\22057 Parker NHC\05 CAD\Plans and Details\C311-UTIL-PLAN.dwg C511 - 6/19/2023

DESIGNED BY:	SSM
DRAWN BY:	SSM
CHECKED BY:	JDC
MIRO JOB NO.	22057

DRAWING NUMBER:

C-511