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April 15, 2021

City of Steamboat Springs Public Works Department  
Attn: Amber Gregory  
12410<sup>th</sup> Street, P.O. Box 775088  
Steamboat Springs, CO 80477  
Phone: (970)-871-8258

RE: Copper Ridge Village - Water Demand Report  
Four Points Surveying and Engineering Job No. 1992-001

### **Introduction**

Four Points Surveying and Engineering (Four Points) has prepared this water demand report for the proposed development of Copper Ridge Village (Project) for the City of Steamboat Springs (City). This report has been prepared in accordance with City Municipal Code Section 25-78 and the City's 2009 and 2019 Water and Wastewater Master Plans. This letter includes all data, methods, assumptions, calculations, and results used by Four Points.

The facts and opinions expressed in this letter are based on Four Points understanding of the Project and data gathered from:

- Plans provided by the Architect
- Water Supply Master Plan for the City of Steamboat Spring and Mount Werner Water and Sanitation District, August 2019 (Master Plan)
- Water and Wastewater Master Plan Updates for the City of Steamboat Springs prepared by McLaughlin Water, December 2009 (Master Plan)
- City and County of Denver Department of Public Works Sanitary Design Technical Criteria Manual, latest revision March 2008.
- City Water and Sewer Division Facilities Map

### **Property and Project Description**

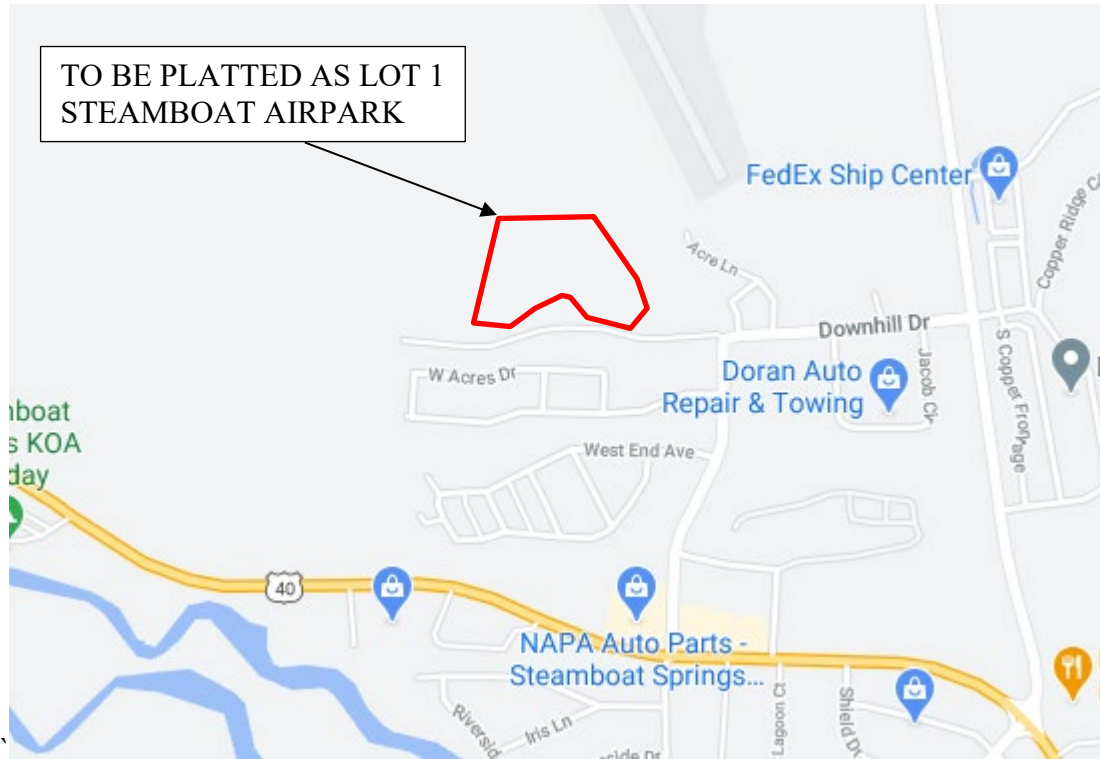
#### Property Description

- Situs Address: 8888 GOSSARD PKWY STEAMBOAT SPRINGS, 80487
- Legal: PT OF LOT 1 (TA 27X), WEST ACRES RANCH SUBD EXEMPTION PLAT, 81.15A
- Proposed Zoning: Multi Family Residential
- Area: 11.0 Acres

#### Project Description

- Copper Ridge Village: (7) apartment buildings consisting of (105) one-bedroom units and (60) two-bedroom units and (36) three-bedroom units for a total of (201) residential units.
- See vicinity map for project location

Figure 1: Vicinity Map for Copper Ridge Village, Lot 1 Steamboat Airpark



Source: Google Maps

### **Methodology**

The 2009 and 2019 Master Plans use the Equivalent Residential Units (EQR) method for determining water demands and wastewater flows, which are based on water use per a standardized development.

*“An EQR is generally considered to have a water demand equivalent to a single-family home, which generally requires approximately 280 gallons of water per day. The use of EQRs in assessing water demands is commonly applied to communities with similar influence by visitors, and provides a means for assessing water demands not associated with permanent population.”*

A single-family home for Steamboat Springs can be classified as a three-bedroom, two-bathroom home up to 2,500 square feet. The Copper Ridge Village project is proposing (105) one-bedroom units and (60) two-bedroom units and (36) three-bedroom units for a total of (201) residential units. Because one-bedroom and two-bedroom multi-family residential units is smaller than a defined EQR, Four Points applied a 0.90 weighted reduction factor for each dwelling unit to the EQR calculation per the 2009 Master Plan Updates.

### **Sanitary Sewer Capacity Study**

The project is proposing (105) one-bedroom units and (60) two-bedroom units and (36) three-bedroom units that results in a factored total EQR of 178. Peaking Factor calculations were performed per the *City and County of Denver Department of Public Works Sanitary Sewer Design Technical Criteria Manual*, where:

$$\text{Peaking Factor} = 2.6 * (\text{Average Flow, CFS})^{-.16}$$

Copper Ridge Village is proposed to be serviced by an existing 8" PVC gravity sewer main that runs north to south along West Acres Drive located in the West Acres Mobile Home Park. An 8" main is proposed to connect to Manhole 48.12.3.1. from the proposed development to the north.

The maximum peak flow generated from the Project was 0.33 CFS. Sanitary sewer capacity calculations are located in **Appendix A**. Each building and the office will have its own service line.

$$\rightarrow (0.33 \text{ CFS} / 7 \text{ Buildings}) = 0.05 \text{ CFS per Building.}$$

The analysis shows that a 4" PVC service pipe with a minimum allowable 2% slope will suffice for each apartment building and an 8" main connection to the existing gravity network at Manhole 48.12.3.1 to serve the entire development. A calculation for closed conduit flow in a 4" PVC pipe is located in **Appendix A**.

### **Potable Water Supply Study**

Potable water will be provided throughout the development from the existing City of Steamboat Springs distribution system. The City maintains a 12" PVC water main that along Gossard Parkway.

The peaking factors for the Maximum Day (2.4 x the Average Day) and the Maximum Hour (2.0 x the Maximum Day) were per the 2009 Master Plan.

Per the 2009 Master Plan, Four Points assumed a demand of 541 gallons per EQR per day to estimate the Projects total development water usage. An average day flow of 67 GPM was calculated for the entire development with a max day flow of 161 GPM and a max hour flow of 321 GPM. Water demand calculations are located in **Appendix B**.

Per the 2009 Master Plan, an average irrigation application rate of 4,000 GPD/acre (Weber, 2008a) can be applied. Approximately 1.0 acre of the proposed development will be irrigated landscaped area. This equates to 4,000 GPD or 2.78 GPM.

### **Appendices**

Appendix A: Sanitary Sewer Capacity Calculations

Appendix B: Water Demand Calculations

Please feel free to contact Four Points with any questions, comments, or concerns.

This report was prepared by Joe Wiedemeier, P.E.



### Appendix A: Wastewater Impact Calculations

Description/Land Use	Assigned EQR	Area (Acres)	# of Units	EQRs	Assumptions:	Calculations:			
					GPD per EQR per Day (gal/day/EQR)	Average Flow Rate (GPD)	Peaking Factor <sup>2</sup>	Peak Flow Rate (GPD)	Peak Flow Rate (CFS)
1-Bedroom Units	0.85	N/A	105	89.3	280	24,990	4.00	99,960	0.15
2-Bedroom Units	0.85	N/A	60	51.0	280	14,280	4.00	57,120	0.09
3-Bedroom Units	1.05	N/A	36	37.8	280	10,584	5.00	52,920	0.08
Infiltration and Inflow <sup>2</sup>						2,500		2,500	0.00
<b>Total</b>				<b>178</b>		<b>52,354</b>		<b>212,500</b>	<b>0.33</b>

Notes

(1) Maximum peaking factor equals 4.0 per City and County of Denver Dept of Public Works Sanitary Design Technical Criteria Manual

(2) Accounting for infiltration and inflow (I/I) based on 500 GPD per every tributary acre and estimating 5 tributary acres.

# Channel Report

## 4-inch Service Line @ 2% Slope Maximum Capacity

### Circular

Diameter (ft) = 0.33

Invert Elev (ft) = 100.00

Slope (%) = 2.00

N-Value = 0.013

### Calculations

Compute by: Q vs Depth

No. Increments = 10

### Highlighted

Depth (ft) = 0.30

Q (cfs) = 0.279

Area (sqft) = 0.08

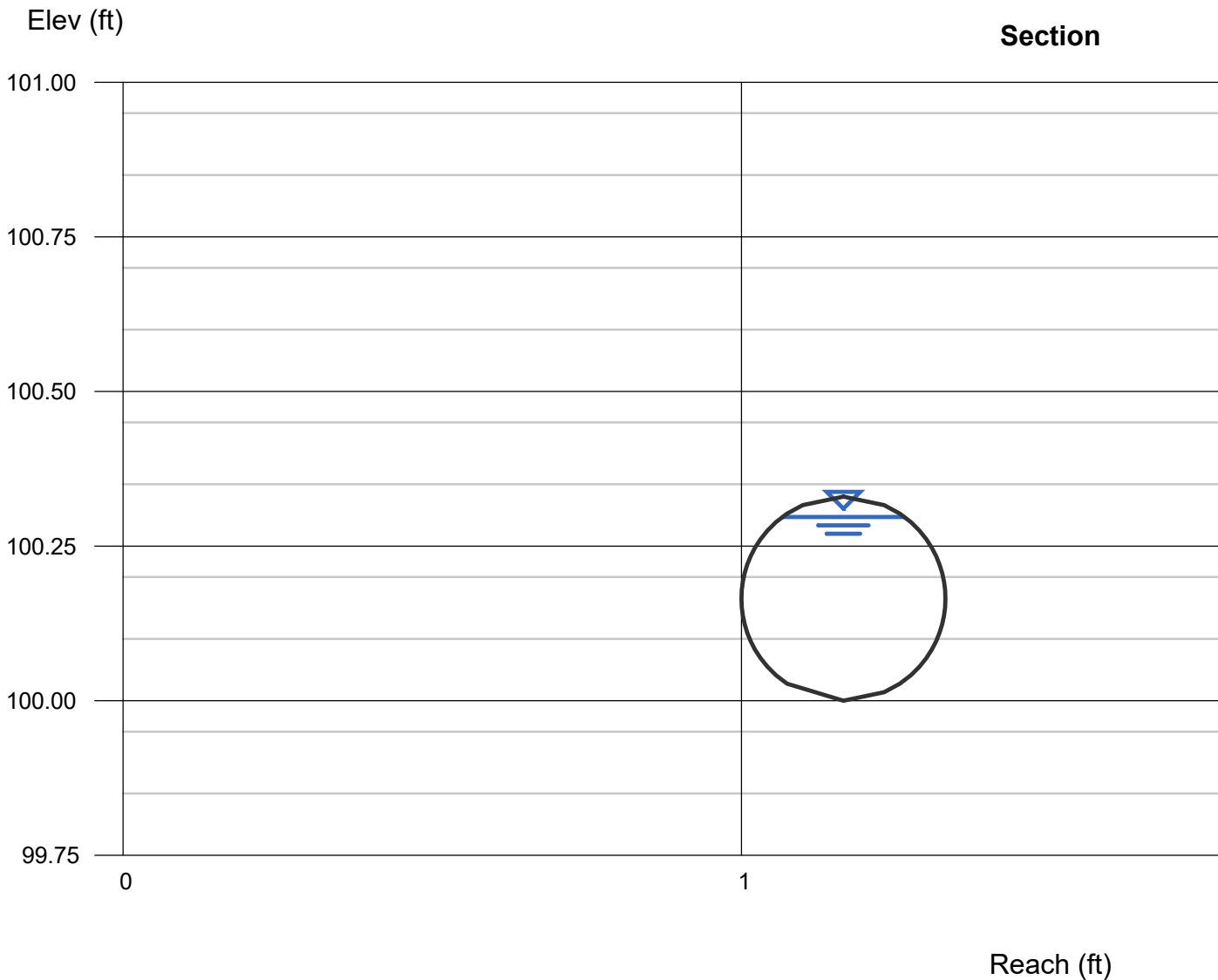
Velocity (ft/s) = 3.44

Wetted Perim (ft) = 0.83

Crit Depth, Yc (ft) = 0.30

Top Width (ft) = 0.20

EGL (ft) = 0.48





**Appendix B: Water Demand Calculations**

Description/Land Use	Assigned EQR	Area (Acres)	# of Units	EQRs	Assumptions:				Calculations:		
					Assumed Demand for the Average Day		Max Day <sup>1</sup>	Max Hour <sup>2</sup>	Average Day	Max Day	Max Hour
					(gal/day/EQR)	(GPM/EQR)	(GPM/EQR)	(GPM/EQR)	(GPM)	(GPM)	(GPM)
1-Bedroom Units	0.85	N/A	105	89.3	541	0.38	0.90	1.80	33.6	80.5	161.1
2-Bedroom Units	0.85	N/A	60	51.0	541	0.38	0.90	1.80	19.2	46.0	92.0
3-Bedroom Units	1.05	N/A	36	37.8	541	0.38	0.90	1.80	14.2	34.1	68.2
<b>Total</b>				<b>178</b>					<b>66.95</b>	<b>160.67</b>	<b>321.34</b>

Notes

- (1) Assumed Max Day peaking factor is 2.4 times the Average Day
- (2) Assumed Max Hour is 2.0 times Maximum Day