

Vista Creek Multi-Family

UTILITY CONFORMANCE LETTER

Project:

**Vista Creek Multi-Family
Aurora, Colorado**

Client:

**Forum Real Estate Group, LLC
4500 Cherry Creek Drive South, Suite 550
Glendale, CO 80246
Mr. Rich Wilson
Managing Director – Development**

Prepared By:

**Kimley-Horn and Associates, Inc.
4582 South Ulster Street, Suite 1500
Denver, CO 80237**

Prepared: September 2, 2021
Revised: March 13, 2023

APPROVED FOR ONE YEAR FROM THIS DATE	

City Engineer	Date
Water Department	Date
Fire Department	Date

ENGINEER'S CERTIFICATION

This report and plan for the utility design of the Vista Creek Multi-Family Development was prepared by me (or under my direct supervision) in accordance with the provisions of City of Aurora Standards and Specifications for Water, Sanitary Sewer and Storm Drainage Criteria and was designed to comply with the provisions thereof.

Adam Harrison, PE
Registered Professional Engineer
State of Colorado No. 51758

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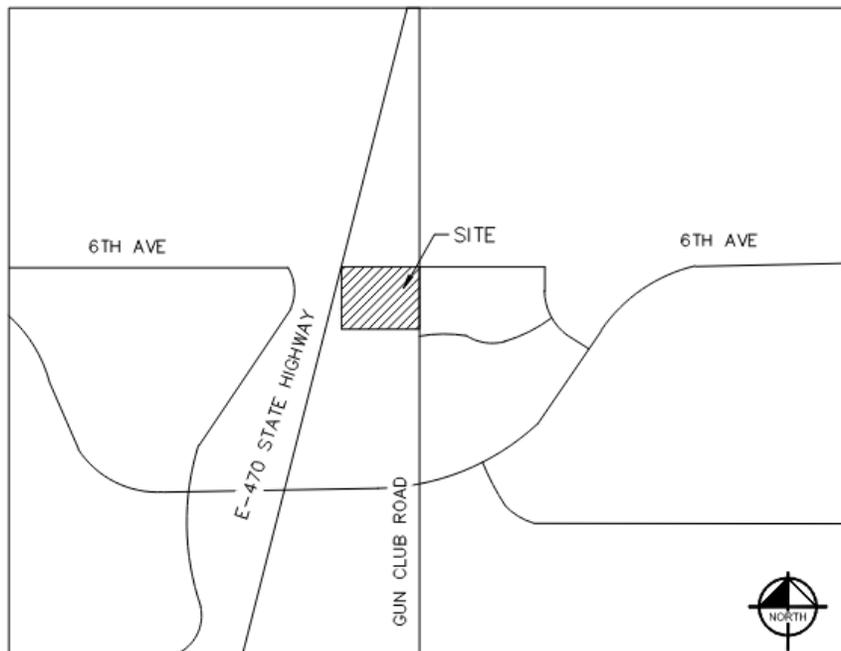
INTRODUCTION

Location

The Site is located to the south of East 6th Avenue and West of Gun Club Road, situated in the Northeast 1/4 of the Northeast 1/4 of the Northeast 1/4 of Section 12, Township 4 South, Range 66 West of the 6th Principal Meridian, County of Arapahoe, State of Colorado. The proposed Project is located bounded by vacant land to the south, East 6th Avenue ROW to the north, E-470 to the west and Gun Club Road to the East. The 9.13 +/- acre project site is currently undeveloped and consists of primarily sparse native grass, weeds, and brush cover.

Vicinity Map

A vicinity map is provided below for reference:



Proposed Land Use

The Site is currently undeveloped land and is zoned Mixed Use Regional district (MU-R). The proposed ±9.13-acre development is anticipated to consist of a garden style multi-family development; Vista Creek Multi-Family (MF). The development will consist of four (4) buildings with 321 total units.

Development of the property will include public road and sidewalk improvements along both Gun Club Road and East 6th Avenue. The Project will also include extensions of the sanitary sewer and water distribution systems developed by properties to the south within the Lamar Landing Subdivision. The proposed development of this property is consistent with the current zoning within the E470 Corridor and is in conformance with the City of Aurora Criteria.

SANITARY SEWER SYSTEM

The proposed Project is served by the 30” diameter First Creek Transfer sanitary sewer interceptor and is located within Sanitary Sewer Basin SS0S3 per the *First Creek Transfer Sanitary Sewer Service Boundary Map* in Appendix C. The proposed project flows through the Lamar Landing Development before being served by the interceptor.

The sanitary sewer design outlined herein is consistent with Aurora Water 2022 Water, Sanitary Sewer, and Storm Drain Infrastructure and Specifications (the “Criteria”).

Sanitary Sewer Loading

The sanitary sewer loading used for the design of the main is based on the tables provided in Section 5.03.9 of the Criteria as outlined below for each of the anticipated uses on site:

<i>Use</i>	<i>Average Day Flow</i>
Multi-Family	68 gpd/capita

The proposed sanitary sewer main shall be sized for the *Peak Hourly Flow*, which is equal to the Average Day Flow multiplied by the *Peaking Factor* as found in the equation below with a maximum result of 4 and a minimum of 1.7:

$$\text{Peaking Factor} = 5 \div p^{0.167}, \text{ where 'p' is population in thousands}$$

When applied to each of the proposed buildings, the peaking factor was greater than 4.0, thus 4.0 has been utilized as the peaking factor for the entire site. See the sanitary loading used to size the proposed main extension to the Vista Creek development below in Table 2.

It is important to note that two analyses were done for the sanitary loading. One calculation represents conformance to the Lamar landing master utility study and a separate calculation was performed for conformance to the cross creek regional utility study. The difference being the peaking factor values that were used in each study.

<i>Area/Land Use</i>	<i>Dwelling Units (DU)</i>	<i>Equivalent Population¹</i>	<i>Average Daily Flow (gpd)</i>	<i>Total Avg Daily Flow (gpm)</i>	<i>Peak Hour Flow (gpm)</i>
Building A	56	155	10,548.2	8.06	30.03
Building B	53	147	9,983.1	7.63	28.42
Building C	106	294	19,966.2	15.25	56.85
Building D	106	294	19,966.2	15.25	56.85
Vista Creek MF Total	321	889.17	60,463.6	46.19	172.15

¹ Multi-family at 2.77 persons per DU

The total Peak Hourly and Average Daily flows anticipated to be conveyed to the First Creek Transfer sewer interceptor are summarized in Table 3 below. It should be noted that no off-site flows from North of the project site are anticipated to flow into the Vista Creek Basin. A detailed analysis of each Sanitary Sewer Basin and sewer pipe capacity calculations have been included in Appendix A.

Table 3: Sanitary Sewer Loading Analysis				
<i>Area/Land Use</i>	<i>Area (ac)</i>	<i>Average Daily Flow (gpd)</i>	<i>Total Avg Daily Flow (gpm)</i>	<i>Peak Hour Flow (gpm)</i>
PA-7 - Detention	1.38	-	-	-
PA-4 - Retail	3.67	5,505.00	4.21	15.67
PA-8 - Open Space	0.83	-	-	-
PA-6 - Retail	1.51	2,265.00	1.73	6.45
PA-3 - Retail	2.96	4,440.00	3.39	12.64
PA-2 - Multi Family	1.87	8,287.84	6.33	23.60
PA-5 - Retail	0.56	-	-	-
PA-10 - Multi Family	9.52	41,250.84	31.51	117.45
Vista Creek MF	9.13	60,463.56	46.19	172.15
PA-11 - Open Space	1.13	-	-	-
Total to Ex Sanitary Sewer Main				347.97

The impact of the Vista Creek MF Development peak hour flow upon the Lamar Landing peak flows is calculated in Appendix A. As seen in the calculations, the peak flows from both developments combined does not exceed 75% of the 8-inch sewer main’s capacity at the time of connection to the existing sewer transfer in 6th Parkway therefore not negatively impacting Lamar Landing’s flows.

Sanitary Sewer Connectivity

The proposed 8-inch sanitary sewer main extension will be approximately 600 lineal feet and will serve the Vista Creek MF Development. The proposed main extension will connect to the existing sewer main through Lamar Landing Development. A peaking factor of 4.0 will be used to design the main extension to the Vista Creek development per the criteria, see the calculations in Appendix A.

Sanitary Sewer Demand Summary

The proposed sanitary sewer main will receive peak hour flows of 172.15 gpm from the Vista Creek MF Development, which will connect with the main installed by the Lamar Landing

development for a combined peak flow of 347.97 gpm. This peak hour flow is within the capacity for 8-inch pipe as specified by Aurora Water.

WATER SYSTEM

The water demand rates and distributions system design are based on the City of Aurora Standards and Specifications for Water.

Water Distribution Loading

The domestic water and fire flow design has been based on the following typical demand rates, consistent with the City Criteria as outlined below in Tables 4 and 5.

<i>Use</i>	<i>Average Day</i>	<i>Max Day</i>	<i>Max Hour</i>
Multifamily	101 gpd/capita ¹	Average Day x2.8	Average Day x4.5

¹ MF zoning assumes 2.77 people per unit

The fire flows have been calculated based on the City of Aurora adopted fire code IFC 2015. Based on the typical demand rates as summarized in Table 3 and the IFC, the resulting water demands for the Lamar Landing Subdivisions are as follows:

Area/Land Use	Demand (gpm)		
	<i>Average Day</i>	<i>Max Day</i>	<i>Peak Hour</i>
PA-7 - Detention	-	-	-
PA-4 - Retail	3.68	10.30	16.55
PA-8 - Open Space	-	-	-
PA-6 - Retail	2.72	7.61	12.23
PA-3 - Retail	2.00	5.60	9.00
PA-2 - Multi Family	7.97	22.30	35.85
PA-5 - Open Space	-	-	-
Vista Creek MF	62.37	174.62	280.64
PA-10 - Multi Family	46.24	129.47	208.08
Total	124.97	349.91	562.35

Water Distribution Modeling

The Project is in Aurora pressure zone 3 with and has an HGL of 5,720. The maximum pressure is assumed to be 72 psi and the min pressure assumed to be 68 psi. Consistent with the City Criteria and ISO Criteria, the system will be analyzed based on the maximum day plus fire flow demand with a minimum residual pressure of 20 psi. The system will also meet the maximum allowable velocity of 3.0 fps for 8-inch domestic lines during both the average day and peak hour scenarios and maximum velocity of 10.0 fps for 8-inch domestic lines and up to 15.0 fps for the hydrant lines during the fire flow scenario. The fire flow component of the water distribution system was evaluated to display 1,500 gpm of flow is available at each hydrant and throughout the system while maintaining allowable pressures, per the 2015 IFC. Below is a table of the

water demands used in the WaterCAD hydraulic model. Model results can be found in Appendix B.

Table 6: Water Loading Analysis for Main Sizing

<i>Area/Land Use</i>	<i>Dwelling Units (DU)</i>	<i>Equivalent Population¹</i>	<i>Average Day Flow (gpm)</i>	<i>Max Day Flow (gpm)</i>	<i>Peak Hour Flow (gpm)</i>
Building A	56	155.1	10.88	30.46	48.96
Building B	53	146.8	10.30	28.83	46.34
Building C	106	293.6	20.59	57.66	92.67
Building D	106	293.6	20.59	57.66	92.67
<i>Vista Creek MF Total</i>	<i>321</i>	<i>889.2</i>	<i>62.37</i>	<i>174.62</i>	<i>280.64</i>

¹ Multi-family at 2.77 persons per DU

Water Connectivity

The Vista Creek water line will provide an 8” waterline stub to the Lamar Landing site, and loop to an existing water line constructed in the 6th Avenue ROW. The new 8-inch main will connect to the existing main in 6th Avenue at two locations, near the mid-point of the northwestern Site frontage and at the northeast Site frontage of 6th Avenue. The 8-inch water main will be located within a utility easement along the private access drives around the site. Additional 8-inch water stubs will be installed to serve each of the future developments within the subdivision.

CONCLUSIONS

This utility conformance letter was prepared in compliance with the City of Aurora Standards and Specifications for Wastewater and Water Distribution Systems. The proposed sanitary sewer and domestic water systems will provide adequate capacity to serve the Vista Creek Multi Family Development.

REFERENCES

Water, Sanitary Sewer & Storm Drainage Infrastructure Standards and Specifications, City of Aurora; September 2019.

Cross Creek Master Utility Report, High Country Engineering, October 2002. EDN: 202189

Lamar Landing Master Utility Report, Kimley-Horn, March 2021 EDN 222137MU1 / 1900-ARAP-E-07T

Appendix A
Sanitary Sewer Demands

Sanitary Sewer Loading Analysis										
Area/Land Use	Area (ac)	Dwelling Units (DU) ²	Equivalent Population ¹	Loading Rate (gpd/capita)	Average Daily Flow (gpd)	Average Daily Flow (gpm)	Infiltration @10% (gpm)	Total Avg Daily Flow (gpm)	Peaking Factor ⁴	Peak Hour Flow (gpm)
PA-7 - Detention ³	1.38	-	-	-	-	-	-	-	-	-
PA-4 - Retail ³	3.67	-	80.74	1,500	5,505.00	3.82	0.38	4.21	4.00	15.67
PA-8 - Open Space ³	0.83	-	-	-	-	-	-	-	-	-
PA-6 - Retail ³	1.51	-	33.22	1,500	2,265.00	1.57	0.16	1.73	4.00	6.45
PA-3 - Retail ³	2.96	-	65.12	1,500	4,440.00	3.08	0.31	3.39	4.00	12.64
PA-2 - Multi Family ³	1.87	44	121.88	68	8,287.84	5.76	0.58	6.33	4.00	23.60
PA-5 - Retail ³	0.56	-	-	-	-	-	-	-	-	-
PA-10 - Multi Family ³	9.52	219	606.63	68	41,250.84	28.65	2.86	31.51	4.00	117.45
Vista Creek MF	9.13	321	889.17	68	60,463.56	41.99	4.20	46.19	4.00	172.15
Total to Ex Sanitary Sewer Main										347.97

¹ Multi-family at 2.77 persons per DU, Equivalent population for retail/commercial is 22/acre

² Assumes 23/units per Acre

³ Part of Lamar Landing Master plan

Sanitary Sewer Loading for Proposed 8" Main										
Area/Land Use	Area (ac)	Dwelling Units (DU) ²	Equivalent Population ¹	Loading Rate (gpd/capita)	Average Daily Flow (gpd)	Average Daily Flow (gpm)	Infiltration @10% (gpm)	Total Avg Daily Flow (gpm)	Peaking Factor ⁴	Peak Hour Flow (gpm)
Vista Creek MF	9.13	321	889.17	68	60,463.56	41.99	4.20	46.19	4.00	172.15

⁴Peaking Factor = $5 \div p^{0.167}$, where 'p' is population in thousands

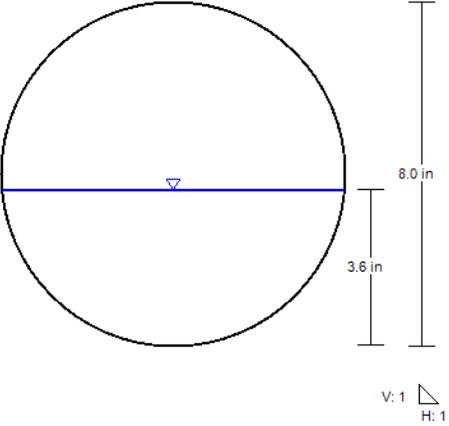
Sanitary Sewer Loading Analysis (Based on Cross Regional Utility Analysis)										
Area/Land Use	Area (ac)	Dwelling Units (DU) ²	Equivalent Population ¹	Loading Rate (gpd/capita)	Average Daily Flow (gpd)	Average Daily Flow (gpm)	Infiltration @10% (gpm)	Total Avg Daily Flow (gpm)	Peaking Factor ³	Peak Hour Flow (gpm)
PA-7 - Detention	1.38	-	-	-	-	-	-	-	-	-
PA-4 - Retail	3.67	-	80.74	1,500	5,505.00	3.82	0.38	4.21	2.38	9.48
PA-8 - Open Space	0.83	-	-	-	-	-	-	-	-	-
PA-6 - Retail	1.51	-	33.22	1,500	2,265.00	1.57	0.16	1.73	2.38	3.90
PA-3 - Retail	2.96	-	65.12	1,500	4,440.00	3.08	0.31	3.39	2.38	7.65
PA-2 - Multi Family	1.87	44	121.88	68	8,287.84	5.76	0.58	6.33	2.38	14.27
PA-5 - Retail	0.56	-	-	-	-	-	-	-	-	-
PA-10 - Multi Family	9.52	219	606.63	68	41,250.84	28.65	2.86	31.51	2.38	71.04
Vista Creek MF	9.13	321	889.17	68	60,463.56	41.99	4.20	46.19	2.38	104.13
PA-11 - Open Space	1.13	-	-	-	-	-	-	-	-	-
Total to Ex Sanitary Sewer Main										210.48
Cross Creek Regional Utility Peak Hour Flow From Bain SSOS3										244.00

¹ Multi-family at 2.77 persons per DU, Equivalent population for retail/commercial is 22/acre

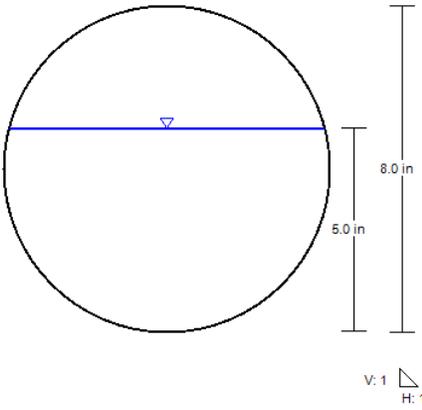
² Assumes 23/units per Acre

³ Peaking Factor From Cross Creek Regional Utility

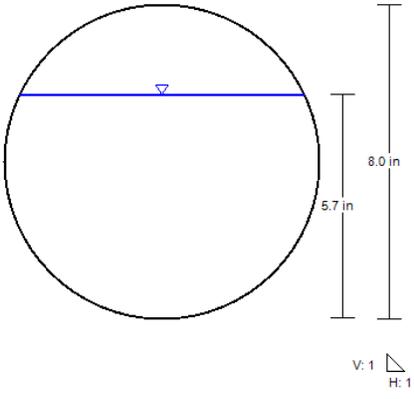
Location 1: Vista Creek MF

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.400 %
Diameter	8.0 in
Discharge	172.12 gal/min
Results	
Normal Depth	3.6 in
Flow Area	0.2 ft ²
Wetted Perimeter	1.0 ft
Hydraulic Radius	1.9 in
Top Width	0.66 ft
Critical Depth	3.5 in
Percent Full	45.5 %
Critical Slope	0.480 %
Velocity	2.48 ft/s
Velocity Head	0.10 ft
Specific Energy	0.40 ft
Froude Number	0.908
Maximum Discharge	436.06 gal/min
Discharge Full	405.37 gal/min
Slope Full	0.072 %
Flow Type	Subcritical
	
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	42.7 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	3.6 in
Critical Depth	3.5 in
Channel Slope	0.400 %
Critical Slope	0.480 %

Location 2: Vista Creek MF + PA 10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.400 %
Diameter	8.0 in
Discharge	289.60 gal/min
Results	
Normal Depth	5.0 in
Flow Area	0.2 ft ²
Wetted Perimeter	1.2 ft
Hydraulic Radius	2.3 in
Top Width	0.65 ft
Critical Depth	4.5 in
Percent Full	62.5 %
Critical Slope	0.537 %
Velocity	2.81 ft/s
Velocity Head	0.12 ft
Specific Energy	0.54 ft
Froude Number	0.831
Maximum Discharge	436.06 gal/min
Discharge Full	405.37 gal/min
Slope Full	0.204 %
Flow Type	Subcritical
	
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	42.7 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.0 in
Critical Depth	4.5 in
Channel Slope	0.400 %
Critical Slope	0.537 %

Location 3: Vista Creek MF & Lamar Landing

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.400 %
Diameter	8.0 in
Discharge	347.97 gal/min
Results	
Normal Depth	5.7 in
Flow Area	0.3 ft ²
Wetted Perimeter	1.3 ft
Hydraulic Radius	2.4 in
Top Width	0.60 ft
Critical Depth	5.0 in
Percent Full	71.4 %
Critical Slope	0.579 %
Velocity	2.91 ft/s
Velocity Head	0.13 ft
Specific Energy	0.61 ft
Froude Number	0.770
Maximum Discharge	436.06 gal/min
Discharge Full	405.37 gal/min
Slope Full	0.295 %
Flow Type	Subcritical
	
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	42.7 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.7 in
Critical Depth	5.0 in
Channel Slope	0.400 %
Critical Slope	0.579 %

Appendix B
Water Demands

Water Demand Analysis									
Area/Land Use	Area (ac)	Dwelling Units (DU) ¹	Equivalent Population	Average Day Per Capita Flow (gpd)	Average Daily Flow (gpm)	Max Hour: Average Day Factor	Max Hour (gpm)	Max Day: Average Day Factor	Max Day (gpm)
Vista Creek MF	9.13	321	889.17	101	62.37	4.50	280.64	2.80	174.62
Lamar Landing Totals					62.60		281.71		175.28
Totals					124.97		562.35		349.90

¹ Multi-family at 2.77 persons per DU, Equivalent population for retail/commercial is 22/acre

Water Demand Analysis Summary - From Lamar Landing Master Utility Report

Area/Land Use	Demand (gpm)		
	Average Day	Max Day	Peak Hour
PA-7 - Detention	-	-	-
PA-4 - Retail	3.68	10.30	16.55
PA-8 - Open Space	-	-	-
PA-6 - Retail	2.72	7.61	12.23
PA-3 - Retail	2.00	5.60	9.00
PA-2 - Multi Family	7.97	22.30	35.85
PA-5 - Open Space	-	-	-
Vista Creek MF	62.37	174.62	280.64
PA-10 - Multi Family	46.24	129.47	208.08
Total	124.97	349.91	562.35

*The water main for Lamar Landing is proposed to be extended north to the Vista Creek MF development



**Required Fire Flow Calculations
 Vista Creek MF
 Aurora, Colorado**

Project Description: Multi-Family Residential
 Construction Type: V-A
 Total Building Area (sf) 306,642
 Sprinklered?: Sprinklered per NFPA 13R

Determine construction types, area of each construction type, % of each construction type vs. total, and total square footage.

	Construction Type	SF of Construction Type	% of Total Building	Required Fire Flow (gpm)	Reduced Fire Flow for Sprinklers (gpm)*
Building C	V-A	97,313	31.7%	6,000	1500
Building B	V-A	54,117	17.6%	4,500	1500
Building D	V-A	97,313	31.7%	6,000	1500
Building A	V-A	57,204	18.7%	5,000	1500
Pool	V-A	695	0.2%	1,500	1500
Sum	V-A	306,642	100%	--	--

*A reduction in required fire-flow of up to 75 percent, as approved, is allowed when the building is provided with an approved automatic sprinkler system installed in accordance with Section 903.3.1.2. The resulting fire-flow shall not be less than 1,500 gallons per minute (5678 L/min) for the prescribed duration as specified in Table B105.1.

Apply Fire Flow to Hydrant Table (Table C105.1)

1 Hydrants Required**

**A. If hydrant can meet 1,500 gpm @ 20 psi minimum. Based on flow test, the existing hydrant has a flow of 6,048 gpm; therefore no additional hydrant is required to meet the required fire flow of 1,500 gpm minimum.

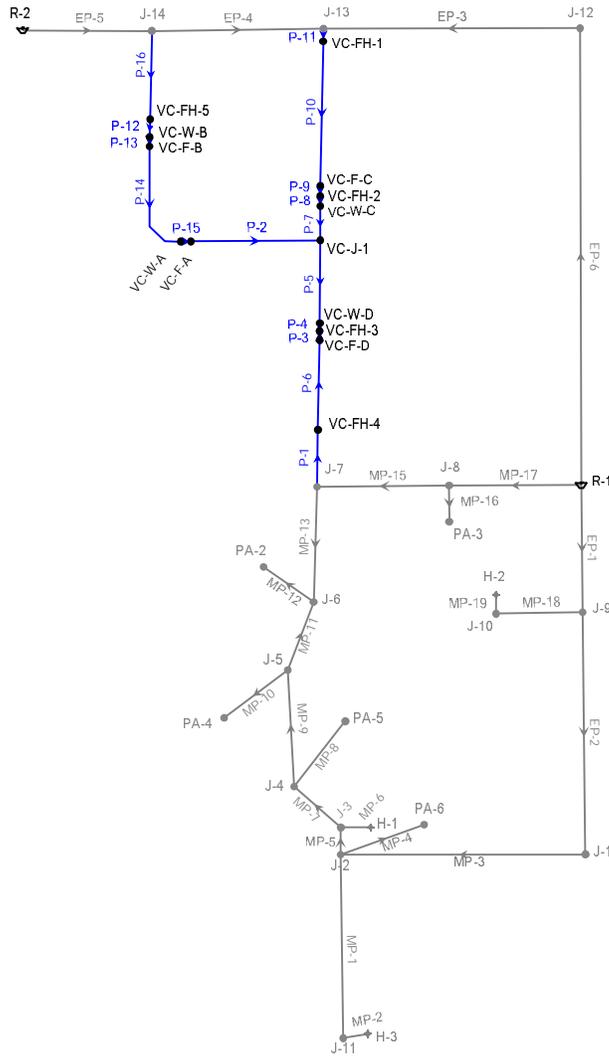
Average Spacing Required? (Table C102.1) 500 ft***

***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

Current Fire Hydrants 6
Current Average Spacing 250 ft

We have spaced these hydrants to provide access to all sides of the buildings

Vista Creek Multi-Family Water Demand Analysis Pipe Schematic



Vista Creek Multi-Family
Water Demand Analysis
Active Scenario: Average Day
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
VC-F-A	5,554.43	0.00	5,720.00	72	Building A Fire Line
VC-F-B	5,553.08	0.00	5,720.00	72	Building B Fire Line
VC-F-C	5,554.07	0.00	5,720.00	72	Building C Fire Line
VC-F-D	5,552.54	0.00	5,720.00	72	Building D Fire Line
VC-FH-1	5,554.07	0.00	5,720.00	72	Fire Hydrant
VC-FH-2	5,554.20	0.00	5,720.00	72	Fire Hydrant
VC-FH-3	5,552.53	0.00	5,720.00	72	Fire Hydrant
VC-FH-4	5,552.76	0.00	5,720.00	72	Fire Hydrant
VC-FH-5	5,552.94	0.00	5,720.00	72	Fire Hydrant
VC-J-1	5,554.41	0.00	5,720.00	72	
VC-W-A	5,554.43	10.88	5,720.00	72	Building A Water Service Line
VC-W-B	5,553.06	10.30	5,720.00	72	Building B Water Service Line
VC-W-C	5,554.17	20.59	5,720.00	72	Building C Water Service Line
VC-W-D	5,552.57	20.59	5,720.00	72	Building D Water Service Line

Vista Creek Multi-Family
Water Demand Analysis
Active Scenario: Average Day
FlexTable: Pipe Table

Label	Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (Absolute) (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	86	J-7	VC-FH-4	8.0	PVC	150.0	13.60	0.09	0.000
P-2	196	VC-J-1	VC-F-A	8.0	PVC	150.0	4.00	0.03	0.000
P-3	14	VC-F-D	VC-FH-3	8.0	PVC	150.0	13.60	0.09	0.000
P-4	12	VC-FH-3	VC-W-D	8.0	PVC	150.0	13.60	0.09	0.000
P-5	125	VC-W-D	VC-J-1	8.0	PVC	150.0	6.99	0.04	0.000
P-6	136	VC-FH-4	VC-F-D	8.0	PVC	150.0	13.60	0.09	0.000
P-7	52	VC-J-1	VC-W-C	8.0	PVC	150.0	2.99	0.02	0.000
P-8	15	VC-W-C	VC-FH-2	8.0	PVC	150.0	23.58	0.15	0.000
P-9	15	VC-FH-2	VC-F-C	8.0	PVC	150.0	23.58	0.15	0.000
P-10	219	VC-F-C	VC-FH-1	8.0	PVC	150.0	23.58	0.15	0.000
P-11	19	VC-FH-1	J-13	8.0	PVC	150.0	23.58	0.15	0.000
P-12	27	VC-W-B	VC-FH-5	8.0	PVC	150.0	25.18	0.16	0.000
P-13	14	VC-F-B	VC-W-B	8.0	PVC	150.0	14.88	0.09	0.000
P-14	178	VC-W-A	VC-F-B	8.0	PVC	150.0	14.88	0.09	0.000
P-15	15	VC-F-A	VC-W-A	8.0	PVC	150.0	4.00	0.03	0.000
P-16	134	VC-FH-5	J-14	8.0	PVC	150.0	25.18	0.16	0.000

Vista Creek Multi-Family
 Water Demand Analysis
 Active Scenario: Max Day
 FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
VC-F-A	5,554.43	0.00	5,719.98	72	Building A Fire Line
VC-F-B	5,553.08	0.00	5,719.98	72	Building B Fire Line
VC-F-C	5,554.07	0.00	5,719.98	72	Building C Fire Line
VC-F-D	5,552.54	0.00	5,719.97	72	Building D Fire Line
VC-FH-1	5,554.07	0.00	5,720.00	72	Fire Hydrant
VC-FH-2	5,554.20	0.00	5,719.98	72	Fire Hydrant
VC-FH-3	5,552.53	0.00	5,719.97	72	Fire Hydrant
VC-FH-4	5,552.76	0.00	5,719.98	72	Fire Hydrant
VC-FH-5	5,552.94	0.00	5,719.99	72	Fire Hydrant
VC-J-1	5,554.41	0.00	5,719.98	72	
VC-W-A	5,554.43	30.46	5,719.98	72	Building A Water Service Line
VC-W-B	5,553.06	28.83	5,719.98	72	Building B Water Service Line
VC-W-C	5,554.17	57.66	5,719.98	72	Building C Water Service Line
VC-W-D	5,552.57	57.66	5,719.97	72	Building D Water Service Line

Vista Creek Multi-Family
Water Demand Analysis
Active Scenario: Max Day
FlexTable: Pipe Table

Label	Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (Absolute) (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	86	J-7	VC-FH-4	8.0	PVC	150.0	38.10	0.24	0.000
P-2	196	VC-J-1	VC-F-A	8.0	PVC	150.0	11.21	0.07	0.000
P-3	14	VC-F-D	VC-FH-3	8.0	PVC	150.0	38.10	0.24	0.000
P-4	12	VC-FH-3	VC-W-D	8.0	PVC	150.0	38.10	0.24	0.000
P-5	125	VC-W-D	VC-J-1	8.0	PVC	150.0	19.56	0.12	0.000
P-6	136	VC-FH-4	VC-F-D	8.0	PVC	150.0	38.10	0.24	0.000
P-7	52	VC-J-1	VC-W-C	8.0	PVC	150.0	8.36	0.05	0.000
P-8	15	VC-W-C	VC-FH-2	8.0	PVC	150.0	66.02	0.42	0.000
P-9	15	VC-FH-2	VC-F-C	8.0	PVC	150.0	66.02	0.42	0.000
P-10	219	VC-F-C	VC-FH-1	8.0	PVC	150.0	66.02	0.42	0.000
P-11	19	VC-FH-1	J-13	8.0	PVC	150.0	66.02	0.42	0.000
P-12	27	VC-W-B	VC-FH-5	8.0	PVC	150.0	70.50	0.45	0.000
P-13	14	VC-F-B	VC-W-B	8.0	PVC	150.0	41.67	0.27	0.000
P-14	178	VC-W-A	VC-F-B	8.0	PVC	150.0	41.67	0.27	0.000
P-15	15	VC-F-A	VC-W-A	8.0	PVC	150.0	11.21	0.07	0.000
P-16	134	VC-FH-5	J-14	8.0	PVC	150.0	70.50	0.45	0.000

Vista Creek Multi-Family
Water Demand Analysis
Active Scenario: Peak Hour
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Notes
VC-F-A	5,554.43	0.00	5,719.94	72	Building A Fire Line
VC-F-B	5,553.08	0.00	5,719.96	72	Building B Fire Line
VC-F-C	5,554.07	0.00	5,719.95	72	Building C Fire Line
VC-F-D	5,552.54	0.00	5,719.94	72	Building D Fire Line
VC-FH-1	5,554.07	0.00	5,720.00	72	Fire Hydrant
VC-FH-2	5,554.20	0.00	5,719.94	72	Fire Hydrant
VC-FH-3	5,552.53	0.00	5,719.94	72	Fire Hydrant
VC-FH-4	5,552.76	0.00	5,719.95	72	Fire Hydrant
VC-FH-5	5,552.94	0.00	5,719.97	72	Fire Hydrant
VC-J-1	5,554.41	0.00	5,719.94	72	
VC-W-A	5,554.43	48.96	5,719.94	72	Building A Water Service Line
VC-W-B	5,553.06	46.34	5,719.96	72	Building B Water Service Line
VC-W-C	5,554.17	92.67	5,719.94	72	Building C Water Service Line
VC-W-D	5,552.57	92.67	5,719.94	72	Building D Water Service Line

Vista Creek Multi-Family
Water Demand Analysis
Active Scenario: Peak Hour
FlexTable: Pipe Table

Label	Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (Absolute) (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	86	J-7	VC-FH-4	8.0	PVC	150.0	61.22	0.39	0.000
P-2	196	VC-J-1	VC-F-A	8.0	PVC	150.0	18.01	0.11	0.000
P-3	14	VC-F-D	VC-FH-3	8.0	PVC	150.0	61.22	0.39	0.000
P-4	12	VC-FH-3	VC-W-D	8.0	PVC	150.0	61.22	0.39	0.000
P-5	125	VC-W-D	VC-J-1	8.0	PVC	150.0	31.45	0.20	0.000
P-6	136	VC-FH-4	VC-F-D	8.0	PVC	150.0	61.22	0.39	0.000
P-7	52	VC-J-1	VC-W-C	8.0	PVC	150.0	13.44	0.09	0.000
P-8	15	VC-W-C	VC-FH-2	8.0	PVC	150.0	106.11	0.68	0.000
P-9	15	VC-FH-2	VC-F-C	8.0	PVC	150.0	106.11	0.68	0.000
P-10	219	VC-F-C	VC-FH-1	8.0	PVC	150.0	106.11	0.68	0.000
P-11	19	VC-FH-1	J-13	8.0	PVC	150.0	106.11	0.68	0.000
P-12	27	VC-W-B	VC-FH-5	8.0	PVC	150.0	113.31	0.72	0.000
P-13	14	VC-F-B	VC-W-B	8.0	PVC	150.0	66.97	0.43	0.000
P-14	178	VC-W-A	VC-F-B	8.0	PVC	150.0	66.97	0.43	0.000
P-15	15	VC-F-A	VC-W-A	8.0	PVC	150.0	18.01	0.11	0.000
P-16	134	VC-FH-5	J-14	8.0	PVC	150.0	113.31	0.72	0.000

Vista Creek Multi-Family
Water Demand Analysis
Active Scenario: Steady State
FlexTable: Reservoir Table

Label	Elevation (ft)	Hydraulic Grade (ft)
R-1	5,720.00	5,720.00
R-2	5,720.00	5,720.00

Vista Creek Multi-Family
Water Demand Analysis
Active Scenario: Max Day + Fire
Fire Flow Node FlexTable: Fire Flow Report

Label	Satisfies Fire Flow Constraints?	Flow (Total Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)	Velocity of Maximum Pipe (ft/s)	Pipe w/ Maximum Velocity
VC-FH-5	True	1,500.00	1,501.00	71	6.82	P-16
VC-FH-4	True	1,500.00	1,501.00	71	5.56	P-1
VC-FH-3	True	1,500.00	1,501.00	71	5.54	P-5
VC-FH-2	True	1,500.00	1,501.00	71	5.00	P-7
VC-FH-1	True	1,500.00	1,501.00	72	8.43	P-11
VC-F-D	True	1,500.00	1,501.00	71	5.43	P-5
VC-F-C	True	1,500.00	1,501.00	71	5.11	P-10
VC-F-B	True	1,500.00	1,501.00	71	6.42	P-16
VC-F-A	True	1,500.00	1,501.00	70	5.04	P-2

Appendix C
Reference Utility Maps

202189 2/3

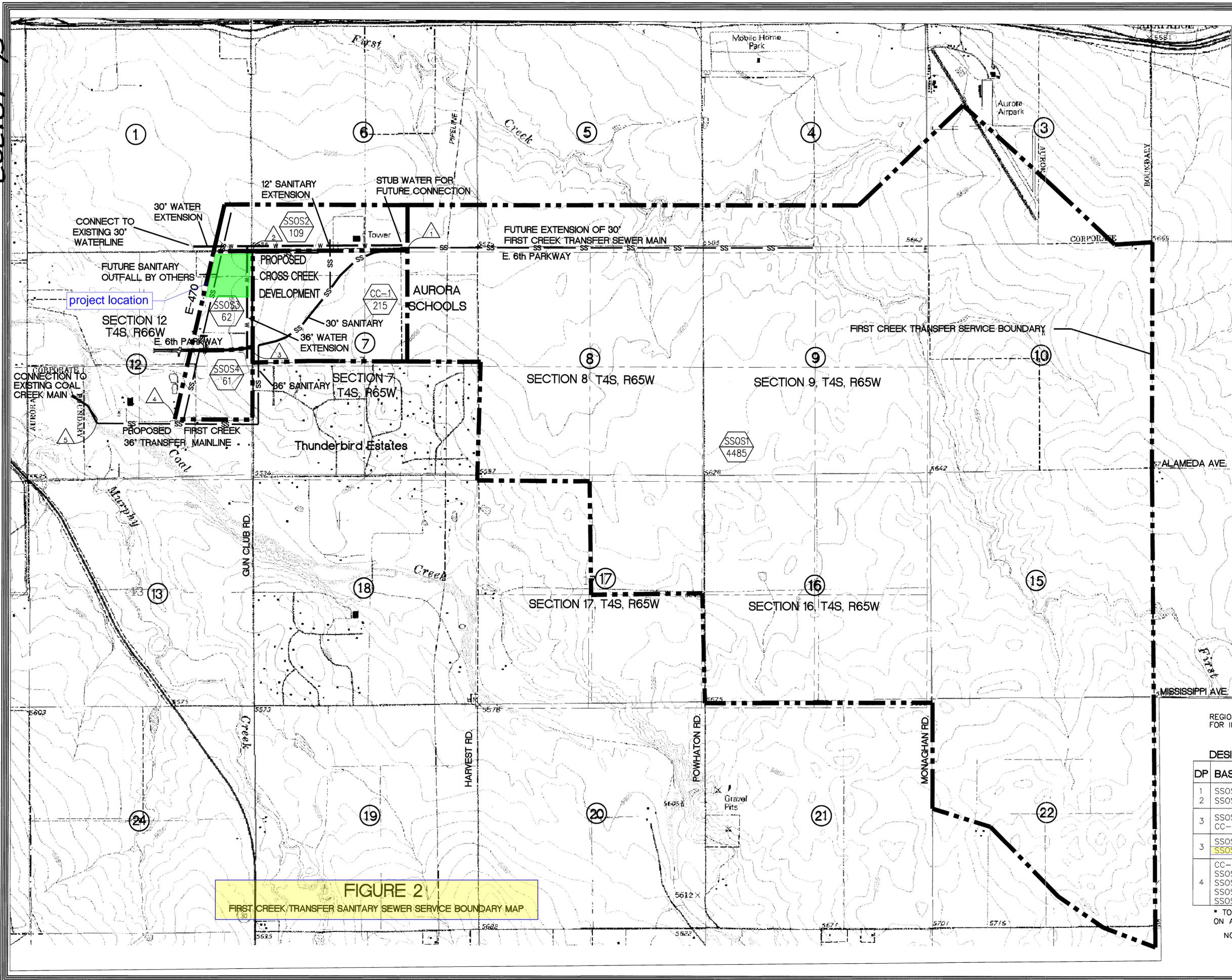
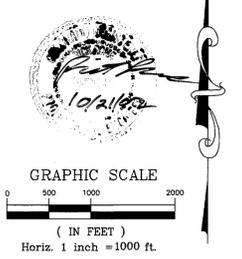


FIGURE 2
FIRST CREEK TRANSFER SANITARY SEWER SERVICE BOUNDARY MAP

LEGEND

- BASIN DESIGNATION
- AREA (ACRES)
- DESIGN POINT
- BASIN BOUNDARY
- SEWER TRUNK LINE
- WATERLINE



REGIONAL DESIGN PRESENTED FOR INFORMATION ONLY

DESIGN FLOW SUMMARY CHART

DP	BASIN	BASIN PEAK HOUR	TOTAL PEAK HOUR
1	SSOS1	10,839.0	---
2	SSOS2	429.1	429.1
3	SSOS1	10,839.0	---
	CC-1	770.9	11,609.9
3	SSOS2	429.1	---
	SSOS3	244.0	673.1
4	CC-1	770.9	---
	SSOS1	10,839.0	---
	SSOS2	429.1	---
	SSOS3	244.0	---
	SSOS4	239.8	11,700.9*

* TOTAL BASIN PEAK FLOW IS BASED ON A UNIFORM PEAK FACTOR OF 2.38

NOTE: PEAK HOUR FLOWS MAY NOT BE DIRECTLY ADDITIVE DUE TO VARYING PEAK FACTORS FOR POPULATION DISTRIBUTION.

CALL UTILITY NOTIFICATION CENTER OF COLORADO 1-800-922-1987 or 534-6700 ENGINEER CALL 7 BUSINESS DAYS IN ADVANCE FOR THE MARKING OF UNDERGROUND UTILITIES

NO.	DATE	REVISION	BY
DES.	DR.	CK.	DATE

HCH COUNTRY ENGINEERING, INC.
14 INVERNESS DRIVE EAST, SUITE D-106
ENGLEWOOD, CO 80120
PH: (303) 925-0544 FX: (303) 925-0547
FILE: SAN-REG-EXHIB

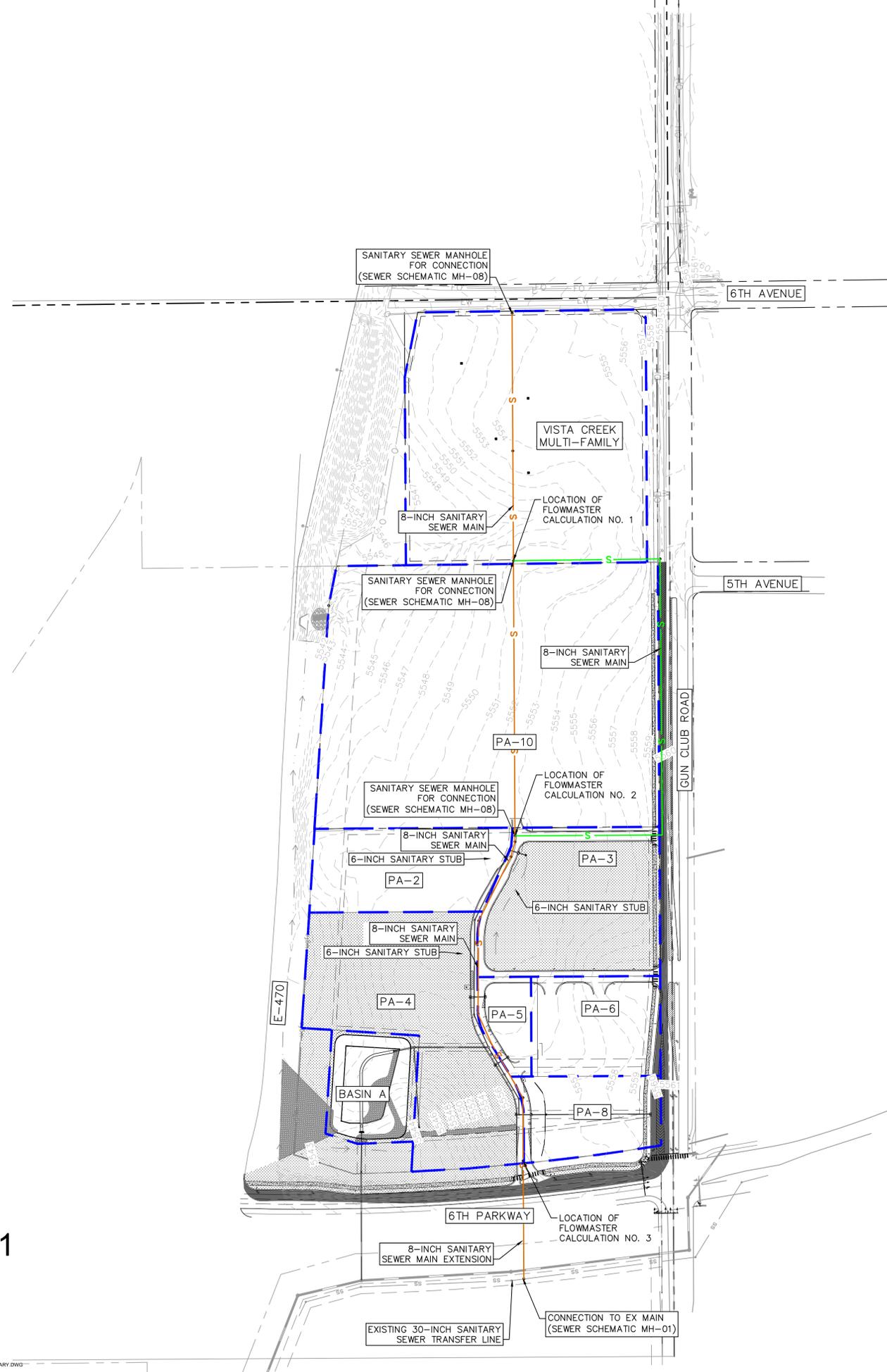


US HOME AURORA, COLORADO CROSS CREEK REGIONAL UTILITY EXHIBIT

PROJECT NO. 2022004.55

202189 2/3

MASTER UTILITY EXHIBIT SANITARY



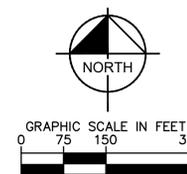
Sanitary Sewer Loading Analysis				
Area/Land Use	Area (ac)	Average Daily Flow (gpd)	Total Avg Daily Flow (gpm)	Peak Hour Flow (gpm)
PA-7 - Detention	1.38	-	-	-
PA-4 - Retail	3.67	5,505.00	4.21	15.67
PA-8 - Open Space	0.83	-	-	-
PA-6 - Retail	1.51	2,265.00	1.73	6.45
PA-3 - Retail	2.96	4,440.00	3.39	12.64
PA-2 - Multi Family	1.87	8,287.84	6.33	23.60
PA-5 - Open Space	0.56	-	-	-
PA-10 - Multi Family	9.52	41,250.84	31.51	117.45
Vista Creek MF	9.13	60,463.56	46.19	172.13
Total to Ex Sanitary Sewer Main			347.94	

LEGEND

- WATER/SANITARY BASIN BOUNDARY
- SANITARY SEWER LINE OPTION 1
- SANITARY SEWER LINE OPTION 2

NOTE
UTILITY ALIGNMENTS AND STUB LOCATIONS SHOWN ARE SCHEMATIC FOR ILLUSTRATIVE PURPOSES AND ARE SUBJECT TO CHANGE WITH THE SITE SPECIFIC PLANNING AND CONSTRUCTIONS DOCUMENTS.

APPROVED ON THIS DATE	
_____	_____
CITY ENGINEER	DATE
_____	_____
WATER DEPARTMENT	DATE
_____	_____
FIRE DEPARTMENT	DATE
_____	_____



**VISTA CREEK FILING NO. 1
& LAMAR LANDING**
AURORA, COLORADO
MARCH 13, 2023

Kimley»Horn
4582 SOUTH ULSTER STREET
SUITE 1500
DENVER, COLORADO, 80237
303.228.2300

MASTER UTILITY EXHIBIT WATER

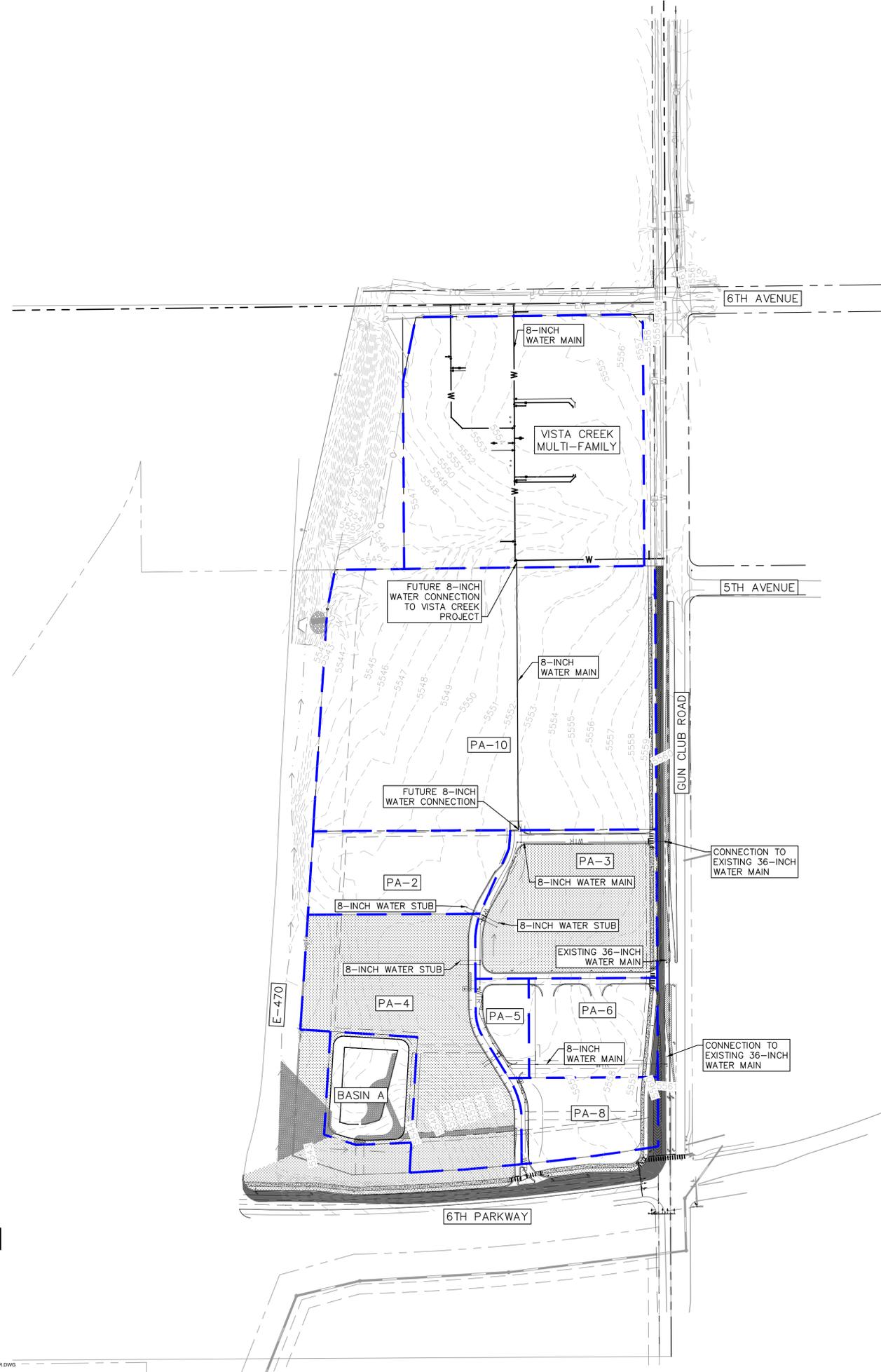
Area/Land Use	Demand (gpm)		
	Average Day	Max Day	Peak Hour
PA-7 - Detention	-	-	-
PA-4 - Retail	3.68	10.30	16.55
PA-8 - Open Space	-	-	-
PA-6 - Retail	2.72	7.61	12.23
PA-3 - Retail	2.00	5.60	9.00
PA-2 - Multi Family	7.97	22.30	35.85
PA-5 - Open Space	-	-	-
Vista Creek MF	62.37	174.62	280.64
PA-10 - Multi Family	46.24	129.47	208.08
Total	124.97	349.91	562.35

LEGEND

 WATER/SANITARY BASIN BOUNDARY

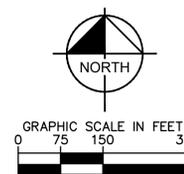
NOTE

UTILITY ALIGNMENTS AND STUB LOCATIONS SHOWN ARE SCHEMATIC FOR ILLUSTRATIVE PURPOSES AND ARE SUBJECT TO CHANGE WITH THE SITE SPECIFIC PLANNING AND CONSTRUCTIONS DOCUMENTS.



VISTA CREEK FILING NO. 1 & LAMAR LANDING

AURORA, COLORADO
January 25, 2023



Kimley»Horn

4582 SOUTH ULSTER STREET
SUITE 1500
DENVER, COLORADO, 80237
303.228.2300

NOTE: THIS PLAN IS CONCEPTUAL IN NATURE