

Water Resources Report
For
Solace Apartments
El Paso County, CO

May 1st, 2020

Prepared for:
Jackson Dearborn Partners
404 S Wells St, Suite 400
Chicago, IL 60607
(734)-216-2577

Prepared by:
JR Engineering, LLC
5475 Tech Center Drive, Suite 235
Colorado Springs, CO 80919
719-593-2593

JR Project No. 25174.00

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1.1. Purpose

This document is intended to serve as the potable water report for Solace Apartments. The purpose of this document is to show that the proposed water demands and fire scenario is within the acceptable criteria of the Cherokee Hills Metropolitan District.

1.2. Summary of Proposed Development

The proposed Solace Apartments, known as “Solace” from herein, is a parcel of land located in Section 7, Township 14 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. Solace is a 28.99 acre, urban, multifamily-development, and is comprised of 16 apartment buildings with a total of 348 units and associated infrastructure. Solace is bound by existing industrial developments to the North and vacant land to the West. Galley Road bounds the property to the south and existing light industrial businesses to the east. Solace will be broken into two phases, with lot 1 (phase 1) one containing the majority of the development and lot 2 (phase 2) consisting of the northern part of the development. Lot 1 of Solace will include 234 units and lot 2 will contain 114 units for a total of 348 units. Please see the site plan in appendix B for the developments phasing. A vicinity map of the area is presented in Appendix A. As previously mentioned, the Cherokee Hills Metropolitan District will provide and service the water and sanitary sewer to this development. Refer to the vicinity map and proposed site plan in Appendix A and Appendix B, respectively.

1.3. Potable Water Supply

The Solace site is located in the service area for the Cherokee Metropolitan District. Cherokee Metropolitan District will supply water to the proposed development via its existing water supply system via three connections discussed in the next section. A demand of 100.6 acre-feet of water per year has been determined to be needed at full build out. Per the phasing of the Solace development, lot one has a demand 64.0 acre-feet of water per year and lot 2 will have a demand of 36.6 acre-feet of water per year. Potable water demand was calculated to be 71.9 acre-feet per year with 28.7 acre-feet per year for landscape irrigation demand. The District has agreed to service the entire project. See appendix for the district letter of commitment.

1.4. Potable Water Service

The development will be served by standard 1.5 inch PVC service taps and 8-inch PVC water main lines. The Potable Water Demand Spreadsheet was set up to model demand from individual junctions, as shown in Appendix D. The proposed potable network at the northern boundary of the site will connect to an existing 8” waterline

in Ainsworth St. and an existing 8" waterline in Paonia St. On the southern boundary of the site, the waterline will connect to an existing 8" X 12" Tee, perpendicular to the 26" waterline in Galley RD. The potable water analysis presented within this report conforms to the ultimate built-out condition and does not include any phasing. Cherokee Metro provided some pressure readings near the potable water tie-in locations to be used for modeling. The pressure near the southern boundary was measured to be 135psi. The pressure at a hydrant near the proposed connection at Paonia Street was measured to be 126psi. The pressure at a hydrant at the southern portion of Ainsworth Street was measured to be approximately 126psi.

Each junction demands correspond to an individual apartment unit. In total, there are 348 apartment units. In addition, the demand from the clubhouse was assumed 200 gpd/10,000 SF. The demand from each individual node corresponds to the closest centroid near adjacent apartment units grouped together or the clubhouse. In prior reports approved by Cherokee Hills Metro District, the modeled multi-family residential demand was 0.2 acre feet per year. Summer time peak hour loadings are 5 times the average day demand. Maximum day demands are 2.8 times the average day demand.

The estimated irrigated area for this site was equal to 11.8 acres that require 2.43 ac-ft-yr/ac as provided by the district. The total irrigation water required was calculated to be 28.7 ac-ft. A possible consideration for the site at time of final landscape design is the use of up to 95 percent xeriscape. Xeriscape has the ability to reduce the site's water demand by approximately 15 percent.

Bentley's WaterCAD V8 XM was utilized to analyze the potable water system model. The overall schematic of the WaterCAD analysis (with corresponding pipe labels and Junction labels) is shown in Appendix C. A Hazen Williams roughness Coefficient of 130 was used to model each pipe link. Overall, the max day, max hour, and max day + Fire demand models account for unit demand, irrigation demand and demand from the clubhouse and swimming pool. The values and inputs of each modeled WaterCAD scenario are shown in the demand table in Appendix D. The calculated irrigation demands were distributed evenly throughout each model node.

The proposed system of potable water conduits has an 8" system loop. There are no dead ends within the model. Each existing connection corresponds to a reservoir; the HGL of each reservoir was calculated by adding the elevation of the connection with the assumed pressure head of 130 psi. The result of the overall analysis in WaterCAD is shown in Appendix D.

DESIGN CONDITIONS

- (1) Maximum hourly flow with a minimum system pressure of 40 pounds per square inch (psi) and maximum velocities of 5 feet per second.
- (2) Maximum daily flow plus fire demand with a minimum system pressure of 30 psi.
- (3) A Fire demand of 2,000 (gpm) + max day flow; at the highest node in the site.

1.5. District Capacity

As shown in Appendix E, Cherokee Hills Metropolitan District committed to serve the proposed development. The service commitment letter states that "the District's Water Reclamation Facility (WRF) has the required capacity to meet the sewer demand for this development". Thus, according to the service commitment letter, the proposed development of this site will not cause a capacity issue with the District, and the District has facilities in place to accept the wastewater discharge from this site. Refer to the Service Commitment Letter in Appendix E for the volumes of capacity and current utilization of the existing treatment plant.

1.6. Waivers from Criteria

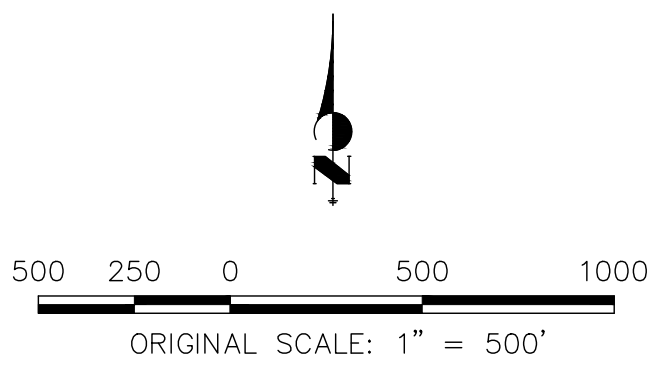
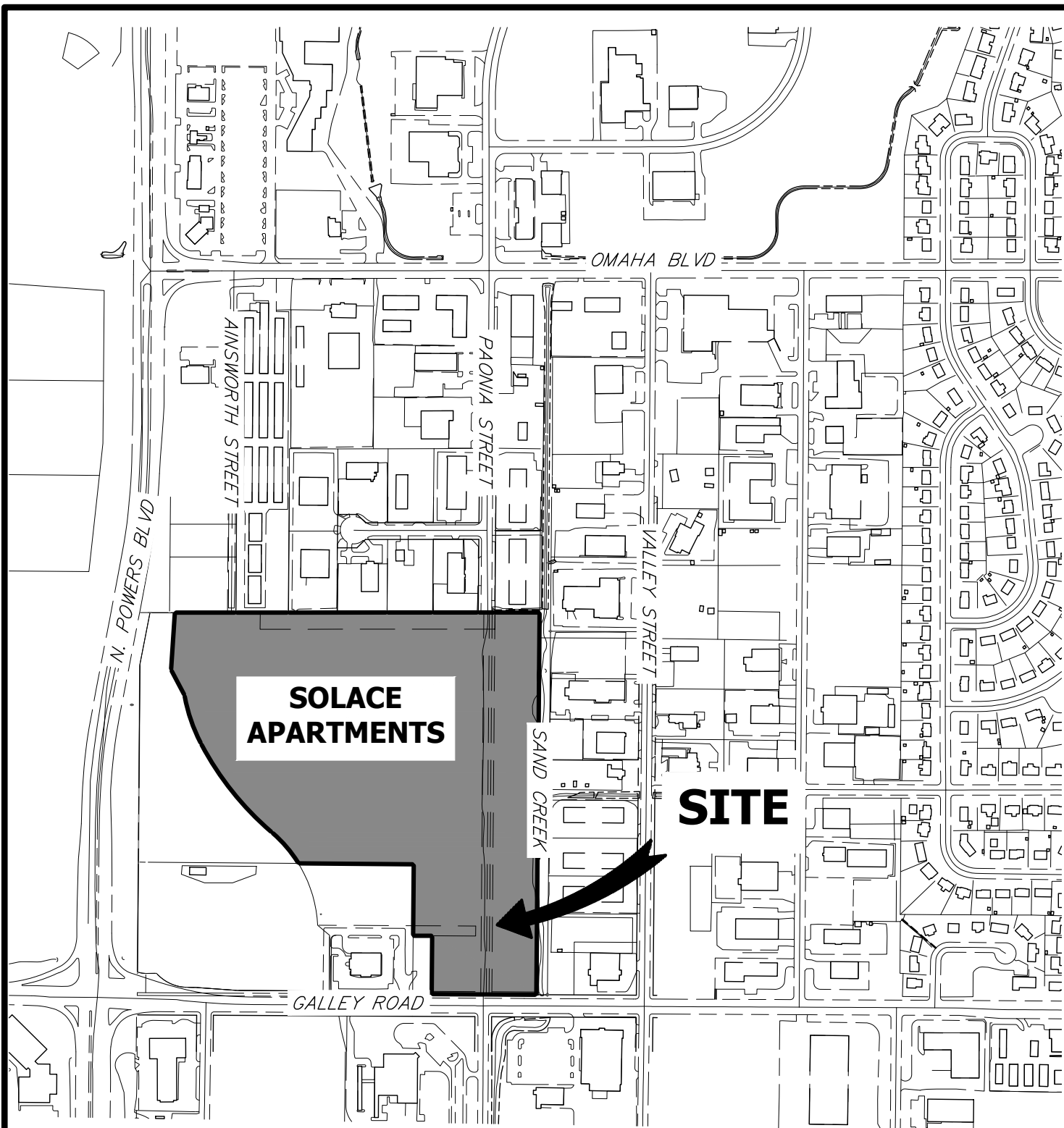
There are no waivers requested for the specifications or the criteria established by the Cherokee Metropolitan District for this project.

1.7. Compliance Pageswith Standards

The water distribution system, design and modeling results conform to all applicable criteria set forth by Cherokee Metropolitan District.

APPENDIX A: VICINITY MAP

X:\2510000.all\2517400\Drawings\Blocks\Vicinity Map.dwg, 8.5x11 Portrait, 12/31/2019 2:00:39 PM, FC

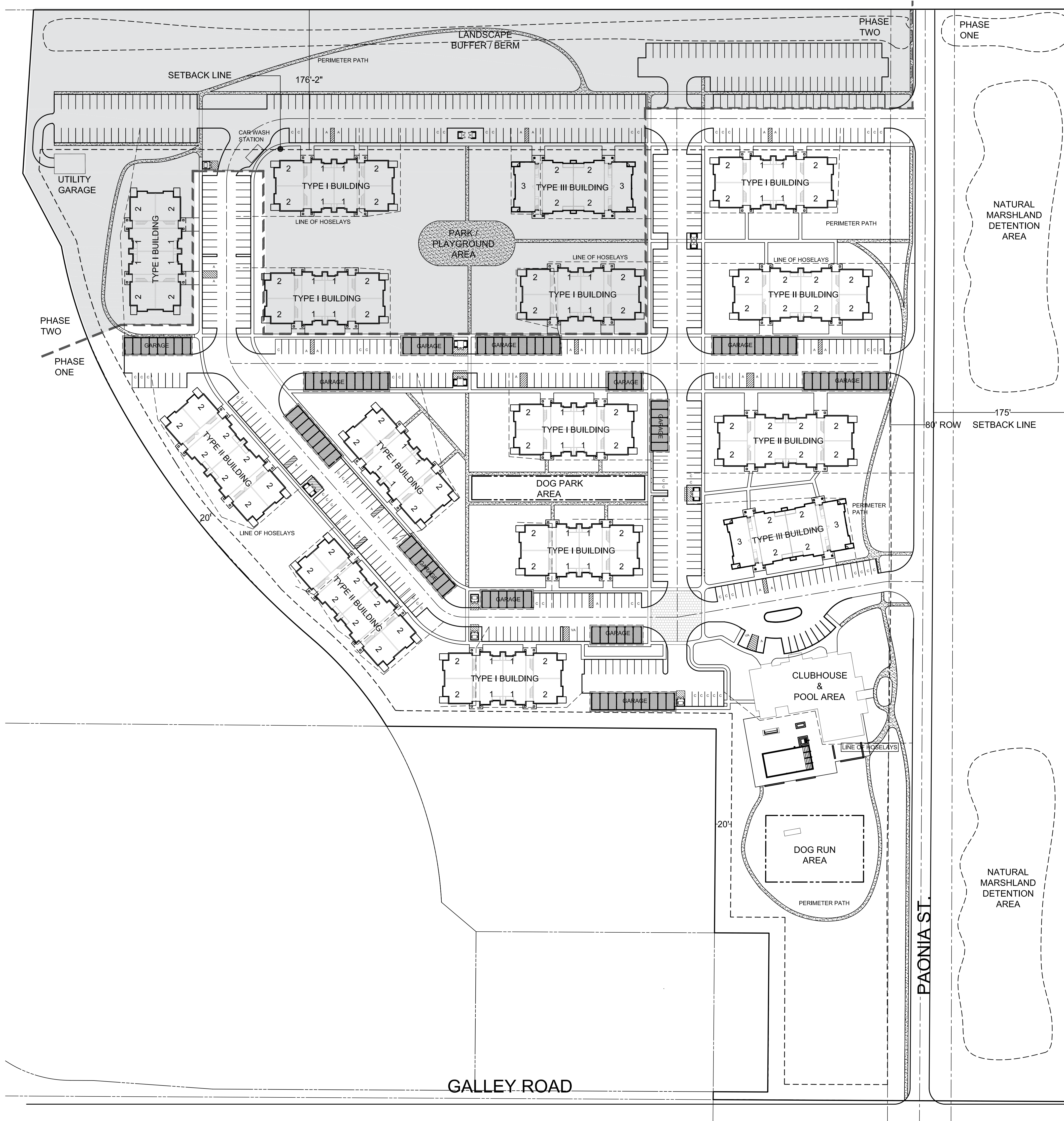


VICINITY MAP
SOLACE APARTMENTS
JOB NO. 25174.00
12/31/2019

 **J-R ENGINEERING**
A Westrian Company

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Fort Collins 970-491-9888 • www.jrengineering.com

APPENDIX B: PROPOSED SITE PLAN



POWERS BLVD. COLORADO SPRINGS
CONCEPTUAL PHASED SITE PLAN

APRIL 20, 2020

PROJECT BREAKDOWN:

PHASE ONE:

ONE BEDROOM UNITS - 60 UNITS
TWO BEDROOM UNITS - 168 UNITS
THREE BEDROOM UNITS - 6 UNITS

TOTAL UNITS = 234 UNITS

PHASE TWO:

ONE BEDROOM UNITS - 48 UNITS
TWO BEDROOM UNITS - 60 UNITS
THREE BEDROOM UNITS - 6 UNITS

TOTAL UNITS = 114 UNITS

TOTAL PROJECT:

ONE BEDROOM UNITS - 108 UNITS
TWO BEDROOM UNITS - 228 UNITS
THREE BEDROOM UNITS - 12 UNITS

TOTAL UNITS = 348 UNITS

PHASE ONE PARKING REQUIREMENTS:

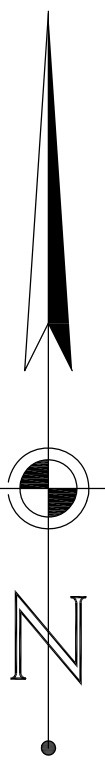
ONE BEDROOM 1.5 PER UNIT	=	90 SPACES
TWO BEDROOM 1.7 PER UNIT	=	286 SPACES
THREE BEDROOM 2 PER UNIT	=	12 SPACES
VISITOR 3 PER TOTAL UNITS	=	78 SPACES
TOTAL PARKING REQ'D	=	466 SPACES
ACCESSIBLE SPOTS REQ'D	=	9 SPACES
ACCESSIBLE SPOTS PROV.	=	16 SPACES
GARAGE SPOTS PROV.	=	78

TOTAL PARKING PROVIDED = 466 SPACES

PHASE TWO PARKING REQUIREMENTS:

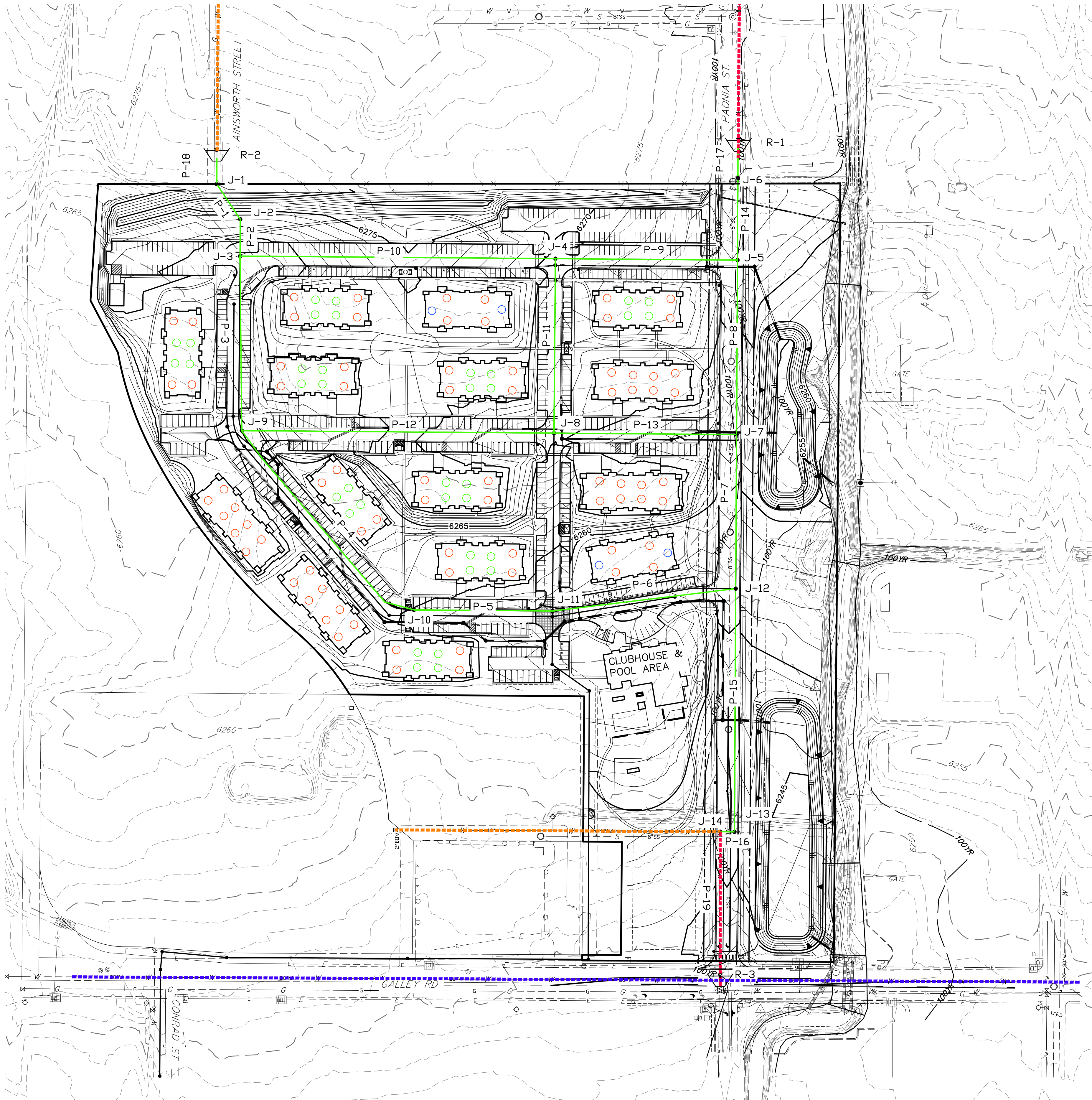
ONE BEDROOM 1.5 PER UNIT	=	72 SPACES
TWO BEDROOM 1.7 PER UNIT	=	102 SPACES
THREE BEDROOM 2 PER UNIT	=	12 SPACES
VISITOR 3 PER TOTAL UNITS	=	38 SPACES
TOTAL PARKING REQ'D	=	224 SPACES
ACCESSIBLE SPOTS REQ'D	=	5 SPACES
ACCESSIBLE SPOTS PROV.	=	10 SPACES
GARAGE SPOTS PROV.	=	24

TOTAL PARKING PROVIDED = 224 SPACES



APPENDIX C: UTILITY SERVICE PLAN

WATER UTILITY PLAN



LEGEND

- 8" \varnothing PROPOSED WATERLINE
- 8" \varnothing EXISTING WATERLINE
- 12" \varnothing EXISTING WATERLINE
- 26" \varnothing EXISTING WATERLINE

RESERVOIR



JUNCTION



INDEX CONTOUR

INTERMEDIATE CONTOUR



1 BEDROOM UNIT



2 BEDROOM UNIT



3 BEDROOM UNIT



NOTE: ALL APARTMENTS ARE 3 STORIES AND HAVE THE SAME FLOOR PLAN ON EACH FLOOR.
NOTE: FOR THE PURPOSE OF THIS POTABLE WATER REPORT, ALL UNITS WERE ASSUMED TO HAVE 7/10 THE DEMAND OF A TYPICAL SINGLE FAMILY UNIT OF (375 GALLONS PER DAY).



WATER UTILITY
SOLACE APARTMENTS
JOB NO. 2517400
01-03-2020
SHEET 1 OF 1



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APPENDIX D: POTABLE DEMAND ANALYSIS AND WATERCAD RESULTS

Project Name Solace Apartments
Project Number 2517400
Date 1/23/2019
Created By AJH
Checked By DRC

Cherokee Hills MD Residential Criteria	Multiply by
Average Day Demand (gpud)	178
Max Day Factor	2.8
Peak Hour Factor	5
Fire Flow (gpm)	2000
Club House	200gpd/1000SF

178.2 gpud derived to match 0.2 AFY/ Unit as provided by district

Definition of Units:
gput = gallons per unit per day
gpud = gallons per irrigated acre per day (based on a 180 day irrigation season)
ggad = gallons per gross acre per day
gsud = gallons per student per day
n.a. = not applicable

TABLE 1 - DEMAND SUMMARY							
Potable Demand						Irrigation Demand	Potable + Irrigation Demand
Junction	No. of Units	Average Day (gpm)	Max Day (gpm)	Fire Flow Demands (gpm)	Peak Hour (gpm)	Irrigation (gpm)	Modeled Demand (gpm)
J-1	0	0.0	0.0	0	0.0	1.4	1.4
J-2	0	0.0	0.0	0	0.0	1.4	1.4
J-3*	48	5.9	16.6	2000	29.7	1.4	7.4
J-4	54	6.7	18.7	0	33.4	1.4	8.1
J-5	12	1.5	4.2	0	7.4	1.4	2.9
J-6	0	0.0	0.0	0	0.0	1.4	1.4
J-7	0	0.0	0.0	0	0.0	1.1	1.1
J-8	72	8.9	24.9	0	44.6	1.1	10.1
J-9	72	8.9	24.9	0	44.6	1.1	10.1
J-10	60	7.4	20.8	0	37.1	1.1	8.6
J-11	30	3.7	10.4	0	18.6	1.1	4.9
J-12	CLUBHOUSE(10820 SF)	1.5	4.2	0	7.5	1.1	2.7
J-13	0	0.0	0.0	0	0.0	1.1	1.1
J-14	0	0.0	0.0	0	0.0	1.1	1.1
TOTAL	348	44.6	124.8	2000.0	222.8		62.4
43.1 gpm (Units) + 1.5 gpm (Clubhouse) = 44.6 gpm						LOT 2 - (PHASE 2) TOTAL	36.6
43.1 gpm (Units) = 69.6 afy						LOT 1 - (PHASE 1) TOTAL	64.0
							100.6

GPM

AFY

AFY

AFY

Total Demand is 2.4% higher than district estimate due to addition of clubhouse demands

DISTRICT
ESTIMATE
VERIFICATION

TABLE 2 - POTABLE DEMAND (PER UNIT) - Provided by Water District					
	Type	AFY/UNIT	UNIT	GPM	AFY
Lot 1 - Phase 1	Multifamily	0.2	234	29.0	46.8
Lot 2 - Phase 2	Multifamily	0.2	114	14.1	22.8
TOTAL			348	43.1	69.6

Potable Demand

DISTRICT
ESTIMATE
VERIFICATION

TABLE 3 - IRRIGATION DEMAND - Derived From Landscape Area					
	Type	AFY/AC	AREA (AC)	GPM	AFY
Lot 1 - Phase 1	Landscaping	2.43	6.1	9.2	14.8
Lot 2 - Phase 2	Landscaping	2.43	5.7	8.6	13.9
TOTAL			11.8	17.8	28.7

Irrigation Demand

Potable + Irrigation Demand

Notes:

- 1) Conversion for AFY to GPM = $(1/365) * (1/24) * (1/60) * (325851)$.
 - 2) 4.74 Acres east of Paonia Street assumed to be native seed and not irrigated for these demands.
 - 3) Phase 1 average day has 1.1 gpm per junction added to account for irrigation and Phase 2 average day demand has 1.4 gpm added per node to account for irrigation.
- * Indicates worst case junction with Fire Flow of 2,000 gpm applied to node.

MAX DAY

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	6,268.0	3.92	6,556.4	124.8
J-1	6,267.8	3.92	6,556.6	125.0
J-4	6,264.6	22.68	6,556.0	126.1
J-3	6,264.0	20.72	6,556.3	126.5
J-6	6,263.8	3.92	6,555.8	126.3
J-5	6,261.8	8.12	6,555.9	127.3
J-8	6,261.4	28.28	6,556.0	127.5
J-9	6,261.2	28.28	6,556.1	127.6
J-7	6,256.8	3.08	6,556.0	129.4
J-10	6,254.9	24.08	6,556.0	130.3
J-11	6,252.1	13.72	6,556.0	131.5
J-12	6,251.4	7.56	6,556.0	131.8
J-14	6,245.8	3.08	6,556.0	134.2
J-13	6,245.8	3.08	6,556.0	134.2

MAX DAY

Label	Length (ft)	Diameter (in)	Hazen-Williams C	Flow (Absolute) (gpm)	Velocity (Maximum) (ft/s)
P-18	1,000	8.0	130.0	334.78	2.14
P-1	75	8.0	130.0	330.86	2.11
P-2	65	8.0	130.0	326.94	2.09
P-14	145	8.0	120.0	185.12	1.18
P-17	1,000	8.0	130.0	181.20	1.16
P-3	309	8.0	130.0	165.55	1.06
P-10	557	8.0	130.0	140.67	0.90
P-9	322	8.0	130.0	104.86	0.67
P-8	308	8.0	130.0	88.38	0.56
P-4	448	8.0	130.0	69.31	0.44
P-12	552	8.0	130.0	67.97	0.43
P-13	323	8.0	130.0	52.82	0.34
P-5	245	8.0	130.0	45.23	0.29
P-7	272	8.0	130.0	38.64	0.25
P-6	327	8.0	130.0	31.51	0.20
P-19	1,000	8.0	130.0	20.86	0.13
P-16	25	8.0	130.0	17.78	0.11
P-15	430	8.0	130.0	14.70	0.09
P-11	308	8.0	130.0	13.13	0.08

PEAK HOUR

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	6,268.0	7.00	6,556.1	124.7
J-1	6,267.8	7.00	6,556.3	124.8
J-4	6,264.6	40.50	6,555.7	125.9
J-3	6,264.0	37.00	6,555.9	126.3
J-6	6,263.8	7.00	6,555.5	126.2
J-5	6,261.8	14.50	6,555.6	127.1
J-8	6,261.4	50.50	6,555.6	127.3
J-9	6,261.2	50.50	6,555.7	127.4
J-7	6,256.8	5.50	6,555.6	129.3
J-10	6,254.9	43.00	6,555.7	130.1
J-11	6,252.1	24.50	6,555.7	131.3
J-12	6,251.4	13.50	6,555.7	131.7
J-14	6,245.8	5.50	6,555.8	134.1
J-13	6,245.8	5.50	6,555.8	134.1

PEAK HOUR

Label	Length (ft)	Diameter (in)	Hazen-Williams C	Flow (Absolute) (gpm)	Velocity (Maximum) (ft/s)
P-18	1,000	8.0	130.0	357.91	2.28
P-1	75	8.0	130.0	350.91	2.24
P-2	65	8.0	130.0	343.91	2.20
P-3	309	8.0	130.0	167.85	1.07
P-14	145	8.0	120.0	150.13	0.96
P-17	1,000	8.0	130.0	143.13	0.91
P-10	557	8.0	130.0	139.06	0.89
P-19	1,000	8.0	130.0	96.72	0.62
P-16	25	8.0	130.0	91.22	0.58
P-15	430	8.0	130.0	85.72	0.55
P-9	322	8.0	130.0	84.74	0.54
P-8	308	8.0	130.0	79.89	0.51
P-12	552	8.0	130.0	62.06	0.40
P-7	272	8.0	130.0	60.01	0.38
P-4	448	8.0	130.0	55.29	0.35
P-13	323	8.0	130.0	25.38	0.16
P-11	308	8.0	130.0	13.82	0.09
P-5	245	8.0	130.0	12.29	0.08
P-6	327	8.0	130.0	12.21	0.08

MAX DAY + FIRE

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-2	6,268.0	3.92	6,542.1	118.6
J-1	6,267.8	3.92	6,543.2	119.2
J-4	6,264.6	22.68	6,544.1	120.9
J-3	6,264.0	2,020.72	6,541.1	119.9
J-6	6,263.8	3.92	6,546.9	122.5
J-5	6,261.8	8.12	6,545.5	122.7
J-8	6,261.4	28.28	6,544.2	122.3
J-9	6,261.2	28.28	6,543.1	122.0
J-7	6,256.8	3.08	6,545.3	124.8
J-10	6,254.9	24.08	6,544.1	125.1
J-11	6,252.1	13.72	6,544.7	126.6
J-12	6,251.4	7.56	6,545.6	127.3
J-14	6,245.8	3.08	6,548.8	131.1
J-13	6,245.8	3.08	6,548.6	131.0

MAX DAY + FIRE

Label	Length (ft)	Diameter (in)	Hazen-Williams C	Flow (Absolute) (gpm)	Velocity (Maximum) (ft/s)
P-18	1,000	8.0	130.0	923.74	5.90
P-1	75	8.0	130.0	919.82	5.87
P-2	65	8.0	130.0	915.90	5.85
P-17	1,000	8.0	130.0	646.65	4.13
P-14	145	8.0	120.0	642.73	4.10
P-19	1,000	8.0	130.0	604.06	3.86
P-16	25	8.0	130.0	600.98	3.84
P-15	430	8.0	130.0	597.90	3.82
P-3	309	8.0	130.0	582.89	3.72
P-10	557	8.0	130.0	521.93	3.33
P-9	322	8.0	130.0	459.52	2.93
P-13	323	8.0	130.0	405.99	2.59
P-6	327	8.0	130.0	356.35	2.27
P-5	245	8.0	130.0	342.63	2.19
P-4	448	8.0	130.0	318.55	2.03
P-12	552	8.0	130.0	292.62	1.87
P-7	272	8.0	130.0	233.98	1.49
P-8	308	8.0	130.0	175.09	1.12
P-11	308	8.0	130.0	85.09	0.54

APPENDIX E: SERVICE COMMITMENT LETTER



CHEROKEE METROPOLITAN DISTRICT

6250 Palmer Park Blvd., Colorado Springs, CO 80915-2842

Telephone: (719) 597-5080 Fax: (719) 597-5145

February 12th, 2020

Mike Bramlett

JR Engineering, LLC

5475 Tech Center Drive, Suite 235

Colorado Springs, CO 80919

Sent via email: mbramlett@jrengineering.com

Original to follow by US Mail

Re: Water and Sewer Service to **Solace Apartments Phase 1**
Commitment Letter No. **2020-04**

Dear Mike Bramlett,

As requested, this document will serve as a formal Letter of Commitment from the Cherokee Metropolitan District to provide municipal water and sewer services for Solace Apartments located at the northeast corner of Powers Boulevard and Galley Road. The proposed location for this development is located within the District's established boundaries and therefore is eligible for service connections from the District.

Cherokee Metropolitan District staff, along with the developer, have determined that the following will be the total water demand required by this occupancy:

Type of Use	Demand (AF/yr)
Domestic	47.0
Irrigation	14.8
Total	61.8

This water commitment is hereby made exclusively for this specific development project at this site within the District. To confirm this commitment you must provide the District with a copy of the final plat approval from El Paso County Development Services within 12 months of the date of this letter. Otherwise, the District may use this allocation for other developments requesting a water commitment. If the subject project is re-platted, you must submit a new commitment request prior to submitting the re-plat to El Paso County, which may result in a recalculation of the water demand for the project.

If I may be of further assistance please contact me at your convenience.

Sincerely,

A handwritten signature in cursive script, appearing to read "Amy Lathen", written over a horizontal line.

Amy Lathen
General Manager

Cc: Peter Johnson; Water Counsel w/ encl: sent via email
Steve Hasbrouck; Board President w/ encl: sent via email
Kevin Brown; Jr. Engineer