

**CONCEPTUAL
MASTER WASTEWATER REPORT
FOR
AED HOMESTEAD
MASTER PLANNED COMMUNITY**

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WP# 184939

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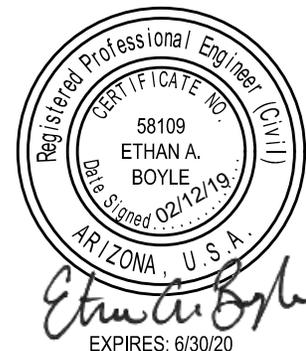


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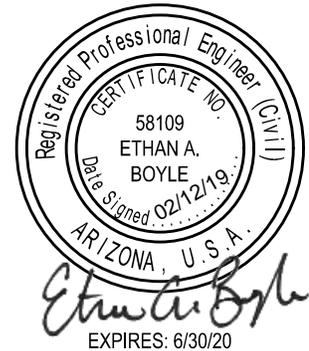
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1.0 INTRODUCTION

1.1 General Background and Project Location

AED Homestead Master Planned Community (Site) is an approximate 866-acre project, with approximately 600 acres of developable land, and 266 acres of open space. The entire Site is planned to be annexed into the City of Prescott.

The Site is located south of Highway 89A, and is bounded on the north by existing commercial development. The Site is bounded on the east by existing Side Road, the Granite Dells subdivision, and vacant land. South of the Site is undisturbed open space, with natural hills and significant grade changes across the landscape. The western boundary borders open space and the Granite Gardens Unit 1 and Unit 2 subdivisions.

The Site is located within Section 36, Township 15 North, Range 2 West; Sections 1 and 12, Township 14 North, Range 2 West; and Sections 6, 7, and 8, Township 14 North, Range 1 West, of the Gila and Salt River Meridian (refer to Exhibit 1 – *Vicinity Map*).

The current zoning of the Site is RCU-2A, R1L-18, and R1L-35. The Site is planned to include a resort with a clubhouse and additional amenities, duplexes, sixplexes, single-family residential, and open space land uses. This Conceptual Master Wastewater Report utilizes a land use plan prepared by Greey|Pickett, dated July 27, 2018.

This Conceptual Master Wastewater Report has been prepared in accordance with Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the City of Prescott's technical requirements for wastewater service, as applicable for the Site.

1.2 Scope of the Conceptual Master Wastewater Report

The purpose of this Conceptual Master Wastewater Report is to determine wastewater design flows, pipe sizes, and wastewater line locations, as required to service the proposed development at full build-out conditions. The required infrastructure identified includes gravity sewer mains and a low-pressure sewer system.

A more-detailed analysis of the wastewater system for each parcel will need to be completed in order to finalize slopes of sewer pipes in locations where there are significant grade elevation differences. Significant mass grading will need to be completed in portions of the Site in order to achieve the modeled gravity sewer system.

1.3 Full Build-Out Condition

The design criteria utilized to calculate wastewater design flows and determine required pipe sizes for the Site are based on projected full build-out conditions for the land use designations within the Site. Refer to Exhibit 2 – *Master Wastewater Exhibit, Full Build-Out Condition*.

2.0 DESIGN CRITERIA

2.1 Wastewater System Criteria

- The sewer design slopes provide minimum design velocities for the applicable required ratio of depth of flow to pipe diameter (d/D), per Section 5.5.4 Sewer System Model Analysis Table 5-1 – Design Criteria, per *City of Prescott General Engineering Standards, 2016* (City standards). Sewer lines are designed to convey the peak dry-weather flow, plus 10% inflow and infiltration factor for new construction, such that the d/D ratio is less than or equal to 0.75 for proposed pipes 12 inches and larger, and less than or equal to 0.50 for new sewer pipes with diameters less than 12 inches. All existing sewer mains on-site will be evaluated for a maximum d/D ratio of 0.90.
- Sewer lines shall be designed with the following minimum slopes and velocities:

Design Criteria

Pipe Size (in)	Minimum Slope (%)	Minimum Design Flowing Full Velocity (ft/s)
8	0.50	2.5
10	0.25	2.5
12	0.20	2.5
14	0.16	2.5
15	0.15	2.5
16	0.14	2.5
18	0.12	2.5
20	0.10	2.5
21	0.10	2.5
24	0.08	2.5

2.2 Wastewater Flow Criteria

For the purpose of this report, wastewater demand design flows and pipe-sizing criteria utilized are based on Wood/Patel's understanding of the applicable wastewater system design criteria listed in the *City of Prescott General Engineering Standards*, dated January 2016, and regionally-accepted criteria.

Per Section 5.9.4, Design Flows, the dry-weather peaking factor, multiplied by the average daily demand for residential areas, is calculated from Title 18 Chapter 9 Section E301.D of the *Arizona Administrative Code*:

WASTEWATER FLOW PEAKING FACTOR

Upstream Population	Dry Weather Peaking Factor
100	3.62
200	3.14
300	2.90
400	2.74
500	2.64
600	2.56
700	2.50
800	2.46
900	2.42
1,000	2.38
1,001 to 10,000	$PF = (6.330 \times p^{-0.231}) + 1.094$
10,001 to 100,000	$PF = (6.177 \times p^{-0.233}) + 1.128$
More than 100,000	$PF = (4.500 \times p^{-0.174}) + 1.945$
PF = Dry Weather Peaking Factor p = Upstream Population	

The dry-weather peaking factor for non-residential areas (or if the population is unknown) is calculated using:

$$PF = C(Q_{avg})^{-m}$$

Q_{avg} , Average Flow (ft ³ /s)	C	M
$0.012 < Q_{avg}$	1.78	0.16
$0.120 < Q_{avg}$	1.79	0.15
$1.20 < Q_{avg} < 35.0$	1.76	0.05

In addition to the dry-weather peaking factor, a wet-weather peaking factor of 1.10 will be used to calculate the peak flow. The peak flow will be calculated by multiplying the average daily demand, dry-weather peaking factor, and the wet-weather peaking factor. A population density of 2.29 persons per dwelling unit was provided by the City of Prescott, and will be used in this report.

3.0 EXISTING CONDITIONS

3.1 Topographic Conditions

The Site is comprised of ridges and valleys throughout, with steeper hills and mountains within the southern half of the Site. Slopes range from approximately 2% in the northwest to 50% through the mountainous region along the south. The Site generally slopes south to north, with elevations ranging from approximately 5,445 feet above mean sea level (MSL) in the southeast, to 4,960 feet above MSL in the northwest.

3.2 Existing Offsite Sewer Infrastructure

There are three (3) gravity sewer locations that will serve as outfalls for the Site. Due to the Site's topography, two (2) outfalls will connect to two (2) existing 8-inch gravity sewer lines that convey flow to the Country Dells Ranch (CDR) Lift Station. According to the *East Airport Regional Lift Station Basis of Design Report* (Carollo, December 2011) found in Appendix C, the CDR Lift Station does not have the capacity to take the majority of the Site's flow. According to the City of Prescott, minor upgrades will be made to the lift station. To account for the lift station reaching full capacity, a 12-inch line in the northeast portion of the Site will serve as the third outfall and will convey flow to the planned East Airport Regional Lift Station.

3.3 Existing Onsite Sewer Infrastructure

It is Wood/Patel's understanding there are currently no existing onsite sewer lines located within the Site's limits.

4.0 PROPOSED WASTEWATER COLLECTION SYSTEM

4.1 Design Flow Calculations

Wastewater design flows are estimated using the design criteria listed in Appendix A: Table 1 – *Wastewater Design Criteria* and Table 2 – *Wastewater Demand Design Flows by Parcel*, and were used to model the Site. Sewer pipe capacities are based upon a flow depth per sewer pipe diameter ratio (d/D) of one-half or three-fourths, depending on the pipe size. Based on the natural topography, the Site can be served by gravity sewer lines that outfall to three (3) locations. The table below summarizes the average day wastewater demand (ADD) and peak flow at the outfall locations for the full build-out of the Site. The total ADD for the entire site is approximately 0.26 million gallons per day (MGD), and the approximate peak flow is 0.67 MGD. Refer to Appendix A: Table 3 – *Wastewater Model, Full Build-Out Condition* for detailed results, and Exhibit 2 – *Master Wastewater Exhibit, Full Build-Out Condition* for the outfall locations and overall proposed onsite wastewater system layout.

Average-Day and Peak Wastewater Flows

Outfall Location	Location	Residential Units	Average Day Demand		Peak Wastewater	
			(gpd)	(gpm)	(gpd)	(gpm)
Outfall 1	Parcels A/C/D/G/H/I	419	76,677	53	204,114	142
Outfall 2	Parcels B/E	182	33,306	23	100,384	70
Outfall 3	Parcels F-G/J/L-T	584	145,804	101	367,280	255
Total		1,185	255,787	177	671,778	467

4.2 Planned Wastewater Collection System

The proposed onsite master wastewater system consists of 8-inch, 10-inch and 12-inch diameter public gravity sewer lines, and an estimated 3/4-inch low-pressure sewer system in Parcel R, that are to be constructed in the roadways and tracts within a sewer easement. The sewer layout generally follows the natural topography of the developable Site, flowing to downstream gravity systems. Some lotting changes will need to occur in order to gravity sewer to parcels. There will also have to be significant mass grading in portions of the Site in order to ensure gravity sewer flow without the addition of lift stations. The

proposed wastewater collection system meets the minimum depth-of-cover requirements established by the City of Prescott. The proposed wastewater system consists of three (3) public sewer systems that outfall to three (3) locations across the Site. The following is a description of the proposed systems:

- Public System to Outfall 1: 8-inch gravity sewer collects wastewater flow from Parcels A, C, D, G, H, & I (Sewer Basin 1) and outfalls to an existing 8-inch gravity sewer line that flows to the Country Dells Ranch Lift Station.
- Public System to Outfall 2: 8-inch gravity sewer collects wastewater flow from Parcels B & E (Sewer Basin 2) and outfalls to an existing 8-inch gravity sewer line that flows to the Country Dells Ranch Lift Station.
- Public System to Outfall 3: 12-inch gravity sewer collects wastewater flow from Parcels F, G, J, L, M, N, O, P, Q, R, S, & T (Sewer Basin 3) and outfalls to an existing 12-inch gravity sewer line that conveys flow to the planned East Airport Regional Lift Station.

Refer to Exhibit 2 for the pipe sizes and outfall locations.

4.3 Pipe Sizing

Proposed sewer lines for the Site were sized to accommodate peak-flow conditions for the full build-out condition. The onsite collection system includes planned gravity sewer mains of 8-inch, 10-inch, and 12-inch diameters. Additionally, there will be one (1) low-pressure sewer system that will be planned in Parcel R. Refer to Table 4 – *Calculated Pipe Capacities, Full Build-Out Condition* within Appendix A for the wastewater model and calculated pipe capacities, and Exhibit 2 – *Master Wastewater Exhibit, Full Build-Out Condition* for the planned full build-out wastewater collection system configurations. Refer to Appendix B for estimated sizing of the planned low-pressure sewer system.

5.0 CONCLUSIONS

The *Conceptual Master Wastewater Report for AED Homestead* presented herein meets the City of Prescott standards and requirements, and serves as a guide for development associated with the planned wastewater system. The following items are conclusions:

1. The AED Homestead Master Planned Community (Site) is an approximate 866 acre-project, with approximately 600 acres of developable land. Currently, the entire Site is located outside the city limits of Prescott.
2. Wastewater design criteria are based on Wood/Patel's understanding of the *City of Prescott General Engineering Standards 2016*, City-accepted population-based criteria, regionally-accepted design standards, and Title 18, Chapter 9 of the *Arizona Administrative Code*.
3. Three (3) planned public wastewater collection systems outfall into three (3) different gravity sewer lines. Two (2) outfalls are existing 8-inch gravity sewer lines that convey flow to the Country Dells Ranch Lift Station. The third outfall is an existing 12-inch gravity sewer line that conveys flow to the planned East Airport Regional Lift Station.
4. The average-day flow generated at full build-out for the Site is approximately 0.26 MGD, and the peak design flow for full build-out is approximately 0.67 MGD.
5. Proposed onsite sewer mains are sized to accommodate peak design flow for the full build-out condition. Wood/Patel's model of the proposed wastewater system provides conveyance and capacity in conformance with the City of Prescott standards and Title 18 of the *Arizona Administrative Code*.
6. A more-detailed analysis of the wastewater system for each subdivision will be presented in future wastewater Basis of Design Reports to confirm conformance with the Conceptual Master Wastewater Report.
7. It is Wood/Patel's understanding the offsite planned East Airport Regional Lift Station and offsite conveyance system have been sized and designed by others to convey the wastewater flows generated onsite. Further analysis by the City of Prescott may be required to verify capacity in the downstream infrastructure.

6.0 REFERENCES

1. *City of Prescott General Engineering Standards*, City of Prescott, 2016.
2. *City of Prescott East Airport Regional Lift Station Basis of Design Report*, Carollo, December 2011.
3. *Arizona Administrative Code*, December 2017.
4. *Engineer's Design Report, Country Dells Sanitary Lift Station & Force Main*, Gordon M. Bowers, P.E., February 2004.

APPENDIX A

DESIGN CRITERIA AND CALCULATIONS

Table 1

Wastewater Design Criteria

TABLE 1 - WASTEWATER DESIGN CRITERIA

Project: AED Homestead
Location: Prescott, Arizona
References: City of Prescott General Engineering Standards, 2016

Project Number: 184939
Project Engineer: Charles Witt, E.I.T.

RESIDENTIAL WASTEWATER DEMANDS							
LAND USE	AVERAGE DAILY DEMAND (ADD)		POPULATION DENSITY		UNIT DAILY WASTEWATER DEMAND		NOTES
	VALUE	UNITS					
Single Family Residential	80	GPD	2.29	Persons/Dwelling Unit	183	GPD/DU	4
Duplex/6 Plex	80	GPD	2.29	Persons/Dwelling Unit	183	GPD/DU	4

NON-RESIDENTIAL WASTEWATER DEMANDS			
LAND USE	AVERAGE DAILY DEMAND (ADD)		NOTES
	VALUE	UNITS	
Hotel, With Kitchen	60	GPD/Bed	Hotel rooms are anticipated to have 2 Beds per Room and 2 People per Bed.
Clubhouse/Amenities	100	Resident Member	Note 7
	10	Non-Resident Member	

HYDRAULIC MODELING CRITERIA: RESIDENTIAL PEAK FLOW			
Peak Flow = ADD x Dry Weather Peaking Factor (PF _d) x Wet Weather Peaking Factor (PF _w)			Notes
Upstream Population	Dry Weather Peaking Factor	Wet Weather Peaking Factor (Percentage of Dry)	
100	3.62	1.1	CITY OF PRESCOTT GENERAL ENGINEERING STANDARDS, SECTION 5.9.4 B, Table 5-4, 2016
200	3.14	1.1	
300	2.90	1.1	
400	2.74	1.1	
500	2.64	1.1	
600	2.56	1.1	
700	2.50	1.1	
800	2.46	1.1	
900	2.42	1.1	
1,000	2.38	1.1	
1,001 to 10,000	$(6.330 \times p^{-0.231}) + 1.094$	1.1	
10,001 to 100,000	$(6.177 \times p^{-0.233}) + 1.128$	1.1	
More than 100,000	$(4.500 \times p^{-0.174}) + 1.945$	1.1	
Mixed Use Development (>200)	3.0	1.1	

HYDRAULIC MODELING CRITERIA: NON-RESIDENTIAL PEAKING FACTOR			
Peaking Factor = C(Q _{avg}) ^m			Notes
Q _{avg} , Average Flow (ft ³ /s)	C	M	
0.012 < Q _{avg}	1.78	0.16	5
0.120 < Q _{avg}	1.79	0.15	5
1.20 < Q _{avg} < 35.0	1.76	0.05	5

HYDRAULIC MODELING CRITERIA: HYDRAULICS		
DESCRIPTION	VALUE	NOTES
Minimum Pipe Diameter (in)	8	2
Manning's "n" value	0.013	2
d/D for Sewer Pipes with Diameters less than 12 inches	0.50	3
d/D for Designing New Sewer Pipes 12 inches and Larger	0.75	3
d/D for Evaluating Existing Mains	0.90	3
Force Main Hazen-William's "C" coefficient	120	1

PIPE SIZE (in)	MEAN VELOCITY		DESIGN SLOPE Minimum (%)
	Minimum Full Flow (ft/sec)	Maximum Peak Flow (ft/sec) ⁶	
8	2.5	10.0	0.500
10	2.5	10.0	0.250
12	2.5	10.0	0.200
14	2.5	10.0	0.160
15	2.5	10.0	0.150
16	2.5	10.0	0.140
18	2.5	10.0	0.120
20	2.5	10.0	0.100
21	2.5	10.0	0.100
24	2.5	10.0	0.080
27	2.5	10.0	0.080
30	2.5	10.0	0.080
36	2.5	10.0	0.080
Force Mains	3.0	7.0	-

Notes:

1. Per City of Prescott General Engineering Standards, 2016
2. Per City of Prescott General Engineering Standards, Section 5.9.5., 2016.
3. Per City of Prescott General Engineering Standards, Section 5.5.4. Table 5-1, 2016.
4. The required density of 2.29 Persons/DU was provided by the City of Prescott during a meeting held January 15, 2019.
5. Per City of Prescott General Engineering Standards, Section 5.5.4. Table 5-3, 2016.
6. Where velocities exceed ten (10) feet per second (fps), the main shall be constructed of a pipe material that is abrasion resistant.
In no case shall velocities exceed fifteen (15) fps
7. Assumption of 100 people will utilize the amenities daily, with 75% resident members and 25% non-resident members.

Table 2

**Wastewater Demand Design Flows
By Parcel**

TABLE 2 - WASTEWATER DEMAND DESIGN FLOWS BY PARCEL

Project: AED Homestead
Location: Prescott, AZ
References: City of Prescott General Engineering Standards, 2016

Project Number: 184939

ONSITE PRELIMINARY LAND USE AND DWELLING UNIT BREAKDOWN BY PARCEL

PARCEL	No. of DUs	Single Family Residential Acres	Density	Non-Single Family Residential Acres	# of Keys	Land Use	Floor Area (SQ. FT.)	Population Density or Acreage		Total Population or Acreage	Unit Daily Water Demand (GPD/DU, AC, or S.F.)		Avg Day Flow (GPD)	Total Avg Day Flow (GPD)
A	83	24	3.5	-	-	Residential	-	2.29	Persons/Dwelling Unit	190	183	GPD/DU	15,189	15,189
B	123	36	3.4	-	-	Residential	-	2.29	Persons/Dwelling Unit	282	183	GPD/DU	22,509	22,509
C	90	12	7.5	-	-	Residential	-	2.29	Persons/Dwelling Unit	206	183	GPD/DU	16,470	16,470
D	74	19	3.9	-	-	Residential	-	2.29	Persons/Dwelling Unit	169	183	GPD/DU	13,542	13,542
E	59	19	3.1	-	-	Residential	-	2.29	Persons/Dwelling Unit	135	183	GPD/DU	10,797	10,797
F	67	26	2.6	-	-	Residential	-	2.29	Persons/Dwelling Unit	153	183	GPD/DU	12,261	12,261
G	144	50	2.9	-	-	Residential	-	2.29	Persons/Dwelling Unit	330	183	GPD/DU	26,352	26,352
H	68	20	3.4	-	-	Residential	-	2.29	Persons/Dwelling Unit	156	183	GPD/DU	12,444	12,444
I	54	38	1.4	-	-	Residential	-	2.29	Persons/Dwelling Unit	124	183	GPD/DU	9,882	9,882
	-	-	-	8.3	-	Future COP Park	-	-	-	-	-	GPD/Acre	-	
J	51	21	2.4	-	-	Residential	-	2.29	Persons/Dwelling Unit	117	183	GPD/DU	9,333	9,333
L	100	35	2.9	-	-	Residential	-	2.29	Persons/Dwelling Unit	229	183	GPD/DU	18,300	18,300
M	63	45	1.4	-	-	Residential	-	2.29	Persons/Dwelling Unit	144	183	GPD/DU	11,529	11,529
N	77	39	2.0	-	-	Residential	-	2.29	Persons/Dwelling Unit	176	183	GPD/DU	14,091	14,091
O	-	-	-	10.0	84	Duplex	-	2.29	Persons/Dwelling Unit	192	183	GPD/DU	15,372	38,932
	-	-	-	4.0	30	6-Plex	-	2.29	Persons/Dwelling Unit	69	183	GPD/DU	5,490	
	-	-	-	4.0	86	Hotel	20,000	2	Beds/Room ¹	344	60	GPD/Bed	10,320	
	-	-	-	4.0	-	Clubhouse/ Amenities	10,000	-	-	75	100	Resident Member	7,500	
	-	-	-	23.0	-	Open Space	-	-	-	25	10	Non-Resident Member	250	
P	16	25	0.6	-	-	Residential	-	2.29	Persons/Dwelling Unit	37	183	GPD/DU	2,928	2,928
Q	37	13	2.8	-	-	Residential	-	2.29	Persons/Dwelling Unit	85	183	GPD/DU	6,771	6,771
R	34	47	0.7	-	-	Residential	-	2.29	Persons/Dwelling Unit	78	183	GPD/DU	6,222	6,222
S	9	19	0.5	-	-	Residential	-	2.29	Persons/Dwelling Unit	21	183	GPD/DU	1,647	1,647
T	36	67	0.5	-	-	Residential	-	2.29	Persons/Dwelling Unit	82	183	GPD/DU	6,588	6,588
Right-of-Way	-	-	-	258	-	Road Right-of-Way/ Open Space	-	-	-	-	-	-	-	-
AED Homestead Total	1,185	555		311	200		30,000			3,419			255,787	255,787

Notes:
1) The population total for the hotel room was calculated by assuming 4 people per hotel room.

Table 3

**Wastewater Model
Full Build-Out Condition**

TABLE 3 - WASTEWATER MODEL, FULL BUILD-OUT CONDITION

Project: AED Homestead
Location: Prescott, Arizona
References: City of Prescott General Engineering Standards, 2016
 Arizona Administrative Code, Title 18, Chapter 9

Project Number: 184939
Project Engineer: Charles Witt, E.I.T.

FROM NODE	TO NODE	PARCEL	LAND USE					RESIDENTIAL NODE ADD (gpd)	RESIDENTIAL TOTAL ADD (gpd)	SEWER NODE ADD (gpd)	TOTAL ADD (gpd)	RESIDENTIAL POPULATION	DRY WEATHER PEAKING FACTOR	PEAK FLOW (gpd)	PEAK FLOW (gpm)
			Residential Dwelling Units	Duplex (Keys)	6 Plex (Keys)	Hotel (Keys)	Clubhouse/ Amenities (People)								
Outfall 1 - Parcels A, C, D, G, H, I															
I1	G4	I	54					9,882	9,882	9,882	9,882	124	3.62	39,350	27
G3	G4	G	9					1,647	1,647	1,647	1,647	21	3.62	6,558	5
G4	H2	G	41					7,503	19,032	19,032	19,032	239	3.14	65,737	46
H1	H2	H	33					6,039	6,039	6,039	6,039	76	3.62	24,047	17
H2	D1	H	35					6,405	31,476	31,476	31,476	395	2.90	100,408	70
D1	C1	D	74					13,542	45,018	45,018	45,018	564	2.64	130,732	91
C1	A1	C	90					16,470	61,488	61,488	61,488	770	2.50	169,092	117
A1	A2	A	83					15,189	76,677	76,677	76,677	960	2.42	204,114	142
Total Outfall 1			419	0	0	0	0	76,677	76,677	76,677	76,677	960	2.42	204,114	142
Outfall 2 - Parcels B and E															
E1	B1	E	59					10,797	10,797	10,797	10,797	135	3.62	42,994	30
B1	B2	B	123					22,509	33,306	33,306	33,306	417	2.74	100,384	70
Total Outfall 2			182	0	0	0	0	33,306	33,306	33,306	33,306	417	2.74	100,384	70

TABLE 3 - WASTEWATER MODEL, FULL BUILD-OUT CONDITION

Project: AED Homestead
Location: Prescott, Arizona
References: City of Prescott General Engineering Standards, 2016
 Arizona Administrative Code, Title 18, Chapter 9

Project Number: 184939
Project Engineer: Charles Witt, E.I.T.

FROM NODE	TO NODE	PARCEL	LAND USE					RESIDENTIAL NODE ADD (gpd)	RESIDENTIAL TOTAL ADD (gpd)	SEWER NODE ADD (gpd)	TOTAL ADD (gpd)	RESIDENTIAL POPULATION	DRY WEATHER PEAKING FACTOR	PEAK FLOW (gpd)	PEAK FLOW (gpm)
			Residential Dwelling Units	Duplex (Keys)	6 Plex (Keys)	Hotel (Keys)	Clubhouse/ Amenities (People)								
Outfall 3 - Parcels F, G, J, L, M, N, O, P, Q, R, S, T															
O1	O3	O		28		86		-	-	15,444	15,444	0	3.24	55,042	38
O2	O3	O		16				-	-	2,928	2,928	0	4.23	13,624	9
O3	X3	-		40	30		100	-	-	20,560	38,932	0	2.79	119,482	83
P1	X3	P	16					2,928	2,928	2,928	2,928	37	3.62	11,659	8
X3	X4	-						-	2,928	-	41,860	37	2.79	128,468	89
N1	X4	N	77					14,091	14,091	14,091	14,091	176	3.62	56,110	39
X4	X5	-						-	17,019	-	55,951	213	2.79	171,714	119
M1	M2	M	63					11,529	11,529	11,529	11,529	144	3.62	45,908	32
M2	L2	L	42					7,686	19,215	7,686	19,215	240	3.14	66,369	46
L1	L2	L	58					10,614	10,614	10,614	10,614	133	3.62	42,265	29
L2	X5	-						-	29,829	-	29,829	373	2.90	95,155	66
X5	X6	-						-	46,848	-	85,780	586	2.64	249,105	173
Q1	X6	Q	37					6,771	6,771	6,771	6,771	85	3.62	26,962	19
X6	X7	R	6					1,098	54,717	1,098	93,649	685	2.56	263,716	183
T1	X1	T	36					6,588	6,588	6,588	6,588	82	3.62	26,233	18
S1	X1	S	9					1,647	1,647	1,647	1,647	21	3.62	6,558	5
X1	X2	-						-	8,235	-	8,235	103	3.62	32,792	23
R1	R2	R	7					1,281	1,281	1,281	1,281	16	3.62	5,101	4
R2	X2	R	11					2,013	3,294	2,013	3,294	41	3.62	13,117	9
X2	X7	R	10					1,830	13,359	1,830	13,359	167	3.62	53,196	37
X7	X8	-						-	68,076	-	107,008	852	2.46	289,564	201
J1	X8	J	51					9,333	9,333	9,333	9,333	117	3.62	37,164	26
X8	X9	-						-	77,409	-	116,341	969	2.42	309,700	215
X9	G2	G	41					7,503	84,912	7,503	123,844	1,063	2.36	321,499	223
G1	G2	G	53					9,699	9,699	9,699	9,699	121	3.62	38,621	27
G2	F1	-						-	94,611	-	133,543	1,184	2.33	342,271	238
F1	F2	F	67					12,261	106,872	12,261	145,804	1,337	2.29	367,280	255
F2	F3	-						-	106,872	-	145,804	1,337	2.29	367,280	255
Total Outfall 3			584	84	30	86	100	106,872	106,872	145,804	145,804	1,337	2.29	367,280	255
Total Outfall 1			419	0	0	0	0								
Total Outfall 2			182	0	0	0	0								
Total Outfall 3			584	84	30	86	100								
Total Onsite Proposed:			1,185	84	30	86	100	216,855	216,855	255,787	255,787	-	-	671,778	467

Table 4

Calculated Pipe Capacities

Full Build-Out Condition

TABLE 4 - CALCULATED PIPE CAPACITIES, FULL BUILD-OUT CONDITION

Project: AED Homestead

Project Number: 184939

Location: Prescott, Arizona

Project Engineer: Charles Witt, E.I.T.

References: City of Prescott General Engineering Standards, 2016
ADEQ Bulletin No. 11

FROM NODE	TO NODE	PIPE SIZE	MODELED PIPE SLOPE	PIPE CAPACITY (FULL FLOW)		PEAK FLOW RESULTS							AVERAGE DAY VELOCITY ¹	FULL FLOW VELOCITY	
						PEAK FLOW	PEAK FLOW	d/D 8" to 10" (max d/D=0.50) 12" & LARGER (max d/D=0.75)	PEAK FLOW VELOCITY	SURPLUS CAPACITY	PERCENT OF CAPACITY	PEAK FLOW VELOCITY			FULL FLOW VELOCITY
		(in)	(ft/ft)	(gpd)	(gpm)	(gpd)	(gpm)		(ft/sec)	(gpd)	(%)	(ft/sec)	(ft/sec)		
Outfall 1 - Parcels A, C, D, G, H, I															
I1	G4	8	0.0050	564,105	392	39,350	27	0.18	2.50	524,755	7.0%	1.00	2.50		
G3	G4	8	0.0050	564,105	392	6,558	5	0.08	2.50	557,547	1.2%	0.60	2.50		
G4	H2	8	0.0050	564,105	392	65,737	46	0.23	2.50	498,368	11.7%	1.20	2.50		
H1	H2	8	0.0050	564,105	392	24,047	17	0.14	2.50	540,058	4.3%	0.80	2.50		
H2	D1	8	0.0050	564,105	392	100,408	70	0.28	2.50	463,697	17.8%	1.30	2.50		
D1	C1	8	0.0050	564,105	392	130,732	91	0.33	2.50	433,373	23.2%	1.50	2.50		
C1	A1	8	0.0050	564,105	392	169,092	117	0.37	2.50	395,013	30.0%	1.60	2.50		
A1	A2	8	0.0050	564,105	392	204,114	142	0.42	2.50	359,991	36.2%	1.80	2.50		
Outfall 2 - Parcels B and E															
E1	B1	8	0.0050	564,105	392	42,994	30	0.19	2.50	521,111	7.6%	1.00	2.50		
B1	B2	8	0.0050	564,105	392	100,384	70	0.28	2.50	463,721	17.8%	1.40	2.50		

TABLE 4 - CALCULATED PIPE CAPACITIES, FULL BUILD-OUT CONDITION

Project: AED Homestead

Project Number: 184939

Location: Prescott, Arizona

Project Engineer: Charles Witt, E.I.T.

References: City of Prescott General Engineering Standards, 2016
ADEQ Bulletin No. 11

FROM NODE	TO NODE	PIPE SIZE	MODELED PIPE SLOPE	PIPE CAPACITY (FULL FLOW)		PEAK FLOW RESULTS							AVERAGE DAY VELOCITY ¹	FULL FLOW VELOCITY	
						PEAK FLOW	PEAK FLOW	d/D 8" to 10" (max d/D=0.50) 12" & LARGER (max d/D=0.75)	PEAK FLOW VELOCITY	SURPLUS CAPACITY	PERCENT OF CAPACITY	PEAK FLOW VELOCITY			FULL FLOW VELOCITY
		(in)	(ft/ft)	(gpd)	(gpm)	(gpd)	(gpm)		(ft/sec)	(gpd)	(%)	(ft/sec)	(ft/sec)		
Outfall 3 - Parcels F, G, J, L, M, N, O, P, Q, R, S, T															
O1	O3	8	0.0050	564,105	392	55,042	38	0.21	2.50	509,063	9.8%	1.10	2.50		
O2	O3	8	0.0050	564,105	392	13,624	9	0.11	2.50	550,481	2.4%	0.70	2.50		
O3	X3	8	0.0050	564,105	392	119,482	83	0.31	2.50	444,623	21.2%	1.40	2.50		
P1	X3	8	0.0050	564,105	392	11,659	8	0.10	2.50	552,446	2.1%	0.70	2.50		
X3	X4	8	0.0050	564,105	392	128,468	89	0.33	2.50	435,637	22.8%	1.50	2.50		
N1	X4	8	0.0050	564,105	392	56,110	39	0.21	2.50	507,995	9.9%	1.10	2.50		
X4	X5	8	0.0050	564,105	392	171,714	119	0.38	2.50	392,391	30.4%	1.60	2.50		
M1	M2	8	0.0050	564,105	392	45,908	32	0.19	2.50	518,197	8.1%	1.00	2.50		
M2	L2	8	0.0050	564,105	392	66,369	46	0.23	2.50	497,736	11.8%	1.20	2.50		
L1	L2	8	0.0050	564,105	392	42,265	29	0.18	2.50	521,840	7.5%	1.00	2.50		
L2	X5	8	0.0050	564,105	392	95,155	66	0.28	2.50	468,950	16.9%	1.30	2.50		
X5	X6	10	0.0025	705,069	490	249,105	173	0.42	2.00	455,964	35.3%	1.40	2.00		
Q1	X6	8	0.0050	564,105	392	26,962	19	0.15	2.50	537,143	4.8%	0.90	2.50		
X6	X7	10	0.0025	705,069	490	263,716	183	0.42	2.00	441,353	37.4%	1.40	2.00		
T1	X1	8	0.0050	564,105	392	26,233	18	0.14	2.50	537,872	4.7%	0.80	2.50		
S1	X1	8	0.0050	564,105	392	6,558	5	0.08	2.50	557,547	1.2%	0.60	2.50		
X1	X2	8	0.0050	564,105	392	32,792	23	0.16	2.50	531,313	5.8%	0.90	2.50		
R1	R2			Refer to Exhibit 2 & Appendix B for Force Main sizing											
R2	X2	8	0.0050	564,105	392	13,117	9	0.11	2.50	550,988	2.3%	0.70	2.50		
X2	X7	8	0.0050	564,105	392	53,196	37	0.21	2.50	510,909	9.4%	1.00	2.50		
X7	X8	10	0.0025	705,069	490	289,564	201	0.45	2.30	415,505	41.1%	1.40	2.00		
J1	X8	8	0.0050	564,105	392	37,164	26	0.18	2.50	526,941	6.6%	0.90	2.50		
X8	X9	10	0.0025	705,069	490	309,700	215	0.47	2.30	395,369	43.9%	1.50	2.00		
X9	G2	10	0.0025	705,069	490	321,499	223	0.47	2.30	383,570	45.6%	1.50	2.00		
G1	G2	8	0.0050	564,105	392	38,621	27	0.18	2.50	525,484	6.8%	1.00	2.50		
G2	F1	12	0.0020	1,015,321	705	342,271	238	0.40	2.30	673,050	33.7%	1.40	2.00		
F1	F2	12	0.0020	1,015,321	705	368,884	256	0.42	2.30	646,437	36.3%	1.40	2.00		
F2	F3	12	0.0020	1,015,321	705	368,884	256	0.42	2.30	646,437	36.3%	1.40	2.00		

Notes:

1. Pipe Segments with average day velocities less than 2 feet per second (fps) will require additional maintenance.

APPENDIX B

ONSITE FORCE MAIN CALCULATIONS

Worksheet for Low Pressure system #1 - R1 to R2

Project Description

Friction Method Manning Formula
Solve For Pressure at 1

Input Data

Pressure 2	0.00	psi
Elevation 1	5160.00	ft
Elevation 2	5120.00	ft
Length	860.00	ft
Roughness Coefficient	0.013	
Diameter	0.75	in
Discharge	4.00	gal/min

Results

Pressure 1	44.31	psi
Headloss	142.20	ft
Energy Grade 1	5262.33	ft
Energy Grade 2	5120.13	ft
Hydraulic Grade 1	5262.20	ft
Hydraulic Grade 2	5120.00	ft
Flow Area	0.00	ft ²
Wetted Perimeter	0.20	ft
Velocity	2.90	ft/s
Velocity Head	0.13	ft
Friction Slope	0.16534	ft/ft

APPENDIX C

AS-BUILTS AND WASTEWATER REPORT EXCERPTS



EXPIRES 06-30-2014

**City of Prescott, Arizona
East Airport Regional Lift Station**

BASIS OF DESIGN REPORT

FINAL
December 2011

The undersigned has approved this document for and on behalf of
Carollo Engineers, Inc.



In Association with



Figure 1.2 is a map showing the five subdivisions (existing and future) served by the proposed LS and the existing Country Dells Ranch (CDR) Lift Station. These include Centerpointe East Development (CED), Granite Dells Estate (GDE), Granite Dells Ranch (GDR), Granite Dells Ranch Holdings (GDRH), and City Planning Area (CPA).

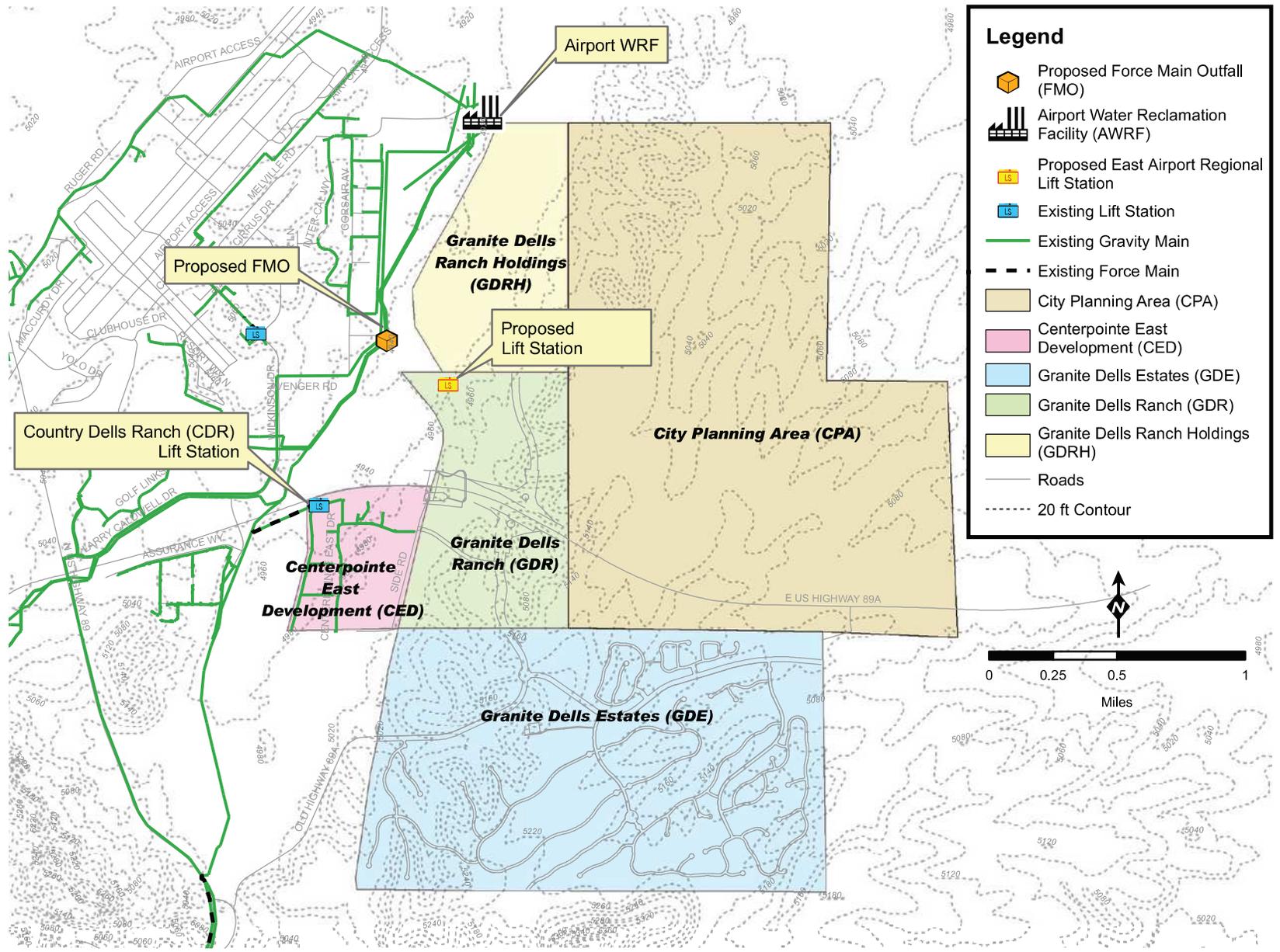
The initial phase of the overall project was to provide immediate sewer service to the GDE in accordance with an executed development agreement. Initial planning called for the installation of a sewer line from the northwest corner of the GDE along the future Side Road alignment. The proposed sewer line was planned to connect to an existing 8-inch line at Centerpointe Drive and convey flows to the CDR Lift Station. Preliminary planning called for an upgrade to the CDR Lift Station to convey the additional flows as a temporary stopgap measure until the increased flows from the GDE could no longer be conveyed.

Once the CDR Lift Station could no longer adequately convey the higher flows generated from the GDE, the second phase of the project would be implemented. The second phase consisted of GDE flows being diverted towards the newly constructed LS. The CDR Lift Station would continue to convey the CED flows to the AWRF.

The CDR Lift Station was originally planned for modification and upgrading to provide additional conveyance capacity for interim flows from the GDE prior to construction of the LS. However, further study of the existing and future capacities of the CDR Lift Station determined that lift station upgrades would only allow a small number of residential lots or commercial development to occur in the GDE before the system would be oversubscribed. Thus, even under modified conditions, the CDR Lift Station would not be able to convey the ultimate total wastewater flows generated in GDE to the AWRF for treatment. In addition, Lyon Engineering determined that the ultimate anticipated wastewater flows from the GDE would exceed the conveyance capacity of the CDR Lift Station force main, and “weak leg” gravity sewer (8-inch diameter) that enters the system from the east. The decision to delete the intermediate step of upgrading the CDR Lift Station was made at a meeting held with the City on June 30, 2009. It was also decided that the installation of the proposed sewer line in the Side Road alignment be eliminated.

Since the implementation of the stopgap measure solution was eliminated, the City decided that the project would move directly to the second phase of the initial planning. This phase involved constructing a sewer line to convey the wastewater generated at buildout condition for the GDE, GDR, and future developments in the region. This sewer extension would be constructed from the intersection of Centerpointe Drive and Side Road. From this point, the sewer would travel northward from the GDE in the Peavine Trail alignment, under Highway 89A, and proceed in a northwesterly direction to the LS site. From the LS, a pair of force mains (phased to match wastewater generation due to development) will convey flows in a westerly direction under Granite Creek to the new FMO in the vicinity of existing MH No. 5929 (see Chapter 4 for FMO description). The wastewater flows generated in the CED will continue to be pumped through the CDR and ultimately conveyed to the AWRF.

SUBDIVISIONS SERVED BY EAST AIRPORT REGIONAL LIFT STATION



LE Lyon Engineering, Inc.
Civil Engineers and Land Surveyors

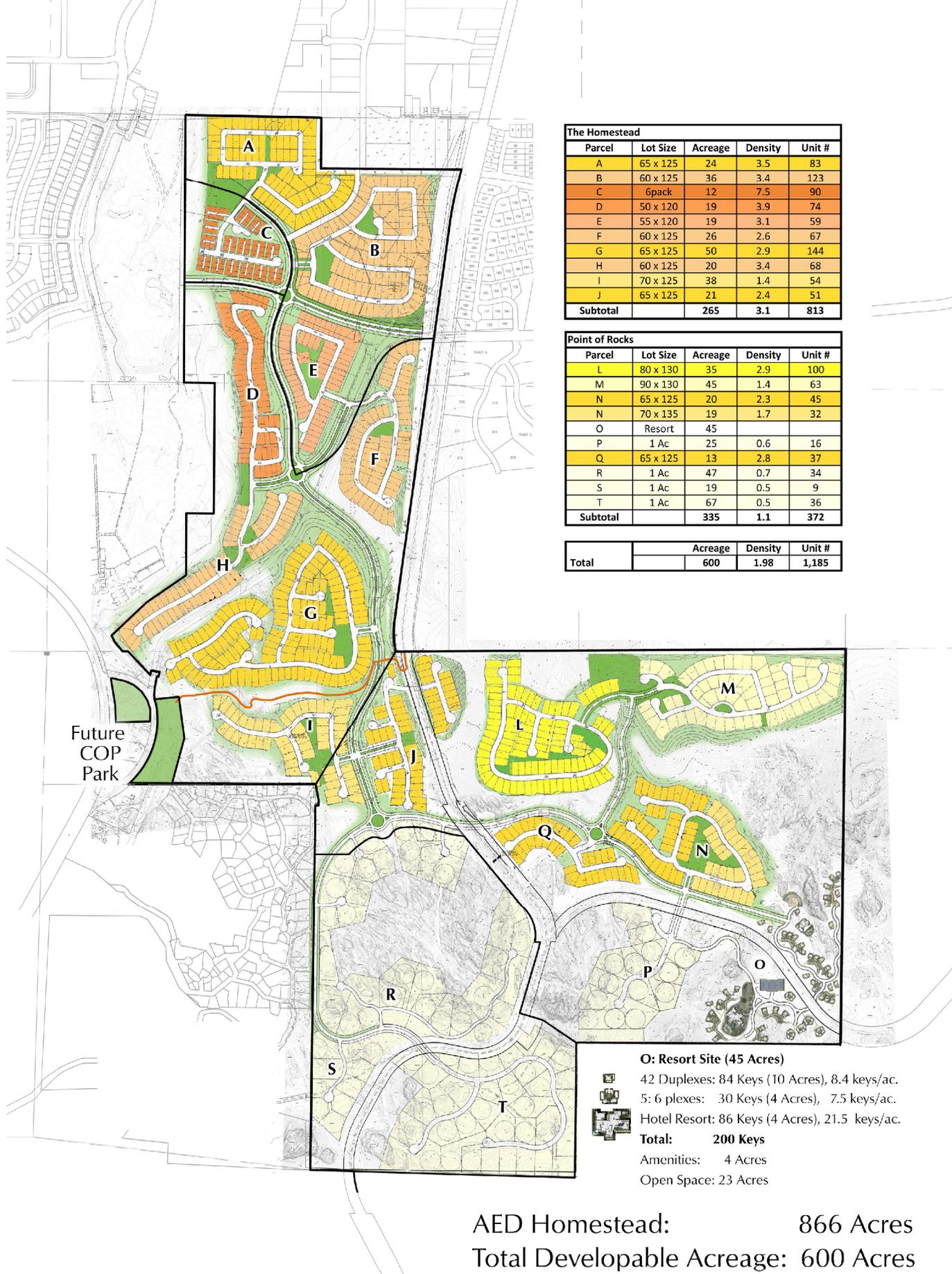


CITY OF PRESCOTT
EAST AIRPORT REGIONAL LIFT STATION

Figure 1.2

APPENDIX D

GREEY|PICKETT LAND PLAN



The Homestead				
Parcel	Lot Size	Acreege	Density	Unit #
A	65 x 125	24	3.5	83
B	60 x 125	36	3.4	123
C	6pack	12	7.5	90
D	50 x 120	19	3.9	74
E	55 x 120	19	3.1	59
F	60 x 125	26	2.6	67
G	65 x 125	50	2.9	144
H	60 x 125	20	3.4	68
I	70 x 125	38	1.4	54
J	65 x 125	21	2.4	51
Subtotal		265	3.1	813

Point of Rocks				
Parcel	Lot Size	Acreege	Density	Unit #
L	80 x 130	35	2.9	100
M	90 x 130	45	1.4	63
N	65 x 125	20	2.3	45
N	70 x 135	19	1.7	32
O	Resort	45		
P	1 Ac	25	0.6	16
Q	65 x 125	13	2.8	37
R	1 Ac	47	0.7	34
S	1 Ac	19	0.5	9
T	1 Ac	67	0.5	36
Subtotal		335	1.1	372

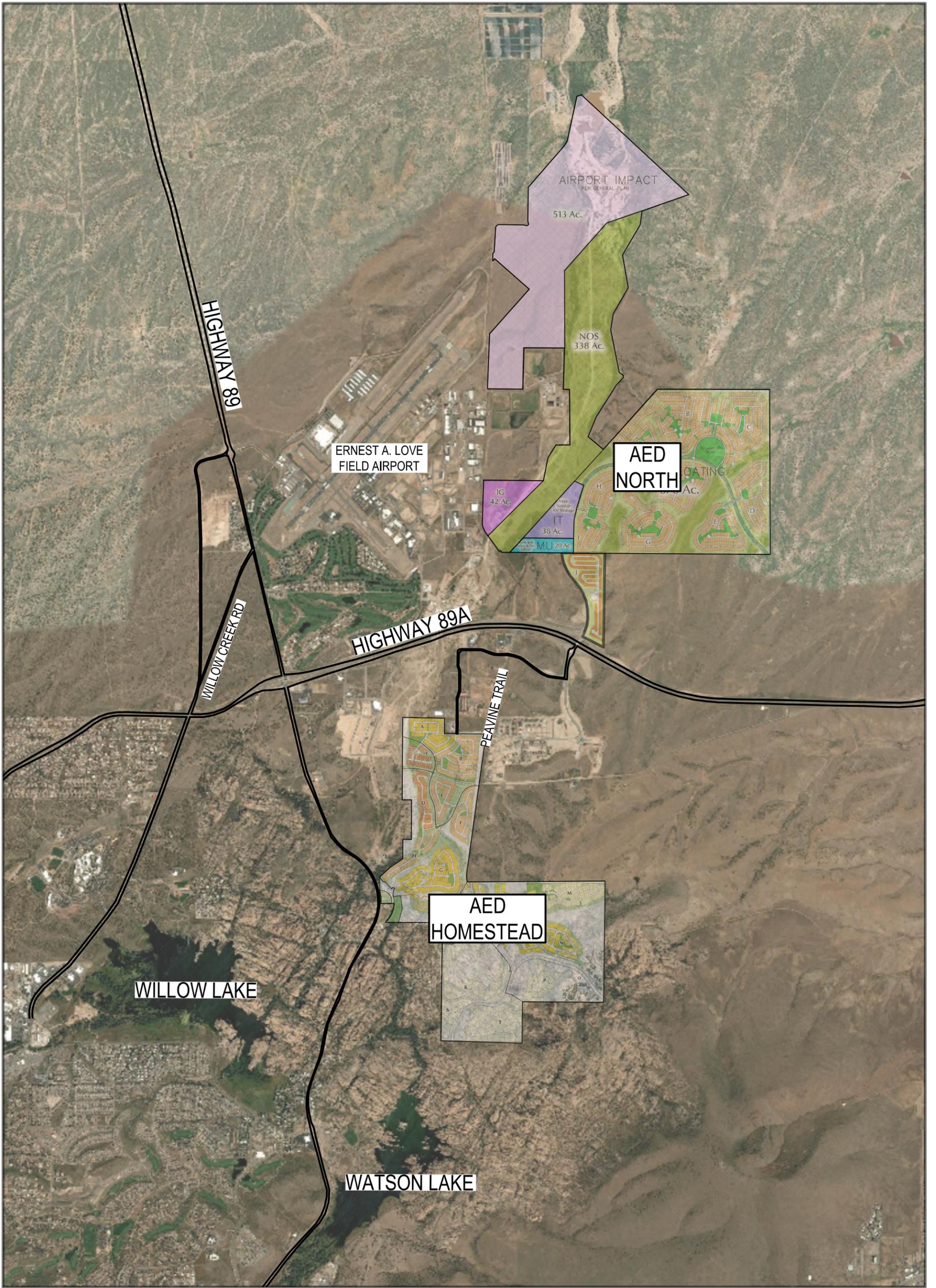
Total			
	Acreege	Density	Unit #
Total	600	1.98	1,185

- O: Resort Site (45 Acres)**
- 42 Duplexes: 84 Keys (10 Acres), 8.4 keys/ac.
- 5: 6 plexes: 30 Keys (4 Acres), 7.5 keys/ac.
- Hotel Resort: 86 Keys (4 Acres), 21.5 keys/ac.
- Total: 200 Keys**
- Amenities: 4 Acres
- Open Space: 23 Acres

AED Homestead: 866 Acres
 Total Developable Acreage: 600 Acres
 Total Open Space Acreage: 266 Acres

EXHIBIT 1

VICINITY MAP



Z:\2018\184939\Project Support\Reports\Drainage\Exhibits\4839- Exhibit 1 - Vicinity Map.dwg



Horz. 1 in. = 3000 ft.

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AED MPC

**EXHIBIT 1
VICINITY MAP**

DATE:
1/22/19

SCALE:
1" = 3000'

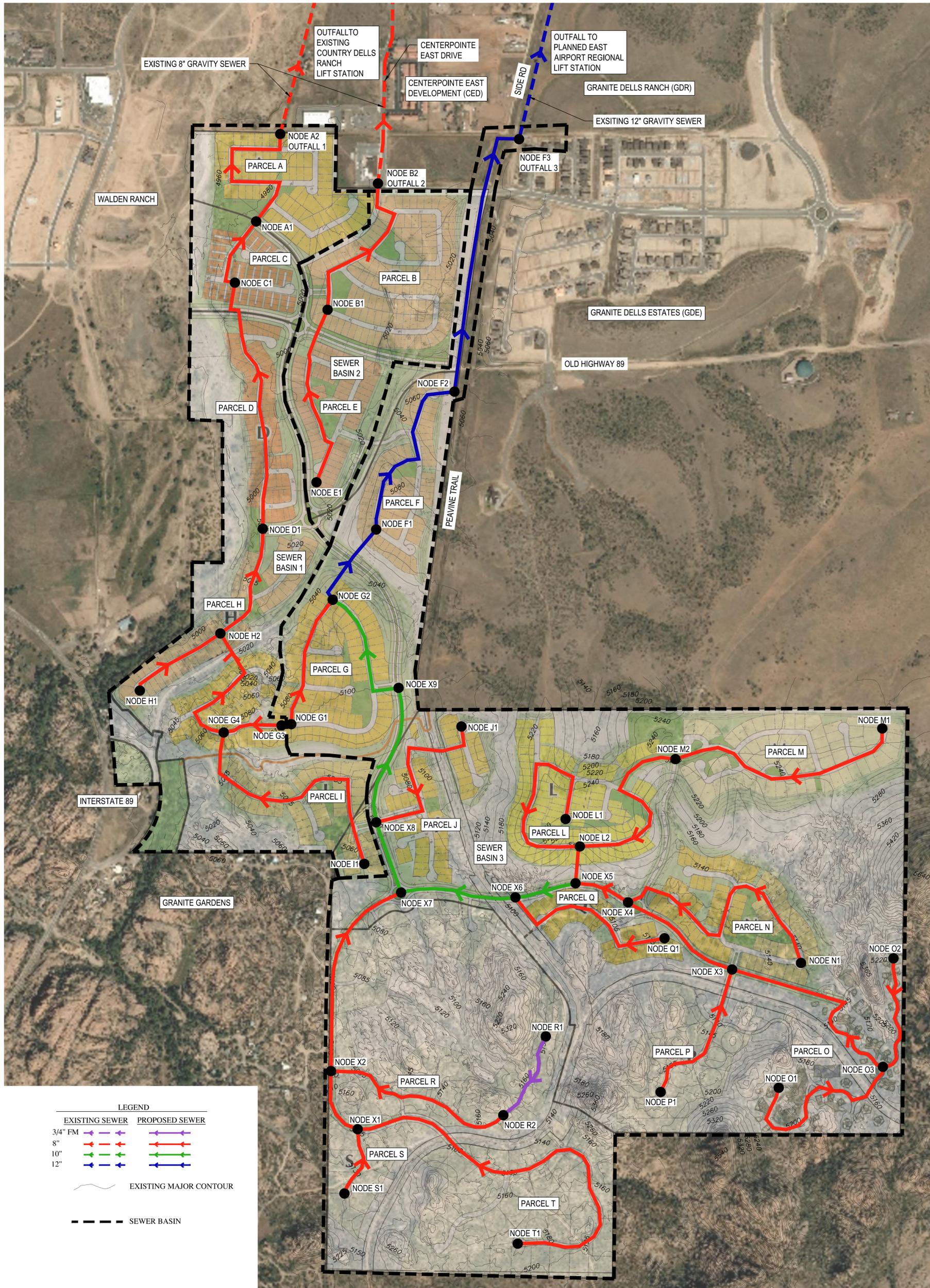
JOB NO.:
184938

DESIGN: JD
DRAWN: JE

SHEET
1 OF 1

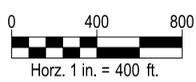
EXHIBIT 2

**MASTER WASTEWATER EXHIBIT
FULL BUILD-OUT CONDITION**



LEGEND

EXISTING SEWER	PROPOSED SEWER
3/4" FM	3/4" FM
8"	8"
10"	10"
12"	12"
	EXISTING MAJOR CONTOUR
	SEWER BASIN



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**MASTER WASTEWATER EXHIBIT
FULL BUILD-OUT CONDITION**

DATE: 02/15/19	SCALE: 1" = 400'	SHEET 1 OF 1
JOB NO.: 184939	DESIGN: CW	
	DRAWN: CW	