

BANNER/NEXCORE HEALTH  
CENTER PLUS  
Basis of Design Water Report

Dibble Project No. 1124010

June 18, 2024



*C. Shannon Mauck*

**DIBBLE**



# BANNER/NEXCORE HEALTH CENTER PLUS

## Basis of Design Water Report

Scottsdale, AZ

City of Scottsdale Case No.  
Dibble Project No. 1124010

Prepared For: Banner Health  
2901 N Central Avenue, Suite 160  
Phoenix, AZ 85012  
P: 602.747.4001

Prepared For: NexCore Group  
1550 Market Street, Suite 200  
Denver, CO 80202  
P: 303.382.0170

June 18, 2024

Prepared By:  
Shannon Mauck, PE  
Senior Project Manager  
1626 N Litchfield Road, Suite 150  
Goodyear, AZ 85395  
P: 623.935.2258



*C. Shannon Mauck*

***Dibble & Associates Consulting Engineers, Inc., dba Dibble***

## Table of Contents

1.	INTRODUCTION .....	2
1.1	Project Location.....	2
2.	EXISTING CONDITIONS .....	3
3.	DESIGN CRITERIA.....	3
4.	PROPOSED CONDITIONS .....	4
4.1	Domestic Water Design.....	4
4.2	Fire Design.....	5
5.	HYDRAULIC ANALYSIS.....	5
5.1	Methodology .....	5
6.	RESULTS.....	6
7.	CONCLUSIONS .....	7
8.	REFERENCES .....	7

## List of Figures

Figure 1 - Vicinity Map.....		2
------------------------------	--	---

## List of Tables

Table 1 – Phase 1 Water Demands .....		4
Table 2 - Fire Flow Demand .....		5
Table 3 - Water Model Results .....		6

## Appendices

Appendix A Pressure Zone Map.....		A
Appendix B Fire Flow Test .....		B
Appendix C Water Exhibit.....		C
Appendix D COS Standards and IFC Tables .....		D
Appendix E Water Demand Calculations .....		E
Appendix F EPANET Results .....		F
Appendix G Master Water Report for Crossroads East Planning Unit VI.....		G



# 1. INTRODUCTION

This report is prepared for Banner Health and NexCore Group as a part of the design of a 11.8-acre Banner/NexCore Health Center Plus in Scottsdale, Maricopa County, AZ (a portion of Parcel 215-07-209H). The site is currently partially developed with a temporary overflow parking area for the golf tournament and partially undeveloped desert. The purpose of this Basis of Design Water Report is to provide analysis and results for the existing and proposed water distribution system at the site.

## 1.1 Project Location

The new Banner/NexCore Health Center Plus site is approximately 11.8 acres in size and is located at the southwest corner of the intersection of Hayden Road and Arizona State Route 101 in Scottsdale, AZ. The majority of the site is in the northeast quadrant of Township 4 North, Range 4 East, Section 35, with a small portion of the site in the southeast quadrant of Township 4 North, Range 4 East, Section 26. The parcel is bounded by Arizona State Route 101 to the north, undeveloped properties along Hayden Road to the east, Mayo Boulevard and residential properties to the south, and undeveloped properties to the west. This project will be on the southeast corner of the parcel as seen in **Figure 1** below.

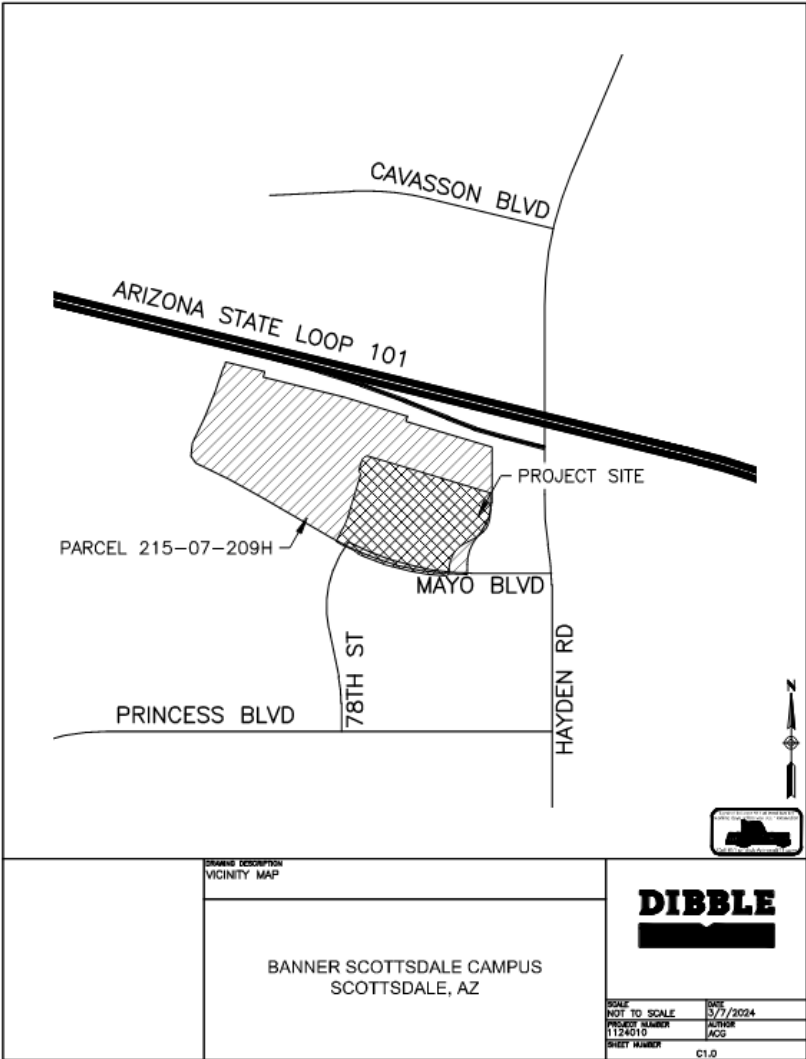


Figure 1 - Vicinity Map

## 2. EXISTING CONDITIONS

The new Banner/NexCore Health Center Plus lies in Parcel 215-07-209H which is located on a portion of the Arizona State Land Department (ASLD) Crossroads East Planning Unit VI. The site is planned to be developed using the underlying C-2 zoning. Parcel 215-07-209H is contained within Pressure Zone 4, as shown in **Appendix A**, and is currently zoned as a Planned Community District (PCD). The project site is partially developed desert that drains from northwest to southeast.

An existing 16-inch ductile iron pipe (DIP) public water main is located north of Parcel 215-07-209H, along Arizona State Route 101. Additionally, there is a 16-inch DIP public water main in Hayden Road, east of the project site, and a 16-inch DIP public water main in a portion of Mayo Boulevard, south of the new Banner/NexCore Health Center Plus.

A fire flow test was conducted in December 2023 to determine the flow and pressure in the existing water distribution system. The results provided in **Appendix B** show the existing system meets current fire flow requirements. **Section 4.2.2** addresses the fire flow requirements for the new medical office building.

## 3. DESIGN CRITERIA

All new public water mains will be submitted to the City of Scottsdale and Maricopa County Environmental Service Department (MCESD) for review. New water mains and services at the site will be designed to meet City of Scottsdale *Design Standards and Policies Manual (2018)*, Maricopa Association of Governments (MAG) standards and details, *Arizona Administrative Code (AAC) Title 18, Arizona Department of Environmental Quality (ADEQ) Bulletins 8 and 10*, and the *2021 International Fire Code (IFC)*. Key design criteria include the following:

- Pipe material shall be ductile iron pipe (DIP) with a pressure class of 350 and polyethylene encasement (polywrap).
- To provide appropriate water pressure, water circulation and redundancy, all new water mains must be designed in a looped configuration.
- All water mains must maintain 3 feet of horizontal clearance to dry utilities. Water mains and sewer mains shall run parallel to each other with 9 feet of separation to pipe centerlines and maintain 6 feet of clearance at manholes.
- All water mains must maintain a 1-foot vertical clearance to dry utilities. Water mains above sewer mains shall maintain 1 to 2 feet of vertical separation with extra protection, greater than 2 feet of separation with no protection. Water mains below sewer mains shall maintain a minimum of 2 feet of vertical separation and always require protection.
- Static pressure in the distribution system shall not exceed 120 pounds per square-inch (psi) and have a minimum of 50 psi at the highest finished floor elevation.
- A minimum cover of 36 inches shall be maintained over lines smaller than 12 inches in diameter, 48 inches of cover shall be maintained over 12-inch lines, and 60 inches of cover shall be maintained over lines larger than 12 inches in diameter.
- All new commercial, industrial, parking area structures, and multi-family residential structures require building sprinkler systems.
- The system shall be designed to maintain 30 psi minimum pressure at the hydrant tee/tap under design fire flow requirements.

## 4. PROPOSED CONDITIONS

### 4.1 Domestic Water Design

#### 4.1.1 Improvements by Others

Multiple off-site improvements are planned to be completed as a part of the Crossroads East Planning Unit VI master plan, which will occur concurrently with the Banner/NexCore Health Center Plus construction. A *Master Water Report for Crossroads East Planning Unit VI* has been prepared by Kimley-Horn & Associates, Inc., and is included in **Appendix G** for reference. These improvements include a 24-inch public water main in Hayden Road east of the Banner/NexCore site and a 20-inch public water main in Mayo Boulevard south of the Banner/NexCore site. The 20-inch public water main is planned to combine with the existing 16-inch water main on the west side of the Banner/NexCore site and increase to a 24-inch main as it continues west along the future Mayo Boulevard alignment.

Additionally, a 12-inch public water line is planned to connect the proposed 24-inch line in Hayden Road to the proposed 20-inch water line in Mayo Boulevard. This line is planned to follow the alignment of a proposed road abutting the east side of the Banner/NexCore property. As a part of the improvements, multiple fire hydrants are to be installed by others. The location of these public water lines and fire hydrants can be seen in **Appendix C**.

#### 4.1.2 Proposed Water Improvements

The new Banner/NexCore Health Center Plus building will be served by a single new 4-inch water service line connected to the proposed 20-inch water main along Mayo Boulevard. A water exhibit with the proposed water system layout is provided in **Appendix C** for reference.

A 12-inch water stub has been included on the west side of the public 12-inch waterline north of the Banner/NexCore Health Center Plus building for potential future development.

#### 4.1.3 Building Water Demand

The City of Scottsdale *Design Standards and Policies Manual (2018)* specifies the design demand for office land use as .000834 gallons per minute (GPM) per 12-hour day per square foot. A maximum day peaking factor of 2.0 and peak hour peaking factor of 3.5 is used for analysis of the water system. The water demand generated by the Banner/NexCore Health Center Plus building is provided in **Table 1** below. These requirements can be seen in **Appendix D** and the calculations can be seen in **Appendix E**.

**Table 1 – Phase 1 Water Demands**

Land Use	Units		Demand	Avg Day Demand		Max Day Demand		Peak Hour Demand	
	Number of Units	Unit	GPM/UNIT-12HR	GAL/DAY	GAL/MIN	GAL/DAY	GAL/MIN	GAL/DAY	GAL/MIN
Office	119,500	SF	0.000834	71,757	100	143,515	199	251,151	349

## 4.2 Fire Design

### 4.2.1 Proposed Fire Improvements

The new Banner/NexCore Health Center Plus building will be served by a new public 8-inch fire loop that connects to a proposed 12-inch public water main north of the site and the proposed 20-inch public water main along Mayo Boulevard. There will be one 8-inch fire service connection to the building from the proposed 20-inch public water line in Mayo Boulevard. There will also be two fire stubs from the proposed 12-inch fire line on the north side of this phase for future phases. The City of Scottsdale *Design Standards and Policies Manual* (2018) requires fire hydrant spacing to be no more than 700 feet apart measured on center along the roadway. City of Scottsdale also requires all hydrants to be within 330 feet of structures. New fire hydrants will be constructed within the Banner/NexCore Health Center Plus site to comply with these requirements. The fire line layout can be seen in **Appendix C**.

### 4.2.2 Building Fire Flow Demand

The *International Fire Code (2021)*, adopted by the City of Scottsdale, specifies required fire flow demands based on Table B105.1(2) and Table B105.2 in **Appendix D**. The new Banner/NexCore Health Center Plus is planned as Type IIB Construction with total building area of 119,500 square feet, resulting in a fire flow demand of 7,250 GPM according to the IFC Table B105.1(2). The new Banner/NexCore Health Center Plus will be constructed to have an approved building sprinkler system per the City of Scottsdale standards. As a result, the fire flow demand can be reduced by 75% according to Section B105.2 of the *International Fire Code (IFC)*. The resulting fire flow demand is 1,813 GPM for a duration of two hours.

**Table 2 - Fire Flow Demand**

Facility	Building Area [SQ FT]	Construction Type	Fire Flow Demand [GPM]	Approved Building Sprinkler System?	Reduced Fire Flow Demand [GPM]	Required Fire Flow Demand [GPM]
Office	119,500	IIB	7,250	Yes	1,813	1,813

## 5. HYDRAULIC ANALYSIS

### 5.1 Methodology

Water system demands for the Banner/NexCore Health Center Plus are calculated based on the specified design demands from the City of Scottsdale. These calculations are shown in **Appendix E** and discussed in **Section 4.1.2**. Four hydraulic scenarios, including the average daily demand, peak hour demand, maximum day plus fire flow demand, and the initial service line design flow were modeled according to the City of Scottsdale *Design Standards and Policies Manual (DS&PM)* (2018). Model Scenarios 1-3 use the demands calculated in **Section 4.1.2**, and Model Scenario 4 uses the water meter demand provided by the MEP Engineer and calculation requested by the City of Scottsdale. Each scenario also has an irrigation demand of 3.68 GPM applied to it which was provided by the landscape architect. Demands provided by the City of Scottsdale have been included in the model for the Optima McDowell Mountain Village development, which is planned but not yet constructed west of this site. The scenarios were modeled in EPANET 2.2 to determine if adequate pressure is provided in the water system, and their minimum requirements are outlined below:

- Model Scenario 1: Average Day Demand
  - 100 GPM applied at demand node BLDG\_D\_3FF\_1 (average day)
  - 3.68 GPM applied at demand node Junction 14 (irrigation)
  - 126 GPM applied at demand node Optima (Optima development average day)
  - Minimum 50 psi at finished floor per City of Scottsdale *DS&PM*

- Model Scenario 2: Peak Hour Demand
  - 349 GPM applied at demand node BLDG\_D\_3FF\_1 (peak hour)
  - 3.68 GPM applied at demand node Junction 14 (irrigation)
  - 451 GPM applied at demand node Optima (Optima development peak hour)
  - Minimum 50 psi at finished floor per City of Scottsdale *DS&PM*
- Model Scenario 3: Maximum Day Demand plus the Worst-case Fire Flow Demand
  - 199 GPM applied at demand node BLDG\_D\_3FF\_1 (max day)
  - 1,813 GPM applied at demand node F5 (worst case hydrant)
  - 3.68 GPM applied at demand node Junction 14 (irrigation)
  - 252 GPM applied at demand node Optima (Optima development maximum day)
  - Minimum 30 psi at hydrant supply line and 15 psi at all domestic demand nodes per City of Scottsdale *DS&PM*
- Model Scenario 4: Initial Service Line Design Flow
  - The MEP Engineer provided demand for the water meter at 194 GPM
  - 3.68 GPM applied at demand node Junction 14 (irrigation)
  - 252 GPM applied at demand node Optima (Optima development maximum day)
  - (194 GPM+10 GPM) X 1.5 safety factor, 306 GPM applied at node BLDG\_D\_3FF\_1 (initial service line)
  - Minimum 50 psi at highest floor per City of Scottsdale *DS&PM*

The water model was calibrated using the fire flow test provided in **Appendix B**. The finished floor has an elevation of 1595.60. The finished floor of the third story has an elevation of 1622.60 with a total building height of 40.5 feet. Node BLDG\_D\_FF3, representing the building service connection at the highest finished floor elevation had the different domestic demands applied to it.

## 6. RESULTS

The four model scenarios outlined in the previous section were modelled in EPANET 2.2 to determine if adequate pressure is provided in the water distribution system to meet City of Scottsdale standards. Results from the model are provided in **Appendix F**. **Table 3** below shows the City of Scottsdale’s minimum requirements compared to the lowest pressures produced in the water model.

**Table 3 - Water Model Results**

SCENARIO	MINIMUM CITY PRESSURE REQUIREMENT	LOWEST MODELED PRESSURE	PRESSURE AT BUILDING CONNECTION POINT (D_BLG_FF3)	SCOTTSDALE REQUIREMENTS MET?
	PSI	PSI	PSI	Yes/No
1	50	38.46	38.49	No
2	50	32.74	32.63	No
3	30 (Hydrant Supply Line) 15 (All Demand Nodes)	68.41 33.36	33.36	Yes
4	50 (Highest Floor)	35.94	35.94	No

The domestic water demands are applied to the highest finished floor of the domestic service line. The resulting pressures at this location are lower than the City of Scottsdale’s requirement of 50 psi. Therefore, a booster pump will be provided on this domestic line within the building. All other pressures within the main and service lines meet the City of Scottsdale’s minimum of 50 psi requirement as shown in **Appendix F**.

## 7. CONCLUSIONS

The proposed water distribution system for the Banner/NexCore Health Center Plus will support the development while adhering to City of Scottsdale design standards. The proposed 20-inch water main to be built as part of the Crossroads East Planning Unit VI master plan along the Mayo Boulevard alignment and the proposed 12-inch water main to the north of the Banner/NexCore Health Center Plus building will provide water services to the site. The highest modeled pressures in the water system are experienced within the public water mains surrounding the site. The lowest pressures modeled are experienced at the building connection. Because the pressure at the lowest and highest finished floors do not meet the minimum pressure requirements in some scenarios, a booster pump will be installed inside the building for domestic flows to maintain a minimum of 50 psi pressure.

## 8. REFERENCES

*Arizona Administrative Code (AAC) Title 18*, September 2016.

*Arizona Department of Environmental Quality (ADEQ) Bulletins 8 and 10*, July 1978.

City of Scottsdale. *Design Standards and Policies Manual*, 2018.

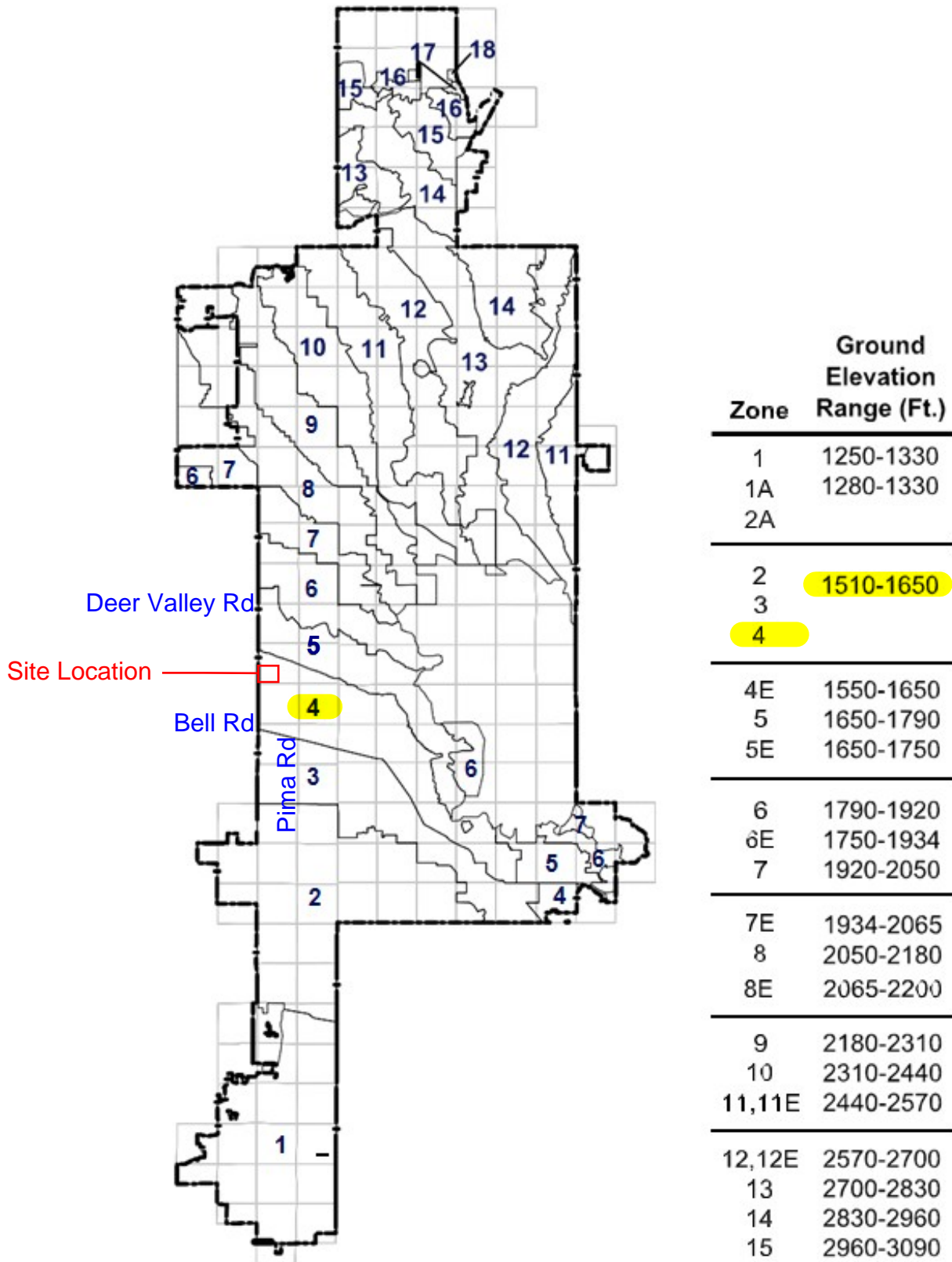
International Code Council. *International Fire Code*, 2021.

International Code Council. *International Plumbing Code*, 2015.

Kimley-Horn & Associates, Inc. *Master Water Report for Crossroads East Planning Unit VI*, 2023.

Maricopa Association of Governments. *Uniform Standard Details for Public Works Construction*, 2021.

## **Appendix A Pressure Zone Map**



6-1.3 CITY PRESSURE ZONE MAP

## **Appendix B Fire Flow Test**

# Arizona Flow Testing LLC

## HYDRANT FLOW TEST REPORT

Project Name: Banner Healthcare  
Project Address: Mayo Boulevard & Hayden Road, Scottsdale, Arizona 85255  
Client Project No.: 1121151.AS01  
Flow Test Permit No.: C74006  
Arizona Flow Testing Project No.: 23949  
Date and Time flow test conducted: December 19, 2023 at 7:15 AM  
Data is current and reliable until: June 19, 2024  
Conducted by: Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)  
Witnessed by: Ray Padilla – City of Scottsdale-Inspector (602-541-0586)

### Raw Test Data

Static Pressure: **76.0 PSI**  
(Measured in pounds per square inch)

Residual Pressure: **67.0 PSI**  
(Measured in pounds per square inch)

Pitot Pressure: **28.0 PSI Hyd A**  
**35.0 PSI Hyd B Each**  
(Measured in pounds per square inch)

Diffuser Orifice Diameter: One 4-inch Pollard Diffuser  
(Measured in inches) Two 2.5-inch Pollard Diffusers

Coefficient of Diffuser: 0.9

Flowing GPM: **4,260 GPM**  
(Measured in gallons per minute)  
2,274 GPM + 993 GPM + 993 GPM = 4,260 GPM

GPM @ 20 PSI: **11,432 GPM**

### Data with 10 % Safety Factor

Static Pressure: **68.4 PSI**  
(Measured in pounds per square inch)

Residual Pressure: **59.4 PSI**  
(Measured in pounds per square inch)

Approx. distance between hydrants: See below

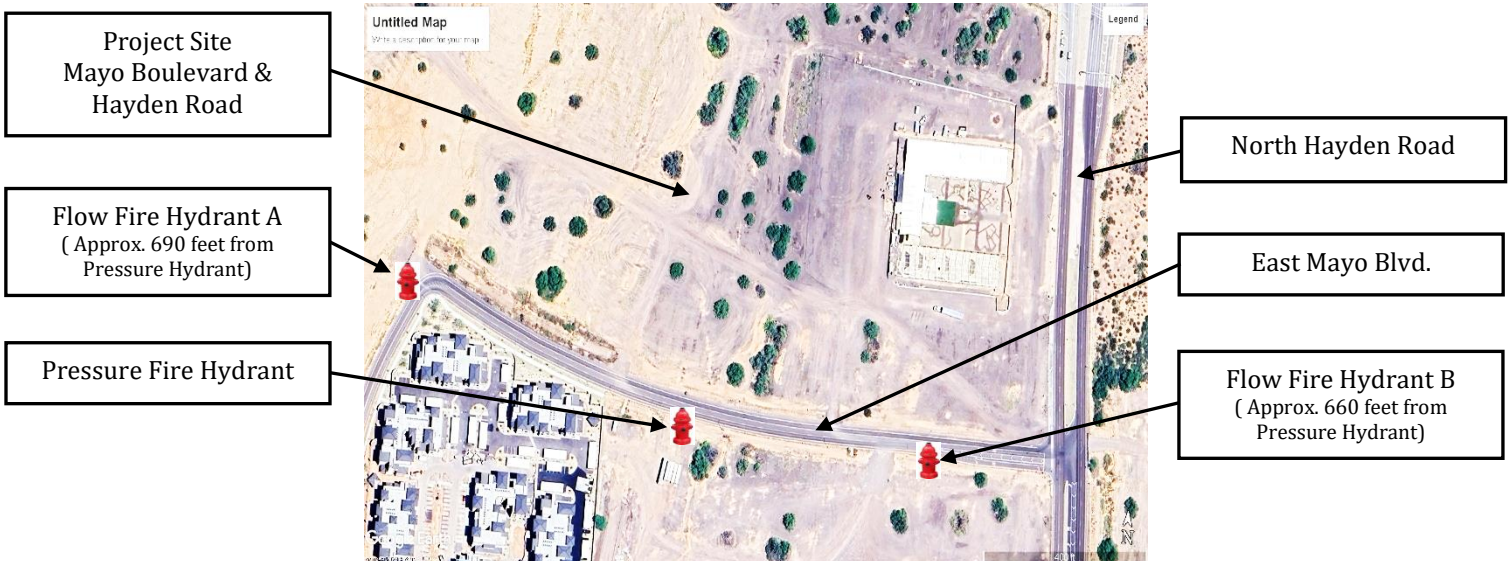
Main size: Not Provided

Flowing GPM: **4,260 GPM**

GPM @ 20 PSI: **10,566 GPM**

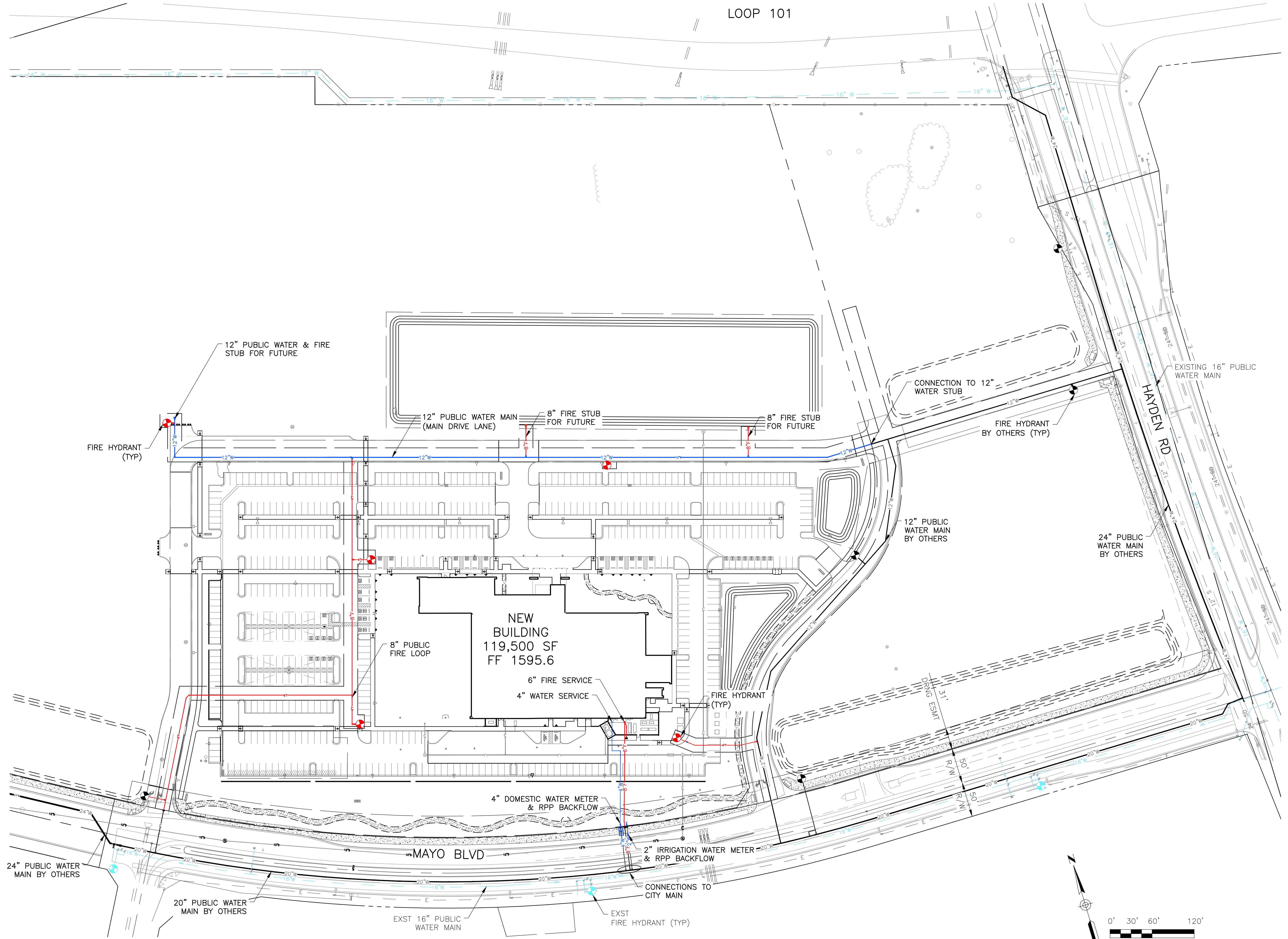
### Flow Test Location

North ↑

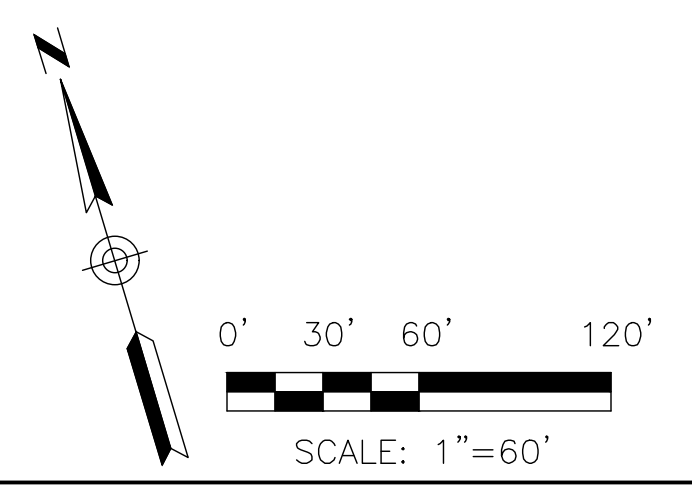


## **Appendix C Water Exhibit**

LOOP 101



WATER EXHIBIT



## **Appendix D    COS Standards and IFC Tables**

## DESIGN FLOW & HEAD LOSS

6-1.404

The ultimate design flow within the city's water transmission and distribution system will be based on the city's current Integrated Water Master Plan. Water demand for each development will be calculated using the average day demands, as shown in Figure 6-1.2, to ensure that the existing distribution supply is sufficient. Designs will include all necessary improvements, including booster pumping stations, reservoirs, lines and appurtenances to meet the system's ultimate demand.

- A. The four hydraulic modeling scenarios detailed in 6-1.202 will demonstrate that the system is adequately designed.
- B. Select model scenario flows and their respective peaking factors are as follows:
  1. **Maximum day:** Defined as 2 times the average day total use flow as determined per Figure 6-1.2 (use gpm value).
  2. **Peak hour:** Defined as 3.5 times the average day total use as determined per Figure 6-1.2 (use gpm value).
  3. **Note:** These peaking factors shall be appropriately increased for restaurants and high-demand water users, or as designated by the Water Resources Department after review.
- C. The maximum allowable pipe head loss for the various water pipelines is as follows:
  1. Transmission mains: 8 feet per 1,000 feet (3.5 psi per 1,000 feet)
  2. Distribution lines: 10 feet per 1,000 feet (4.3 psi per 1,000 feet)
  3. Service lines – domestic, dedicated fire, or combined domestic/fire: size as required to satisfy both hydraulic modeling requirements and Fire Code. Generally, velocities of more than 5 feet per second are undesirable. Velocities more than 7.5 feet per second are not allowed.
  4. As otherwise designated by the Water Resources Department

## SYSTEM FLOW TEST REQUIREMENTS & USE OF RESULTS

6-1.405

Pressure and available flow information for existing water lines must be obtained by having a fire hydrant flow test performed on the system. Hydrant flow tests are required for the following situations:

- A. On all commercial projects, multi-family residential projects, and public extensions of the city's water distribution system.
- B. For any proposed system connecting to the existing distribution system, the design capacity of the existing system (flow versus pressure) will need to be determined by the engineer.
- C. Prior to acceptance by the city, all platted subdivisions shall conduct an additional flow test at the lowest and highest elevation available in which the development is constructed.
- D. Developments that cross pressure zone boundaries must conduct a flow test within each pressure zone.

A private fire protection company shall perform the tests and certify the results. A right-of-way permit issued by the One Stop Shop is required for a flow test and the Inspection Services Division will be notified a minimum of 48 hours before performing the flow test. The permit is also available [online](#). Refer to the [flow test design form](#).

- d. Pipe flow velocity in feet per second (fps)
- e. Each pipe segment’s head loss rate (ft. /1,000ft or psi/ft.)
- f. PRVs: Upstream and downstream pressures (psi or HGL elevation)
- g. Tanks: Inflow and outflow (gpm)
- h. Shows all units for the values presented or provide a legend on the diagram page that indicates the units used

AVERAGE DAY WATER DEMANDS <sup>(1)</sup>							
IN GALLONS PER DAY (GPD) <sup>(2)</sup>				IN GALLONS PER MINUTE (GPM) <sup>(2)(3)</sup>			
Land Use	Inside Use	Outside Use	Total Use	Inside Use	Outside Use	Total Use	Units
<b>Residential Demand per Dwelling Unit</b>							
< 2 dwelling unit per acre (DU/ac)	208.9	276.7	485.6	0.30	0.39	0.69	per unit
2 – 2.9 DU/ac	193.7	276.7	470.4	0.27	0.39	0.66	per unit
3 – 7.9 DU/ac	175.9	72.3	248.2	0.25	0.11	0.36	per unit
8 – 11.9 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
12 – 22 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
High Density Condominium (condo)	155.3	30	185.3	0.22	0.05	0.27	per unit
Resort Hotel (includes site amenities)	401.7	44.6	446.3	0.56	0.07	0.63	per room
<b>Service and Employment</b>							
Restaurant	1.2	0.1	1.3	1.67E-03	1.39E-04	1.81E-03	per square foot (sq.ft.)
Commercial/Retail	0.7	0.1	0.8	9.73E-04	1.39E-04	1.11E-03	per sq.ft.
Commercial High Rise	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.

AVERAGE DAY WATER DEMANDS <sup>(1)</sup>							
IN GALLONS PER DAY (GPD) <sup>(2)</sup>				IN GALLONS PER MINUTE (GPM) <sup>(2)(3)</sup>			
Office	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.
Institutional	670	670	1340	0.94	0.94	1.88	per acre
Industrial	873	154	1027	1.22	0.22	1.44	per acre
Research and Development	1092	192	1284	1.52	0.27	1.79	per acre
Special Use Areas							
Natural Area Open Space	0	0	0	0.0	0.0	0.0	per acre
Developed Open Space – Parks	0	1786	1786	0.0	2.49	2.49	per acre
Developed Open Space – Golf Course	0	4285	4285	0.0	5.96	5.96	per acre
Notes:							
(1) These values shall not be used directly for service line or water meter sizing.							
(2) Gallon per day values are provided for reference only. The instantaneous gallon per minute flow rates presented are intended for use in the required hydraulic modeling scenarios. The gpm values assume a 12-hour active water use period per 24-hour day. In large or specialty developments or master plans the hydraulic analysis criteria and parameters should be discussed with the Water Resources Department. Seasonal peaking should also be considered. Upon review, the Water Resources Department reserves the right to designate flows to be used in hydraulic modeling scenarios that may be different from those presented here.							
(3) The hydraulic modeling peaking factors used in select modeling scenarios are to be applied to the gpm values shown here. Max day and peak hour peaking factors can be found in Section 6-1.404.							

FIGURE 6-1.2 AVERAGE DAY WATER DEMANDS

**B105.2 Buildings other than one- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.**

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

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

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

For SI: 1 gallon per minute = 3.785 L/m.

- a. The reduced fire flow shall be not less than 1,000 gallons per minute.
- b. The reduced fire flow shall be not less than 1,500 gallons per minute.

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

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

For SI: 1 square foot = 0.0929 m<sup>2</sup>, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

- a. Types of construction are based on the *International Building Code*.
- b. Measured at 20 psi residual pressure.

## **Appendix E Water Demand Calculations**

**Banner/NexCore Healthcare Plus**  
**Dibble Project No. 1124010**  
**Water Demand Calculations**



Factors	
Maximum Day	2
Peak Hour	3.5

From City of Scottsdale Design Standards and Policies Manual (2018)

Demands		
Land Use	Demand/Unit	Unit
Office (GPM)	0.000834	SF
Office (GPD)	0.6	SF

From City of Scottsdale Design Standards and Policies Manual (2018)

**Development Water Demand**

Land Use	Units		Avg Day Demand		Max Day Demand		Peak Hour Demand	
	Number of Units	Unit	GAL/DAY	GAL/MIN	GAL/DAY	GAL/MIN	GAL/DAY	GAL/MIN
Office	119,500	SF	71,757	100	143,515	199	251,151	349

**Development Fire Demand**

Land Use	Avg Day Demand	Max Day Demand	Peak Hour Demand	Fire Flow Required	Max Day + Fire Flow
	GAL/MIN	GAL/MIN	GAL/MIN	GAL/MIN	GAL/MIN
Office	100	199	349	1,813	2,012

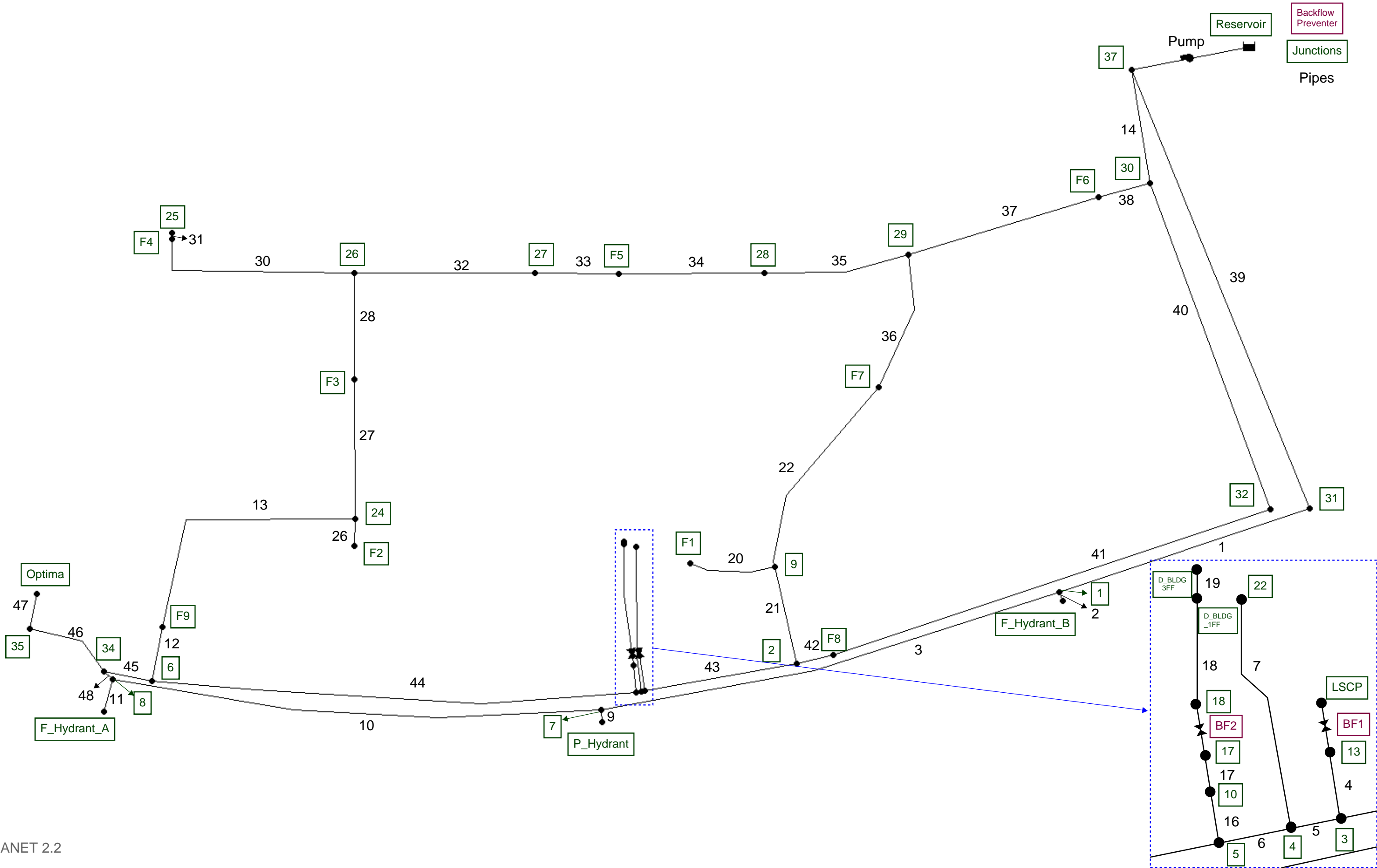
**Optima McDowell Mountain Village Development Demands**

Avg Day Demand	Max Day Demand	Peak Hour Demand
GAL/MIN	GAL/MIN	GAL/MIN
126	252	451

*Demands provided by City of Scottsdale*

*This development is served by the water main in Mayo Boulevard*

**Appendix F   EPANET Results**



\*\*\*\*\*  
\* E P A N E T \*  
\* Hydraulic and Water Quality \*  
\* Analysis for Pipe Networks \*  
\* Version 2.0 \*  
\*\*\*\*\*

Input File: Banner NexCore

Static Condition

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 10		678	16	150	0	0	0 Open
Pipe 27		193	8	150	0.01	0	0 Open
Pipe 28		146	8	150	0.01	0	0 Open
Pipe 32		248	12	150	0.02	0	0 Open
Pipe 31		55	12	150	0	0	0 Open
Pipe 33		115	12	150	0.02	0	0 Open
Pipe 34		202	12	150	0.02	0	0 Open
Pipe 38		75	12	150	0.01	0	0 Open
Pipe 39		502	16	150	0	0	0 Open
Pipe 1		357	16	150	0	0	0 Open
Pipe 2		23	6	150	0	0	0 Open
Pipe 11		34	6	150	0	0	0 Open
Pipe 9		23	6	150	0	0	0 Open
Pipe 4		69	2	150	0	0	0 Open
Pipe 19		27	4	130	0	0	0 Open
Pipe 35		203	12	150	0.02	0	0 Open
Pipe 37		274	12	150	0.01	0	0 Open
Pipe 16		51	4	150	0	0	0 Open
Pipe 17		1	4	150	0	0	0 Open
Pipe 18		155	4	150	0	0	0 Open
Pipe 40		500	24	150	0.01	0	0 Open
Pipe 41		643	20	150	0.01	0	0 Open
Pipe 5		3	20	150	0.02	0	0 Open
Pipe 6		6	20	150	0.02	0	0 Open
Pipe 44		674	20	150	0.02	0	0 Open
Pipe 46		3160	24	150	0	0	0 Open
Pipe 47		500	8	150	0	0	0 Open
Pipe 14		1	24	150	0	0	0 Closed
Pipe 42		52	20	150	0.01	0	0 Open
Pipe 48		7	16	150	0	0	0 Open
Pipe 36		192	12	150	0	0	0 Open
Pipe 3		655	16	150	0	0	0 Open
Pipe 43		215	20	150	-0.02	0	0 Open
Pipe 26		48	8	150	0	0	0 Open
Pipe 45		60	20	150	0	0	0 Open
Pipe 13		387	8	150	-0.02	0	0 Open
Pipe 12		77	8	150	-0.02	0	0 Open
Pipe 21		149	12	150	0	0	0 Open
Pipe 20		118	8	150	0	0	0 Open
Pipe 7		218	8	150	0	0	0 Open
Pipe 30		302	12	150	0	0	0 Open
Pipe 22		306	12	150	0	0	0 Open
Pump Pump	#N/A	#N/A	#N/A		0	0	-157.85 Open
Valve BF2	#N/A		4 #N/A		0	0	25.5 Open
Valve BF1	#N/A		2 #N/A		0	0	25.4 Open

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Head ft	Pressure psi
Junc F6	1598.5	0	1747.35	64.5
Junc 28	1590	0	1747.35	68.18
Junc F5	1589.5	0	1747.35	68.4
Junc 27	1590	0	1747.35	68.18
Junc F4	1590	0	1747.35	68.18
Junc F3	1597	0	1747.35	65.15
Junc F2	1596	0	1747.35	65.58
Junc 17	1586	0	1747.35	69.91
Junc 18	1586	0	1721.85	58.86
Junc 7	1584	0	1747.35	70.78
Junc 26	1590	0	1747.35	68.18
Junc 25	1590	0	1747.35	68.18
Junc 31	1584	0	1747.35	70.78
Junc F_Hydrant_B	1591	0	1747.35	67.75
Junc 1	1584.5	0	1747.35	70.56
Junc 8	1583	0	1747.35	71.21
Junc F_Hydrant_A	1590	0	1747.35	68.18
Junc P_Hydrant	1589.5	0	1747.35	68.4
Junc 13	1586	0	1747.35	69.91
Junc LSCP	1586	0	1772.75	80.92
Junc F1	1595	0	1747.35	66.01
Junc D_BLDG_1FF	1596	0	1721.85	54.53
Junc D_BLDG_3FF	1622.6	0	1721.85	43.01
Junc 29	1591	0	1747.35	67.75
Junc 10	1586	0	1747.35	69.91
Junc 22	1596	0	1747.35	65.58
Junc 32	1587.3	0	1747.35	69.35
Junc F8	1585.7	0	1747.35	70.04
Junc 3	1585.6	0	1747.35	70.09
Junc 4	1585.6	0	1747.35	70.09
Junc 5	1585.5	0	1747.35	70.13
Junc F9	1583.6	0	1747.35	70.95
Junc 34	1584	0	1747.35	70.78
Junc 35	1583	0	1747.35	71.21
Junc Optima	1583	0	1747.35	71.21
Junc 37	1594	0	1747.35	66.45
Junc F7	1588.5	0	1747.35	68.83
Junc 2	1586	0	1747.35	69.91
Junc 30	1594	0	1747.35	66.45
Junc 24	1596	0	1747.35	65.58
Junc 6	1584	0	1747.35	70.78
Junc 9	1587	0	1747.35	69.48
Resvr Reservoir	1589.5 #N/A		1589.5	0

\*\*\*\*\*  
 \* EPANET \*  
 \* Hydraulic and Water Quality \*  
 \* Analysis for Pipe Networks \*  
 \* Version 2.0 \*  
 \*\*\*\*\*

Input File: Banner NexCore

Fire Flow Calibration

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 10		678	16	150	-1986	3.17	1.84 Open
Pipe 27		193	8	150	0.72	0	0 Open
Pipe 28		146	8	150	0.72	0	0 Open
Pipe 32		248	12	150	0.72	0	0 Open
Pipe 31		55	12	150	0	0	0 Open
Pipe 33		115	12	150	0.72	0	0 Open
Pipe 34		202	12	150	0.72	0	0 Open
Pipe 38		75	12	150	0.61	0	0 Open
Pipe 39		502	16	150	-4260	6.8	7.01 Open
Pipe 1		357	16	150	4260	6.8	12.24 Open
Pipe 2		23	6	150	2274	25.8	1069.58 Open
Pipe 11		34	6	150	1986	22.54	620.2 Open
Pipe 9		23	6	150	0	0	0 Open
Pipe 4		69	2	150	0	0	0 Open
Pipe 19		27	4	130	0	0	0 Open
Pipe 35		203	12	150	0.72	0	0 Open
Pipe 37		274	12	150	0.61	0	0 Open
Pipe 16		51	4	150	0	0	0 Open
Pipe 17		1	4	150	0	0	0 Open
Pipe 18		155	4	150	0	0	0 Open
Pipe 40		500	24	150	0.61	0	0 Open
Pipe 41		643	20	150	0.61	0	0 Open
Pipe 5		3	20	150	0.72	0	0 Open
Pipe 6		6	20	150	0.72	0	0 Open
Pipe 44		674	20	150	0.72	0	0 Open
Pipe 46		3160	24	150	0	0	0 Open
Pipe 47		500	8	150	0	0	0 Open
Pipe 14		1	24	150	0	0	0 Closed
Pipe 42		52	20	150	0.61	0	0 Open
Pipe 48		7	16	150	0	0	0 Open
Pipe 36		192	12	150	0.11	0	0 Open
Pipe 3		655	16	150	1986	3.17	2.33 Open
Pipe 43		215	20	150	-0.72	0	0 Open
Pipe 26		48	8	150	0	0	0 Open
Pipe 45		60	20	150	0	0	0 Open
Pipe 13		387	8	150	-0.72	0	0 Open
Pipe 12		77	8	150	-0.72	0	0 Open
Pipe 21		149	12	150	0.11	0	0 Open
Pipe 20		118	8	150	0	0	0 Open
Pipe 7		218	8	150	0	0	0 Open
Pipe 30		302	12	150	0	0	0 Open
Pipe 22		306	12	150	0.11	0	0 Open
Pump Pump	#N/A	#N/A	#N/A	4260		0	-146.5 Open
Valve BF2	#N/A		4 #N/A		0	0	25.5 Open
Valve BF1	#N/A		2 #N/A		0	0	25.4 Open

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Head ft	Pressure psi
Junc F6	1598.5	0	1725.34	54.96
Junc 28	1590	0	1725.34	58.64
Junc F5	1589.5	0	1725.34	58.86
Junc 27	1590	0	1725.34	58.64
Junc F4	1590	0	1725.34	58.64
Junc F3	1597	0	1725.34	55.61
Junc F2	1596	0	1725.34	56.04
Junc 17	1586	0	1725.34	60.37
Junc 18	1586	0	1750.84	71.42
Junc 7	1584	0	1726.59	61.78
Junc 26	1590	0	1725.34	58.64
Junc 25	1590	0	1725.34	58.64
Junc 31	1584	0	1732.48	64.34
Junc F_Hydrant_B	1591	2274	1703.51	48.75
Junc 1	1584.5	0	1728.11	62.23
Junc 8	1583	0	1725.34	61.67
Junc F_Hydrant_A	1590	1986	1704.25	49.5
Junc P_Hydrant	1589.5	0	1726.59	59.4
Junc 13	1586	0	1725.34	60.37
Junc LSCP	1586	0	1750.74	71.38
Junc F1	1595	0	1725.34	56.48
Junc D_BLDG_1FF	1596	0	1750.84	67.09
Junc D_BLDG_3FF	1622.6	0	1750.84	55.57
Junc 29	1591	0	1725.34	58.21
Junc 10	1586	0	1725.34	60.37
Junc 22	1596	0	1725.34	56.04
Junc 32	1587.3	0	1725.34	59.81
Junc F8	1585.7	0	1725.34	60.5
Junc 3	1585.6	0	1725.34	60.55
Junc 4	1585.6	0	1725.34	60.55
Junc 5	1585.5	0	1725.34	60.59
Junc F9	1583.6	0	1725.34	61.41
Junc 34	1584	0	1725.34	61.24
Junc 35	1583	0	1725.34	61.67
Junc Optima	1583	0	1725.34	61.67
Junc 37	1594	0	1736	61.53
Junc F7	1588.5	0	1725.34	59.29
Junc 2	1586	0	1725.34	60.37
Junc 30	1594	0	1725.34	56.91
Junc 24	1596	0	1725.34	56.04
Junc 6	1584	0	1725.34	61.24
Junc 9	1587	0	1725.34	59.94
Resvr Reservoir	1589.5	#N/A	1589.5	0

\*\*\*\*\*  
 \* E P A N E T \*  
 \* Hydraulic and Water Quality \*  
 \* Analysis for Pipe Networks \*  
 \* Version 2.0 \*  
 \*\*\*\*\*

Input File: Banner NexCore

Average Daily Demand Condition Scenario 1

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 10		678	16	150	-60.21	0.1	0 Open
Pipe 27		193	8	150	-12.81	0.08	0.01 Open
Pipe 28		146	8	150	-12.81	0.08	0 Open
Pipe 32		248	12	150	-12.81	0.04	0 Open
Pipe 31		55	12	150	0	0	0 Open
Pipe 33		115	12	150	-12.81	0.04	0 Open
Pipe 34		202	12	150	-12.81	0.04	0 Open
Pipe 38		75	12	150	-40.15	0.11	0.01 Open
Pipe 39		502	16	150	-60.21	0.1	0 Open
Pipe 1		357	16	150	60.21	0.1	0 Open
Pipe 2		23	6	150	0	0	0 Open
Pipe 11		34	6	150	0	0	0 Open
Pipe 9		23	6	150	0	0	0 Open
Pipe 4		69	2	150	3.68	0.38	0.48 Open
Pipe 19		27	4	130	100	2.55	10.52 Open
Pipe 35		203	12	150	-12.81	0.04	0 Open
Pipe 37		274	12	150	-40.15	0.11	0.01 Open
Pipe 16		51	4	150	100	2.55	12.51 Open
Pipe 17		1	4	150	100	2.55	1017.82 Open
Pipe 18		155	4	150	100	2.55	6.29 Open
Pipe 40		500	24	150	129.32	0.09	0 Open
Pipe 41		643	20	150	129.32	0.13	0 Open
Pipe 5		3	20	150	152.98	0.16	0.08 Open
Pipe 6		6	20	150	152.97	0.16	0.04 Open
Pipe 44		674	20	150	52.97	0.05	0 Open
Pipe 46		3160	24	150	126	0.09	0 Open
Pipe 47		500	8	150	126	0.8	0.35 Open
Pipe 14		1	24	150	169.47	0.12	0 Open
Pipe 42		52	20	150	129.32	0.13	0.01 Open
Pipe 48		7	16	150	60.21	0.1	0 Open
Pipe 36		192	12	150	27.33	0.08	0 Open
Pipe 3		655	16	150	60.21	0.1	0 Open
Pipe 43		215	20	150	-156.66	0.16	0.01 Open
Pipe 26		48	8	150	0	0	0 Open
Pipe 45		60	20	150	65.79	0.07	0 Open
Pipe 13		387	8	150	12.81	0.08	0.01 Open
Pipe 12		77	8	150	12.81	0.08	0.01 Open
Pipe 21		149	12	150	27.33	0.08	0 Open
Pipe 20		118	8	150	0	0	0 Open
Pipe 7		218	8	150	0	0	0 Open
Pipe 30		302	12	150	0	0	0 Open
Pipe 22		306	12	150	27.33	0.08	0 Open
Pump Pump	#N/A	#N/A	#N/A	229.68	0	-157.79	Open
Valve BF2	#N/A		4 #N/A	100	2.55	32.93	Open
Valve BF1	#N/A		2 #N/A	3.68	0.38	26.25	Open

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Head ft	Pressure psi
Junc F6	1598.5	0	1747.29	64.47
Junc 28	1590	0	1747.29	68.15
Junc F5	1589.5	0	1747.29	68.37
Junc 27	1590	0	1747.29	68.15
Junc F4	1590	0	1747.29	68.15
Junc F3	1597	0	1747.29	65.12
Junc F2	1596	0	1747.29	65.55
Junc 17	1586	0	1745.63	69.17
Junc 18	1586	0	1712.7	54.9
Junc 7	1584	0	1747.29	70.75
Junc 26	1590	0	1747.29	68.15
Junc 25	1590	0	1747.29	68.15
Junc 31	1584	0	1747.29	70.75
Junc F_Hydrant_B	1591	0	1747.29	67.72
Junc 1	1584.5	0	1747.29	70.54
Junc 8	1583	0	1747.29	71.19
Junc F_Hydrant_A	1590	0	1747.29	68.15
Junc P_Hydrant	1589.5	0	1747.29	68.37
Junc 13	1586	0	1747.26	69.87
Junc LSCP	1586	3.68	1721.01	58.5
Junc F1	1595	0	1747.29	65.99
Junc D_BLDG_1FF	1596	0	1711.73	50.14
Junc D_BLDG_3FF	1622.6	100	1711.44	38.49
Junc 29	1591	0	1747.29	67.72
Junc 10	1586	0	1746.65	69.61
Junc 22	1596	0	1747.29	65.55
Junc 32	1587.3	0	1747.29	69.32
Junc F8	1585.7	0	1747.29	70.02
Junc 3	1585.6	0	1747.29	70.06
Junc 4	1585.6	0	1747.29	70.06
Junc 5	1585.5	0	1747.29	70.1
Junc F9	1583.6	0	1747.29	70.93
Junc 34	1584	0	1747.29	70.75
Junc 35	1583	0	1747.28	71.18
Junc Optima	1583	126	1747.1	71.11
Junc 37	1594	0	1747.29	66.42
Junc F7	1588.5	0	1747.29	68.8
Junc 2	1586	0	1747.29	69.89
Junc 30	1594	0	1747.29	66.42
Junc 24	1596	0	1747.29	65.55
Junc 6	1584	0	1747.29	70.75
Junc 9	1587	0	1747.29	69.45
Resvr Reservoir	1589.5	#N/A	1589.5	0

Note: A booster pump for domestic flows will be installed to regulate these pressures

\*\*\*\*\*  
 \* EPANET \*  
 \* Hydraulic and Water Quality \*  
 \* Analysis for Pipe Networks \*  
 \* Version 2.0 \*  
 \*\*\*\*\*

Input File: Banner NexCore

Peak Hour Demand Condition Scenario 2

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 10		678	16	150	-213.18	0.34	0.03 Open
Pipe 27		193	8	150	-45.6	0.29	0.05 Open
Pipe 28		146	8	150	-45.6	0.29	0.05 Open
Pipe 32		248	12	150	-45.6	0.13	0.01 Open
Pipe 31		55	12	150	0	0	0 Open
Pipe 33		115	12	150	-45.6	0.13	0.01 Open
Pipe 34		202	12	150	-45.6	0.13	0.01 Open
Pipe 38		75	12	150	-140.52	0.4	0.07 Open
Pipe 39		502	16	150	-213.18	0.34	0.03 Open
Pipe 1		357	16	150	213.18	0.34	0.04 Open
Pipe 2		23	6	150	0	0	0 Open
Pipe 11		34	6	150	0	0	0 Open
Pipe 9		23	6	150	0	0	0 Open
Pipe 4		69	2	150	3.68	0.38	0.48 Open
Pipe 19		27	4	130	349	8.91	112.6 Open
Pipe 35		203	12	150	-45.6	0.13	0.01 Open
Pipe 37		274	12	150	-140.52	0.4	0.06 Open
Pipe 16		51	4	150	349	8.91	140.55 Open
Pipe 17		1	4	150	349	8.91	12385.25 Open
Pipe 18		155	4	150	349	8.91	64.73 Open
Pipe 40		500	24	150	449.98	0.32	0.02 Open
Pipe 41		643	20	150	449.98	0.46	0.05 Open
Pipe 5		3	20	150	541.21	0.55	0.98 Open
Pipe 6		6	20	150	541.21	0.55	0.53 Open
Pipe 44		674	20	150	192.21	0.2	0.01 Open
Pipe 46		3160	24	150	451	0.32	0.02 Open
Pipe 47		500	8	150	451	2.88	3.88 Open
Pipe 14		1	24	150	590.5	0.42	0.12 Open
Pipe 42		52	20	150	449.98	0.46	0.08 Open
Pipe 48		7	16	150	213.18	0.34	0.17 Open
Pipe 36		192	12	150	94.92	0.27	0.04 Open
Pipe 3		655	16	150	213.18	0.34	0.03 Open
Pipe 43		215	20	150	-544.89	0.56	0.07 Open
Pipe 26		48	8	150	0	0	0 Open
Pipe 45		60	20	150	237.82	0.24	0.02 Open
Pipe 13		387	8	150	45.6	0.29	0.06 Open
Pipe 12		77	8	150	45.6	0.29	0.06 Open
Pipe 21		149	12	150	94.92	0.27	0.03 Open
Pipe 20		118	8	150	0	0	0 Open
Pipe 7		218	8	150	0	0	0 Open
Pipe 30		302	12	150	0	0	0 Open
Pipe 22		306	12	150	94.92	0.27	0.04 Open
Pump Pump	#N/A	#N/A	#N/A	803.68	0	-157.3	Open
Valve BF2	#N/A		4 #N/A	349	8.91	16.2	Open
Valve BF1	#N/A		2 #N/A	3.68	0.38	26.25	Open

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Head ft	Pressure psi
Junc F6	1598.5	0	1746.8	64.26
Junc 28	1590	0	1746.78	67.93
Junc F5	1589.5	0	1746.78	68.15
Junc 27	1590	0	1746.78	67.93
Junc F4	1590	0	1746.78	67.93
Junc F3	1597	0	1746.77	64.89
Junc F2	1596	0	1746.76	65.32
Junc 17	1586	0	1727.18	61.18
Junc 18	1586	0	1710.98	54.16
Junc 7	1584	0	1746.75	70.52
Junc 26	1590	0	1746.78	67.93
Junc 25	1590	0	1746.78	67.93
Junc 31	1584	0	1746.79	70.54
Junc F_Hydrant_B	1591	0	1746.77	67.5
Junc 1	1584.5	0	1746.77	70.31
Junc 8	1583	0	1746.73	70.94
Junc F_Hydrant_A	1590	0	1746.73	67.91
Junc P_Hydrant	1589.5	0	1746.75	68.14
Junc 13	1586	0	1746.71	69.64
Junc LSCP	1586	3.68	1720.46	58.26
Junc F1	1595	0	1746.76	65.76
Junc D_BLDG_1FF	1596	0	1700.95	45.48
Junc D_BLDG_3FF	1622.6	349	1697.91	32.63
Junc 29	1591	0	1746.78	67.5
Junc 10	1586	0	1739.57	66.54
Junc 22	1596	0	1746.74	65.32
Junc 32	1587.3	0	1746.79	69.11
Junc F8	1585.7	0	1746.76	69.79
Junc 3	1585.6	0	1746.74	69.82
Junc 4	1585.6	0	1746.74	69.82
Junc 5	1585.5	0	1746.74	69.86
Junc F9	1583.6	0	1746.74	70.69
Junc 34	1584	0	1746.73	70.51
Junc 35	1583	0	1746.68	70.92
Junc Optima	1583	451	1744.74	70.08
Junc 37	1594	0	1746.8	66.21
Junc F7	1588.5	0	1746.77	68.58
Junc 2	1586	0	1746.76	69.66
Junc 30	1594	0	1746.8	66.21
Junc 24	1596	0	1746.76	65.32
Junc 6	1584	0	1746.73	70.51
Junc 9	1587	0	1746.76	69.22
Resvr Reservoir	1589.5	#N/A	1589.5	0

Note: A booster pump for domestic flows will be installed to regulate pressure on all floors

```

*****
*
*                               E P A N E T                               *
*                               Hydraulic and Water Quality                   *
*                               Analysis for Pipe Networks                   *
*                               Version 2.0                                  *
*****

```

Input File: Banner NexCore

**Maximum Daily Demand + Fire Flow Condition Scenario 3**

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 10		678	16	150	-380.38	0.61	0.08 Open
Pipe 27		193	8	150	398.38	2.54	2.86 Open
Pipe 28		146	8	150	398.38	2.54	2.96 Open
Pipe 32		248	12	150	398.38	1.13	0.5 Open
Pipe 31		55	12	150	0	0	0 Open
Pipe 33		115	12	150	398.38	1.13	0.46 Open
Pipe 34		202	12	150	-1414.62	4.01	4.44 Open
Pipe 38		75	12	150	-927.81	2.63	2.55 Open
Pipe 39		502	16	150	-380.38	0.61	0.08 Open
Pipe 1		357	16	150	380.38	0.61	0.12 Open
Pipe 2		23	6	150	0	0	0 Open
Pipe 11		34	6	150	0	0	0 Open
Pipe 9		23	6	150	0	0	0 Open
Pipe 4		69	2	150	3.68	0.38	0.48 Open
Pipe 19		27	4	130	199	5.08	38.76 Open
Pipe 35		203	12	150	-1414.62	4.01	6.41 Open
Pipe 37		274	12	150	-927.81	2.63	1.93 Open
Pipe 16		51	4	150	199	5.08	47.34 Open
Pipe 17		1	4	150	199	5.08	4028.44 Open
Pipe 18		155	4	150	199	5.08	22.69 Open
Pipe 40		500	24	150	959.49	0.68	0.07 Open
Pipe 41		643	20	150	959.49	0.98	0.21 Open
Pipe 5		3	20	150	469	0.48	0.77 Open
Pipe 6		6	20	150	469	0.48	0.39 Open
Pipe 44		674	20	150	270	0.28	0.02 Open
Pipe 46		3160	24	150	252	0.18	0.01 Open
Pipe 47		500	8	150	252	1.61	1.3 Open
Pipe 14		1	24	150	1887.3	1.34	0.24 Open
Pipe 42		52	20	150	959.49	0.98	0.32 Open
Pipe 48		7	16	150	380.38	0.61	0.58 Open
Pipe 36		192	12	150	-486.81	1.38	0.91 Open
Pipe 3		655	16	150	380.38	0.61	0.1 Open
Pipe 43		215	20	150	-472.68	0.48	0.05 Open
Pipe 26		48	8	150	0	0	0 Open
Pipe 45		60	20	150	-128.38	0.13	0.01 Open
Pipe 13		387	8	150	-398.38	2.54	3.33 Open
Pipe 12		77	8	150	-398.38	2.54	3.33 Open
Pipe 21		149	12	150	-486.81	1.38	0.63 Open
Pipe 20		118	8	150	0	0	0 Open
Pipe 7		218	8	150	0	0	0 Open
Pipe 30		302	12	150	0	0	0 Open
Pipe 22		306	12	150	-486.81	1.38	0.86 Open
Pump Pump	#N/A	#N/A	#N/A		2267.68	0	-154.24 Open
Valve BF2	#N/A		4 #N/A		199	5.08	32.93 Open
Valve BF1	#N/A		2 #N/A		3.68	0.38	26.25 Open

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Head ft	Pressure psi
Junc F6	1598.5	0	1743.55	62.85
Junc 28	1590	0	1741.72	65.74
Junc F5	1589.5	1813	1740.82	65.57
Junc 27	1590	0	1740.88	65.37
Junc F4	1590	0	1741	65.43
Junc F3	1597	0	1741.43	62.58
Junc F2	1596	0	1741.98	63.26
Junc 17	1586	0	1737.1	65.47
Junc 18	1586	0	1704.16	51.2
Junc 7	1584	0	1743.59	69.15
Junc 26	1590	0	1741	65.43
Junc 25	1590	0	1741	65.43
Junc 31	1584	0	1743.7	69.2
Junc F_Hydrant_B	1591	0	1743.66	66.15
Junc 1	1584.5	0	1743.66	68.96
Junc 8	1583	0	1743.53	69.56
Junc F_Hydrant_A	1590	0	1743.53	66.53
Junc P_Hydrant	1589.5	0	1743.59	66.77
Junc 13	1586	0	1743.51	68.25
Junc LSCP	1586	3.68	1717.26	56.88
Junc F1	1595	0	1743.46	64.33
Junc D_BLDG_1FF	1596	0	1700.65	45.34
Junc D_BLDG_3FF	1622.6	199	1699.6	33.36
Junc 29	1591	0	1743.02	65.87
Junc 10	1586	0	1741.12	67.22
Junc 22	1596	0	1743.54	63.93
Junc 32	1587.3	0	1743.71	67.77
Junc F8	1585.7	0	1743.57	68.41
Junc 3	1585.6	0	1743.54	68.44
Junc 4	1585.6	0	1743.54	68.44
Junc 5	1585.5	0	1743.54	68.48
Junc F9	1583.6	0	1743.27	69.19
Junc 34	1584	0	1743.53	69.12
Junc 35	1583	0	1743.51	69.55
Junc Optima	1583	252	1742.86	69.27
Junc 37	1594	0	1743.74	64.88
Junc F7	1588.5	0	1743.2	67.03
Junc 2	1586	0	1743.55	68.27
Junc 30	1594	0	1743.74	64.88
Junc 24	1596	0	1741.98	63.26
Junc 6	1584	0	1743.53	69.12
Junc 9	1587	0	1743.46	67.79
Resvr Reservoir	1589.5	#N/A	1589.5	0

Note: A booster pump for domestic flows will be installed to regulate pressure on all floors

\*\*\*\*\*  
\* E P A N E T \*  
\* Hydraulic and Water Quality \*  
\* Analysis for Pipe Networks \*  
\* Version 2.0 \*  
\*\*\*\*\*

Input File: Banner NexCore

Initial Service Scenario 4

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 10		678	16	150	-145.19	0.23	0.01 Open
Pipe 27		193	8	150	-30.89	0.2	0.02 Open
Pipe 28		146	8	150	-30.89	0.2	0.03 Open
Pipe 32		248	12	150	-30.89	0.09	0 Open
Pipe 31		55	12	150	0	0	0 Open
Pipe 33		115	12	150	-30.89	0.09	0 Open
Pipe 34		202	12	150	-30.89	0.09	0 Open
Pipe 38		75	12	150	-98.44	0.28	0.04 Open
Pipe 39		502	16	150	-145.19	0.23	0.01 Open
Pipe 1		357	16	150	145.19	0.23	0.02 Open
Pipe 2		23	6	150	0	0	0 Open
Pipe 11		34	6	150	0	0	0 Open
Pipe 9		23	6	150	0	0	0 Open
Pipe 4		69	2	150	3.68	0.38	0.48 Open
Pipe 19		27	4	130	306	7.81	87.72 Open
Pipe 35		203	12	150	-30.89	0.09	0 Open
Pipe 37		274	12	150	-98.44	0.28	0.03 Open
Pipe 16		51	4	150	306	7.81	108.93 Open
Pipe 17		1	4	150	306	7.81	9522.22 Open
Pipe 18		155	4	150	306	7.81	50.64 Open
Pipe 40		500	24	150	318.05	0.23	0.01 Open
Pipe 41		643	20	150	318.05	0.32	0.03 Open
Pipe 5		3	20	150	381.91	0.39	0.49 Open
Pipe 6		6	20	150	381.91	0.39	0.26 Open
Pipe 44		674	20	150	75.91	0.08	0 Open
Pipe 46		3160	24	150	252	0.18	0.01 Open
Pipe 47		500	8	150	252	1.61	1.3 Open
Pipe 14		1	24	150	416.49	0.3	0 Open
Pipe 42		52	20	150	318.05	0.32	0.04 Open
Pipe 48		7	16	150	145.19	0.23	0.09 Open
Pipe 36		192	12	150	67.54	0.19	0.02 Open
Pipe 3		655	16	150	145.19	0.23	0.02 Open
Pipe 43		215	20	150	-385.59	0.39	0.03 Open
Pipe 26		48	8	150	0	0	0 Open
Pipe 45		60	20	150	106.81	0.11	0.01 Open
Pipe 13		387	8	150	30.9	0.2	0.03 Open
Pipe 12		77	8	150	30.9	0.2	0.03 Open
Pipe 21		149	12	150	67.54	0.19	0.02 Open
Pipe 20		118	8	150	0	0	0 Open
Pipe 7		218	8	150	0	0	0 Open
Pipe 30		302	12	150	0	0	0 Open
Pipe 22		306	12	150	67.54	0.19	0.02 Open
Pump Pump	#N/A	#N/A	#N/A		561.68	0	-157.56 Open
Valve BF2	#N/A		4 #N/A		306	7.81	16.2 Open
Valve BF1	#N/A		2 #N/A		3.68	0.38	26.25 Open

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Head ft	Pressure psi
Junc F6	1598.5	0	1747.06	64.37
Junc 28	1590	0	1747.05	68.05
Junc F5	1589.5	0	1747.05	68.27
Junc 27	1590	0	1747.05	68.05
Junc F4	1590	0	1747.05	68.05
Junc F3	1597	0	1747.05	65.02
Junc F2	1596	0	1747.04	65.45
Junc 17	1586	0	1731.95	63.24
Junc 18	1586	0	1715.75	56.22
Junc 7	1584	0	1747.04	70.65
Junc 26	1590	0	1747.05	68.05
Junc 25	1590	0	1747.05	68.05
Junc 31	1584	0	1747.06	70.65
Junc F_Hydrant_B	1591	0	1747.05	67.62
Junc 1	1584.5	0	1747.05	70.43
Junc 8	1583	0	1747.03	71.07
Junc F_Hydrant_A	1590	0	1747.03	68.04
Junc P_Hydrant	1589.5	0	1747.04	68.26
Junc 13	1586	0	1747	69.76
Junc LSCP	1586	3.68	1720.75	58.39
Junc F1	1595	0	1747.04	65.88
Junc D_BLDG_1FF	1596	0	1707.9	48.49
Junc D_BLDG_3FF	1622.6	306	1705.53	35.94
Junc 29	1591	0	1747.05	67.62
Junc 10	1586	0	1741.48	67.37
Junc 22	1596	0	1747.03	65.44
Junc 32	1587.3	0	1747.06	69.22
Junc F8	1585.7	0	1747.04	69.91
Junc 3	1585.6	0	1747.03	69.95
Junc 4	1585.6	0	1747.03	69.95
Junc 5	1585.5	0	1747.03	69.99
Junc F9	1583.6	0	1747.03	70.82
Junc 34	1584	0	1747.03	70.64
Junc 35	1583	0	1747.01	71.07
Junc Optima	1583	252	1746.36	70.78
Junc 37	1594	0	1747.06	66.32
Junc F7	1588.5	0	1747.05	68.7
Junc 2	1586	0	1747.04	69.78
Junc 30	1594	0	1747.06	66.32
Junc 24	1596	0	1747.04	65.45
Junc 6	1584	0	1747.03	70.64
Junc 9	1587	0	1747.04	69.35
Resvr Reservoir	1589.5	#N/A	1589.5	0

Note: A booster pump for domestic flows will be installed to regulate pressure on all floors

**Appendix G    Master Water Report for Crossroads East  
Planning Unit VI**

# MASTER WATER REPORT

## CROSSROADS EAST PLANNING UNIT VI AND PORTION OF PLANNING UNIT III

CASE 37-SA-2023

Prepared for:

Hayden Loop 101 Investors, LLC  
17207 North Perimeter Drive  
Scottsdale, AZ 85255

Prepared by:

Kimley-Horn & Associates, Inc.  
7740 North 16<sup>th</sup> Street, Suite 300  
Phoenix, AZ 85020





# Crossroads East Planning Unit VI and Portion of Planning Unit III

MASTER WATER REPORT

JULY 2023

Prepared By:

**Kimley»»Horn**

## Contents

1.0 Introduction .....	1
1.1 Project Description .....	1
1.2 Site Location .....	1
1.3 Purpose .....	1
1.4 Objectives .....	1
2.0 Design Documentation .....	2
2.1 Design Procedures, Policies, and Methodologies.....	2
2.2 Previous Studies .....	2
3.0 Description of Existing Water Infrastructure.....	3
3.1 Existing Water Infrastructure .....	3
4.0 Demands .....	4
4.1 General.....	4
4.2 Sale Parcel Water Demands .....	4
5.0 Data Analysis Methods.....	6
5.1 Design Criteria .....	6
6.0 Results.....	7
6.1 Proposed Water System Layout .....	7
6.2 Water System Analysis Results .....	7
6.3 Conformance to Previous Studies.....	8
6.4 City Infrastructure Improvement Plans .....	9
6.5 Proposed Special Water Facilities .....	9
6.6 Project Phasing.....	10
7.0 Conclusion .....	11
7.1 Overall Project .....	11
8.0 References.....	12

## Appendices

Appendix A – Vicinity Map

Appendix B – Land Use Map, Planning Unit Layout, and ASLD Proposed Zoning Districts

Appendix C – Existing Conditions Water Infrastructure Exhibit and City of Scottsdale Quarter Section Maps

Appendix D – Proposed Conditions Water Infrastructure Exhibit

Appendix E – Crossroads East Preliminary Planning Analysis by Coe and Van Loo Consultants, June 2009

Appendix F – Crossroads East Planning Unit VII Master Water Report

Appendix G – Fire Flow Test Results and WaterCAD Analysis Results

Appendix H: City of Scottsdale IIP

## 1.0 INTRODUCTION

### 1.1 PROJECT DESCRIPTION

A new development will be located on a portion of Arizona State Land Department (ASLD) Crossroads East Planning Unit VI and a portion of Planning Unit III that was purchased at public auction on April 13, 2022. The project will include a mixed-use development as well as supporting roadway, utility, drainage, and site infrastructure.

### 1.2 SITE LOCATION

Planning Unit VI encompasses approximately 61 gross acres in north Scottsdale, near the northwest corner of Hayden Road and Mayo Boulevard. The project site also includes approximately 24 acres of Planning Unit III, located at the northwest corner of the Mayo Boulevard alignment and the Miller Road alignment. The combined parcels encompass approximately 85 gross acres (hereinafter known as the Sale Parcel) and was purchased from ASLD by Hayden Loop 101 Investors LLC. The Sale Parcel is located in the North Half of Section 35 and the South Half of Section 26, Township 4 North, Range 4 East of the Gila and Salt River Base and Meridian in Maricopa County, Arizona. See **Appendix A** for the Vicinity Map. The Sale Parcel is zoned PCD. More specifically, the Sale Parcel is bounded by the future Mayo Boulevard alignment and vacant undeveloped desert to the south, Hayden Road to the east, the Loop 101 freeway to the north, and vacant undeveloped desert to the west. The site slopes from the northeast to the southwest at approximately 1.8%. Refer to **Appendix B** for the Land Use Map.

### 1.3 PURPOSE

This Master Water Report for Crossroads East Planning Unit VI is intended to satisfy the City of Scottsdale water master planning requirement of the Development Agreement recorded against the property (19-ZN-2002#2) for Planning Unit VI, as well as more specific guidelines for the Sale Parcel development in accordance with the City of Scottsdale water guidelines and standards. It provides a description of the water system requirements (demands), infrastructure location and sizing, and phasing for the Sale Parcel.

### 1.4 OBJECTIVES

This Master Water Report provides an infrastructure plan for the development of the Sale Parcel that will meet the City of Scottsdale guidelines. The report will demonstrate the following:

1. Water demands for the Sale Parcel development.
2. Location and size of proposed water infrastructure improvements necessary to serve the Sale Parcel development and future development of the surrounding parcels.

## 2.0 DESIGN DOCUMENTATION

### 2.1 DESIGN PROCEDURES, POLICIES, AND METHODOLOGIES

The existing and proposed water network surrounding the Sale Parcel was analyzed using the computer program WaterCAD by Bentley. The water analysis utilizes the Hazen-Williams equation for pressurized pipes. The existing water system pressures and flows are based on two fire flow tests performed on December 13, 2022. After calibration of the water system to the flow tests, the average daily demand, maximum daily demand, peak hour demand, and maximum daily demand plus fire flow were analyzed to determine the size of the water infrastructure in accordance with the following standards as outlined in Chapter 6 of the 2018 City of Scottsdale Design Standards and Policy Manual (DS&PM).

Refer to **Appendix G** for the Fire Flow Test Results.

### 2.2 PREVIOUS STUDIES

Previous studies of the area include the Crossroads East Preliminary Planning Analysis prepared by Coe and Van Loo, dated June 2009 (CVL Study). This study examined the Crossroads East land area, which includes the Sale Parcel. The Crossroads East Planning Units cover approximately 900 acres; and the limits of this area is depicted on the Planning Unit Layout in **Appendix B**. This study calculated the demands of the parcels based upon maximum floor area ratios and rates determined in the City of Scottsdale Integrated Wastewater Report. See **Appendix E** for the Crossroads East Preliminary Planning Analysis by Coe and Van Loo Consultants, Inc.

A Master Water Report for Crossroads East Planning Unit VII was prepared in July 2018 by Kimley-Horn & Associates. Crossroads East Planning Unit VII encompasses approximately 111 acres and is bounded by Mayo Boulevard on the north, Hayden Road on the east, Princess Boulevard on the south, and Miller Road on the west. This report recommended a 16-inch water main in Mayo Boulevard between Miller Road and Hayden Road, and a 12-inch water main in Miller Road between Mayo Boulevard and Princess Boulevard. Refer to **Appendix F** for the Crossroads East Planning Unit VII Master Water Report.

The City of Scottsdale has an Infrastructure Improvement Plan (IIP) in place to cover the water main construction in the adjacent portion of Hayden Road, Miller Road, and the water main north of the Loop 101 freeway. This is known as W-IIP-020 and includes 3.5 miles of pipeline and pressure reducing valve stations west of Hayden Road and north of Princess Boulevard. This IIP includes 16-inch water main in Mayo Boulevard along the project frontage, 24-inch water main in Miller Road along the project frontage, and 24-inch water main on the north side of the Loop 101 freeway between Miller Road and Claret Drive. This IIP also includes relocation of the existing 16-inch water main on the south side of the Loop 101 freeway that crosses the subject parcel. The total cost allocated to W-IIP-20 is \$8,937,000.

Water infrastructure that is covered in the IIP documents will be eligible for reimbursement from the City following construction. Infrastructure will need to be installed in accordance with applicable Arizona Revised Statutes Title 34 requirements for bidding and construction.

## 3.0 DESCRIPTION OF EXISTING WATER INFRASTRUCTURE

### 3.1 EXISTING WATER INFRASTRUCTURE

The Sale Parcel currently consists of vacant desert and a gravel parking area that has previously been used for regional event parking. A 16-inch ACP water main crosses the northern portion of the site and runs parallel with the Loop 101 right-of-way to Hayden Road.

A 16-inch DIP water main is located in Hayden Road along the east side of Planning Unit VI. This 16-inch water main decreases to a 12-inch DIP main south of Axon Drive.

A 16-inch DIP water main is located in Mayo Boulevard between 78<sup>th</sup> Street and Hayden Road. This water main continues south in 78<sup>th</sup> Street and connects to water infrastructure in Princess Boulevard.

A 16-inch DIP water main is located in Mayo Boulevard to the west of 73<sup>rd</sup> Place.

A 24-inch DIP water main is located along the north side of the Loop 101 freeway between Hayden Road and Claret Drive. This water main is stubbed to the west side of Claret Drive.

A 30-inch steel casing is in place under the Loop 101 freeway to the east of the Miller Road underpass.

There is an existing City of Scottsdale well site at the southeast corner of the Loop 101 freeway and the Miller Road alignment. Based on discussions with City Staff, this well site is used for monitoring and testing and is not a water production facility. Access to this well site will need to be maintained with the proposed development.

The water main infrastructure surrounding the Sale Parcel is within Pressure Zone 4 of the City of Scottsdale water system. Refer to **Appendix C** for the Existing Conditions Water Infrastructure Exhibit and the City of Scottsdale Quarter Section Maps.

## 4.0 DEMANDS

### 4.1 GENERAL

The projected water demands for the Sale Parcel will be determined based on parcel size, the anticipated land uses, and the anticipated densities. This report will review the demands for the Sale Parcel, which encompasses approximately 85 gross acres. Per the ASLD Proposed Zoning Districts shown in **Appendix B**, permitted zoning categories for the Sale Parcel include I-1, PRC, PCP, C-2, C-3, C-O, and R-5.

For the purposes of this report, assumptions regarding the land uses and densities have been made and are depicted on the Land Use Map in **Appendix B**.

The Average Daily Demand (ADD), Maximum Daily Demand (MDD), and Peak Hour Demand (PHD) will be calculated for each parcel in accordance with Chapter 6 of the DS&PM and the assumptions noted above. Based on Section 6-1.501 of the DSPM, the water system needs to be designed to provide a minimum fire flow based on Appendix B of the International Fire Code (IFC). This report will assume a maximum fire flow demand of 4,000 gallons per minute (gpm) at 20 psi, and it will assume that all buildings include a fire sprinkler system. It is anticipated that any buildings which are large enough to require a fire flow greater than 4,000 gpm will provide a building fire pump to supplement the flow. Per Section 6-1.406 of the DS&PM, fire hydrants shall maintain a minimum pressure of 30 psi.

### 4.2 SALE PARCEL WATER DEMANDS

As noted above, the assumptions for the Sale Parcel land uses are shown on the Land Use Map in **Appendix B**. Table 1 below provides the design water demands for the Sale Parcel per Figure 6-1.2 of the DS&PM:

**Table 1: Sale Parcel Water Demands**

Zoning	Net Area	Land Use	Density	Unit	Units or Area		Average Daily Demand		Maximum Daily Demand		Peak Hour Demand <sup>3</sup>	
	(Acres)						GPD	GPM	GPD	GPM	GPD	GPM
I-1	21.1	Research & Development	1,284	GPD/AC	21.1	AC	27,092	38	54,185	75	94,823	132
SC	5.0	Workforce Housing	14	DU/AC	80	Units	18,208	25	36,416	51	63,728	89
SC	20.0	Hospital	320	Bed	500	GPD	160,000	222	320,000	444	560,000	778
SC	15.1	Medical Office	0.22	FAR	175,000	SF	105,000	146	210,000	292	367,500	510
SC	8.0	Cancer Center	0.24	FAR	85,000	SF	51,000	71	102,000	142	178,500	248
C-2	2.5	Office	0.34	FAR	32,670	SF	19,602	27	39,204	54	68,607	95
C-2	5.8	Restaurant	0.13	FAR	30,000	SF	39,000	54	78,000	108	234,000	325
	77.5						419,902	583	839,805	1,166	1,567,158	2,177

**Notes:**

1. ADD for Research & Development is 1,284 GPD/AC based on Figure 6.1-2 of the DS&PM and includes Inside Use and Outside Use.
2. ADD for Workforce Housing is 227.6 GPD/Unit based on Figure 6-1.2 of the DS&PM and includes Inside Use and Outside Use.
3. ADD for Commercial is 0.8 GPD/SF based on Figure 6-1.2 of the DS&PM and includes Inside Use and Outside Use.
4. ADD for Restaurant is 1.3 GPD/SF based on Figure 6-1.2 of the DS&PM and includes Inside Use and Outside Use.
5. ADD for Hospital is assumed to be 500 GPD/Bed and includes Inside Use and Outside Use.
6. ADD for Medical Office/Cancer Center is assumed to be 0.6 GPD/SF and includes Inside Use and Outside Use (based on "Office" use).
7. ADD for office is 0.6 GPD/SF based on Figure 6-1.2 of the DS&PM and includes Inside Use and Outside Use.
8. MDD is 2.0 times the ADD.
9. PHD is 3.5 times the ADD for all uses except restaurant; PHD for restaurant is 6 times ADD.
10. GPM demands are based on a 12-hour active water use period.  $GPM = GPD / (12 \text{ hrs} \times 60 \text{ minutes})$ .

## 5.0 DATA ANALYSIS METHODS

### 5.1 DESIGN CRITERIA

In addition to the domestic and landscape water demands outlined in Section 4, the proposed water system model will consider a demand that is the sum of the MDD and the fire flow demand for each parcel. To be conservative, the demands will be placed at the most hydraulically remote locations in the model.

The existing water system pressure and available flow is based on the fire flow tests performed on December 13, 2022. A reservoir and pump system will be calibrated into the model to simulate the available water flow and pressure at the connection points. The elevations for all nodes are included in the model to account for elevation changes over the development area. Refer to **Appendix G** for the Fire Flow Test Results and WaterCAD Analysis.

The following design criteria will be used for the proposed water system:

- Minimum pressure of 50 psi for ADD, MDD, and PHD model scenarios
- Minimum pressure of 30 psi for MDD + Fire Flow model scenario
- Maximum pipe velocity of five feet per second for ADD, MDD, and PHD scenarios
- Maximum pressure of 120 psi for all scenarios
- Minimum of 15 psi at the highest floor elevation for MDD + Fire Flow scenario. This requirement will be addressed with future Basis of Design report submittals, as the elevations of the highest floors are not known at this time. A booster pump may be required for larger/taller buildings.

Section 6-1.400 of the DS&PM provides general requirements for water main sizes based on mile and half-mile streets, and the CVL Study also provided recommendations for water main sizing throughout the Crossroads East development area.

The proposed water system layout will have a looped configuration which allows for multiple points of connection and redundancy for individual users, including the hospital use. Isolation valves will be provided on the proposed water mains at

## 6.0 RESULTS

### 6.1 PROPOSED WATER SYSTEM LAYOUT

As previously noted, existing water mains are present in the adjacent portions of Mayo Boulevard and Hayden Road. The proposed water system for the Sale Parcel will connect to these existing water mains. The water main infrastructure noted below is anticipated to include fire hydrants with spacing per Section 6-1.502 of the DS&PM.

As previously noted, 16-inch water mains are present within Mayo Boulevard to the west and to the east of the project. This project will connect the existing 16-inch DIP water mains with a new 16-inch DIP water main in Mayo Boulevard across the project frontage. This project will also include a new 24-inch DIP water main in Miller Road between Mayo Boulevard and a new 16-inch DIP water main to be installed in an existing 30-inch sleeve under the Loop 101 freeway.

This project will also install a new 24-inch DIP water main along the north side of the Loop 101 freeway between the Miller Road underpass and Claret Drive. This water main will connect to the existing 24-inch water main along the north side of the Loop 101 freeway that is located east of Claret Drive. The City of Scottsdale will work with the Arizona State Land Department (ASLD) to provide land rights to construct this water main across ASLD property.

The existing 16-inch water main that runs east-west across the Sale Parcel will be relocated to the northern edge of the property to the east of Miller Road. The existing 16-inch water main that crosses the site west of Miller Road will be removed and replaced with the proposed 16-inch water main in Mayo Boulevard.

In summary, the project will include the following water infrastructure improvements:

- 24-inch water main on the north side of the Loop 101 freeway between Miller Road and Claret Drive. This will connect to the existing water main in Claret Drive near the Cavasson Development.
- New 16-inch water main through the existing 30-inch steel casing under the Loop 101 freeway.
- New 24-inch water main in Miller Road between Mayo Boulevard and the Loop 101 freeway.
- Realignment of the existing 16-inch water main to the east of Miller Road. The relocated water main will be located along the northern property line.
- New 16-inch water main in Mayo Boulevard between 73<sup>rd</sup> Place and 78<sup>th</sup> Street.

Refer to **Appendix D** for the Proposed Conditions Water Infrastructure Exhibit.

### 6.2 WATER SYSTEM ANALYSIS RESULTS

The aforementioned water system was modeled using the WaterCAD computer program. The existing system pressure and flow was based on the fire flow test results from December 13, 2022. The following demand scenarios were modeled: Average Daily Demand (ADD), Maximum Daily Demand (MDD), Peak Hour Demand (PHD), and Maximum Daily Demand plus Fire Flow. Flow demands were placed at the

midpoint of each land use designation. These demands are conservative, and it is anticipated that actual future demands will be less than those used in this model. Refer to Table 2 for the Water System Model Results.

**Table 2: Water System Model Results**

Demand Node	ADD		MDD		PHD		MDD + Fire Flow	
	Flow (GPM)	Pressure (PSI)	Flow (GPM)	Pressure (PSI)	Flow (GPM)	Pressure (PSI)	Flow (GPM)	Pressure (PSI)
Research & Development	38	61	75	59	132	58	4,075	30
Workforce Housing	25	61	51	59	89	58	4,051	30
Hospital	222	61	444	59	778	57	4,444	30
Medical Office	146	60	292	58	510	57	4,292	30
Cancer Center	71	61	142	59	248	58	4,142	30
Office	27	59	54	57	95	56	4,054	30
Restaurant	54	61	108	59	325	58	4,108	31

Refer to **Appendix G** for the WaterCAD Analysis Results.

### 6.3 CONFORMANCE TO PREVIOUS STUDIES

As previously noted, the Sale Parcel was part of the CVL Study in 2009. Since the CVL Study was completed, ASLD has revised the configuration, size, and location of the various planning units within Crossroads East. Additionally, the future roadway alignments of Mayo Boulevard, Miller Road, and others have changed since the CVL Study was completed.

The CVL Study recommended a 16-inch water main in the future Mayo Boulevard alignment which is consistent with the recommendations presented herein. Additionally, these water mains conform to City of Scottsdale requirements for 12-inch water mains in mile and half-mile alignment streets.

The CVL did not provide recommendations for water mains within Princess Boulevard or the future 78<sup>th</sup> Street alignment. Refer to **Appendix E** for the CVL Study.

Kimley-Horn prepared a Master Water Report for Crossroads East Planning Unit VII in July 2018. This report covered the area bounded by Hayden Road, Mayo Boulevard, 78<sup>th</sup> Street, and Princess Boulevard. This report supports the findings of the Planning Unit VII Master Water Report.

The City of Scottsdale released the Integrated Water Resources Master Plan (IWRMP) in August 2022. The IWRMP updates and integrates the City’s water resources, water system and wastewater system master plans using a common framework that establishes the same growth and planning assumptions for all systems. The report outlines water use demand projections based on historic and projected population growth estimates across different areas of the City. The proposed site is within an area that is designated as “Development Intensity Area” in the IWRMP. This area was modeled as having an anticipated growth rate that is higher than the baseline rate across other parts of the City. The IWRP presented recommendations for budgets of future water and wastewater projects across the City.

The previous Kimley-Horn study recommended that a 16-inch water main be installed in Mayo Boulevard between Hayden Road and the Miller Road alignment. A 16-inch water main was installed in Mayo Boulevard between Hayden Road and 78<sup>th</sup> Street as part of the Mark-Taylor project in 2019. This report includes the extension of this 16-inch main in Mayo Boulevard between 78<sup>th</sup> Street and 73<sup>rd</sup> Place. Refer to **Appendix F** for the Crossroads East Planning Unit VII Master Water Report.

## 6.4 CITY INFRASTRUCTURE IMPROVEMENT PLANS

The City of Scottsdale has an Infrastructure Improvement Plan (IIP) in place to cover the water main construction in the adjacent portion of Hayden Road, Miller Road, and the water main north of the Loop 101 freeway. This is known as W-IIP-020 and includes 3.5 miles of pipeline and pressure reducing valve stations west of Hayden Road and north of Princess Boulevard. This IIP includes 16-inch water main in Mayo Boulevard along the project frontage, 24-inch water main in Miller Road along the project frontage, and 24-inch water main on the north side of the Loop 101 freeway between Miller Road and Claret Drive. This IIP also includes relocation of the existing 16-inch water main on the south side of the Loop 101 freeway that crosses the subject parcel. The total cost allocated to W-IIP-20 is \$8,937,000.

Water infrastructure that is covered in the IIP documents will be eligible for partial reimbursement from the City following construction. Infrastructure will need to be installed in accordance with applicable Arizona Revised Statutes Title 34 requirements for bidding and construction.

Refer to Appendix H for City of Scottsdale IIP documents.

## 6.5 PROPOSED SPECIAL WATER FACILITIES

Portions of the water main may need to be constructed with extra protection due to drainage culvert or other utility crossings as specified by Maricopa Association of Governments (MAG) Standard Detail 404 and COS Standard Detail 2401. Any crossings of washes will need to comply with DSPM requirements from Sections 6-1.414, 6-1.415, 6-1.410, and 6-1.202. In general, the requirements for wash crossings include greater bury depths based on the 100-year flow rate of the wash crossing. Dipped sections of water main will require hydrants or air release valves per COS requirements.

As part of the overall development, several >50 cfs washes will be adjusted. These modifications are outlined in a separate Master Drainage Report for Crossroads East Planning Unit VI and Portion Of Planning Unit III. The 16-inch water mains outlined in this report will be located under public streets (Mayo Boulevard and Miller Road) and any drainage crossings will be channelized through a culvert for the roadway crossings. The 24-inch water mains will be located within undeveloped areas and may require wash crossings that comply with the DSPM requirements noted above.

A Stockpile Plan is under review concurrently with this Master Plan. The purpose of the Stockpile Plan is to allow for fill material to be stockpiled on the site prior to construction. The stockpile location is at least 25 feet away from the nearest existing water main and 350 feet from the nearest proposed water main and the water infrastructure will not be affected by the stockpile locations.

A City of Scottsdale monitoring well is located near the southeast corner of the Loop 101 freeway and the Miller Road underpass. This monitoring well will remain in place post-development, and access to the monitoring well will be provided from Miller Road. The elevation of the well will need to be lowered so that

it can be accessed from Miller Road. Further coordination with City Staff will take place during plan reviews to ensure adequate access and maneuvering areas around the monitoring well. Dedications of easements for access and maintenance for the well will be required.

Water easements will need to be dedicated for public water mains that fall outside of the right-of-way. Additionally, a 10-foot wide water easement will need to be dedicated adjacent to the ADOT right-of-way where there is an existing 16-inch water main within the ADOT right-of-way. Refer to the Proposed Conditions Water Infrastructure Exhibit in **Appendix D** for schematic locations of proposed easements.

## 6.6 PROJECT PHASING

The 16-inch DIP water main extension in Mayo Boulevard between 73<sup>rd</sup> Place and 78<sup>th</sup> Street will be completed in a single phase.

Subsequent on-site developments will be phased based on market demand. Individual developments within the Sale Parcel will need to provide site-specific water system modelling to justify site demands and infrastructure sizing. The individual developments will provide Basis of Design (BOD) reports with their entitlement packages that demonstrate consistency with this Master Water Report.

## 7.0 CONCLUSION

### 7.1 OVERALL PROJECT

Based on the results of this Water Master Report, the following can be concluded:

- Water main extensions can be installed to provide adequate pressure and flow to the Sale Parcel.
- The water demand calculations are based on conservative land use assumptions, and the actual water demands will likely be less than the demands presented in this report.
- The timing of subsequent on-site developments within the Sale Parcel will be based on market demand. Individual developments within the Sale Parcel will provide site-specific BOD reports that include water system modelling, justify site water demands, verify infrastructure sizing, and demonstrate consistency with this Master Water Report.
- This Water Master Plan is generally consistent with the CVL Study that was prepared in 2009 for Crossroads East and the Master Water Report for Crossroads Planning Unit VII prepared in 2018 by Kimley-Horn.

This Water Master Report is intended to provide a level of assurance that water service can be provided to the Sale Parcel. It is also intended to provide guidance for future developments adjacent to the Sale Parcel.

## 8.0 REFERENCES

City of Scottsdale, *Design Standards and Policies Manual, Chapter 6: Water*, January 2018.

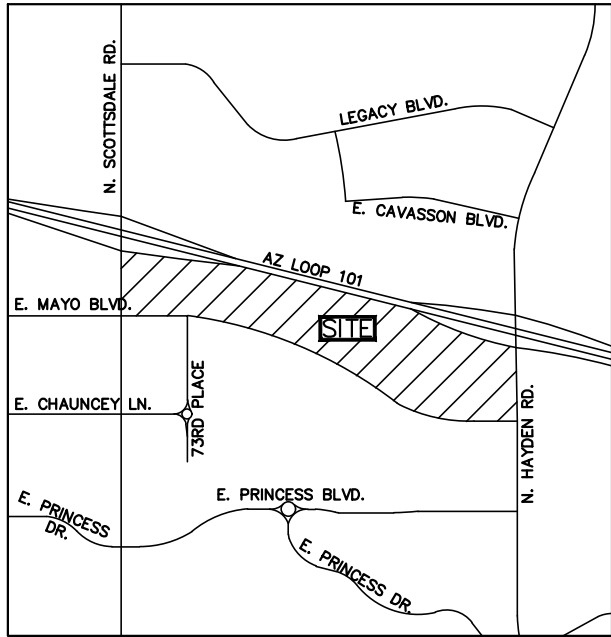
Coe and Van Loo Consultants, Inc, *Crossroads East Preliminary Planning Analysis*, June 2009.

Kimley-Horn & Associates, Inc, *Master Water Report for Crossroads East Planning Unit VII*, July 2018.

WaterCAD v8i, Bentley Systems, Inc. and *WaterCAD User's Guide*, 2022

Carollo Engineers, *City of Scottsdale Integrated Water Resources Master Plan*, August 2022.

## Appendix A – Vicinity Map



**VICINITY MAP**  
 CITY OF SCOTTSDALE  
 N.T.S.

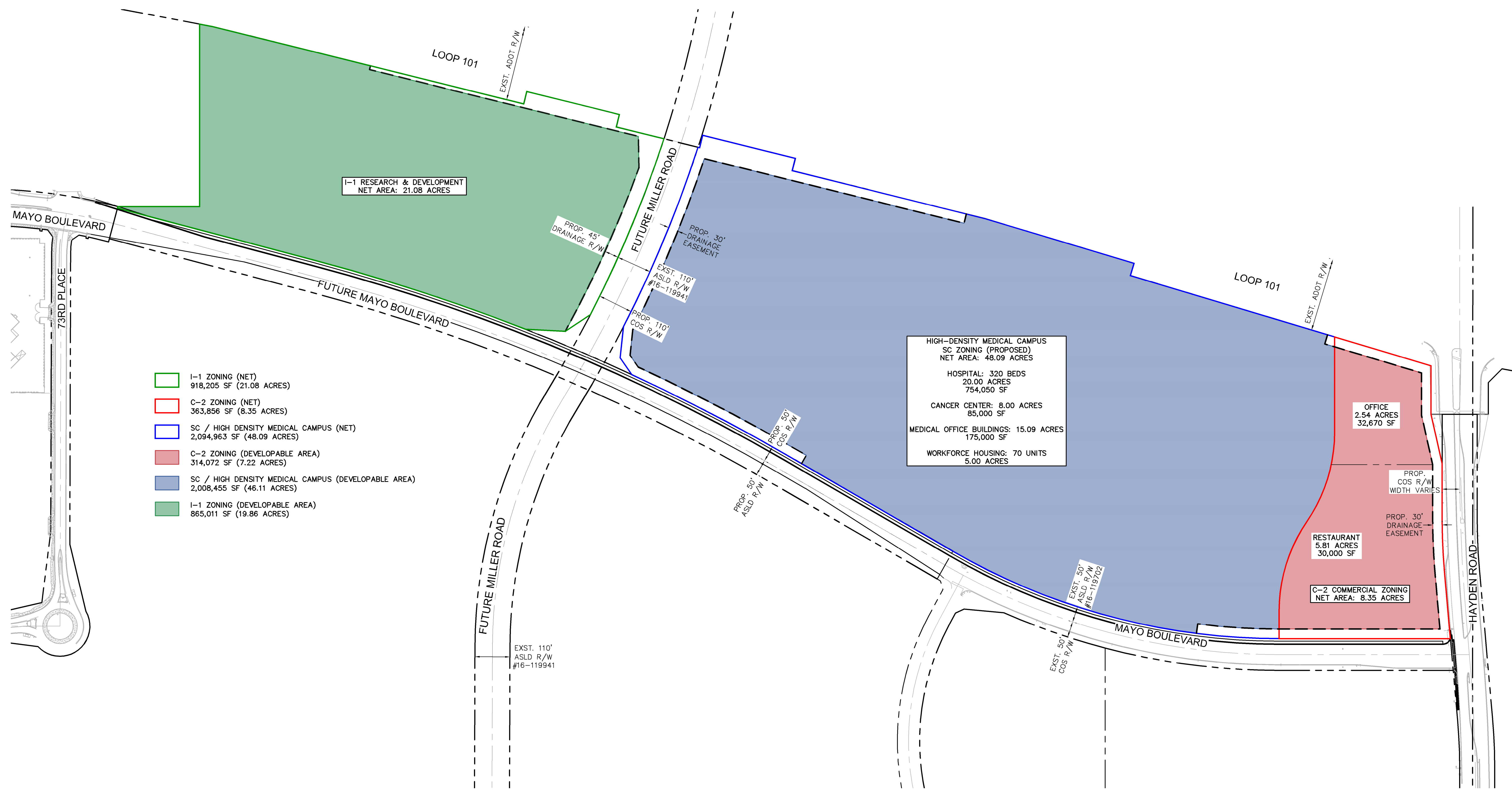


NORTH



Appendix B – Land Use Map, Planning  
Unit Layout, and ASLD Proposed  
Zoning Districts

K:\PHX\_Civil\291268016 Hayden 101\CADD\Exhibits\2023-07-27 Land Use Map.dwg Jul 27, 2023 Laurel Wright  
\\scc\cadd\291268016 Hayden 101\CADD\Exhibits\2023-07-27 Land Use Map.dwg 7/27/2023 11:52:00 AM



- I-1 ZONING (NET)  
918,205 SF (21.08 ACRES)
- C-2 ZONING (NET)  
363,856 SF (8.35 ACRES)
- SC / HIGH DENSITY MEDICAL CAMPUS (NET)  
2,094,963 SF (48.09 ACRES)
- C-2 ZONING (DEVELOPABLE AREA)  
314,072 SF (7.22 ACRES)
- SC / HIGH DENSITY MEDICAL CAMPUS (DEVELOPABLE AREA)  
2,008,455 SF (46.11 ACRES)
- I-1 ZONING (DEVELOPABLE AREA)  
865,011 SF (19.86 ACRES)

**HIGH-DENSITY MEDICAL CAMPUS**  
SC ZONING (PROPOSED)  
NET AREA: 48.09 ACRES

HOSPITAL: 320 BEDS  
20.00 ACRES  
754,050 SF

CANCER CENTER: 8.00 ACRES  
85,000 SF

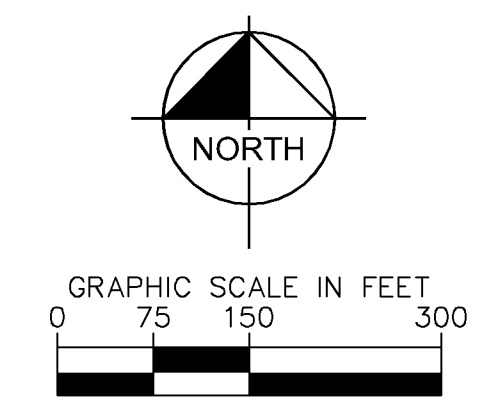
MEDICAL OFFICE BUILDINGS: 15.09 ACRES  
175,000 SF

WORKFORCE HOUSING: 70 UNITS  
5.00 ACRES

OFFICE  
2.54 ACRES  
32,670 SF

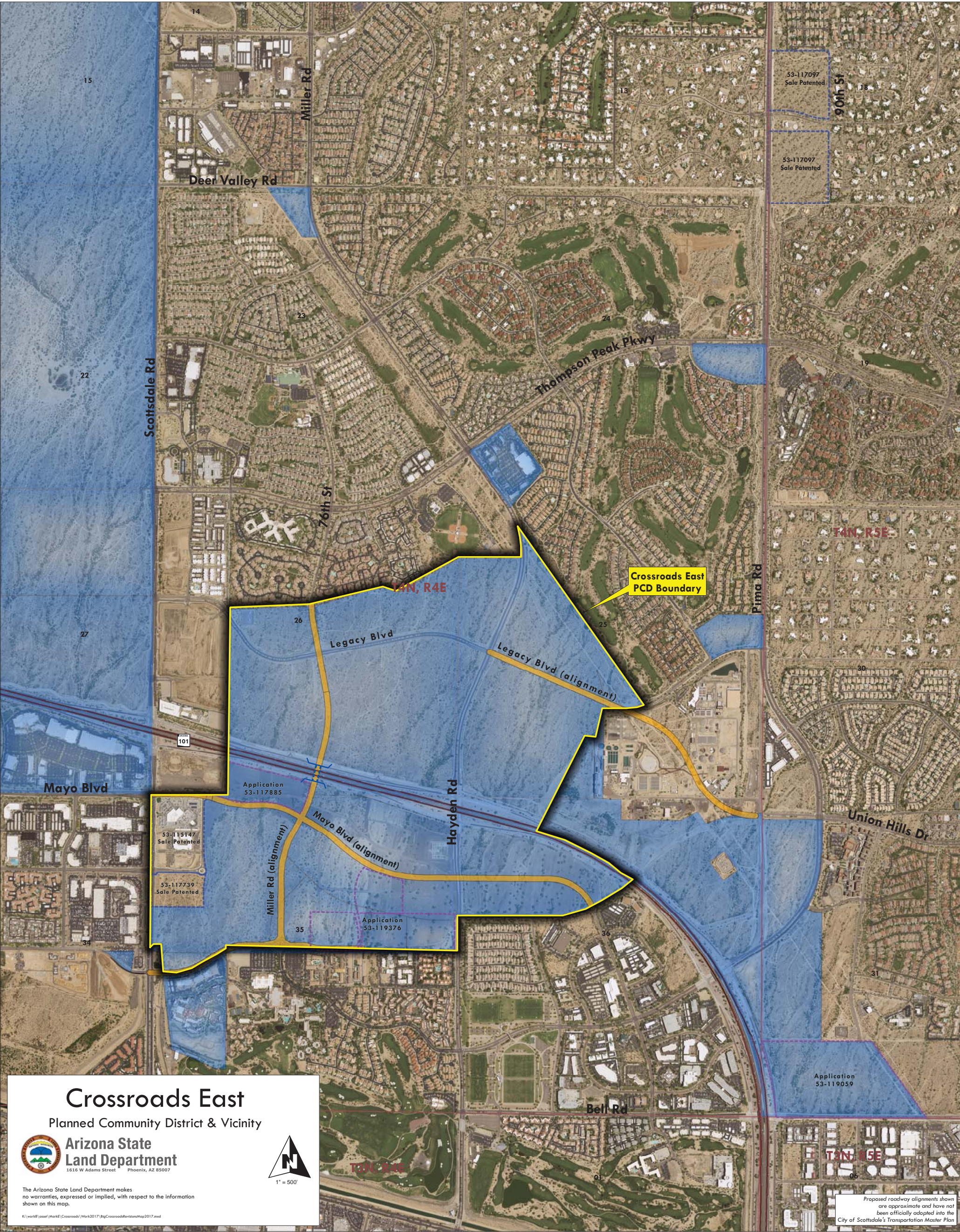
RESTAURANT  
5.81 ACRES  
30,000 SF

C-2 COMMERCIAL ZONING  
NET AREA: 8.35 ACRES



SWC - HAYDEN ROAD  
& LOOP 101 FREEWAY  
LAND USE MAP  
7/27/2023





# Crossroads East

Planned Community District & Vicinity




The Arizona State Land Department makes no warranties, expressed or implied, with respect to the information shown on this map.

K:\work\asse\Map\E\Crossroads\Work\2017\BigCrossroadsRevisionsMap2017.mxd

Proposed roadway alignments shown are approximate and have not been officially adopted into the City of Scottsdale's Transportation Master Plan

# PROPOSED PLANNING UNITS

## Roads & Alignments

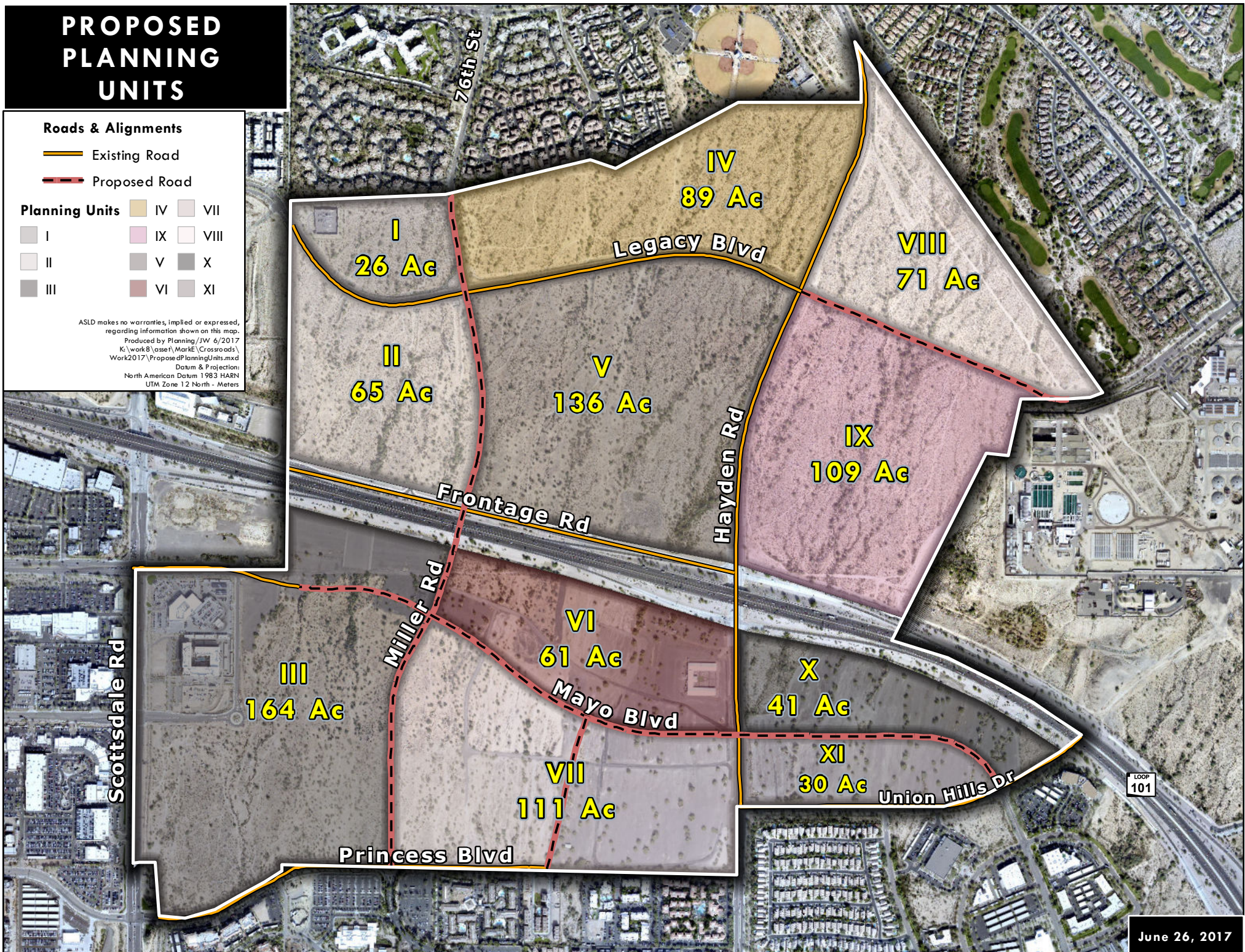
 Existing Road

 Proposed Road

## Planning Units

 I	 IX	 VIII
 II	 V	 X
 III	 VI	 XI

ASLD makes no warranties, implied or expressed, regarding information shown on this map.  
 Produced by Planning/JW\_6/2017  
 K:\work\8\asset\MapK\Crossroads\Work2017\ProposeDPlanningUnits.mxd  
 Datum & Projection:  
 North American Datum 1983 HARN  
 UTM Zone 12 North - Meters



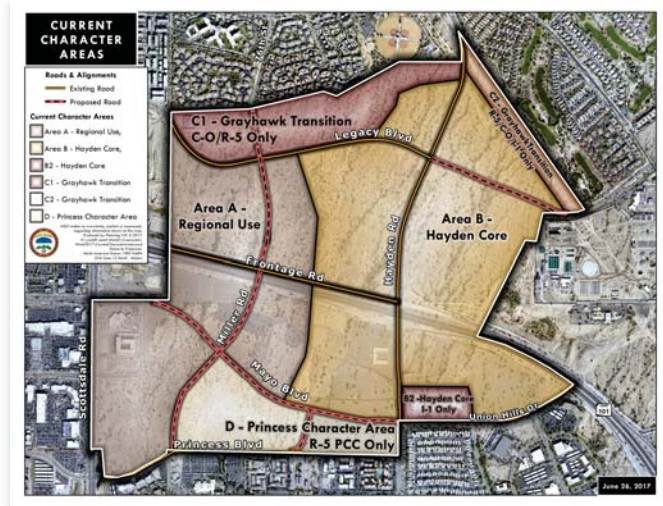
# WHERE ZONING CAN BE USED AT CROSSROADS EAST

JUNE 2017



## 2002

### CURRENT/EXISTING CHARACTER AREAS

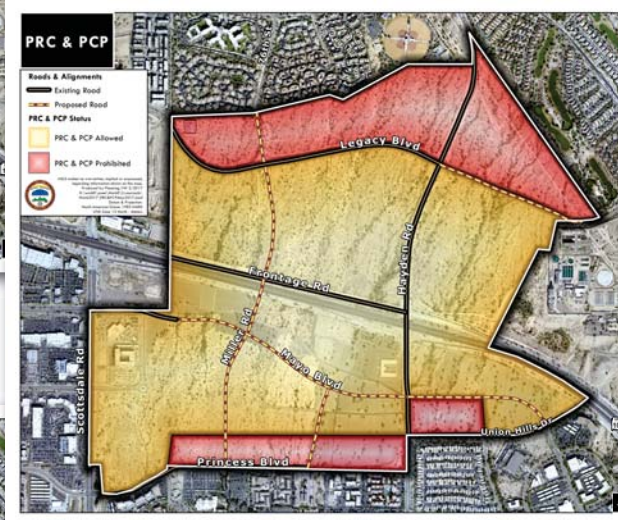
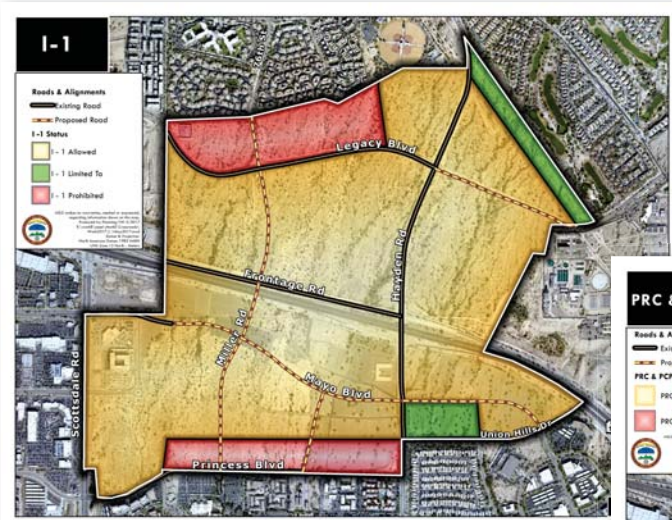


## TODAY

LAND USE INDEX: PRC/PCP - REGIONAL CENTER C-2/C-3 COMMERCIAL  
 R-5 MULTIFAMILY RESIDENTIAL I-1 INDUSTRIAL PARK C-O COMMERCIAL OFFICE

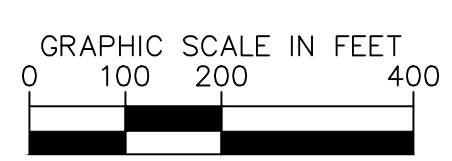
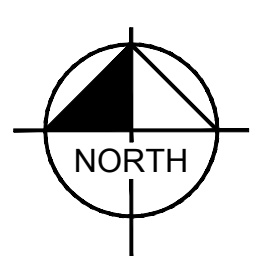
### PROPOSED ZONING DISTRICTS

LIMITED TO
  ALLOWED
  PROHIBITED

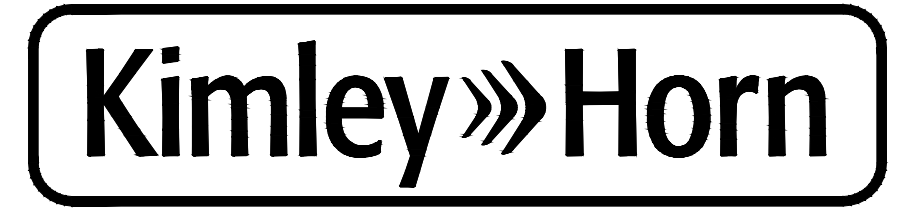


Appendix C – Existing Conditions  
Water Infrastructure Exhibit and City of  
Scottsdale Quarter Section Maps

K:\PHX\_Civil\291268016\_Hoyden\101\CADD\Exhibits\2022-12-07\_Exist\_Water\_Exhibit.dwg Jul 27, 2023 Laurel Wright



EXISTING WATER INFRASTRUCTURE







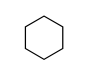










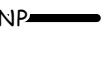
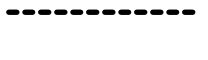





SALE PARCEL

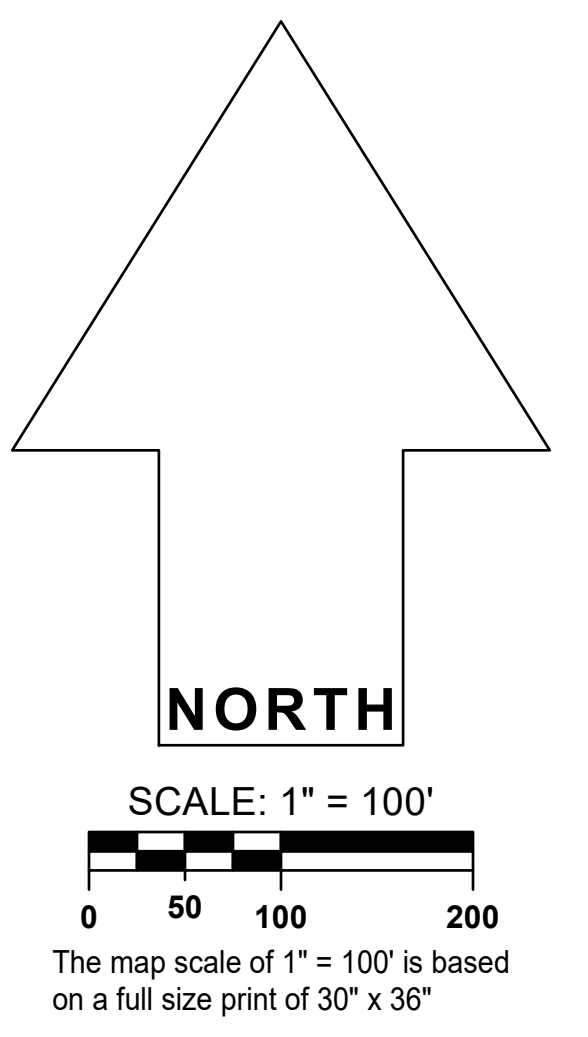
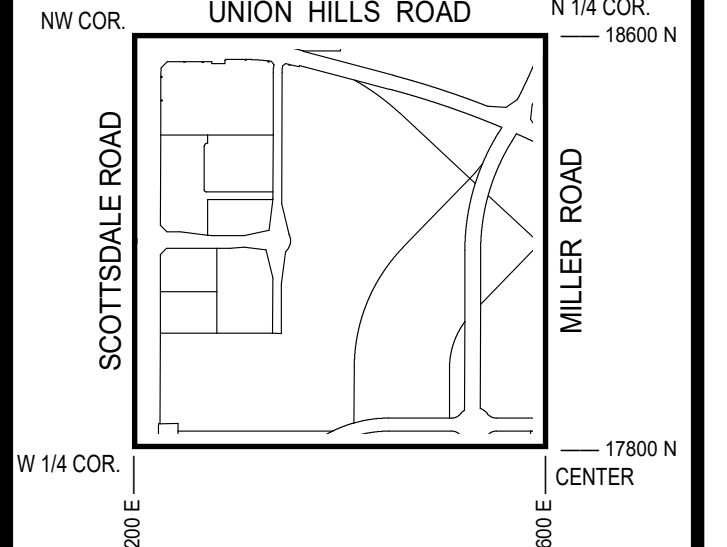
**GENERAL NOTES:**

- THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7792.
- THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS "CALCULATED" ON THE MAP.

**LEGEND:**

- Air Release Valve 
- Non-potable Air Release Valve 
- Blowoff 
- Cap 
- Cathodic Protection 
- Fill Drain 
- Fire Hydrant 
- Non-GPS Point 
- Pressure Reducing Valve 
- Pump 
- Reducer 
- Sample Station 
- Water Manhole 
- Non-Potable Manhole 
- Well 
- Valve 
- Non-potable Valve 
- Vault 
- Water Main 
- Non-Potable Main 
- Fire / Private Main 
- Non-Scottsdale Main 

**VICINITY MAP**



**WATER**  
 QUARTER SECTION MAP  
**38-45**  
 NW 1/4 SEC. 35 T4N R4E

**NOTICE**

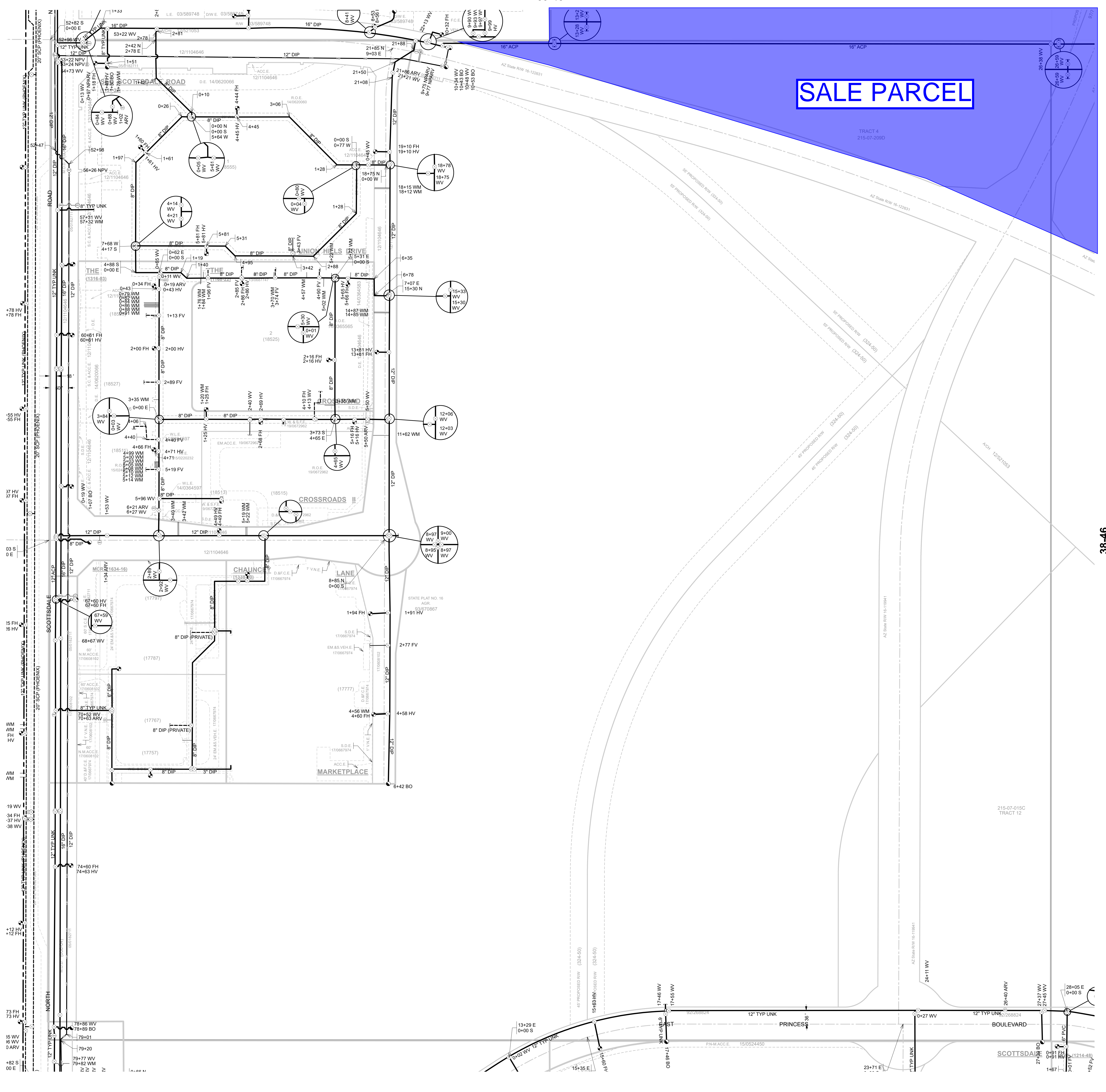
THIS DOCUMENT IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY. THE CITY OF SCOTTSDALE DOES NOT WARRANT ITS ACCURACY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE. IT SHOULD NOT BE RELIED UPON WITHOUT FIELD VERIFICATION.

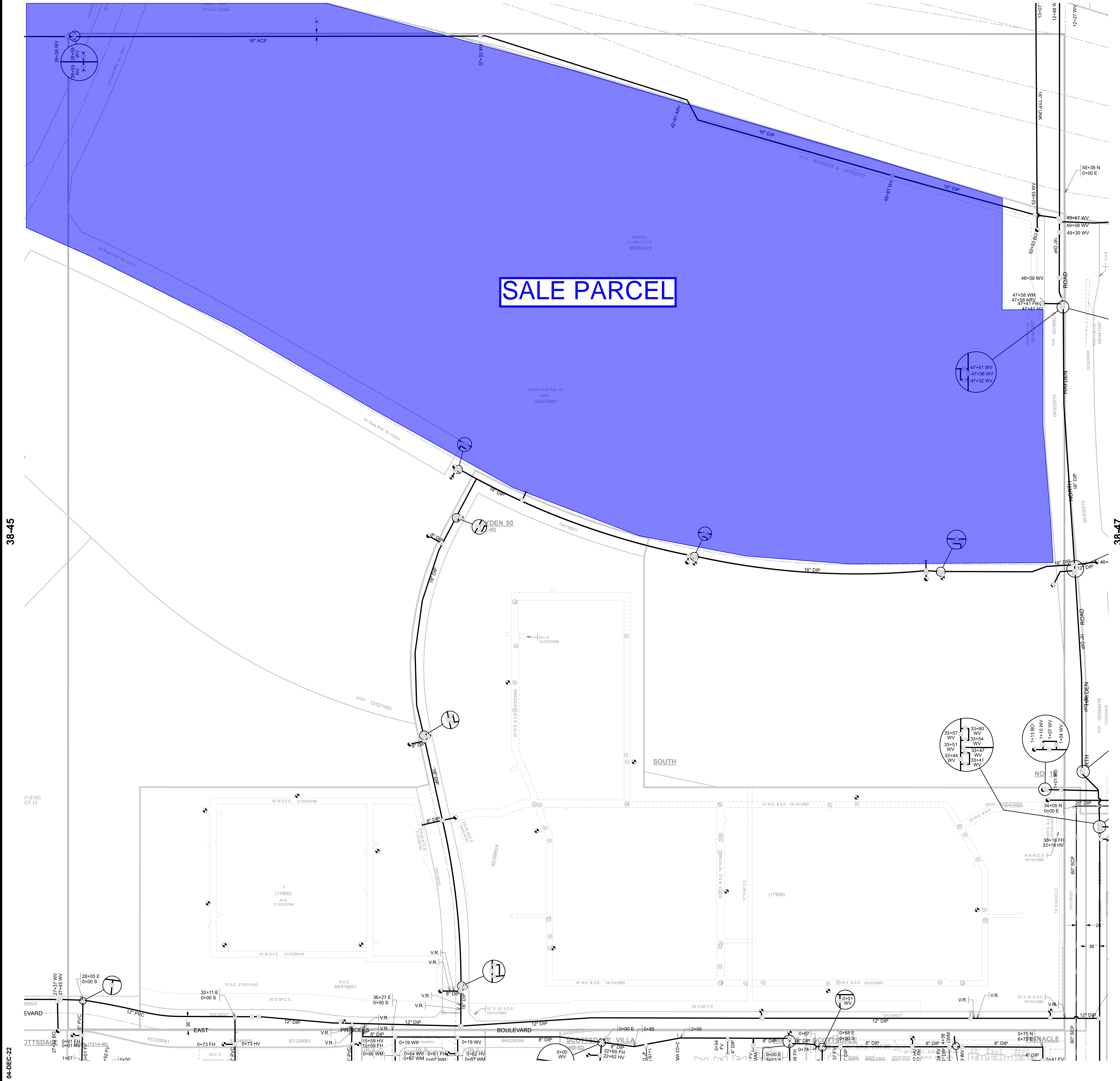
THE CITY OF SCOTTSDALE

38-44

38-46

04-DEC-22

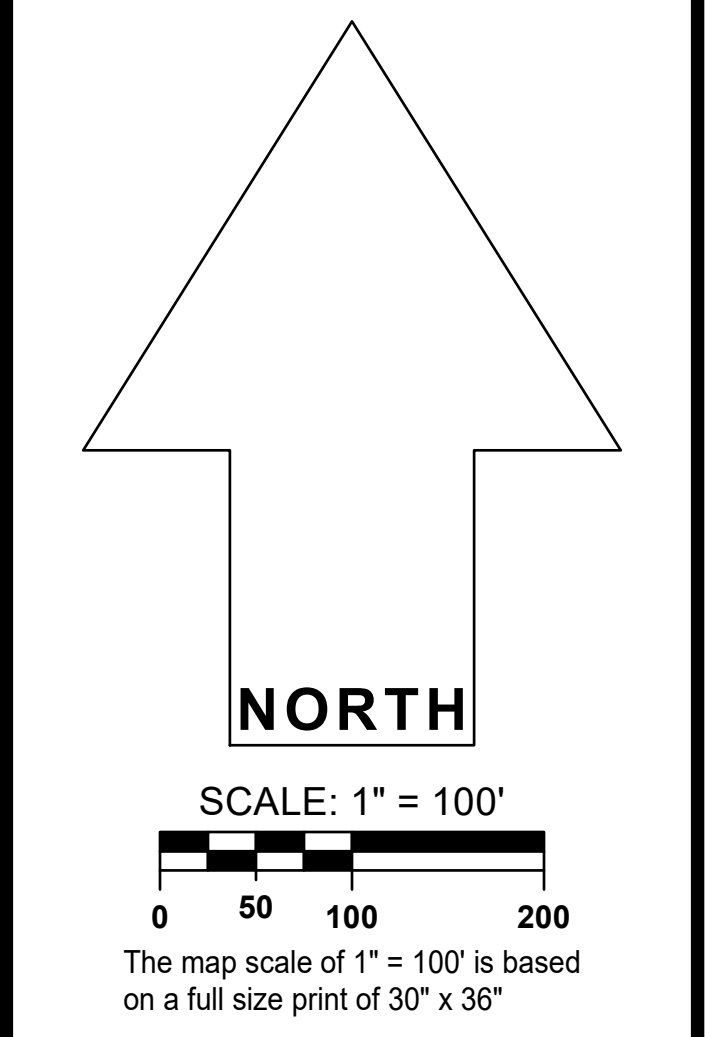
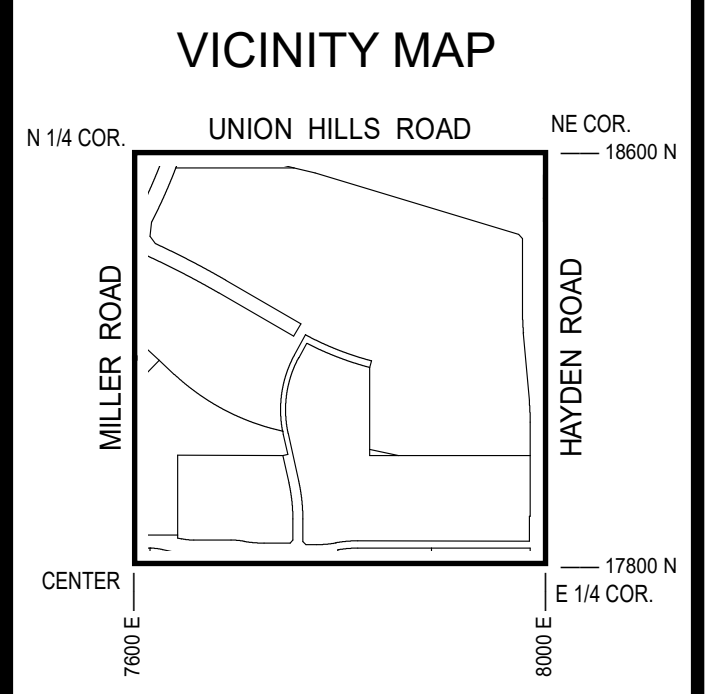




**GENERAL NOTES:**  
 \* THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7792.  
 \* THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER, 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS 'CALCULATED' ON THE MAP.

**LEGEND:**

Air Release Valve	
Non-potable Air Release Valve	
Blowoff	
Cap	
Cathodic Protection	
Fill Drain	
Fire Hydrant	
Non-GPS Point	
Pressure Reducing Valve	
Pump	
Reducer	
Sample Station	
Water Manhole	
Non-Potable Manhole	
Well	
Valve	
Non-potable Valve	
Vault	
Water Main	
Non-Potable Main	
Fire / Private Main	
Non-Scottsdale Main	



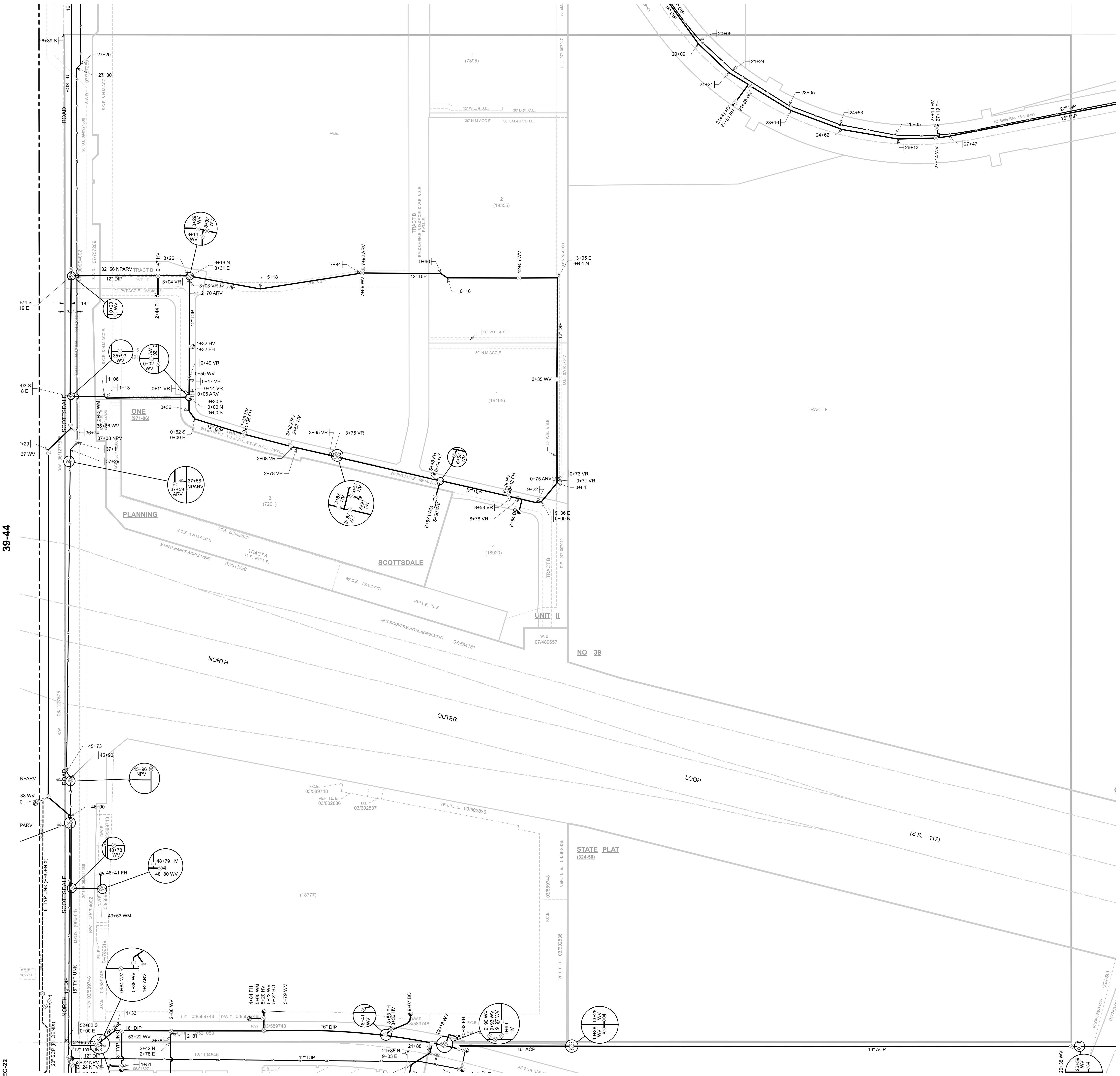
**WATER**  
 QUARTER SECTION MAP  
**38-46**  
 NE 1/4 SEC. 35 T4N R4E

**NOTICE**  
 THIS DOCUMENT IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY. THE CITY OF SCOTTSDALE DOES NOT WARRANT ITS ACCURACY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE. IT SHOULD NOT BE RELIED UPON WITHOUT FIELD VERIFICATION.  
 THE CITY OF SCOTTSDALE

38-45

38-47

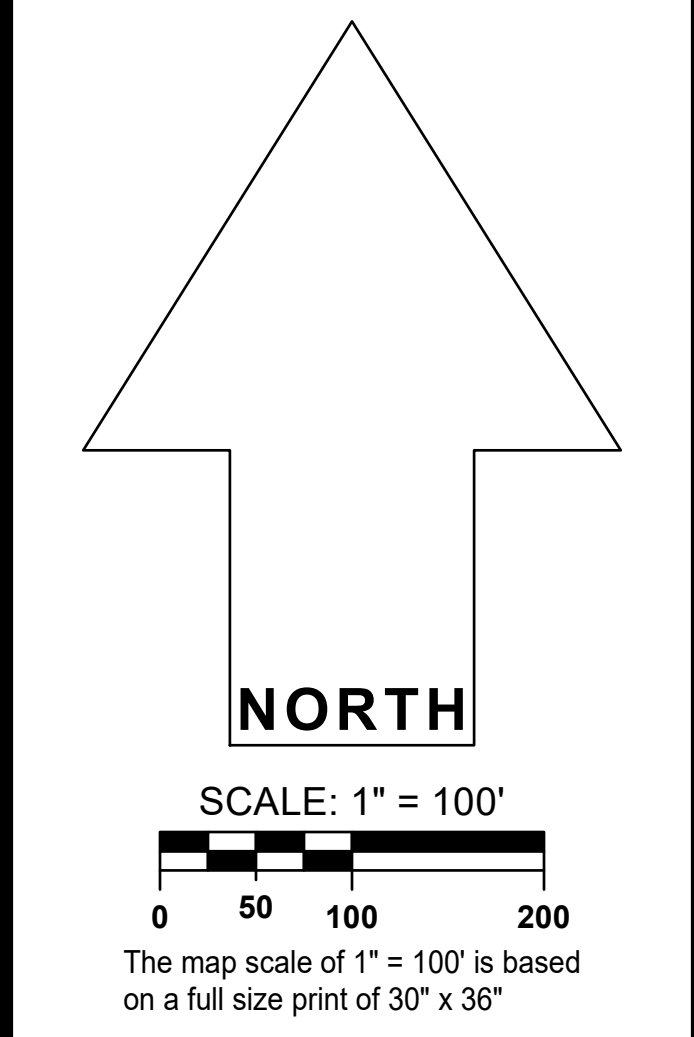
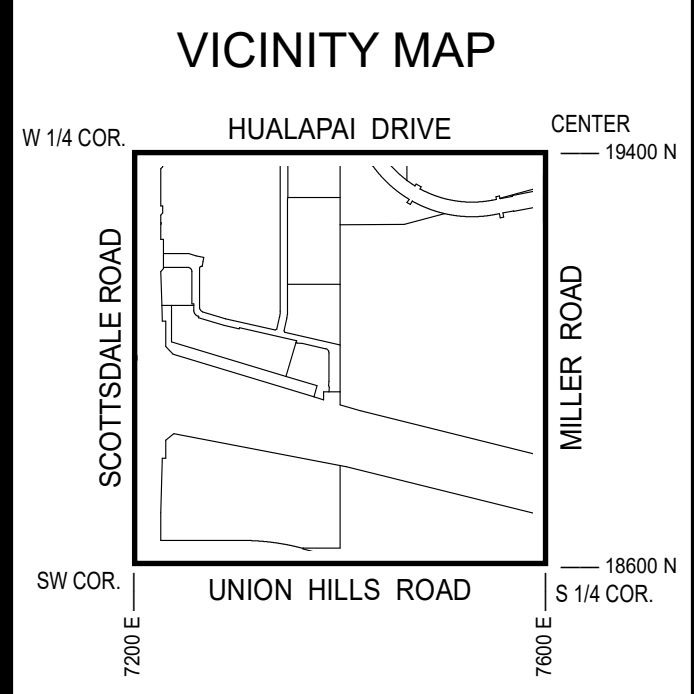
04-DEC-22



**GENERAL NOTES:**  
 THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7792.  
 THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER, 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS 'CALCULATED' ON THE MAP.

**LEGEND:**

Air Release Valve	(Symbol)
Non-potable Air Release Valve	(Symbol)
Blowoff	(Symbol)
Cap	(Symbol)
Cathodic Protection	(Symbol)
Fill Drain	(Symbol)
Fire Hydrant	(Symbol)
Non-GPS Point	(Symbol)
Pressure Reducing Valve	(Symbol)
Pump	(Symbol)
Reducer	(Symbol)
Sample Station	(Symbol)
Water Manhole	(Symbol)
Non-Potable Manhole	(Symbol)
Well	(Symbol)
Valve	(Symbol)
Non-potable Valve	(Symbol)
Vault	(Symbol)
Water Main	(Symbol)
Non-Potable Main	(Symbol)
Fire / Private Main	(Symbol)
Non-Scottsdale Main	(Symbol)



**WATER**  
 QUARTER SECTION MAP  
**39-45**  
 SW 1/4 SEC. 26 T4N R4E























**NOTICE**  
 THIS DOCUMENT IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY. THE CITY OF SCOTTSDALE DOES NOT WARRANT ITS ACCURACY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE. IT SHOULD NOT BE RELIED UPON WITHOUT FIELD VERIFICATION.  
 THE CITY OF SCOTTSDALE

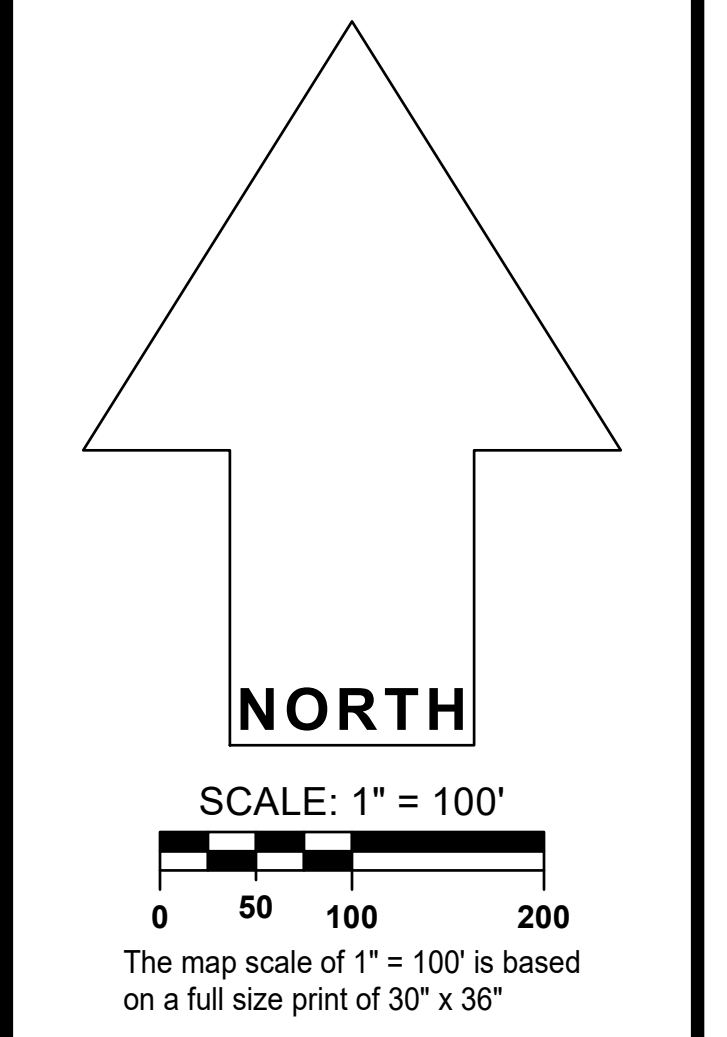
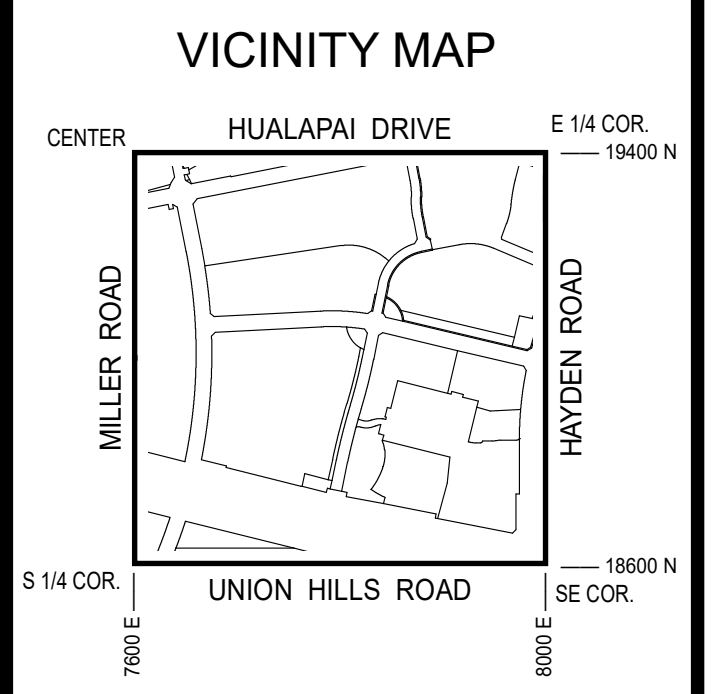
04-DEC-22

**GENERAL NOTES:**

- THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7792.
- THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER, 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS 'CALCULATED' ON THE MAP.

**LEGEND:**

- Air Release Valve 
- Non-potable Air Release Valve 
- Blowoff 
- Cap 
- Cathodic Protection 
- Fill Drain 
- Fire Hydrant 
- Non-GPS Point 
- Pressure Reducing Valve 
- Pump 
- Reducer 
- Sample Station 
- Water Manhole 
- Non-Potable Manhole 
- Well 
- Valve 
- Non-potable Valve 
- Vault 
- Water Main 
- Non-Potable Main 
- Fire / Private Main 
- Non-Scottsdale Main 



**WATER**  
 QUARTER SECTION MAP  
**39-46**  
 SE 1/4 SEC. 26 T4N R4E

**NOTICE**

THIS DOCUMENT IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY. THE CITY OF SCOTTSDALE DOES NOT WARRANT ITS ACCURACY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE. IT SHOULD NOT BE RELIED UPON WITHOUT FIELD VERIFICATION.

THE CITY OF SCOTTSDALE



# Appendix D – Proposed Conditions Water Infrastructure Exhibit

K:\PHX\_Civil\291268016\_Hayden\_101\CADD\Exhibits\2022-12-22\_Prop\_Water\_Exhibit.dwg Jul 28, 2023 Laurel Wright

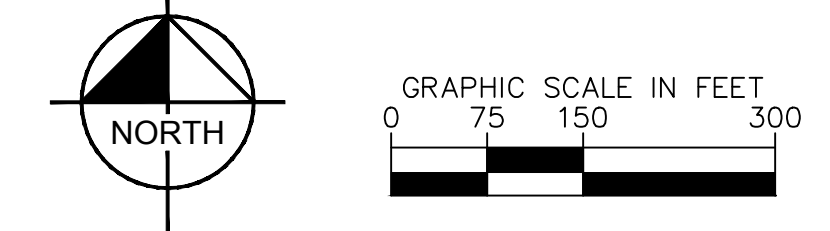


**LEGEND**

	EXISTING WATER MAIN
	PROPOSED 16" DIP WATER MAIN
	PROPOSED 24" DIP WATER MAIN
	SALE PARCEL BOUNDARY

**WATER CROSSING NOTES:**

1. WATER MAIN CROSSINGS OF WASHES SHALL COMPLY WITH DSPM SECTION 6-1.414.
2. WATER MAIN CROSSINGS OF CULVERTS AND OTHER UTILITIES SHALL COMPLY WITH DSPM SECTION 6-1.415 AND COS STANDARD DETAIL 2401.



PROPOSED CONDITIONS WATER INFRASTRUCTURE EXHIBIT

Appendix E – Crossroads East  
Preliminary Planning Analysis by Coe  
and Van Loo Consultants, June 2009

# CROSSROADS EAST

## PRELIMINARY PLANNING ANALYSIS

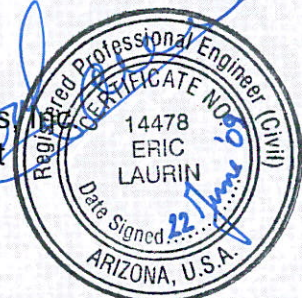
JUNE 22<sup>TH</sup>, 2009

**Prepared for:**

Arizona State Land Department  
1616 W. Adams  
Phoenix, AZ 85007

**Prepared by:**

Coe & Van Loo Consultants, Inc.  
4550 North 12<sup>th</sup> Street  
Phoenix, AZ 85014  
(602) 264-6831



Expires: 6/30/12

CVL Project No.: 1.07.0220002



**PHOENIX**

4550 N. 12th St.  
Phoenix, AZ 85014  
Phone: 602.264.6831  
Fax: 602.264.0928

**LAS VEGAS**

6280 S. Valley View Blvd., Ste. 200  
Las Vegas, NV 89118  
Phone: 702.368.3008  
Fax: 702.368.0047

**DENVER**

7901 E. Belleview, Ste. 150  
Englewood, CO 80111  
Phone: 720.482.9526  
Fax: 720.482.9546

Table of Contents

Section	Page
<b>1.0 INTRODUCTION .....</b>	<b>4</b>
1.1 Site Context and Circulation.....	4
1.2 Site History .....	5
1.3 Previous Studies .....	5
1.4 Current Study.....	6
<b>2.0 LAND DEVELOPMENT / LAND USE .....</b>	<b>7</b>
<b>3.0 WATER SYSTEM.....</b>	<b>9</b>
3.1 Existing Infrastructure .....	9
3.2 Unit Factors .....	9
3.3 Water Use Estimates & Modeling Results .....	10
3.4 Recommendations .....	11
<b>4.0 WASTEWATER SYSTEM .....</b>	<b>12</b>
4.1 Existing Infrastructure .....	12
4.2 Unit Factors .....	12
4.3 Wastewater Generation Estimates .....	13
4.3.1 Option 1: Gravity Flow to Hayden Rd and Union Hills Dr.....	13
4.3.2 Option 2: Northern Lift Station .....	13
4.3.3 Option 3: Lift Station serving the West half of Crossroads North .....	13
4.3.4 Option 4: Gravity Flow to Pima Rd.....	14
4.4 Recommendations .....	14

Tables

Table 1: Proposed Land Use Plan.....	8
Table 2: Water Use Unit Factors .....	9
Table 3: Water Use Estimates .....	10
Table 4: Water Modeling Results.....	11
Table 5: Wastewater Generation Unit Factors .....	12
Table 6: Wastewater Generation Estimates.....	13

---

## Appendices

---

- Appendix A: 2008 City of Scottsdale Integrated Master Planning Exhibits
- Appendix B: City of Scottsdale Coordination Documents
- Appendix C: 2008 City of Scottsdale Zoning District Definitions and Integrated Master Planning Unit Factors
- Appendix D: CVL Calculations and Modeling Documentation
- Appendix E: CVL Correspondence
- Appendix F: Report Figures
  - Figure 1: Site Conditions
  - Figure 2: Land Use
  - Figure 3: Water Service Analysis
  - Figure 4: Option 1 - Wastewater Service Analysis
  - Figure 5: Option 2 - Wastewater Service Analysis
  - Figure 6: Option 3 - Lift Station Serving West Half of Crossroads North
  - Figure 7: Option 4 - Gravity Flow to Pima Rd

## **1.0 INTRODUCTION**

Ideally positioned on both sides of the dynamic Loop 101/Pima Freeway corridor, Crossroads East (the "Site") represents a long-term opportunity for significant commercial, office and mixed use development. The Site is owned and held in trust by the Arizona State Land Department ("ASLD"), which is responsible for the management and ultimate disposition of the land on behalf of ASLD's institutional beneficiaries. The Site encompasses approximately 900 gross acres and features excellent visibility and access.

### **1.1 Site Context and Circulation**

As shown in Figure 1 ("Site Conditions"), the Site is bisected by State Route Loop 101 ("SR101"). The existing Hayden Road traffic interchange is in the center of the Site, which is located approximately one mile east of Scottsdale Road. While the Hayden Road interchange provides freeway access, there are other significant arterials and collectors serving the property.

The recent completion of Hayden Road through the Site provides continuous north-south arterial access between Thompson Peak Parkway to the north and Frank Lloyd Wright Boulevard to the south. Between Hayden and Scottsdale Roads is the north-south alignment of Miller Road, which, when complete, will provide collector access on the northern portion of the Site from Thompson Peak Parkway to the SR101 westbound frontage road. The proposed Miller Road alignment also curves through the southern portion of the Site and will connect to Scottsdale Road on the south. The stipulations contained in the 2002 Crossroads East rezoning approval (discussed below in Section 1.2) require ASLD and the City of Scottsdale to enter into a future agreement that would specify sources of funding and repayment mechanisms for a Miller Road undercrossing at the SR101. The City of Scottsdale is currently rebuilding Scottsdale Road in the project area to install drainage culverts and expand the roadway to full arterial profile. Completion of this project is anticipated in the summer of 2009.

In addition to the east-west access through the Site provided by SR101, the north half of the Site is served by Legacy Boulevard, a minor arterial whose completion between Scottsdale and Hayden roads is scheduled for the summer of 2009. Future construction on Legacy Boulevard will extend the road eastward from Hayden Road to the alignment of Union Hills Drive, where it will connect with Pima Road. East-west access through the southern half of the Site will be provided by Union Hills Drive from its connection with Scottsdale Road and Mayo Boulevard to Hayden Road. Union Hills Drive currently exists as a half-street between Hayden Road and SR101 and does not access or cross the freeway. The future developer(s) of the adjacent portion of the Site may be required to complete the north half of Union Hills Drive in this area.

Development is encroaching on all sides. The Princess Resort, single family homes and the Perimeter Center business park are on the south. The Grayhawk master-planned community is located to the north and north-east. An existing APS power line easement is on the east boundary. Significant public infrastructure facilities are also located to the east, including City of Scottsdale water and wastewater plants and a solid waste transfer station. On the west, the Site north of SR101 is immediately adjacent to "One Scottsdale," a mixed-use project currently being developed by DMB. South of SR101, the site abuts the growing and active Scottsdale Road, including the future site of Lund Cadillac at the north-east corner of Scottsdale Road and Mayo Boulevard/Union Hills Drive. Scottsdale Road in this area straddles the shared municipal

boundaries of Phoenix and Scottsdale. The Phoenix (west) side of Scottsdale Road south of SR101 has been extensively developed in recent years with several auto dealerships and two retail “power centers.”

## 1.2 Site History

The project area is part of two larger state plats, known as Core North and Core South, which were originally planned and zoned in the mid-1980s. In 2002, ASLD and the City of Scottsdale combined the remaining portions of these state plats in a single rezoning case (19-ZN-2002) which renamed the project area as “Crossroads East.” As part of the Crossroads East rezoning approval, the City of Scottsdale and ASLD entered into a Development Agreement (Agreement No. 2002-141-COS, recorded 11/22/02), which vested the Site’s entitlements, provided a framework for the implementation of “Character Areas” in Crossroads East (described below), and outlined the terms of reimbursement for City-installed roadway and infrastructure improvements by ASLD’s future buyers and lessees.

This zoning and the resulting Development Agreement assigned the “Planned Community” (“PC”) zoning district to the Site and created a “bank” of allowable land uses, as defined by zoning districts and allowable acreages of each. The rezoning stipulations divided the Site into four “Planning Unit” quadrants, allotted a variety of uses over approximately 1,000 gross acres, and created Character Areas. The “Grayhawk Transition” and “Princess” Character Areas were established to create a buffer for existing residential and resort land uses adjacent to the Site’s northern and southern boundaries by only allowing compatible land uses and restricting building heights. The “Regional Use” Character Area is intended to group more intense commercial and mixed-use areas close to existing and proposed commercial and mixed-use development in the Scottsdale Road corridor, while the “Hayden Core” Character Area is intended for less-intense office, commercial and residential uses. Development standards were modified. The list of uses and standards is attached in Appendix C. This approval also provided for allowable Floor Area Ratios (FAR) for each commercial and office zoning district and a total of 3,443 residential dwelling units (“DU”).

## 1.3 Previous Studies

In 2005, URS was commissioned to study Site land use, drainage and water/wastewater requirements. This study caused confusion by alternately identifying a gross land area of both 906.1 and 879.6 acres. As ASLD’s internal records indicate a gross site acreage of 905.76 acres (not including approximately 81 acres within the SR101 right-of-way), it can be surmised that the two acreage references in the URS report (906.1 and 879.6) refer to gross and net acreage, respectively. This draft plan varied from the Crossroads East zoning approval, especially in the difference of dwelling counts from the 2002 rezoning case. It should also be noted that URS derived their floor area and dwelling unit numbers by combining similar zoning districts into broad general plan-type land use categories (i.e., “Commerce Park/Business Park,” “Retail,” and “High Density Residential”) and then multiplying the acreage in each category by respective FARs and DU densities that were greater than those allowed by the individual zoning districts. URS’ methodology produced Commerce/Business Park building area of 12,142,120 square feet (“SF”), Retail building area of 4,533,110 SF and 6,473 DU.

In 2007, Coe and Van Loo Consultants, Inc. was asked to prepare a revised land use plan. This plan utilized a land area close to the URS study and FARs and DU densities based on the approved zoning. The result was an allowable total SF of buildings of 14,545,555 SF (all uses) and a total of 2,670 dwelling units.

After the 2007 study was complete, discrepancies remained in the understanding of the City of Scottsdale's ability to serve the site with water and wastewater.

#### **1.4 Current Study**

This most recent study updates the land plan and the water/wastewater system capabilities and requirements. The land plan, shown in Figure 2, has been updated based upon recent development activity and plans along the SR101 corridor and guidance from City of Scottsdale.

The plan envisions the primary mixed-use areas (PRC zoning district) on the west side adjacent to or near Scottsdale Road, as are the Commercial-Office (C-O) zoning districts. Higher density residential uses (R-5 zoning district) are placed on the north and south edges of the site to provide transition from existing residential areas. A node of commercial activity is shown at the SR101/Hayden Road traffic interchange to take advantage of this excellent exposure and access. The balance of the site is primarily I-1 zoning, which is well suited to office uses.

The final chart of land use allocations, square footage and dwelling distribution is shown in Table 1.

## **2.0 LAND DEVELOPMENT / LAND USE**

Land planning is based upon the original land use budget and character areas per the zoning and development agreement approved in November 2002. This allocation places the PRC or mixed use districts proximate to the Scottsdale Road corridor. Residential uses (R-5) are placed to the north and south to provide transitions from existing lower density residential uses. The final concept places commercial uses (C-2) at the Hayden/101 intersection to provide a node of commercial activity at this important junction.

Land areas are based upon the base map shown in Figure 2 (see Appendix F). There is a discrepancy between the zoning land use budget totaling 1,000 acres and the gross planning area, calculated at 882.5 acres (see acreage discussion in Section 1.3, above).

For purposes of calculating the yield, the FAR ratios approved in the zoning development agreement were used. Calculations are based on net parcel area, which is gross area less proposed street rights-of-way. Table 1 lists the proposed land use calculations.

Figure 1 is a site conditions map chronicling current planned and proposed uses and development in the immediate vicinity (see Appendix F).

**Table 1: Proposed Land Use Plan**

Parcel	Zoning	Area (Gr) [ac]	Area (Net) [ac]	Non-Res. [sf]	Res. Area [ac]	Res. DU	Total Area [ac]
<b>North</b>							
P5	C-O	25.5	22.7	593,287			25.5
P6	R-5	84.2	77.7		77.7	1,291	
P6	PCoC	2.0	1.2	15,682			86.2
P7	I-1	72.6	64.2	1,398,276			72.6
P8	PRC	60.0	55.8	972,259		543	60.0
P9	I-1	96.3	89.1	1,940,598			
P9	C-2	34.2	32.4	423,403			130.5
P10	C-2	28.7	26.9	351,529			
P10	I-1	74.1	69.9	1,522,422			102.8
<b>Subtotal</b>	<b>-</b>	<b>477.6</b>	<b>439.9</b>	<b>7,217,456</b>	<b>77.7</b>	<b>1,834</b>	<b>477.6</b>
<b>South</b>							
P11	C-2	29.8	26.6	347,609			29.8
P12	I-1	70.4	66.2	1,441,836			
P12	C-2	38.8	35.2	459,994			109.2
P13	I-1	69.6	67.6	1,472,328			69.6
P14	PRC	108.3	94.8	1,651,795		981	108.3
P15	PCC	12.0	10.2	133,294		48	
P15	R-5	37.8	35.7		35.7	580	
P15	C-O	38.2	35.0	914,760			88.0
<b>Subtotal</b>	<b>-</b>	<b>404.9</b>	<b>371.3</b>	<b>6,421,615</b>	<b>35.7</b>	<b>1,609</b>	<b>404.9</b>
<b>Grand Total</b>		<b>882.5</b>	<b>811.2</b>	<b>13,639,072</b>	<b>113.4</b>	<b>3,443</b>	<b>882.5</b>
Notes: Yield per Dev Agree.				max allowed (based on net area, less ROW's)			
		I-1	0.5 FAR				
		C-0	0.6 FAR				
		C-2	0.3 FAR				
		PCC	0.3 FAR				
		PCoC	0.3 FAR				
		PRC	0.8 FAR				
		R-5	15 DU/ac				
			50% of FAR is for Non-Res				

### 3.0 WATER SYSTEM

#### 3.1 Existing Infrastructure

The area’s existing infrastructure is identified in Figure 3, Appendix F. The existing waterlines shown on the map are based on conversations and correspondence with the City of Scottsdale (the “City”), as-builts, and quarter-section map research. Information regarding additional extended area infrastructure can be reviewed in the City’s Integrated Water Master Plan maps included in Appendix A. A sketch of the project area infrastructure, given to CVL from the City, is included in Appendix B.

Crossroads East is planned to include four major internal collector roadways: Legacy Boulevard, Hayden Road, Miller Road, and Union Hills Drive. Only Hayden Road and Legacy Boulevard contain existing waterlines, which are 16-inch transmission mains. The existing system is strengthened by a 16-inch waterline that parallels the SR101. This parallel waterline links the 16-inch Scottsdale Road waterline to the City water campus. The existing water treatment plant has a design capacity of 50 mgd, with plans to increase its capacity to 70 mgd in 2009. Plans for further expansion forecast its capacity to rise to 80 mgd by 2015.

Crossroads East is located in the City’s South Central water service region along the upper border of Pressure Zone 4. Since the development is located at the top of the pressure zone, the northern edge of the project will be provided with the lowest zonal pressure. This may require portions of Parcels 6 and 7 to be served in the bottom of Pressure Zone 5. Correspondence with the City estimates a Zone 4 hydraulic grade line (HGL) of 1,750 ft MSL and a Zone 5 HGL of 1,860 ft MSL (see Appendix E).

#### 3.2 Unit Factors

The proposed development’s water use estimates are based on information found within the City’s Integrated Water Master Plan, Table 2.2 (see Appendix C). These unit demand estimates represent data taken from various City land use utility billing records (2006). As recommended by the City, Table 2 lists unit factors that have been interpreted to be representative of the proposed land use allocations shown in Table 1.

**Table 2: Water Use Unit Factors**

Parcel Zoning Designations	City Land Use Type Designations	ADDMM [gpapd]	MDD [gpapd]	PHD [gpapd]
C-2	Business - General	1,749	1,924	2,693
C-O	Office - Minor	1,694	1,863	2,609
I-1	Industrial - Minor	915	1,007	1,409
R-5	Residential MF	3,957	4,353	6,094
PRC	Regional Center	1,080	1,188	1,663
PCC	Community Center	1,074	1,181	1,654
PCoC	Retail - Community	1,074	1,181	1,654

<sup>1</sup> ADDMM = Average Day Demand of Maximum Month, MDD = Maximum Day Demand, PHD = Peak Hour Demand

<sup>2</sup> MDD = ADDMM x 1.10 and PHD = MD x 1.40

The City’s Integrated Water Master Plan explains that the “High Use” utility data water usage rates were established from summer demand observations, representing the maximum usage month of the year (July 2006). Peaking factors were also established through billing data observations.

Typically, water use estimates for proposed developments within the City of Scottsdale are calculated using demand criteria from the City’s Design Standards & Policies Manual (DSPM). This approach was evaluated by CVL in May of 2008 and compared to the criteria from the City’s Integrated Master Plan. CVL’s assessment showed a large discrepancy between the estimated water usages derived from each set of criteria. The DSPM criteria yielded flow rates that seemed extraordinarily high, while the Integrated Master Plan criteria produced flow rates that were lower but similar to design flow rates used by Arizona American Water Company and Global Water Resources.

In December 2008, CVL sought direction from the City to specify which set of criteria was more realistic and recommendable for Crossroads East preliminary infrastructure planning. The City offered CVL a chronological list of water use estimates that have been performed for this development over the past eight years (see Appendix B), and recommended using the Integrated Master Plan criteria.

In February 2009, CVL received additional direction from the City in regards to applying the unit factor criteria from the Integrated Master Plan to the Crossroads East project. The City stated that all the unit factors found within the design criteria are correlated with a FAR ratio of 0.25. Since the design criteria unit factors use gross parcel area as a basis for determining water demand and wastewater flows, each non-residential area must be adjusted to an equivalent area. This applies to all non-residential parcels with FARs unequal to 0.25 (see Appendix D).

### 3.3 Water Use Estimates & Modeling Results

Water demand estimates for the entire development, as based on the Integrated Master Plan usage rates, are summarized in Table 3.

**Table 3: Water Use Estimates**

Section	Adjusted Area <sup>2</sup> [ac]	ADMM [gpm]	MDD [gpm]	PHD [gpm]		ADMM [mgd]	MDD [mgd]	PHD [mgd]
North	901	850	935	1,308		1.22	1.35	1.88
South	853	760	836	1,771		1.09	1.20	1.69
<b>Total</b>	<b>1,754</b>	<b>1,610</b>	<b>1,771</b>	<b>2,479</b>		<b>2.32</b>	<b>2.55</b>	<b>3.57</b>

<sup>1</sup> Calculated Storage = One Average Day Demand = 2.32 MG

<sup>2</sup> See Table 1 and Section 3.2: Adjust Area = Gross Parcel Area x Parcel FAR / 0.25

The City’s list of historical water use estimates cites an average day demand of 5.6 mgd, as calculated by Community Development in 2008. Note that this estimate is approximately 2.4 times larger than the water estimate derived from the recommended usage rate criteria.

Results of the water modeling simulation, using the water use estimates listed above and the infrastructure shown in Figure 3, are presented in Table 4. See Appendix D for the complete CVL water modeling data.

The City requires that all daily scenarios meet a minimum pressure requirement of 50 psig. Using the Pressure Zone 4 HGL of 1,750 ft, the modeling analysis indicates that all of the proposed Parcels meet this requirement except Parcels 6 and 7. Inspection of the model's maximum velocity and headloss data indicates that these areas of sub-50 psig pressure are not the result of high headloss rates, but rather from insufficient source pressure. Pressure testing is recommended to determine how much of Parcels 6 & 7 should be included within the next higher zone, Pressure Zone 5.

**Table 4: Water Modeling Results**

Demand Scenario	Water Demand (gpm)	Pressure (psig)				Maximum Velocity (fps)	Pipe ID
		Minimum	Node	Maximum	Node		
Average Day	1,610	40	10-A	86	J-2	1.22	P-39
Maximum Day	1,771	40	10-A	86	J-2	1.35	P-39
Peak Hour	2,479	40	10-A	85	J-2	1.88	P-39
Max. Day + Fire Flow <sup>1</sup>	5,479	40	10-A	63	J-2	N/A	N/A

<sup>1</sup> Simulated with a fire flow rate of 3,500 gpm.

As indicated by the water modeling results, the existing and planned infrastructure in Pressure Zone 4 has demonstrated maximum day plus a 3,500 gpm fire flow adequacy above 30 psig.

### 3.4 Recommendations

Per CVL's analysis and coordination with the City of Scottsdale, the following lists this study's site recommendations.

- 1) Unit Factors: The water demand calculations performed in this study are based on unit factors recommended by the City.
- 2) Water Campus Capacity: The City has stated that each project, as it comes closer to realization, is considered and prepared for on a priority basis. The City has been aware of the Crossroads East development's pending water needs since 2002, and is willing to work with ASLD to make sure its water demands are met with their northern water campus. The City would not comment on how much excess capacity is currently available at the water treatment plant.
- 3) Pressure Zone Service: CVL recommends that flow testing be performed along the Legacy Boulevard to obtain current and accurate area pressure data. Per HGL information given by the City, portions of Parcels 6 & 7 may need to be serviced by Pressure Zone 5 to meet the City's minimum pressure requirements. Preliminary modeling indicates that the current existing infrastructure installed within Hayden and Miller Roads is sufficient to serve Parcels 6 & 7 with no undue transmission losses.
- 4) The Parcels that require the minimal additional infrastructure to obtain adequate City water service are Parcels 4, 5, 6, 7, 10, 11, and 13.

**4.0 WASTEWATER SYSTEM**

**4.1 Existing Infrastructure**

The area’s existing infrastructure is identified in Appendix F, Figure 4. The wastewater collection lines shown in the map are based on conversations and correspondence with the City of Scottsdale (the “City”), as-builts, and quarter-section map research. Information regarding additional extended area infrastructure may be found in the City’s Integrated Wastewater Master Plan maps included in Appendix A. A sketch of the project area infrastructure, given to CVL from the City, is also included in Appendix B.

Crossroads East is planned to include four major internal collector roadways: Legacy Boulevard, Hayden Road, Miller Road, and Union Hills Drive. Of these four roadways, only Hayden Road contains existing infrastructure that is ready for use (dry 12-inch sewer). Legacy Boulevard contains existing dry 8 and 12-inch sewer lines that are constructed to flow into the future Miller Road sewer. All of the wastewater generated from the proposed development will be treated at the City’s wastewater reclamation facility at Union Hills Drive and Pima Road. The current average annual capacity of the plant is 20 mgd, and upgrades to 25 mgd are forecasted to begin in 2014.

Crossroads East is within the City’s Sub-basin 4 collection area. The area’s surrounding existing wastewater collection system flows to the south as it follows the area’s natural topography. All of the wastewater in Sub-basin 4 flows to the North Pumpback Station (NPS) or is bypassed to the 91st Avenue WWTP. The NPS has a current pumping capacity of 34 mgd and is forecasted to have an ultimate capacity of 47 mgd. Two 18-inch force mains convey wastewater from the NPS to the wastewater reclamation facility. One of the force mains typically handles all flows up to 18 mgd, while the other is activated when NPS flows consistently exceed 20 mgd. The Integrated Master Plan has indicated that the NPS normally pumps approximately 16 – 18 mgd during peak periods.

**4.2 Unit Factors**

The proposed development’s wastewater generation estimates are based on information found in the City’s Integrated Wastewater Master Plan, Table 2.2 (see Appendix C). As recommended by the City, Table 5 lists unit factors interpreted to be representative of the proposed land use allocations shown in Table 1.

**Table 5: Wastewater Generation Unit Factors**

CVL Land Use Designations	City Land Use Type Designations	ADDMM [gpapd]	Peak Flow [gpapd]
C-2	Business - General	1,173	2,346
C-O	Office - Minor	878	1,756
I-1	Industrial - Minor	561	1,122
R-5	Res. MF	2,060	4,120
PRC	Regional Center	680	1,360
PCC	Community Center	656	1,312
PCoC	Retail - Community	656	1,312

<sup>1</sup> ADDMM = Average Day Demand of Maximum Month

<sup>2</sup> Peak Flow = ADDMM x 2.0

### 4.3 Wastewater Generation Estimates

Wastewater generation estimates for the entire development, as based on the Integrated Master Plan usage rates, are summarized in Table 6.

**Table 6: Wastewater Generation Estimates**

Section	Adjusted Area <sup>2</sup> [ac]	ADDMM [gpm]	Peak Flow [gpm]	ADDMM [mgd]	Peak Flow [mgd]
North	901	500	1,001	0.72	1.44
South	853	456	913	0.66	1.31
<b>Total</b>	<b>1,754</b>	<b>957</b>	<b>1,913</b>	<b>1.38</b>	<b>2.76</b>

<sup>2</sup> See Table 1 and Section 3.2: Adjust Area = Gross Area x Parcel FAR / 0.25

CVL assessed four alternatives for conveying the development’s effluent to the wastewater reclamation facility. Below is a description of each option.

#### 4.3.1 Option 1: Gravity Flow to Hayden Rd and Union Hills Dr.

Original planning for the Crossroads East site entailed the construction of a wastewater collection system that would flow by gravity to the NPS. Wastewater from northern section of the project would drain into collection sewers within Miller and Hayden Roads, as depicted in Figure 4 of Appendix F. These two main collection sewers would converge into an existing 21-inch sewer at the intersection of Hayden Road and Union Hills Drive in route to the NPS.

#### 4.3.2 Option 2: Northern Lift Station

Option 2 uses a lift station to convey flows generated north of the SR101 to the wastewater reclamation facility, while the southern portion of the project flows by gravity to the City’s collection system.

The northern lift station system layout is mapped in Figure 5 of Appendix F. Notice that the Miller Road sewer flows to the east at the SR101. It parallels the Freeway and collects the Hayden Road flows with a drop manhole in route to the proposed lift station within Parcel 10. The manhole’s flow line is estimated to be 20-foot deep, which is 10-foot under the existing Hayden Road sewer. The lift station is estimated to have an ultimate capacity of 650 gpm with dual 8-inch forcemains (one redundant). The southern portion of the project is designed exactly as described within the gravity flow option.

#### 4.3.3 Option 3: Lift Station serving the West half of Crossroads North

Similar to Option 2, Option 3 uses a lift station to convey flows generated from the western half of the portion of Crossroads north of the SR101 to the wastewater reclamation facility, while the southern portion of the project flows by gravity to the City’s collection system. This option utilizes the existing capacity of a 12-inch sewer within Hayden that is able to service the entire eastern half of the portion of Crossroads East.

The northern lift station system layout is mapped in Figure 6 of Appendix F. Notice that the Miller Road sewer flows to the east at SR101 Freeway. The lift station is estimated to have an ultimate capacity of 450 gpm with dual 6-inch forcemains (one redundant). The southern portion of the project is designed exactly as described within the gravity flow option.

#### **4.3.4 Option 4: Gravity Flow to Pima Rd**

This option entails draining the portion of Crossroads north of the SR101 by gravity to an existing 21-inch sewer located south of Pima Road along the east side of the 101. The 21-inch then crosses under the 101 Freeway and continues south to the NPS. The southern portion of the project is designed exactly as described within the gravity flow option. Refer to Figure 7 of Appendix F.

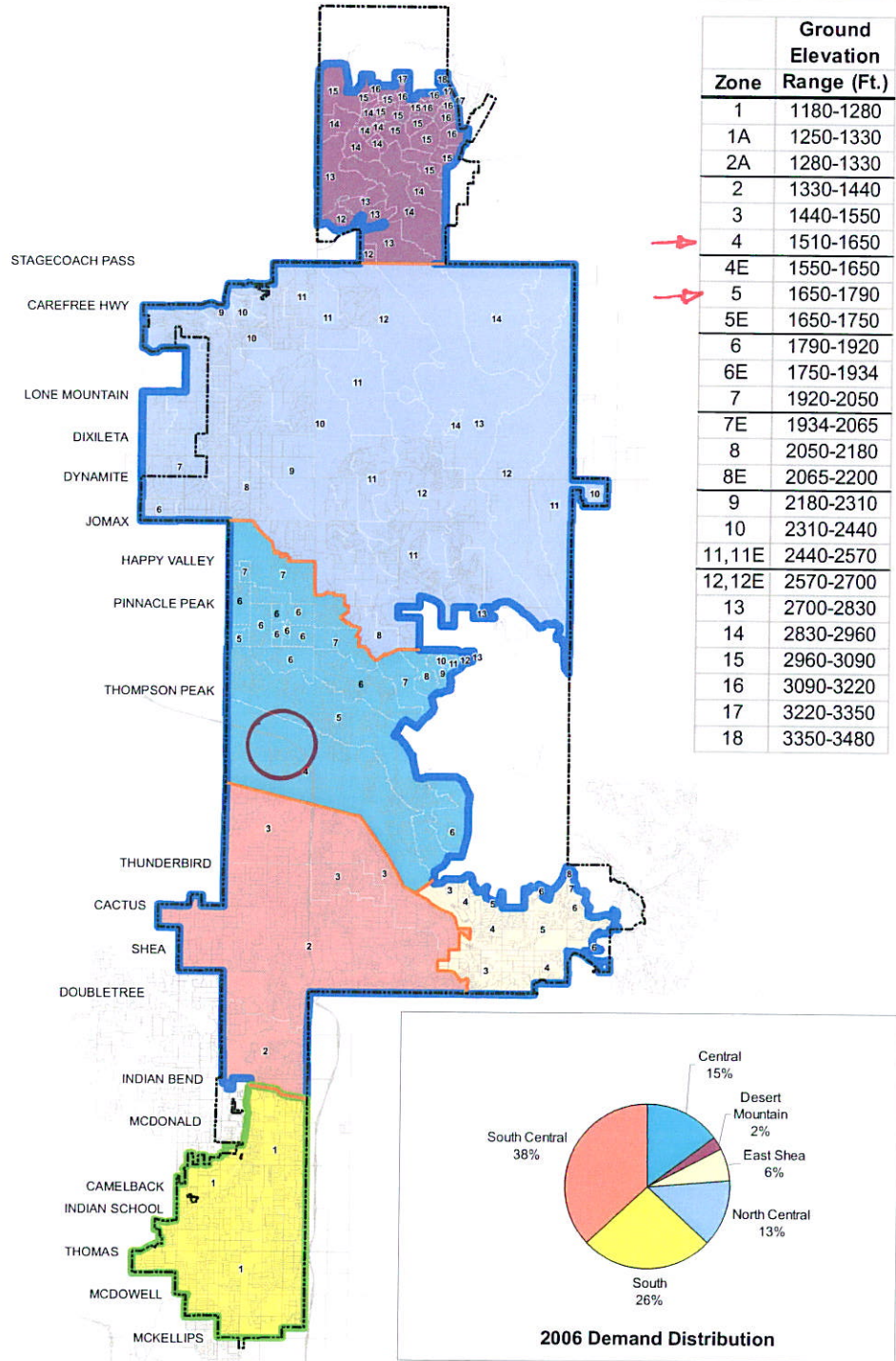
#### **4.4 Recommendations**

Per CVL's analysis and coordination with the City of Scottsdale, the following lists this study's site recommendations.

- 1) Unit Factors: The wastewater generation calculations performed in this study are based on unit factors recommended by the City. They are consistent with the unit factors used to estimate water use for this project.
- 2) Wastewater Reclamation Facility Capacity: The City has stated that each project, as it comes closer to realization, is considered and prepared for on a priority basis. The City has been aware of this project area's development pending water needs since 2001, and is willing to work with ASLD to ensure that sufficient capacity exists to treat wastewater flows at their northern wastewater reclamation facility. The City would not comment on how much excess capacity is currently available at the wastewater reclamation facility.
- 3) Parcel 6: Due to adverse topography and insufficient pipe capacity, Parcel 6 can not be served by the existing 8-inch Greyhawk collection line along Parcel 6's northern border. The eastern portion of Parcel 6 can be collected by the existing 12-inch sewer within Hayden Road, while the western portion is expected to ultimately drain into the future Miller Road sewer. Should Parcel 6 be developed before the Miller Road sewer is built, wastewater generated from the west side of Parcel 6 could be pumped into the existing Hayden Road sewer.
- 4) Hayden Road contains the sole existing sewer, ready for use, within the project boundary. Parcels that border the Hayden Road 12-inch sewer are the most developable, as they would require the least amount of additional conveyance infrastructure to bring online. It shall be noted that there is an existing 12-inch sewer sleeve just east of the Miller Road alignment under the SR101 freeway.
- 5) In order to evaluate which option is in the best interest of State Trust Land, a Sewer Conceptual Master Plan is recommended and each option will be evaluated based on costs, viability of construction, additional sewer easements needed, and the City of Scottsdale's approval per the City's master planning requirements.

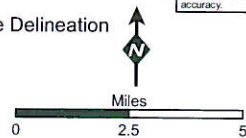
# **APPENDIX A**

2008 City of Scottsdale Integrated Master Planning Exhibits



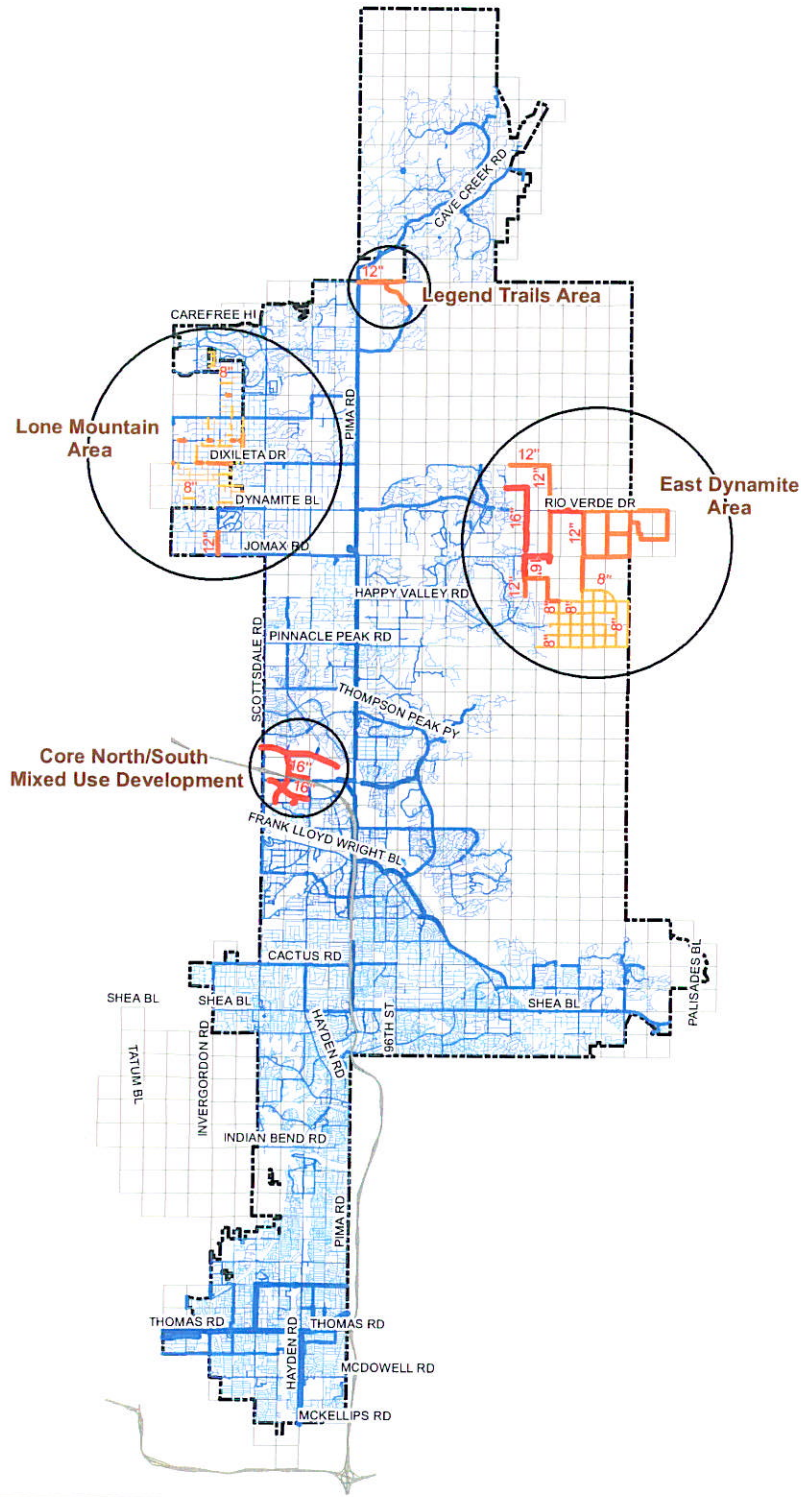
- Water Service Regions — Water Service Region Divisions
- Region — City Boundary
- Desert Mountain — CAP Service Area
- North Central — SRP Service Area
- Central
- East Shea
- South Central
- South
- 2 — Pressure Zone Delineation

This GIS map is a limited representation of facilities, intended for planning purposes only. It is not intended for construction or other purposes requiring greater positional accuracy.

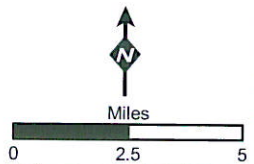


## WATER SERVICE AND DROUGHT STUDY REGIONS

2008 Scottsdale Integrated Water Master Plan

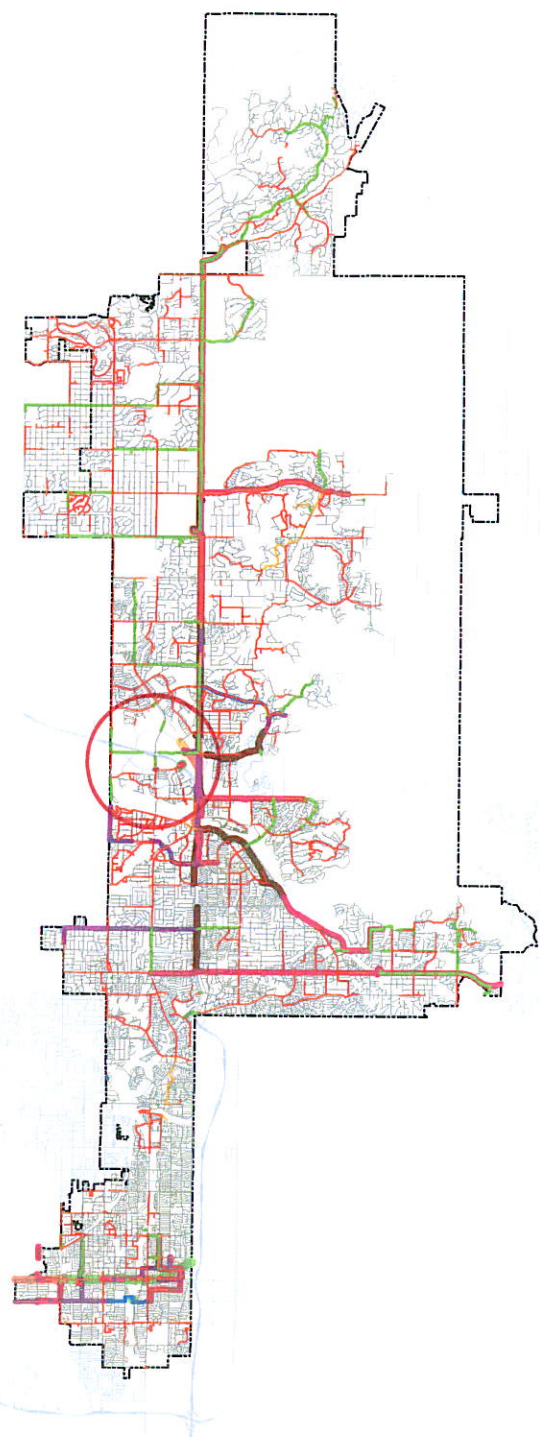


Future Water Main	Existing Water Main	Future Tank
Diameter	Diameter	City Boundary
6"	45" - 72"	Quarter Sections
8"	30" - 42"	
12"	16" - 24"	
16"	10" - 14"	
20"	8"	
	Less than 8"	



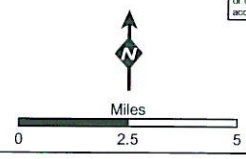
**WATER DISTRIBUTION SYSTEM INFRASTRUCTURE TO SERVE NEW DEVELOPMENT**  
 2008 Scottsdale Integrated Water Master Plan





- |          |   |       |   |               |
|----------|---|-------|---|---------------|
| Pipes    |  | 20"   |  | City Boundary |
| Diameter |  | 24"   |  | Streets       |
|          |  | < 12" |  |               |
|          |  | 12"   |  |               |
|          |  | 14"   |  |               |
|          |  | 16"   |  |               |
|          |  | 18"   |   |               |

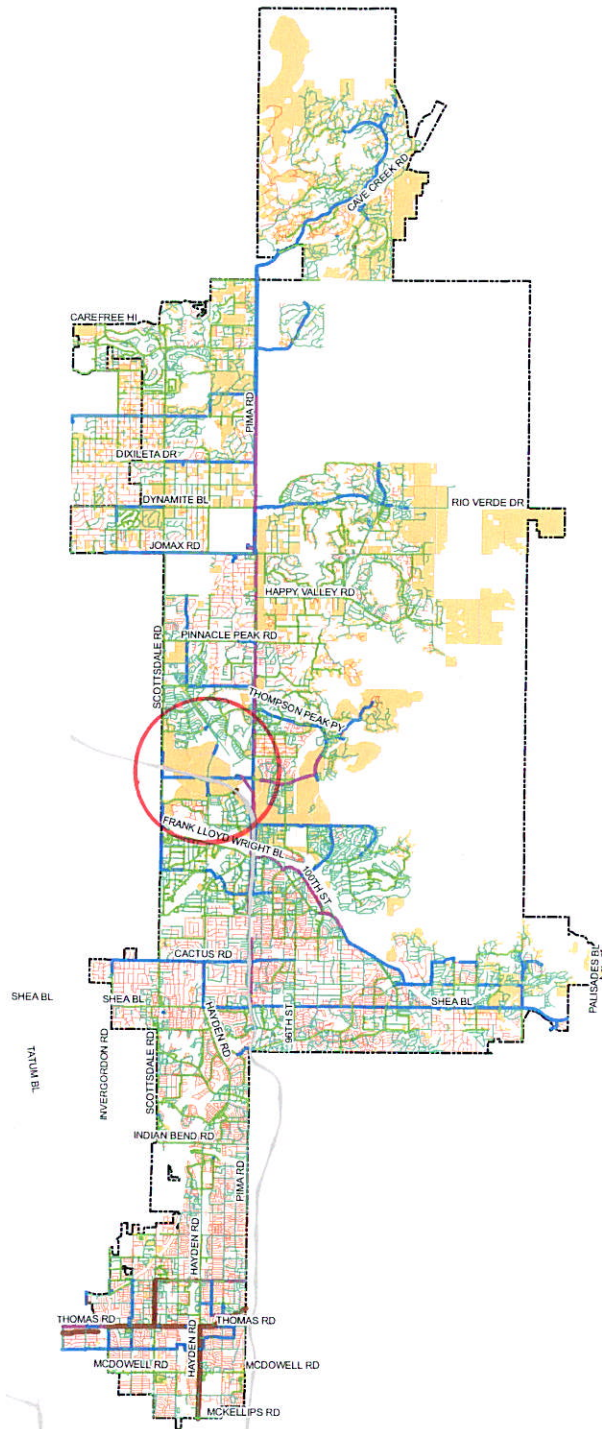
This GIS map is a limited representation of facilities, intended for planning purposes only. It is not intended for construction or other purposes requiring greater positional accuracy.



Page 4-25  
Figure 4.1

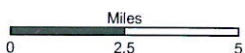
## WATER DISTRIBUTION SYSTEM

### 2008 Scottsdale Integrated Water Master Plan



- Existing Water Main Diameter**
- 45" - 60"
  - 30" - 42"
  - 16" - 24"
  - 10" - 14"
  - 8"
  - Less than 8"
- City Limits
  - Quarter Sections
  - Undeveloped Parcels

This GIS map is a limited representation of facilities, intended for planning purposes only. It is not intended for construction or other purposes requiring greater positional accuracy.



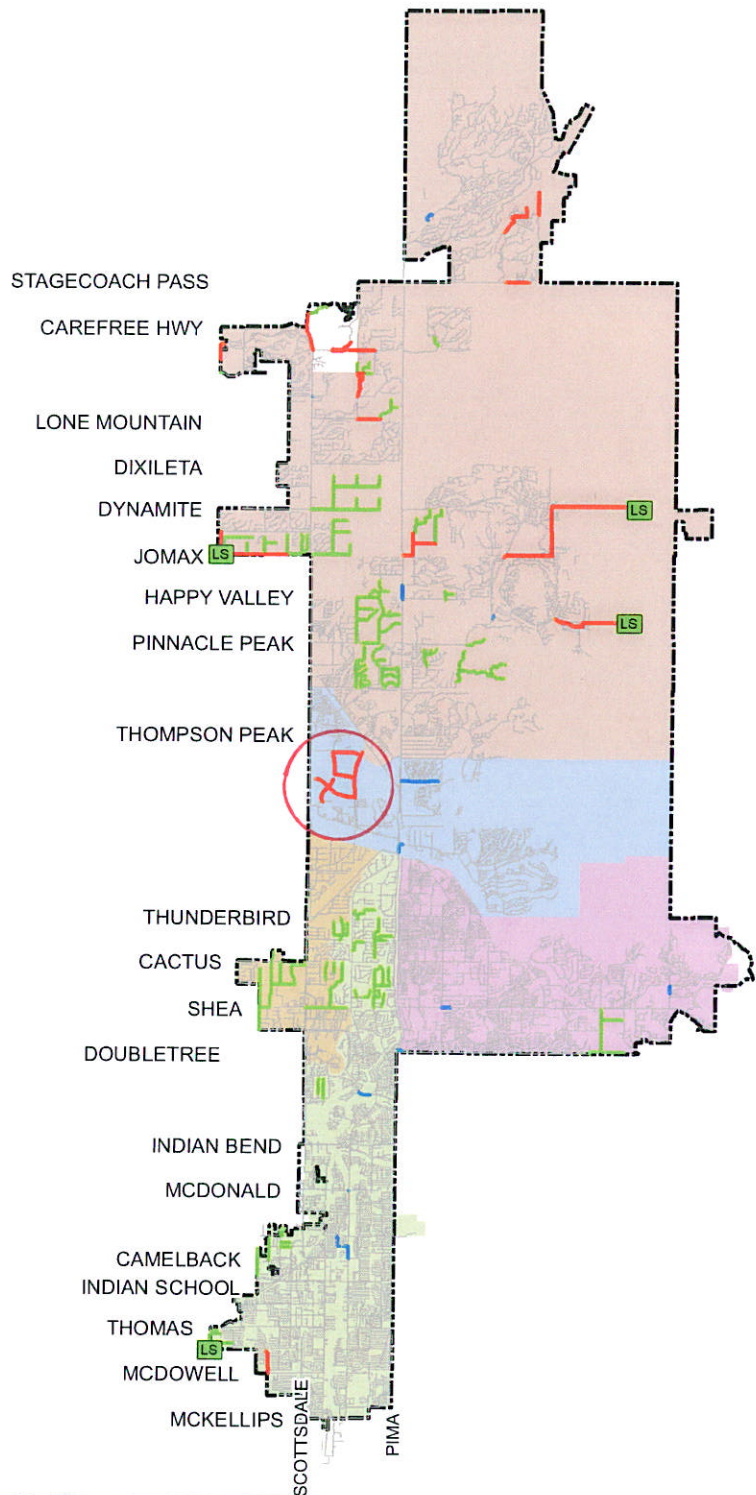
Page 4-30












Figure 4.5

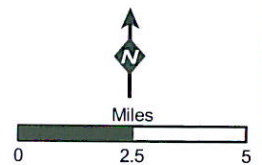
**EXISTING WATER DISTRIBUTION SYSTEM AND UNDEVELOPED PARCELS**  
2008 Scottsdale Integrated Water Master Plan



M:\Client\Scottsdale\7265h00\_Scottsdale Asset Management Project\Analysis\GIS\Maps\Wastewater\Figure 1\_2\_WW Planned Infrastr Future.mxd



- |   |   |   |              |   |                        |
|---|---|---|--------------|---|------------------------|
|  | Proposed Pipes: Undeveloped Areas       |  | Sub-Basins 1 |  | Proposed Lift Stations |
|  | Proposed Pipes: Septic Areas            |  | Sub-Basins 2 |  | Scottsdale Boundary    |
|  | Proposed Pipes: Needing Larger Diameter |  | Sub-Basins 3 |   |                        |
|  | Existing Pipes                          |  | Sub-Basins 4 |   |                        |
|   |   |  | Sub-Basins 5 |   |                        |



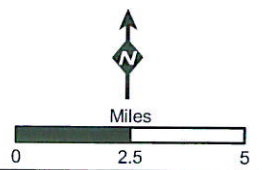
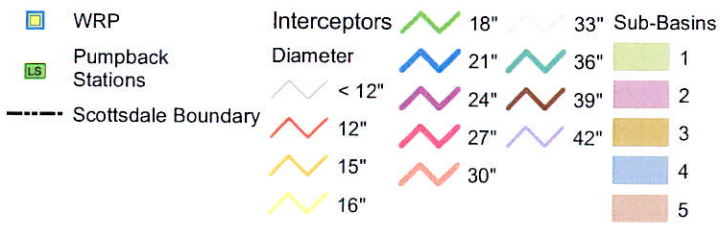
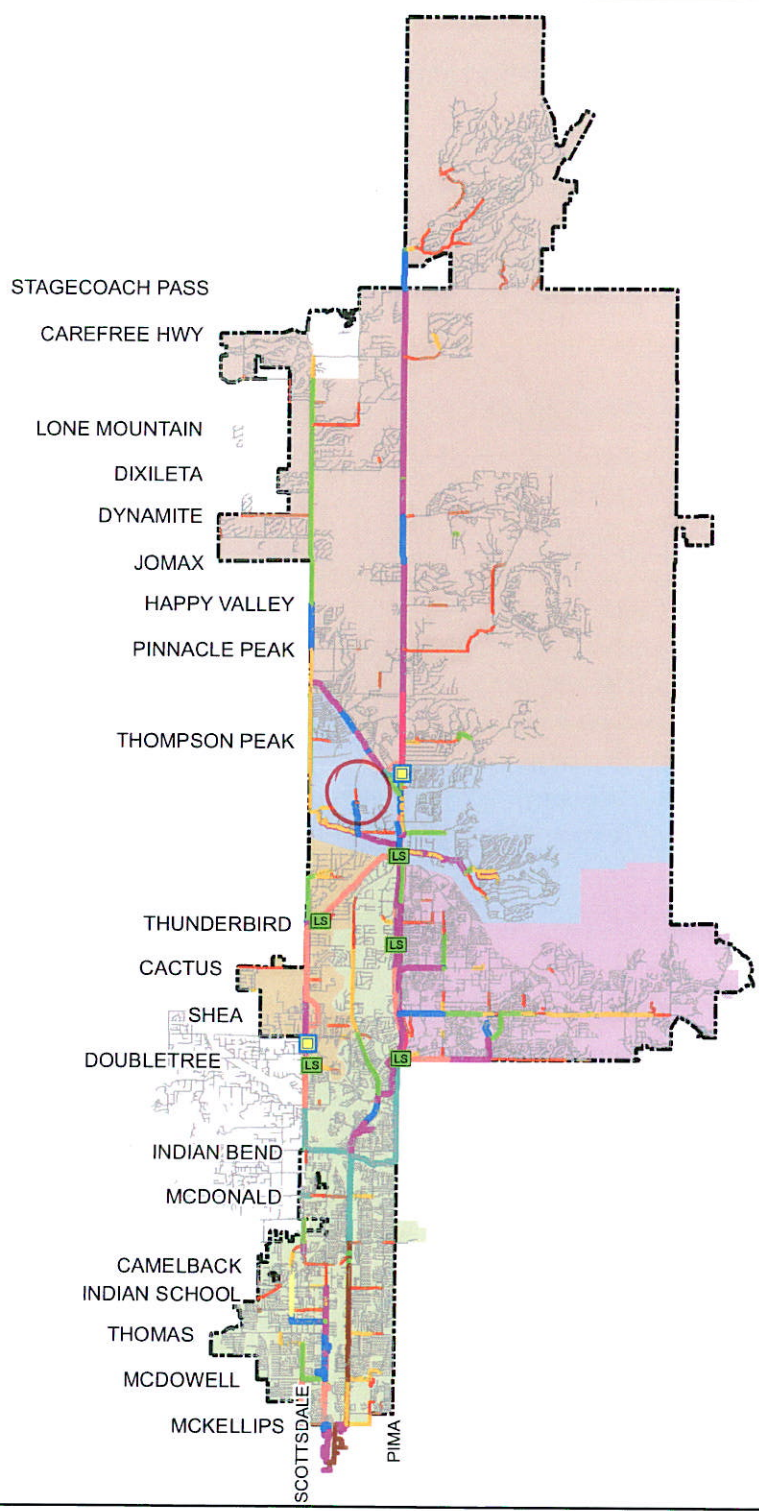
**PLANNED WASTEWATER COLLECTION SYSTEM INFRASTRUCTURE AND SEPTIC SYSTEM CONNECTIONS TO SERVE FUTURE GROWTH**

2008 Scottsdale Integrated Wastewater Master Plan



Figure 1.5

M:\Client\Scottsdale\7265b00\_Scottsdale Asset Management Project\Analysis\GIS\Maps\Wastewater\Figure 1.1 WW Collection Sys Plan Areas.mxd



## WASTEWATER COLLECTION SYSTEM AND SUB-BASINS

2008 Scottsdale Integrated Wastewater Master Plan

Figure 1.2



## **APPENDIX B**

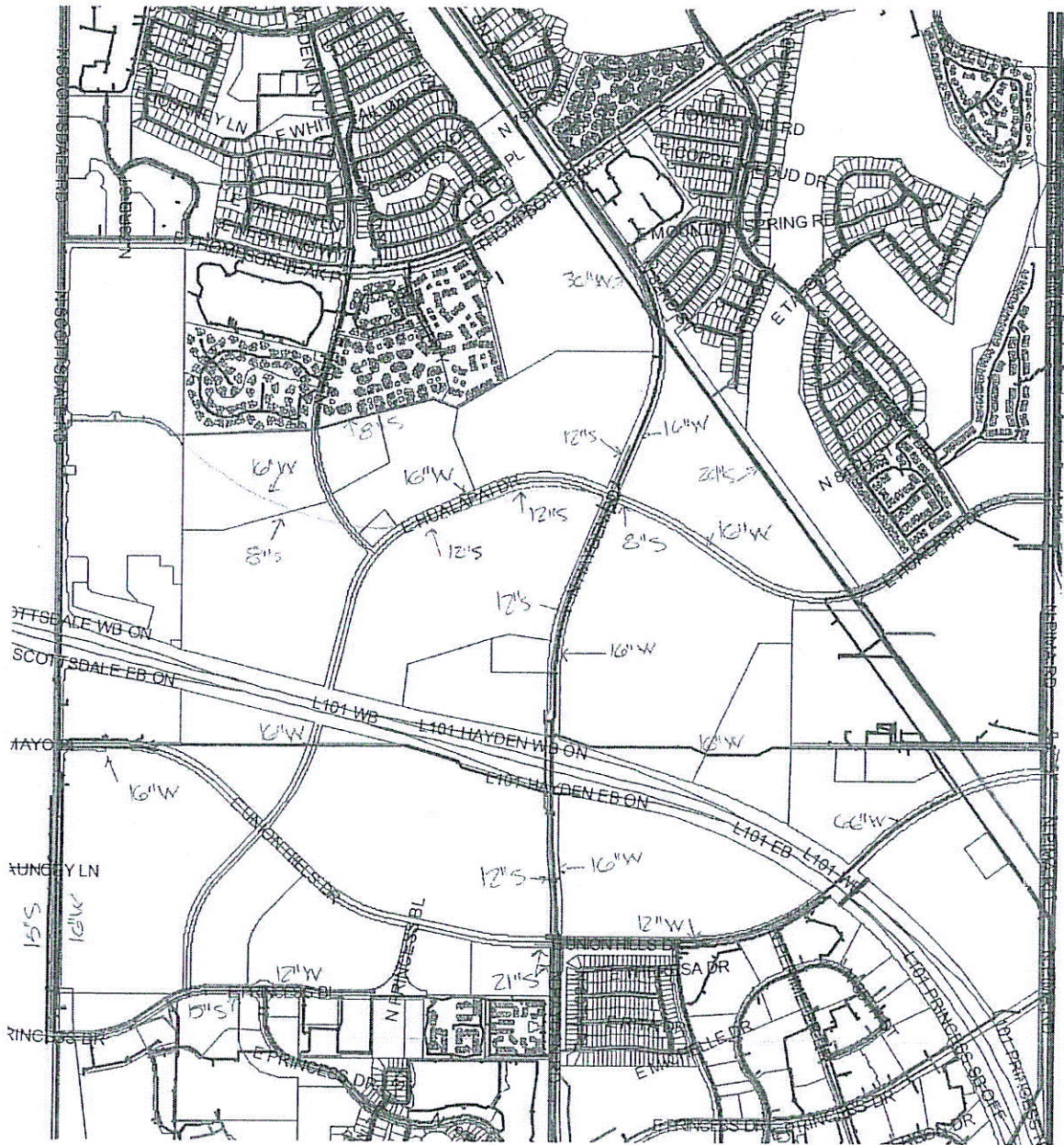
City of Scottsdale Coordination Documents

Average Day Core North/South Water and Sewer Demand Estimates  
 (including One Scottsdale - except as noted) January 2009

Source	Demands (MGD)		Unit Demand Source
	Water	Sewer	
2001 Master Plan	2.1	2.0	MP/Land Use
2002 Comm. Dev.	2.6	2.4	MP/Land Use
2005 MP Update	3.4		MP/Land Use
2008 Comm. Dev.	7.9	6.5	DS+PM/LU
2008 C+VL	9.4	8.0	DS+PM /LU
2008 Comm. Dev.	5.6*		MP/Zoning

\* does not include One Scottsdale (~0.25 mgd)

1.7 demand factor (average day to maximum day)



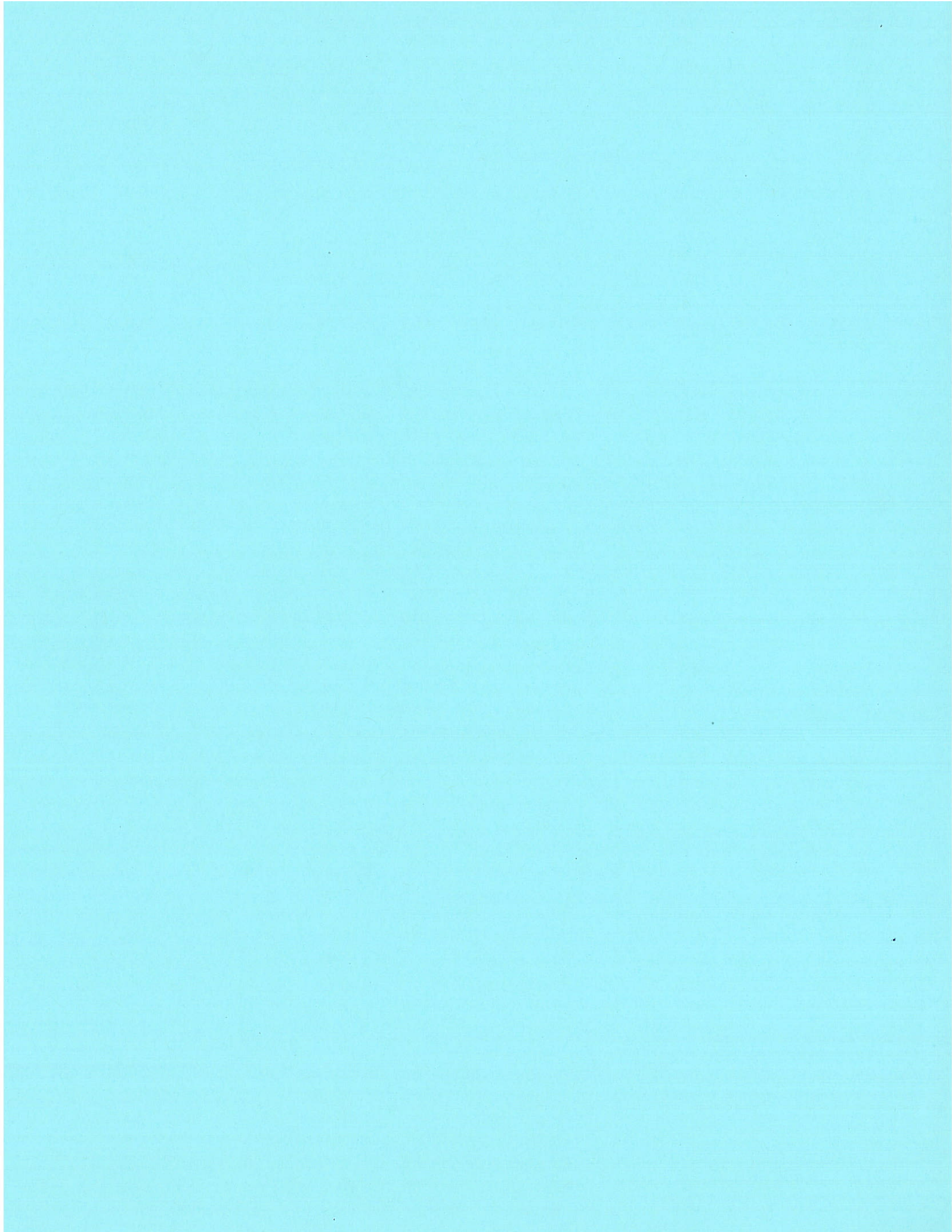
## **APPENDIX C**

2008 City of Scottsdale Zoning District Definitions and  
Integrated Master Planning Unit Factors

## Zoning District Definitions

District	Title	Purpose	Development Standards *
R – 5	Multiple Family Residential	Provide for development of multifamily residential neighborhoods as well as hotel and healthcare facilities	23 Du/Ac Max 1,871 Total Dwelling Units Allotted
C – 2	Central Business District	Provide all uses allowed in to C – 1 district as well as uses usually associated with the central business district and shopping facilities not ordinarily compatible with residential development	30% Floor Area Ratio
C – O	Commercial Office	Provide an environment desirable for and conducive to development of office and related uses adjacent to the central business district or other major commercial course	60% Floor Area Ratio
PCC	Planned Community Center	Provide a large variety of goods and is normally found in a typical neighborhood shopping center	30% Floor Area Ratio 50% of FAR will go to Non-Residential 4 Du/Ac Max 48 Total Dwelling Units Allotted
PCoC	Planned Convenience Center	Provide a basic convenience goods and services within walking distance of nearby residences	30% Floor Area Ratio
PRC	Planned Regional Center	Provide for a broad variety of general merchandise, and services in full depth and variety within a planned commercial center; may include office and residential uses carefully interrelated by design	80% Floor Area Ratio 50% of FAR will go to Non-Residential 2,000 sq/ft min gross lot size per dwelling unit 1,524 Total Dwelling Units Allotted
I – 1	Industrial Park	Promote the development of employment in aeronautical activities and an active, landscaped industrial park	50% Floor Area Ratio

\*Per Approved Development Agreement



assumed to be the end of the planning period for the City of Scottsdale. The population estimate in the previous master plan was 285,000 by the year 2020. The relatively small increase in population from the previous master plan is primarily due to revitalization and the extended planning period.

Planning Period	Population	Employee Population
2000	204,317	152,116
2005	228,692	166,692
2010	253,066	181,267
2020	287,312	205,887
2025	289,619	210,364
2030	292,706	214,841

Figure 2.1 shows the growth rates for City of Scottsdale Planning Zones A through E within the Scottsdale service area through Year 2030. These planning zones are used by the City for the purposes of developing population growth projections. The population growth rates by planning zones in Figure 2.1 were then used to develop the percent growth or percent buildout in each water service region shown in Figure 2.2. The water service regions shown in Figure 2.2 were established to evaluate water transfers across the system involving major transmission lines, pump stations, and valves located along region boundaries.

### **2.2.2 Land Use Plan**

Water system demands have been estimated based on the land use element of the City's General Plan, together with unit demands per land use category. The land use plan categorizes property parcels based on the current land use for developed areas, and upon the planned use for undeveloped areas. The acreage of each land use category was multiplied by a unit demand per acre to estimate water demands. Development of unit demands and Citywide demand projections are discussed in Sections 2.2.3 and 2.3.3, respectively. Figure 2.3 shows the land use plan that was used in this study.

### **2.2.3 Unit Demands**

Unit water demands used in the 1999 Water Master Plan and 2001 Integrated Water Master Plan were updated in this Master Plan to reflect changes in land use and water use patterns in different parts of the City. The two previous master plans divided the City into two zones with different water use characteristics, namely Planning Zone A (including downtown districts) and Planning Zones B through E. Unit water demands in this Master Plan apply Citywide, as no significant differences were now found between Planning Zone A and the remaining zones. In addition, a new land use category called "Mixed Use" has been incorporated in the Land Use Plan by the City to designate areas where a higher

density of various residential and non-residential users are allowed, particularly in the downtown districts. It has been determined in this Master Plan that on a per acre basis, the water use rate in "Mixed Use" areas was ranked the third highest among all land use categories.

For this Master Plan, unit demands are calculated for three different time periods of the year: winter (minimum), summer (maximum), and annual average demands. Unit water demands were developed from an analysis of Scottsdale's 2006 Utility Billing database using the months of January, April, and July. Water meters were linked to parcel locations through the meter address, and correlated to land use categories.

Table 2.2 summarizes the unit water demand estimates by land use category. The acreage shown in the table represents all the parcels with water meter data used in the analysis. Approximately 63 percent of the accounts in the Utility Billing database were matched to parcels by address resulting in a satisfactory sample size that was used to develop the unit water demands in this Master Plan. The 2006 unit water demands are summarized in terms of gallons per acre per day (gpad) for winter (or low demand), summer (or high demand), and annual average demands.

The April unit demands, originally assumed to be representing the annual average water use, were adjusted by a multiplier of 1.212 to match the actual annual average production in 2006. A comparison with the actual production revealed that the unit demands and the resulting water use in January and July were representative of the minimum and maximum month water demand conditions, respectively, with no adjustments necessary. The unit water demands by land use category shown in Table 2.2 were used to predict the additional water demands from undeveloped parcels by water service area through the Year 2035.

#### **2.2.4 Potable Water Use Peaking Factors**

Potable water use peaking factors represent highest water use rates during a day or throughout the year. They are used for long-term planning of water resources to ensure demands are met with adequate redundancy. Peaking factors are also needed for designing and sizing water system infrastructure such as pipelines, pump stations, reservoirs, etc.

Seasonal and diurnal peaking factors for Scottsdale's water system were determined from an analysis of seasonal water use data from the Utility Billing record database, and daily production/pumping records. A global (i.e., applied across all land use categories) multiplier of 1.34 was used in the previous master plan to calculate maximum month demands from annual average demand estimates. A maximum month ratio was not needed in this Master Plan as unit demands for the maximum month (July) were developed from the actual billing data. The multiplier to convert from average month to maximum month demands differs by land use type. A comparison of the average monthly and annual average potable water productions in 2006 yielded a multiplier of approximately 1.25 Citywide.

**Table 2.2 Unit Demand Estimates by Land Use Type from 2006 Utility Billing Database**  
**2008 Scottsdale Integrated Water Master Plan**

Land Use Type	Subcategory	Area <sup>(1)</sup> (acres)	Water Use from 2006 Utility Billing (gpad)		
			Low	Average	High
Single Family Residential	1/5 - 1/3 du/ac	2,096	215	285	365
	1/3 - 1/2 du/ac	2,612	312	441	544
	1/2 - 1 du/ac	8,637	624	965	1,269
	1 - 2 du/ac	2,701	1,135	1,652	1,905
	2 - 4 du/ac	8,051	1,459	2,147	2,363
Patio Home and Townhouse Residential	4 - 6 du/ac	1,412	1,711	2,396	2,700
Townhouse Residential	6 - 8 du/ac	1,053	1,870	2,588	2,749
Multi-Family Residential	8 - 12 du/ac	183	2,129	2,591	3,080
	12 - 23 du/ac	1,280	3,030	3,476	3,957
Destination Resort	10 - 25 rm/ac	104	1,024	1,375	1,467
Hotel / Resort	3 - 10 rm/ac	0	1,086	1,230	1,533
	10 - 43 rm/ac	168	4,428	5,015	6,249
Churches	Churches	252	554	592	733
Community Service Facilities	Community Service Facilities	129	383	413	822
Improved Open Spaces	Golf Courses	1,253	140	160	210
	Private Open and Recreation Areas	98	567	820	923
	Public Parks, etc.	298	151	552	1,111
Industrial	Major Industrial	882	884	1,237	1,567
	Minor Industrial	50	660	783	915
Institutional Facilities	Institutional Facilities	39	755	807	744
Mixed Use	Mixed Use	338	2,894	3,857	4,221
Office	Major Office	318	1,206	1,585	2,173
	Minor Office	210	1,058	1,268	1,694
Retail	Community	66	745	960	1,074
	General	726	1,333	1,626	1,749
	Neighborhood	212	570	699	776
	Regional	184	773	904	1,080
	Specialty / Tourism	124	1,250	1,159	1,375
Schools	Schools	630	764	1,411	2,081
Utilities	Utilities	112	1,852	4,155	5,377
<b>TOTAL</b>		<b>34,220</b>			

(1) Acreages given here are for parcels that had exact match in the utility billing database by address, and therefore are only a partial representation of the total developed area.  
gpad = gallons/acre/day, du/ac = dwelling units per acre, rm/ac = rooms per acre

Planning for water production capacity is based on the annual maximum day demand. For the City of Scottsdale, the maximum day demand is typically about 10 percent greater than the maximum month demand. Therefore, a maximum day to maximum month peaking factor of 1.1 has been used for master planning purposes.

The system-wide peak hour to maximum day factor was determined by analyzing the daily diurnal water use variations from production/pumping records. Figure 2.4 is a summary of diurnal water use patterns for several of Scottsdale's water service areas. Generally, the northern service areas show a much higher peaking factor than the more developed, built out areas in the southern part of the City. This is primarily due to a higher residential/commercial based water use pattern in the north, coupled with a greater influence of construction water use in these developing areas. As these areas are built out, it is expected that the peak hour factor will approach that of the southern area. These observations are consistent with those from the City's previous water master plan. Based on these observations, a peak hour factor of 1.4 was determined to be representative for long-term and Citywide master planning purposes.

The following is a summary of the potable water use peaking factors:

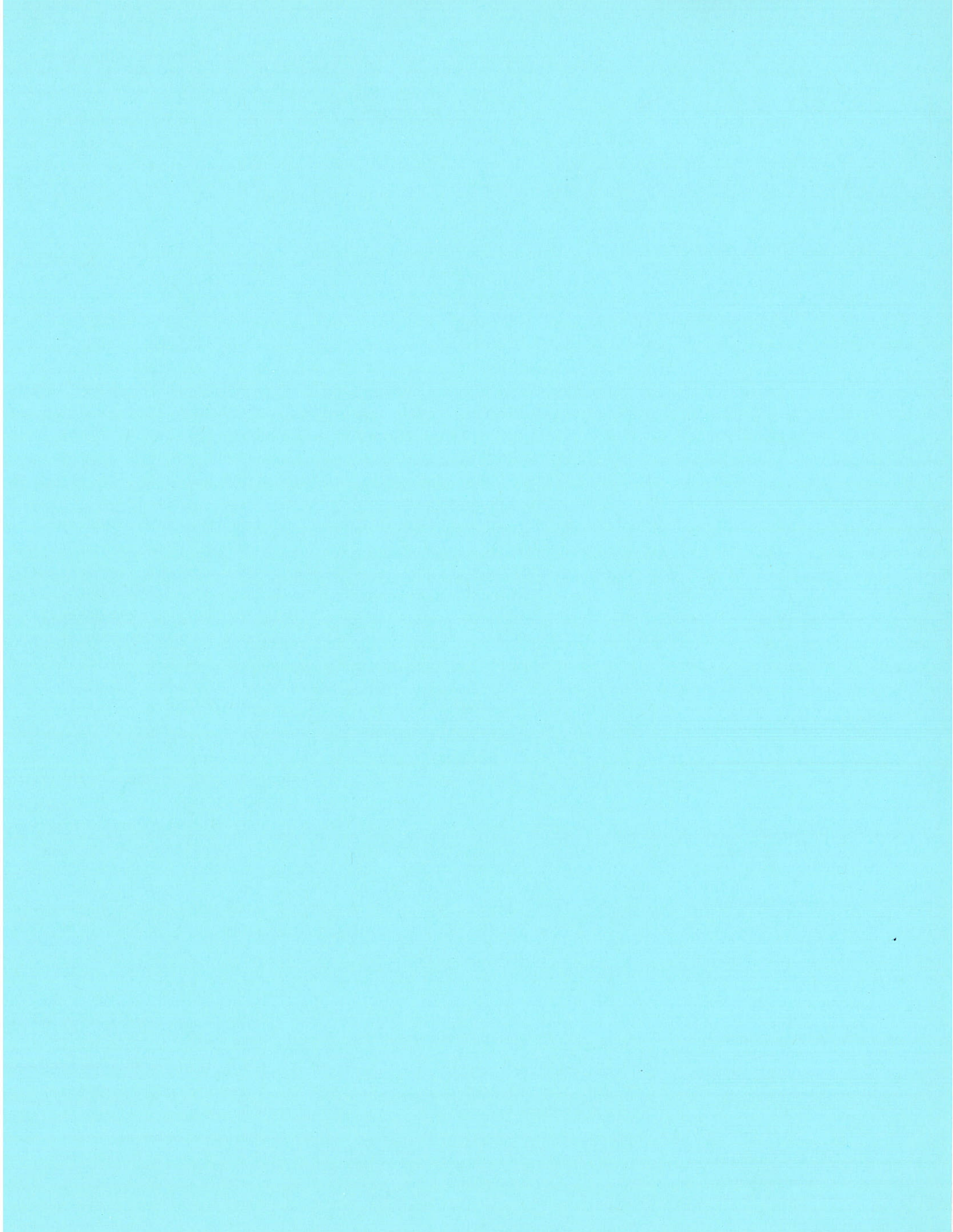
- Maximum Month to Annual Average Day (MM/AAD) = 1.25
- Maximum Day to Maximum Month (MD/MM) = 1.10
- Peak Hour to Maximum Day (PH/MD) = 1.40

## **2.2.5 Unaccounted For Water**

Differences between water production and the Utility Billing records are usually attributable to unaccounted for water (UFW), which reflects system losses such as leaks, fire flows, and other sources of un-metered water losses.

A study that was done in 2004 revealed a UFW factor of approximately 8.9 percent Citywide. This UFW factor was used for the demand projections in this Master Plan considering factors such as the aging of infrastructure, the system expansion, and increasing demands.

It is important to note however, that water use and production records from 2006 show an improvement over the previous years (5.48 percent UFW). This improvement was due to a combination of factors, including the addition of a new meter at the Water Campus, an aggressive meter changeout program conducted by Water Operations, the implementation of a newer and more accurate Utility Billing system, and the ability to track water usage more effectively through implementation of a data warehouse. Should the UFW factor continue to remain at this level, the City should re-evaluate the UFW factor used in future water demand projections.



The population estimate in the previous (2001) master plan was 285,000 people by the year 2020. The increase in population from the previous master plan is primarily due to revitalization and the extended planning period.

<b>Table 2.1 Population Projections</b> <i>2008 Scottsdale Integrated Wastewater Master Plan</i>				
<b>Planning Period</b>	<b>Resident Population</b>	<b>Employee Population</b>	<b>Total Equivalent Population*</b>	<b>Percent Developed</b>
2000	204,317	152,116	255,022	70%
2005	228,692	166,692	284,255	78%
2010	253,066	181,267	313,488	86%
2020	287,312	205,887	355,941	98%
2025	289,619	210,364	359,740	99%
2030	292,706	214,841	364,320	100%
* Total Equivalent Population = Population + 1/3 Employee Population; Based on SAZ 2006 population projections.				

### 2.3.2 Land Use Plan

Wastewater loads have been estimated based on the City's land use element of the General Plan. Unit flows have been defined for each land use category. The land use plan categorizes property parcels based on the current land use for developed areas, and the planned use for undeveloped areas. The acreage of each land use category was multiplied by a unit demand per acre, as defined in the following section, to estimate wastewater loads. Figure 2.4 shows the land use plan that was used in this study.

### 2.3.3 Unit Loads

Wastewater collection system unit loads were developed based on water consumption from utility billing information, then adjusted to account for the proportion of wastewater that is generated from potable water deliveries. Table 2.2 shows the land use classifications that are used in the City's land use plan. Acreages within each land use classification were correlated directly with water consumption from the utility billing system. January water consumption was used because irrigation water in this month is typically small or negligible. Wastewater load estimates using this method were compared with actual wastewater flows in 2006 to verify that the estimated wastewater loads are consistent with actual annual average day wastewater flows. Additional unit loads and projections for the revitalization area are presented in Appendix A.

<b>Land Use Type</b>	<b>Sub-Category</b>	<b>Unit Load Estimate (gpad)</b>
Single Family Residential	1/5 - 1/3 du/ac	92
	1/3 - 1/2 du/ac	134
	1/2 - 1 du/ac	268
	1 - 2 du/ac	488
	2 - 4 du/ac	627
Patio Home and Townhouse Residential	4 - 6 du/ac	1,215
Townhouse Residential	6 - 8 du/ac	1,328
Multi-Family Residential	8 - 12 du/ac	1,448
	12 - 23 du/ac	2,060
Destination Resort	10 - 25 rm/ac	861
Hotel / Resort	3 - 10 rm/ac	977
	10 - 43 rm/ac	3,985
Churches	Churches	277
Community Service Facilities	Community Service Facilities	192
Improved Open Spaces	Golf Courses	0
	Private Open and Recreation Areas	0
	Public Parks, etc.	0
Industrial	Major Industrial	752
	Minor Industrial	561
Institutional Facilities	Institutional Facilities	378
Mixed Use	Mixed Use	1,447
Office	Major Office	1,001
	Minor Office	878
Retail	Community	656
	General	1,173
	Neighborhood	502
	Regional	680
	Specialty/Tourism	1,100
Schools	Schools	382
Utilities	Utilities	1,574
<b>Note:</b> gpad = gallons/acre/day, du/ac = dwelling units per acre, rm/ac = rooms per acre		

### 2.3.4 Peaking Factors

Scottsdale has a seasonal tourist population that influences the total wastewater load from month to month. Flow data from 2006 was evaluated to determine appropriate seasonal peaking factors. Based on this data, the maximum monthly flow rate was 10 percent above the annual average day flow. The maximum weekly flow rate was 14 percent above the annual average day flow. For planning purposes and to correctly size infrastructure, the maximum month flow (MMF) has been set at 15 percent above the annual average day flow (AADF).

Daily peaking factors were set based on flow monitoring data that was collected in March and April 2006. Appendix E contains a map with the locations where the flow monitoring data was collected and graphs that show the diurnal flow patterns from the field test data for each of the monitored sites. Diurnal flow patterns define the magnitude of the flow peaks that were used in the basin upstream from each flow monitoring point in the City's hydraulic model. The diurnal patterns are different for each basin, and the flow peaks vary between 1.4 and 2.0 times the average daily flow. The flow peaks and diurnal patterns are assumed to be the same in future planning years as was measured in 2006.

### 2.3.5 Wet Weather Infiltration and Inflow

All wet weather storm simulations used in this Master Plan have been developed in coordination with the "Regional Capacity Management Facilities (RCMF) Project" currently being undertaken by SROG. The purpose of the regional project is to quantify the amount of storm inflow into the SROG interceptors, and then find a way to effectively handle the storm flows, either by constructing SROG flow, equalization or conveyance facilities, or by each community managing the local storm flows independently. Due to the inter-relationship between the SROG system and the Scottsdale system, using a consistent methodology to estimate storm inflows was necessary to ensure a common basis for infrastructure recommendations. In addition, CMOM guidelines elevated the need to evaluate I&I flows when considering collection system capacity. The methodology that was used to estimate the inflow from storms is described in detail in the "*Regional Capacity Management Facilities Project Appendix A4 - City of Scottsdale Rainfall Calibration and 10-Year, 24-Hour Rainfall Event*" report. A brief summary of the methodology is given below.

A 10-year, 24-hour design storm as defined by the Maricopa County Flood Control District was used as the event for which rainfall-derived infiltration and inflow (RDII) was estimated. The definition of this design storm event includes a volume of rainfall and a storm hydrograph. The proportion of rainfall that enters the collection system (RDII) following a storm event was calculated based on a recorded storm event that occurred in Scottsdale on August 2-3, 2005. This storm event was selected because it is the largest storm that has occurred in recent years where recorded flow data is available. The volume of rainfall as measured by a number of rain gauges in and around Scottsdale was compared with the increased volume of wastewater measured at the Water Campus and at the SROG Princess

# **APPENDIX D**

CVL Calculations

**Water Use Estimates as based on the City's Integrated Master Plan**

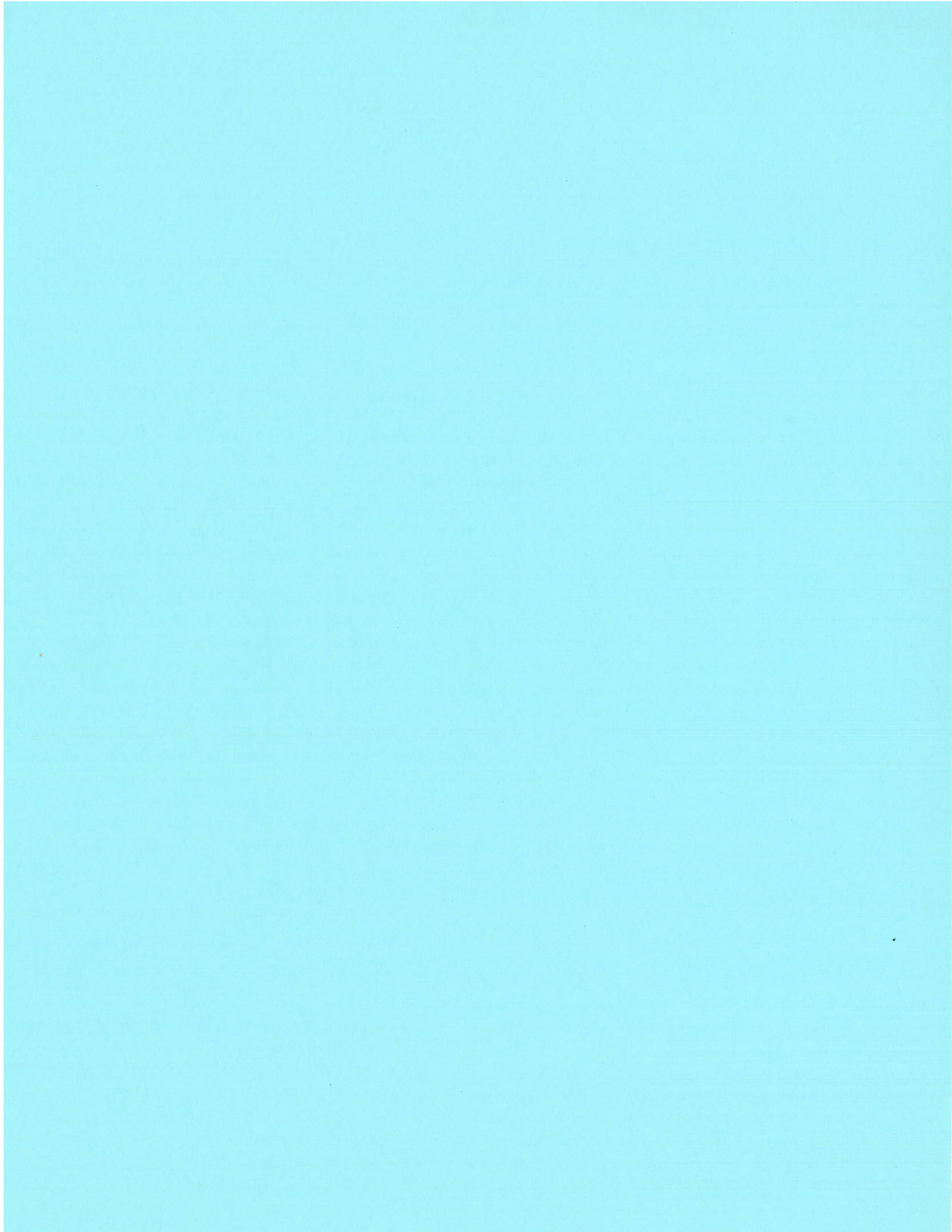
<b>Areas North of the SR101</b>												
Parcel	Land Use	Area [ac]	FAR (proposed)	FAR (Eq.)	Adjusted Area [ac]	DU	ADMM [gpm]	MDD [gpm]	PHD [gpm]	ADMM [gpd]	MDD [gpd]	PHD [gpd]
P5	C-O	25.5	0.6	2.4	61.2	-	72.0	79.2	110.9	103,673	114,040	159,656
P6	R-5	84.2	0.25	1.0	84.2	1,291	231.4	254.5	356.3	333,179	366,497	513,096
P6	PCoC	2.0	0.3	1.2	2.4	-	1.8	2.0	2.8	2,578	2,835	3,970
P7	I-1	72.6	0.5	2.0	145.2	-	92.3	101.5	142.1	132,858	146,144	204,601
P8	PRC	60.0	0.8	3.2	192.0	543	144.0	158.4	221.8	207,360	228,096	319,334
P9	I-1	96.3	0.5	2.0	192.6	-	122.4	134.6	188.5	176,229	193,852	271,393
P9	C-2	34.2	0.3	1.2	41.0	-	49.8	54.8	76.8	71,779	78,957	110,540
P10	C-2	28.7	0.3	1.2	34.4	-	41.8	46.0	64.4	60,236	66,259	92,763
P10	I-1	74.1	0.5	2.0	148.2	-	94.2	103.6	145.0	135,603	149,163	208,829
<b>Subtotal</b>		478	-	-	901	1,834	849.6	934.6	1,308.5	1,223,494	1,345,844	1,884,181
<b>Areas South of the SR101</b>												
Parcel	Land Use	Area [ac]	FAR (proposed)	FAR (Eq.)	Adjusted Area [ac]	DU	ADMM [gpm]	MDD [gpm]	PHD [gpm]	ADMM [gpd]	MDD [gpd]	PHD [gpd]
P11	C-2	29.8	0.3	1.2	35.8	-	43.4	47.8	66.9	62,544	68,799	96,318
P12	I-1	70.4	0.5	2.0	140.8	-	89.5	98.4	137.8	128,832	141,715	198,401
P12	C-2	38.8	0.3	1.2	46.6	-	56.6	62.2	87.1	81,433	89,577	125,407
P13	I-1	69.6	0.5	2.0	139.2	-	88.5	97.3	136.2	127,368	140,105	196,147
P14	PRC	108.3	0.8	3.2	346.6	981	259.9	285.9	400.3	374,285	411,713	576,399
P15	PCC	12.0	0.3	1.2	14.4	48.0	10.7	11.8	16.5	15,466	17,012	23,817
P15	R-5	37.8	0.25	1.0	37.8	580	103.9	114.3	160.0	149,575	164,532	230,345
P15	C-O	38.2	0.6	2.4	91.7	-	107.9	118.6	166.1	155,306	170,837	239,171
<b>Subtotal</b>		405	-	-	853	1,609	760.3	836.3	1,170.8	1,094,809	1,204,289	1,686,005
<b>Grand Totals</b>		883	-	-	1,754	3,443	1,610	1,771	2,479	2.32	2.55	3.57

**Wastewater Generation Estimates as based on the City's Integrated Master Plan**

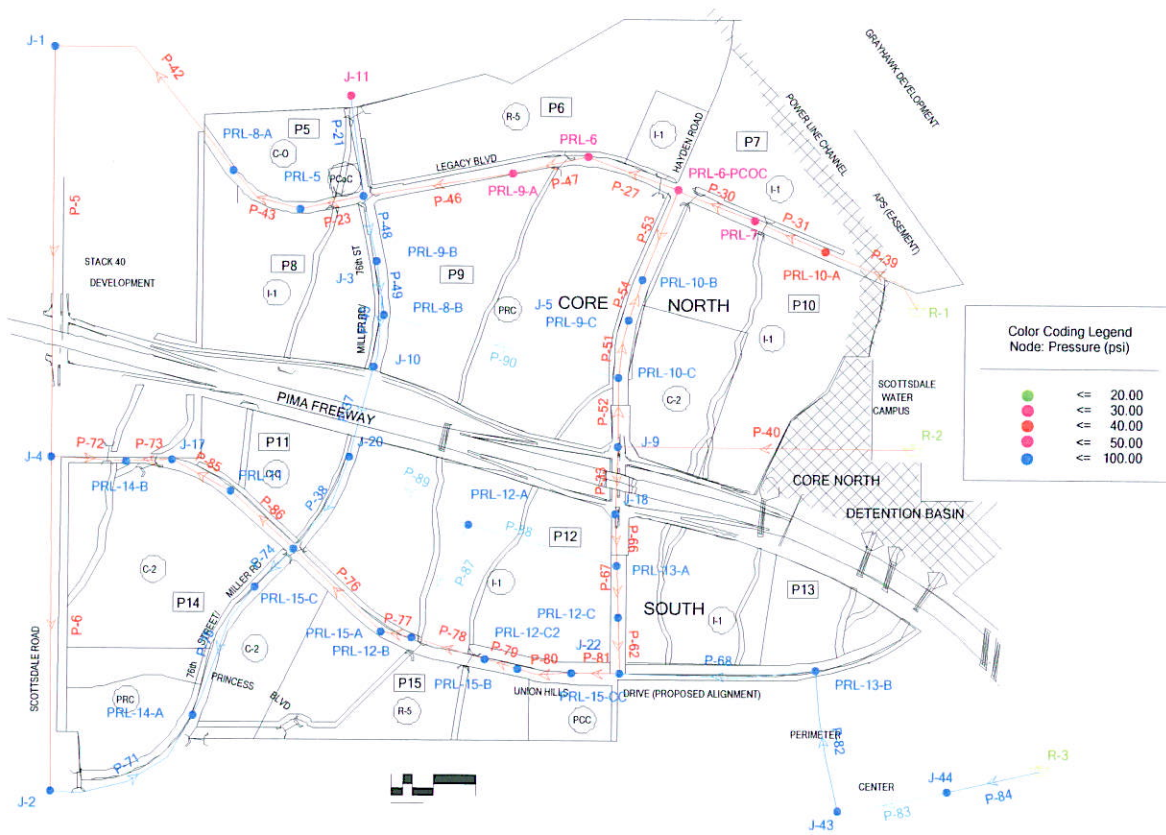
<b>Areas North of the SRI01</b>										
Parcel	Land Use	Area [ac]	FAR (proposed)	FAR (Eq.)	Adjusted Area [ac]	DU	AADF [gpm]	PF [gpm]	AADF [gpd]	PF [gpd]
P5	C-O	25.5	0.6	2.4	61.2	-	37.3	74.6	53,734	107,467
P6	R-5	84.2	0.25	1.0	84.2	1,291	120.5	240.9	173,452	346,904
P6	PCoC	2.0	0.3	1.2	2.4	-	1.1	2.2	1,574	3,149
P7	I-1	72.6	0.5	2.0	145.2	-	56.6	113.1	81,457	162,914
P8	PRC	60.0	0.8	3.2	192.0	543	90.7	181.3	130,560	261,120
P9	I-1	96.3	0.5	2.0	192.6	-	75.0	150.1	108,049	216,097
P9	C-2	34.2	0.3	1.2	41.0	-	33.4	66.9	48,140	96,280
P10	C-2	28.7	0.3	1.2	34.4	-	28.1	56.1	40,398	80,796
P10	I-1	74.1	0.5	2.0	148.2	-	57.7	115.5	83,140	166,280
<b>Subtotal</b>		478	-	-	901	1,834	500.4	1,000.7	720,504	1,441,008
<b>Areas South of the SRI01</b>										
Parcel	Land Use	Area [ac]	FAR (proposed)	FAR (Eq.)	Adjusted Area [ac]	DU	AADF [gpm]	PF [gpm]	AADF [gpd]	PF [gpd]
P11	C-2	29.8	0.3	1.2	35.8	-	29.1	58.3	41,946	83,893
P12	I-1	70.4	0.5	2.0	140.8	-	54.9	109.7	78,989	157,978
P12	C-2	38.8	0.3	1.2	46.6	-	37.9	75.9	54,615	109,230
P13	I-1	69.6	0.5	2.0	139.2	-	54.2	108.5	78,091	156,182
P14	PRC	108.3	0.8	3.2	346.6	981	163.7	327.3	235,661	471,322
P15	PCC	12.0	0.3	1.2	14.4	48.0	6.6	13.1	9,446	18,893
P15	R-5	37.8	0.25	1.0	37.8	580	54.1	108.2	77,868	155,736
P15	C-O	38.2	0.6	2.4	91.7	-	55.9	111.8	80,495	160,990
<b>Subtotal</b>		405	-	-	853	1,609	456.3	912.7	657,112	1,314,223
<b>Grand Totals</b>		883	-	-	1,754	3,443	957	1,913	1.38	2.76

**Wastewater Collection System Analysis: Depth Calculations – See Figure 5**

Start MH	End MH	Length (feet)	Line Diameter (inches)	Sewer Line Slope (ft/ft)	Start NG Rim Elevation (feet)	Start Invert Elevation	Calc End Invert Elevation	Start MH Cover (feet)	Mid-line Bend Drops (ft)	Collector Drop - From Start (ft)
<b>Preliminary Collection System Calculations - See Figure 5</b>										
<b>North</b>										
N1	N2	1,750	8	0.0141	1,640	1,632.33	1,607.39	7.0	0.4	
N2	N3	1,620	8	0.0053	1,615	1,607.29	1,598.38	7.0	0.3	0.1
N3	N4	2,430	12	0.0031	1,615	1,597.95	1,589.92	16.1	0.5	0.1
N4	LS	1,115	12	0.0031	1,615	1,589.82	1,586.14	24.2	0.2	0.1
LS	-	-	12	-	1,610	1,586.04	-	23.0	-	0.1
<b>South</b>										
S1	S2	1,150	8	0.0084	1,595	1,587.33	1,577.44	7.0	0.2	
S2	S3	3,410	12	0.0035	1,585	1,577.01	1,564.53	7.0	0.7	0.1
S3	S4	225	21	0.0031	1,583	1,563.68	1,562.94	17.6	0.0	0.1
S4	-	-	21	-	1,581	1,562.94	-	16.3	-	0.0
<b>UH1</b>										
UH1	S3	2,900	8	0.0081	1,600	1,591.33	1,567.40	8.0	0.6	
S3	-	-	21	-	1,583	1,566.22	-	<b>15.0</b>	-	0.1



# Scenario: PHD



**Scenario: PHD**  
**Steady State Analysis**  
**Junction Report**

Label	Elevation (ft)	Demand (Calculated) (gpm)	Pressure (psi)	Calculated Hydraulic Grade (ft)
PRL-10-A	1,657.00	72.50	39.85	1,749.10
PRL-7	1,655.00	142.08	40.47	1,748.54
PRL-9-A	1,650.00	94.23	42.14	1,747.40
PRL-6	1,650.00	356.31	42.21	1,747.57
PRL-6-PCOC	1,650.00	2.76	42.44	1,748.08
J-11	1,647.00	0.00	43.33	1,747.15
J-1	1,630.00	0.00	50.63	1,747.02
PRL-8-A	1,630.00	110.88	50.65	1,747.06
J-3	1,630.00	0.00	50.69	1,747.15
PRL-10-B	1,630.00	72.50	51.09	1,748.08
PRL-9-C	1,630.00	76.77	51.09	1,748.08
PRL-5	1,628.00	110.88	51.53	1,747.09
PRL-9-B	1,625.00	94.23	52.83	1,747.11
PRL-10-C	1,620.00	64.42	55.42	1,748.09
J-43	1,620.00	0.00	55.44	1,748.13
J-44	1,620.00	0.00	56.16	1,749.81
PRL-8-B	1,615.00	110.88	57.16	1,747.11
J-10	1,610.00	0.00	59.31	1,747.09
J-9	1,610.00	0.00	59.77	1,748.15
J-20	1,600.00	0.00	63.63	1,747.07
PRL-12-A	1,600.00	45.92	63.68	1,747.19
J-18	1,600.00	0.00	64.01	1,747.94
J-4	1,590.00	0.00	67.91	1,746.96
PRL-13-A	1,590.00	68.11	68.27	1,747.78
PRL-13-B	1,590.00	68.11	68.29	1,747.85
PRL-15-C	1,585.00	166.09	70.05	1,746.91
PRL-11	1,585.00	66.73	70.08	1,746.98
J-5	1,585.00	0.00	70.10	1,747.02
PRL-12-C	1,585.00	45.92	70.39	1,747.70
PRL-14-B	1,580.00	200.14	72.24	1,746.96
J-17	1,580.00	0.00	72.24	1,746.97
PRL-15-B	1,580.00	79.99	72.38	1,747.28
PRL-12-C2	1,580.00	87.09	72.40	1,747.35
PRL-15-CC	1,580.00	16.48	72.47	1,747.49
J-22	1,580.00	0.00	72.52	1,747.62
PRL-15-A	1,570.00	79.99	76.64	1,747.13
PRL-12-B	1,570.00	45.92	76.65	1,747.17
PRL-14-A	1,560.00	200.14	80.85	1,746.87
J-2	1,550.00	0.00	85.20	1,746.93

**Scenario: PHD**  
**Steady State Analysis**  
**Pipe Report**

Label	Length (ft)	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-39	1,063.00	16.0	1,180.77	1.88	0.85
P-31	741.00	16.0	-1,108.27	1.77	0.76
P-83	1,088.00	8.0	-262.85	1.68	1.54
P-40	2,784.00	16.0	-1,035.46	1.65	0.67
P-30	777.00	16.0	-966.18	1.54	0.59
P-27	897.00	16.0	-951.72	1.52	0.57
P-66	481.00	16.0	701.40	1.12	0.32
P-33	639.00	16.0	701.40	1.12	0.32
P-81	446.00	16.0	-653.77	1.04	0.28
P-80	525.00	16.0	-637.29	1.02	0.27
P-47	731.00	16.0	-595.41	0.95	0.24
P-79	325.00	16.0	-550.20	0.88	0.21
P-90	2,297.00	8.0	-132.07	0.84	0.43
P-88	1,445.00	8.0	-128.33	0.82	0.41
P-67	485.00	16.0	504.96	0.81	0.18
P-46	1,413.00	16.0	-501.18	0.80	0.17
P-78	719.00	16.0	-470.22	0.75	0.15
P-84	901.00	12.0	-262.85	0.75	0.21
P-82	1,353.00	12.0	-262.85	0.75	0.21
P-74	508.00	12.0	261.68	0.74	0.21
P-62	539.00	16.0	459.03	0.73	0.15
P-77	298.00	16.0	-448.92	0.72	0.14
P-76	1,132.00	16.0	-368.94	0.59	0.10
P-23	606.00	16.0	-359.63	0.57	0.09
P-68	1,852.00	12.0	-194.73	0.55	0.12
P-52	656.00	16.0	-334.05	0.53	0.08
P-48	621.00	12.0	141.55	0.40	0.07
P-43	772.00	16.0	-248.75	0.40	0.05
P-86	814.00	16.0	-233.54	0.37	0.04
P-89	1,297.00	8.0	-57.78	0.37	0.09
P-38	1,020.00	12.0	126.29	0.36	0.05
P-71	1,661.00	12.0	-104.54	0.30	0.04
P-75	1,357.00	12.0	95.59	0.27	0.03
P-73	425.00	16.0	-166.81	0.27	0.02
P-85	637.00	16.0	-166.81	0.27	0.02
P-5	3,887.00	16.0	137.87	0.22	0.02
P-42	2,252.00	16.0	-137.87	0.22	0.02
P-51	543.00	16.0	-137.57	0.22	0.02
P-45	850.00	12.0	68.51	0.19	0.02
P-37	896.00	12.0	68.51	0.19	0.02
P-6	3,162.00	16.0	104.54	0.17	0.01
P-87	1,197.00	8.0	24.63	0.16	0.02
P-49	516.00	12.0	47.32	0.13	0.01
P-54	403.00	16.0	-60.80	0.10	0.00
P-72	704.00	16.0	33.33	0.05	0.00
P-53	911.00	16.0	11.71	0.02	0.00
P-21	951.00	12.0	0.00	0.00	0.00

**Scenario: PHD**  
**Steady State Analysis**  
**Reservoir Report**

Label	Elevation (ft)	Calculated Hydraulic Grade (ft)	Outflow (gpm)
R-1	1,750.00	1,750.00	1,180.77
R-2	1,750.00	1,750.00	1,035.46
R-3	1,750.00	1,750.00	262.85

**Scenario: MD+FF**  
**Fire Flow Analysis**  
**Fire Flow Report**

Label	Elevation (ft)	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Total Flow Needed (gpm)	Total Flow Available (gpm)	Minimum Pressure (psi)	Calculated Residual Pressure (psi)
PRL-10-A	1,657.00	true	true	3,551.79	5,051.79	40.03	36.09
PRL-7	1,655.00	true	true	3,601.49	5,101.49	40.76	35.44
PRL-9-A	1,650.00	true	true	3,567.31	5,067.31	42.66	32.31
PRL-6	1,650.00	true	true	3,754.51	5,254.51	42.70	33.75
PRL-6-PCOC	1,650.00	true	true	3,501.97	5,001.97	42.82	36.66
J-11	1,647.00	true	false	3,500.00	3,065.08	43.90	30.00
J-1	1,630.00	true	true	3,500.00	5,000.00	51.23	33.97
PRL-8-A	1,630.00	true	true	3,579.20	5,079.20	51.24	36.25
J-3	1,630.00	true	true	3,500.00	5,000.00	51.26	39.32
PRL-10-B	1,630.00	true	true	3,551.79	5,051.79	51.47	44.39
PRL-9-C	1,630.00	true	true	3,554.83	5,054.84	51.47	44.39
PRL-5	1,628.00	true	true	3,579.20	5,079.20	52.11	38.63
PRL-9-B	1,625.00	true	true	3,567.31	5,067.31	53.41	37.29
PRL-10-C	1,620.00	true	true	3,546.01	5,046.01	55.80	49.09
J-43	1,620.00	true	true	3,500.00	4,299.39	55.81	30.00
J-44	1,620.00	true	true	3,500.00	5,000.00	56.20	43.06
PRL-8-B	1,615.00	true	true	3,579.20	5,079.20	57.74	40.67
J-10	1,610.00	true	true	3,500.00	5,000.00	59.90	40.73
J-9	1,610.00	true	true	3,500.00	5,000.00	60.14	54.24
J-20	1,600.00	true	true	3,500.00	5,000.00	64.22	47.21
PRL-12-A	1,600.00	true	true	3,532.80	4,887.53	64.25	30.00
J-18	1,600.00	true	true	3,500.00	5,000.00	64.42	56.81
J-4	1,590.00	true	true	3,500.00	5,000.00	68.52	52.58
PRL-13-A	1,590.00	true	true	3,548.65	5,048.65	68.71	60.19
PRL-13-B	1,590.00	true	true	3,548.65	5,048.65	68.72	41.65
PRL-15-C	1,585.00	true	true	3,618.64	5,118.64	70.67	50.63
PRL-11	1,585.00	true	true	3,547.66	5,047.66	70.69	55.67
J-5	1,585.00	true	true	3,500.00	5,000.00	70.70	57.38
PRL-12-C	1,585.00	true	true	3,532.80	5,032.80	70.85	61.52
PRL-14-B	1,580.00	true	true	3,642.96	5,142.96	72.85	56.92
J-17	1,580.00	true	true	3,500.00	5,000.00	72.85	57.17
PRL-15-B	1,580.00	true	true	3,557.13	5,057.13	72.92	61.09
PRL-12-C2	1,580.00	true	true	3,562.20	5,062.21	72.94	61.46
PRL-15-CC	1,580.00	true	true	3,511.77	5,011.77	72.97	62.26
J-22	1,580.00	true	true	3,500.00	5,000.00	73.00	63.14
PRL-15-A	1,570.00	true	true	3,557.13	5,057.13	77.21	64.53
PRL-12-B	1,570.00	true	true	3,532.80	5,032.80	77.22	64.87
PRL-14-A	1,560.00	true	true	3,642.96	5,142.96	81.48	54.69
J-2	1,550.00	true	true	3,500.00	5,000.00	85.82	62.90

# **APPENDIX E**

CVL Correspondence

---

**From:** Mann, Doug [mailto:DMANN@SCOTTSDALEAZ.GOV]  
**Sent:** Friday, March 20, 2009 8:29 AM  
**To:** Sandy Skidmore; Ekblaw, Kroy; medelman@land.az.gov; mfarley@land.az.gov  
**Cc:** Eric Laurin; Anderson, Scott L.  
**Subject:** RE: Crossroads East Update Memo

We are in agreement with using the unit demands from our city's master plans.

I recommend you use a "FAR adjustment factor" or "density demand factor" to account for the proposed increases in FAR from the baseline 0.25. Adjusting the acreage will lead to confusion.

Please carry out the demand calculations for each parcel (P5 thru P15) so you can evaluate how much water/wastewater needs to move where, and thus verify the necessary infrastructure sizing.

Thanks, Doug

---

**From:** Mann, Doug [mailto:DMANN@SCOTTSDALEAZ.GOV]  
**Sent:** Thursday, January 22, 2009 9:41 AM  
**To:** CVL  
**Subject:** RE: Core N/S - Existing Water/Sewer

The sewer in Center pretty much follows the topography (see flow direction arrows on attachment). The Miller sewer is not in and is only stubbed north and south at Miller. The sewer east of Hayden in Center is not in; only stubbed out east.

---

**From:** Mann, Doug [mailto:DMANN@SCOTTSDALEAZ.GOV]  
**Sent:** Thursday, January 22, 2009 7:03 AM  
**To:** CVL  
**Subject:** RE: Core N/S - Existing Water

- The GIS maps are updated when as-builts become available. The Center Drive (Hualapai alignment) line is not complete as of yet and is in fact still under construction thru the Corrigan property (One Scottsdale). I upsized the line in "Hualapai" from Hayden to the power line corridor at the water campus from 16 to 24 and it was installed as such. The sketch info I gave you is incorrect at that location. It remains a 16 inch line from Scottsdale Road to Hayden though.

- No, the 12 inch line terminates in UHD west of the 101. The 66 inch line is a raw water feed to our plant.

- Wood/Patel used 1764 for the source Zone 4 HGL 1910 for the source Zone 5 HGL in the One Scottsdale master plan. HGLs in the One Scottsdale area generally appeared to be in the 1750 and 1860 range for the peak hour analysis.

---

**From:** Mann, Doug [mailto:DMANN@SCOTTSDALEAZ.GOV]  
**Sent:** Friday, January 09, 2009 4:57 PM  
**To:** CVL  
**Subject:** RE: ASLD Follow Up Question

I am guessing you are eluding to excess plant capacity, as we certainly will have capacity for the planned development of the Crossroads East area as it occurs.

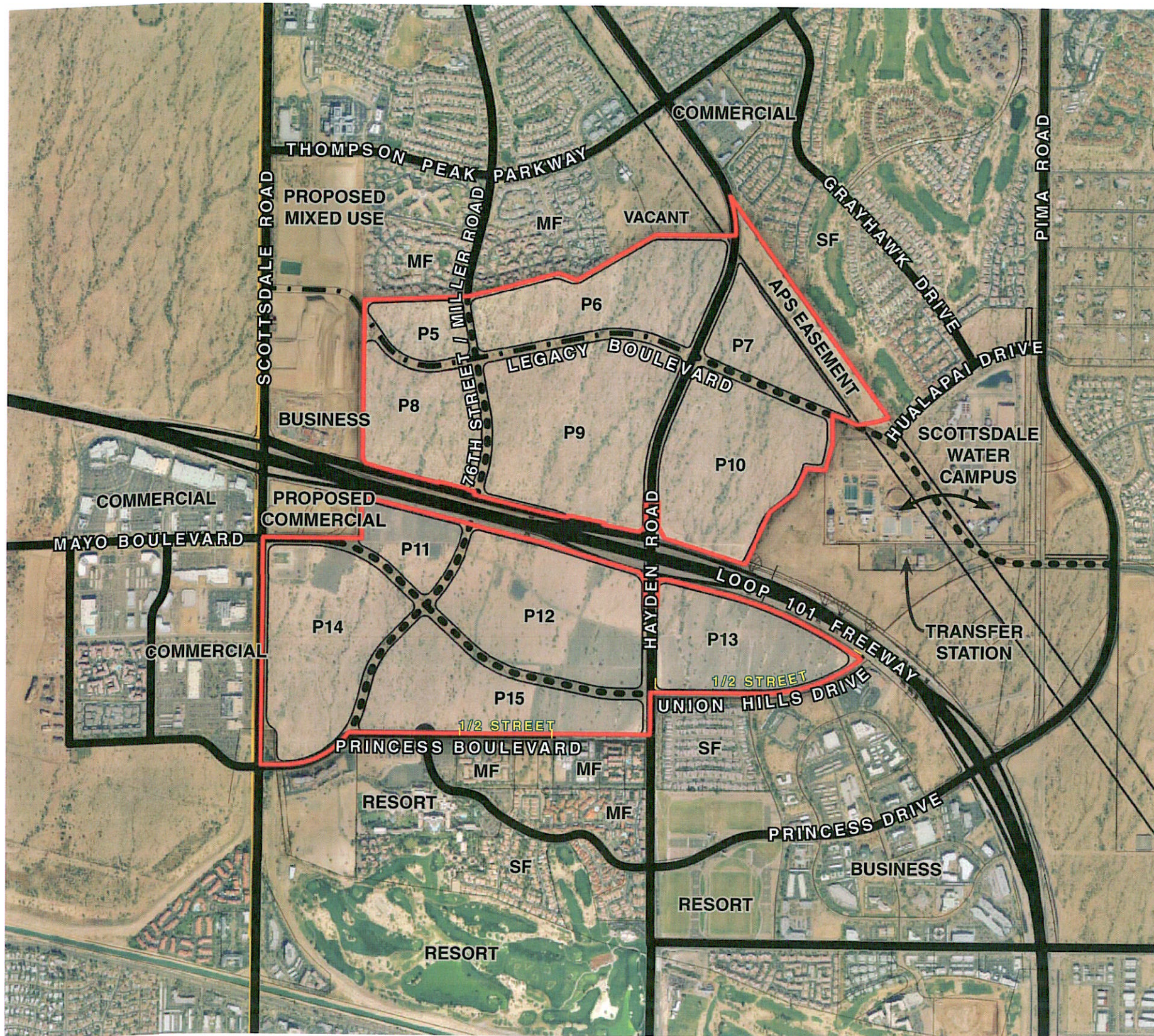
Excess capacity is not a yes/no type question by any means. Both the water treatment and wastewater reclamation plant have planned expansions to meet increasing demand as it is projected to occur. Recent economic indicators have deferred some of these timelines. Additionally, we are studying areas of potential redevelopment within Scottsdale along with any impacts that changes in land use or zoning may have on our system. I cannot state that there is "x" amount of excess plant capacity for any specific project.

The best way to approach this is to understand that the City feels confident that we can provide quality water and wastewater service to development and redevelopment as it may occur in the years to come. If the Crossroads East area, Airpark area, or other portions of our service area realize growth or density increases in excess of our current master planning efforts, we will need to address them as they become apparent and make the necessary adjustments to our water and wastewater programs. And do keep in mind that will impact other city services as well.

As for pipe capacity I would use the 2 to 8 feet per second rule for average and max day demands.

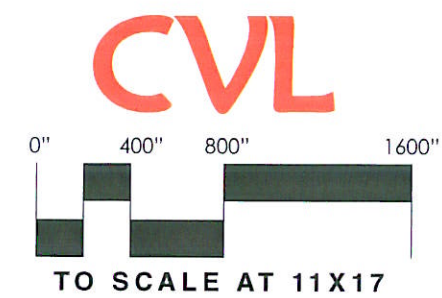
# **APPENDIX F**

Report Figures



**LEGEND**

- PROJECT BOUNDARY
- EXISTING ROADWAY ALIGNMENT
- · - · -** ROADWAY ALIGNMENTS UNDER CONSTRUCTION
- PROPOSED ROADWAY ALIGNMENT



**CROSSROADS EAST**

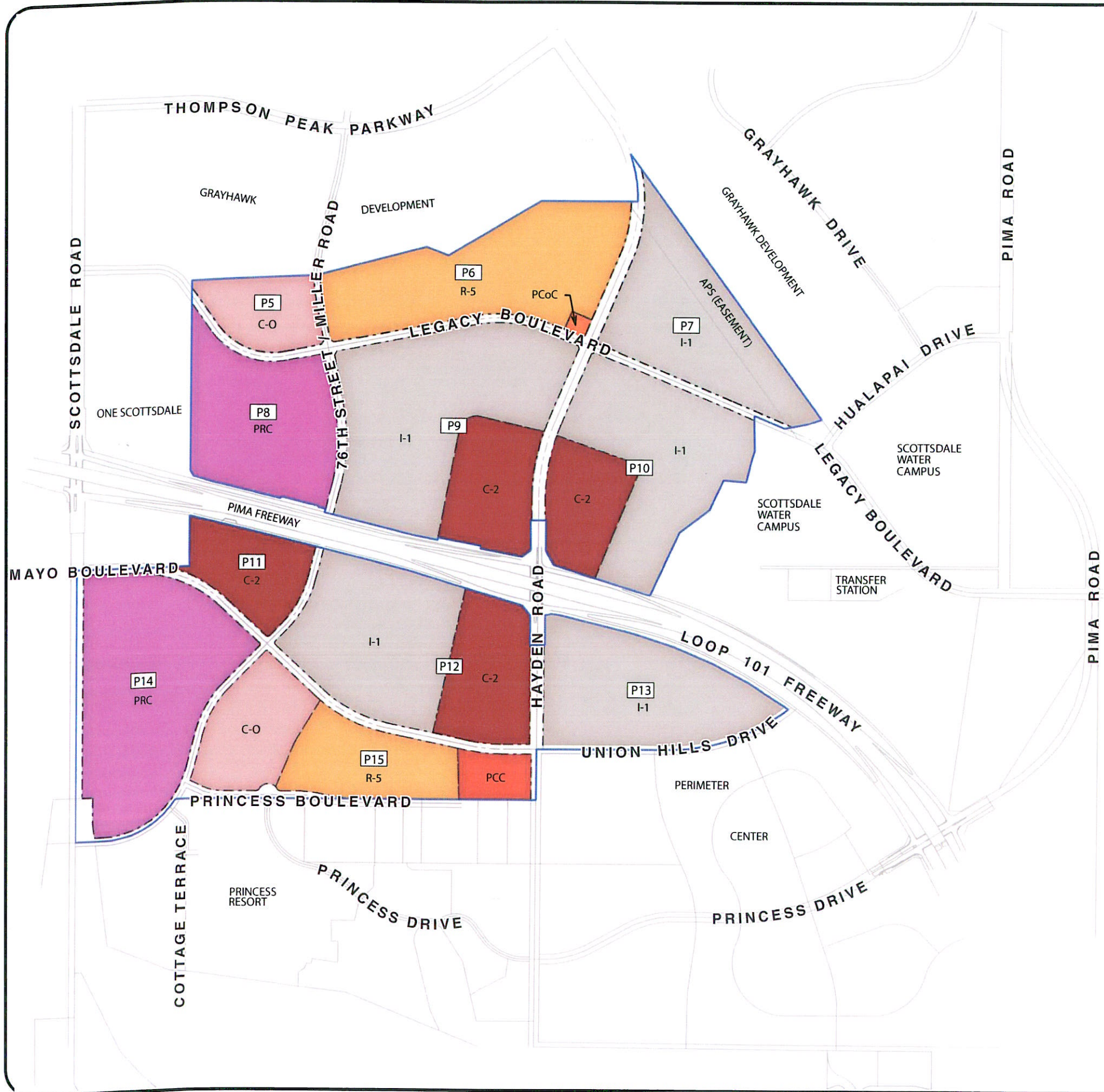
**COE & VAN LOO**  
 PLANNING ENGINEERING LANDSCAPE ARCHITECTURE

**SITE CONDITIONS**

4550 NORTH 12TH STREET  
 PHOENIX, ARIZONA 85014  
 TELEPHONE (602) 264-6831

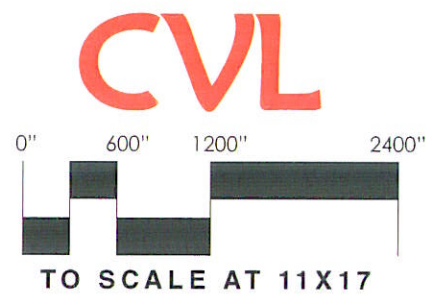
JOB NO  
 07-0133901

FIGURE  
**1**



**ZONING/LAND USE PLAN**

- R-5 MULTIPLE FAMILY
- C-2 CENTRAL BUSINESS
- C-0 COMMERCIAL/OFFICE
- PCC PLANNED COMMUNITY CENTER
- PCoC PLANNED CONVENIENCE CENTER
- PRC PLANNED REGIONAL CENTER (MIXED USE)
- I-1 INDUSTRIAL PARK
- PARCEL BOUNDARY (NET)
- PROJECT BOUNDARY (GROSS)
- P8 PARCEL NUMBER



**CROSSROADS EAST**

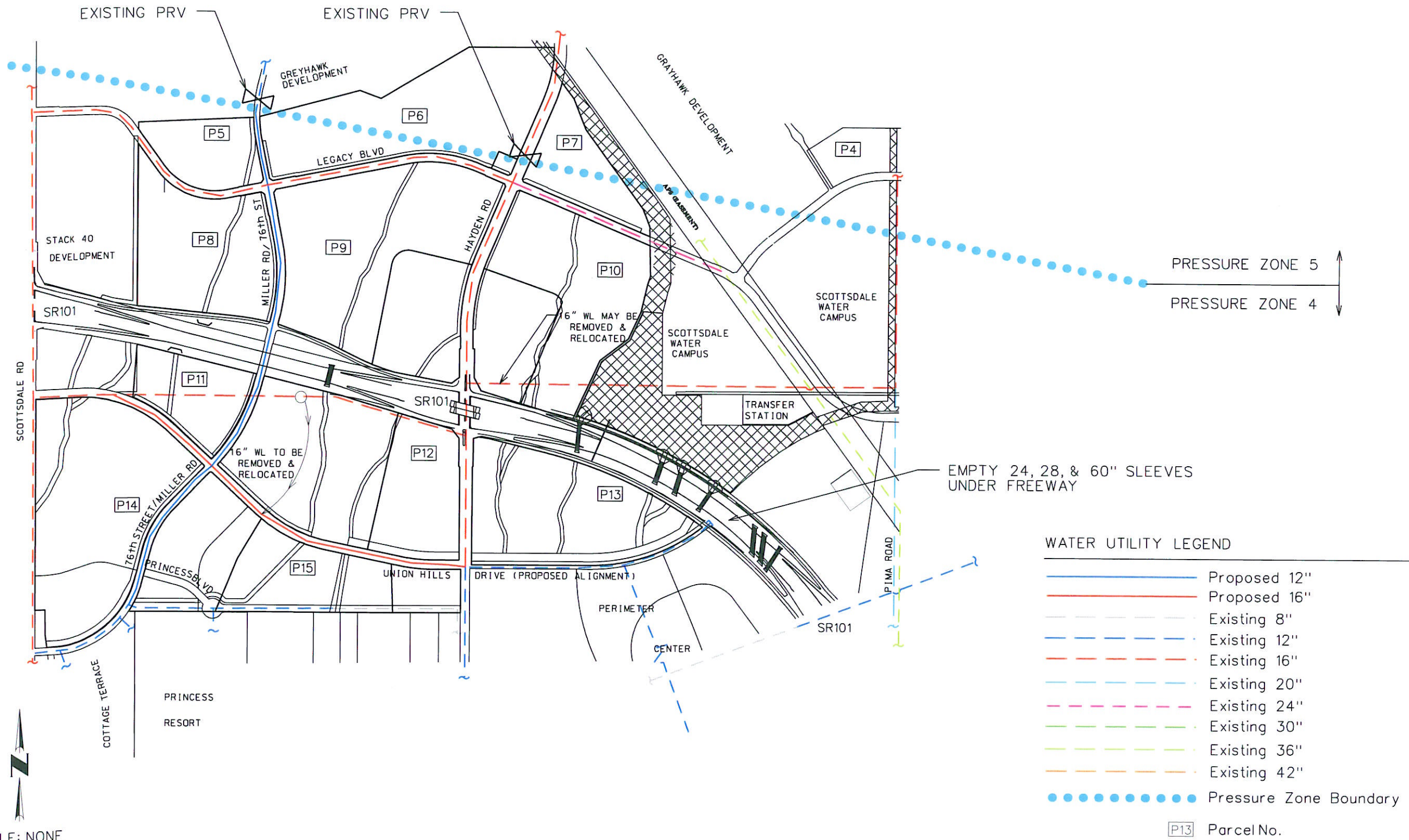
**COE & VAN LOO**  
PLANNING ENGINEERING LANDSCAPE ARCHITECTURE

**LAND USE PLAN**

4550 NORTH 12TH STREET  
PHOENIX, ARIZONA 85014  
TELEPHONE (602) 264-6831

JOB NO  
07-0133901

FIGURE  
**2**



**WATER UTILITY LEGEND**

	Proposed 12"
	Proposed 16"
	Existing 8"
	Existing 12"
	Existing 16"
	Existing 20"
	Existing 24"
	Existing 30"
	Existing 36"
	Existing 42"
	Pressure Zone Boundary
	Parcel No.

**CROSSROADS EAST**

**COE & VAN LOO**  
 PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

**WATER SERVICE ANALYSIS**

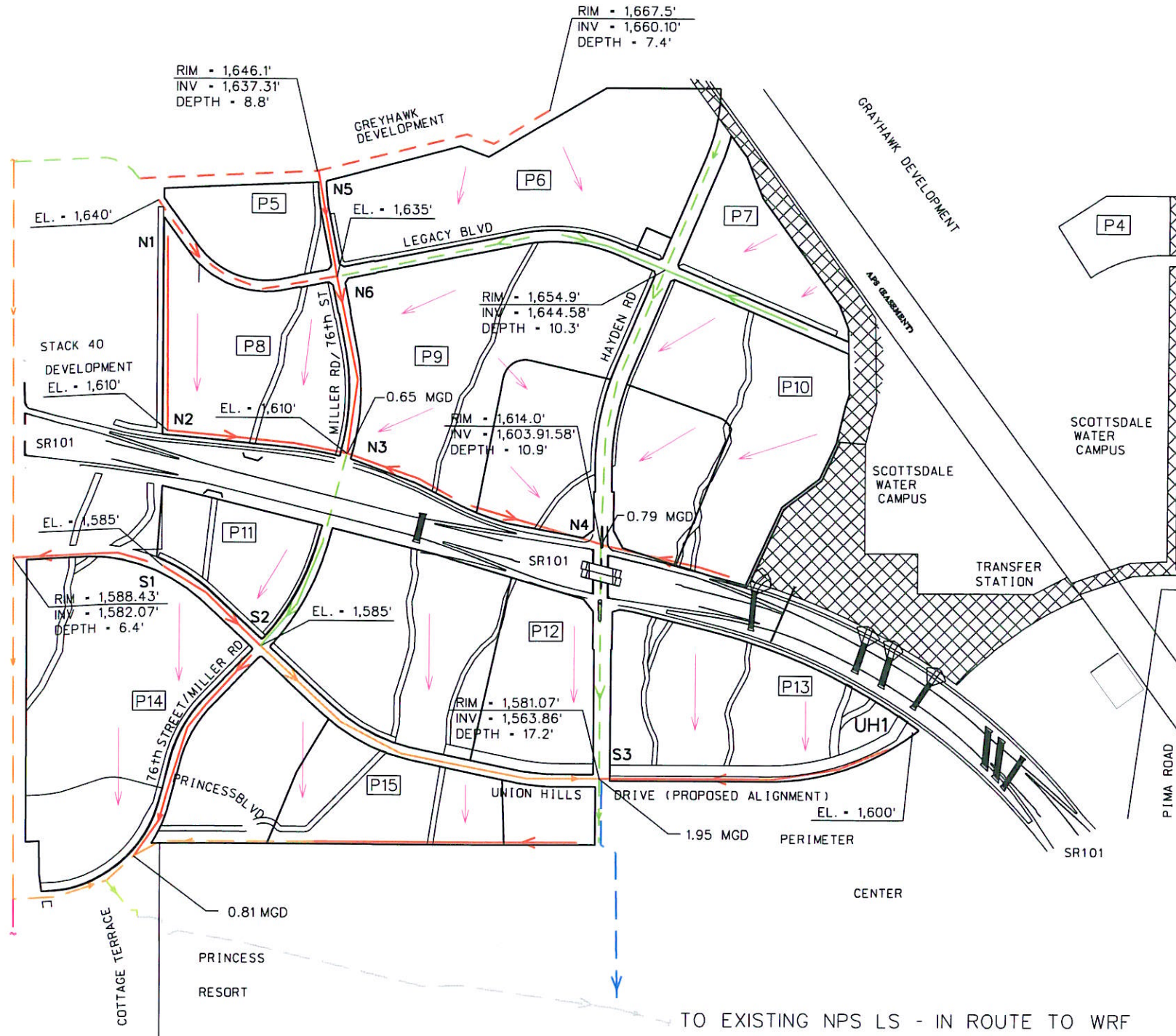
4550 NORTH 12TH STREET  
 PHOENIX, ARIZONA 85014  
 TELEPHONE (602) 264-6831

JOB NO  
 1.07.0220002

FIGURE  
**3**



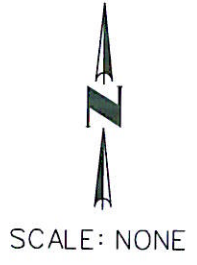
# OPTION 1: GRAVITY FLOW SYSTEM



### WASTEWATER UTILITY LEGEND

- 8" PROP.
  - 12" PROP.
  - - - 12" EX.
  - 15" PROP.
  - - - 15" EX.
  - - - 18" EX.
  - - - 21" EX.
  - - - 24" EX.
- P13 PARCEL NO.
- GENERAL FLOW DIRECTION

PEAK FLOW ESTIMATES BASED ON COS 2008 IWWMP CRITERIA  
 ALL PROPOSED INFRASTRUCTURE IS FOR PRELIMINARY PLANNING ANALYSIS ONLY



**CROSSROADS EAST**

**COE & VAN LOO**  
 PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

**WASTEWATER SERVICE ANALYSIS**

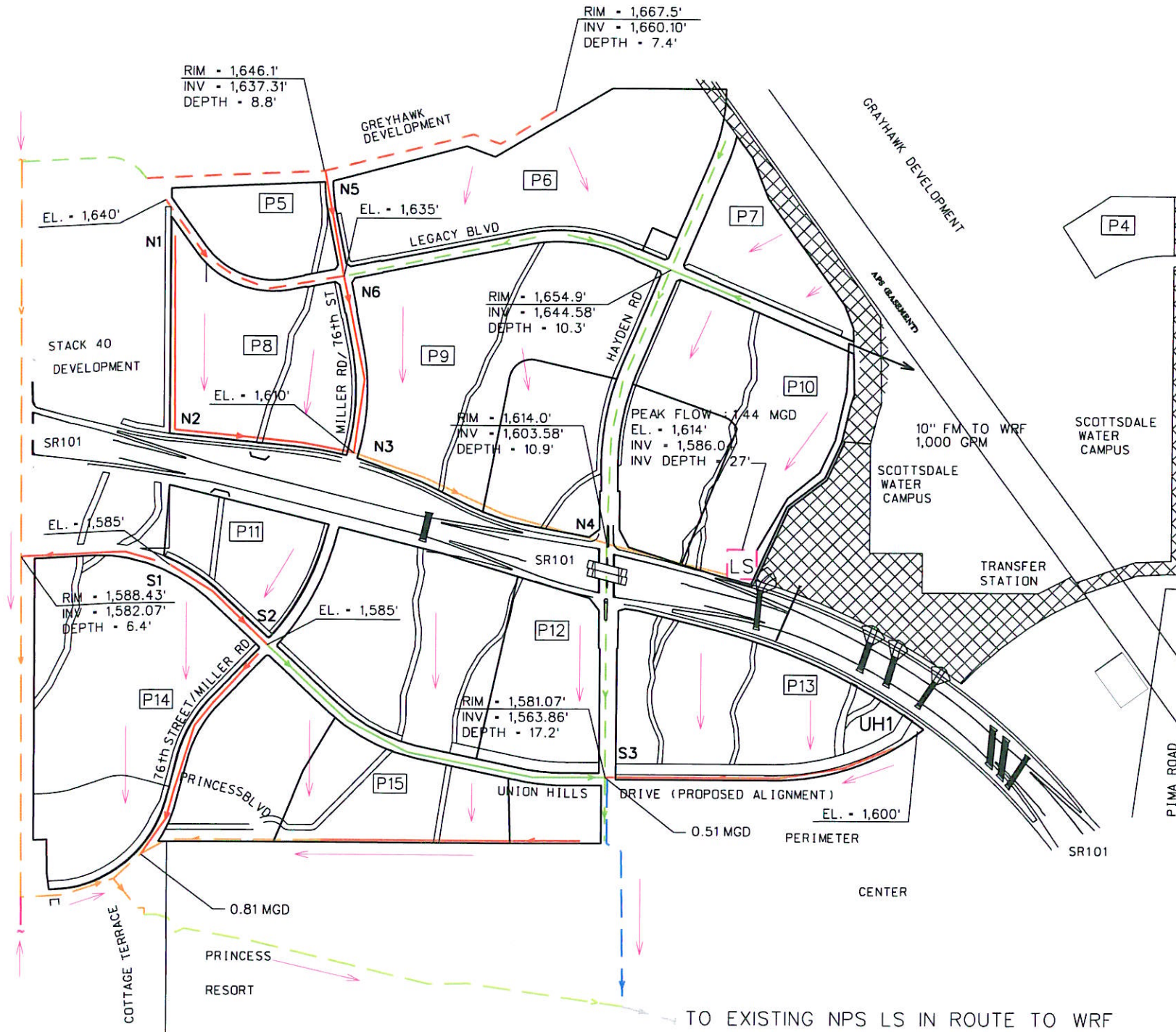
4550 NORTH 12TH STREET  
 PHOENIX, ARIZONA 85014  
 TELEPHONE (602) 264-6831

JOB NO  
 1.07.0220002

FIGURE  
**4**



### OPTION 2: NORTHERN LIFT STATION



#### WASTEWATER UTILITY LEGEND

- 8" PROP.
  - 12" PROP.
  - 15" PROP.
  - - - 8" EX.
  - - - 12" EX.
  - - - 15" EX.
  - - - 18" EX.
  - - - 21" EX.
  - - - 24" EX.
- P13 PARCEL NO.



SCALE: NONE

PEAK FLOW ESTIMATES BASED ON COS 2008 IWWMP CRITERIA  
ALL PROPOSED INFRASTRUCTURE IS FOR PRELIMINARY PLANNING ANALYSIS ONLY

CROSSROADS EAST

**COE & VAN LOO**  
PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

WASTEWATER SERVICE ANALYSIS

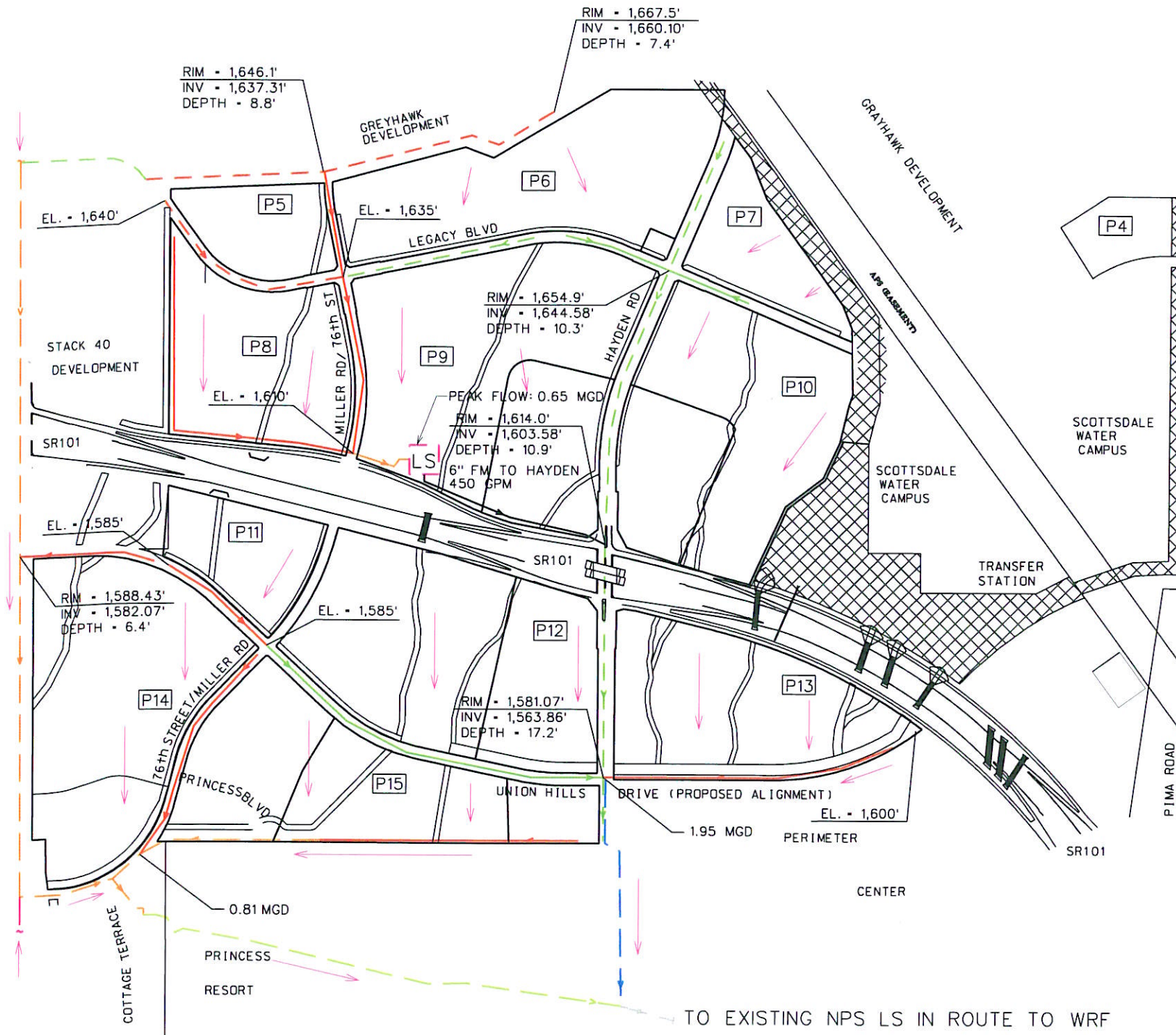
4550 NORTH 12TH STREET  
PHOENIX, ARIZONA 85014  
TELEPHONE (602) 264-6831

JOB NO  
1.07.0220002

FIGURE  
**5**



### OPTION 3: LIFT STATION SERVING WEST HALF OF CROSSROADS NORTH



#### WASTEWATER UTILITY LEGEND

- 8" PROP.
- 12" PROP.
- 15" PROP.
- - - 8" EX.
- - - 12" EX.
- - - 15" EX.
- - - 18" EX.
- - - 21" EX.
- - - 24" EX.
- P13 PARCEL NO.



SCALE: NONE

PEAK FLOW ESTIMATES BASED ON COS 2008 IWWMP CRITERIA  
ALL PROPOSED INFRASTRUCTURE IS FOR PRELIMINARY PLANNING ANALYSIS ONLY

## CROSSROADS EAST

**COE & VAN LOO**  
PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

### WASTEWATER SERVICE ANALYSIS

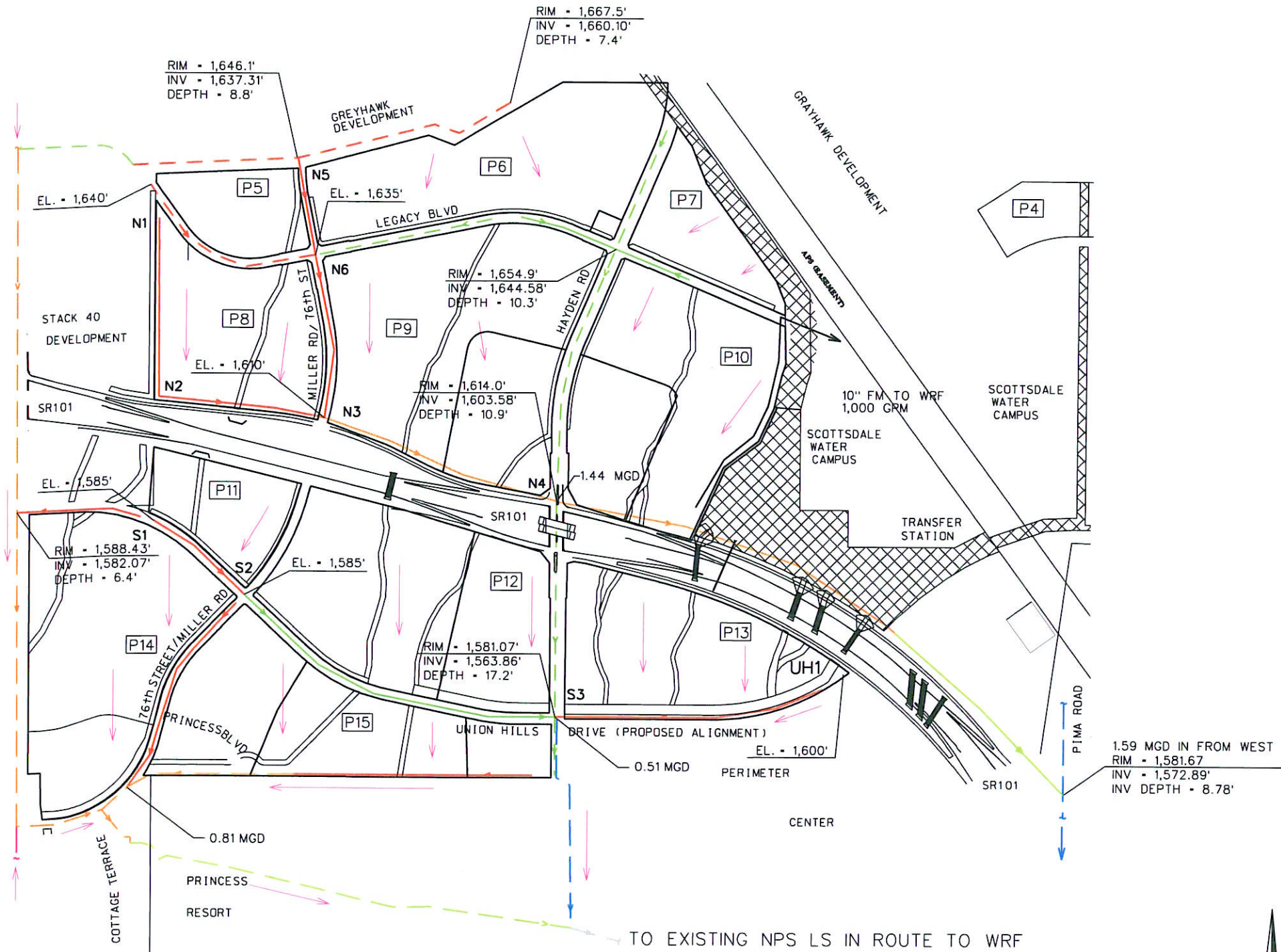
4550 NORTH 12TH STREET  
PHOENIX, ARIZONA 85014  
TELEPHONE (602) 264-6831

JOB NO  
1.07.0220002

FIGURE  
**6**



### OPTION 4: GRAVITY FLOW TO PIMA RD



#### WASTEWATER UTILITY LEGEND

- 8" PROP.
- 12" PROP.
- 15" PROP.
- 18" PROP.
- - - 8" EX.
- - - 12" EX.
- - - 15" EX.
- - - 18" EX.
- - - 21" EX.
- - - 24" EX.
- P13 PARCEL NO.

SCALE: NONE

PEAK FLOW ESTIMATES BASED ON COS 2008 IWWMP CRITERIA  
 ALL PROPOSED INFRASTRUCTURE IS FOR PRELIMINARY PLANNING ANALYSIS ONLY

## CROSSROADS EAST

**COE & VAN LOO**  
 PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

### WASTEWATER SERVICE ANALYSIS

4550 NORTH 12TH STREET  
 PHOENIX, ARIZONA 85014  
 TELEPHONE (602) 264-6831

JOB NO  
1.07.0220002

FIGURE  
**7**

# Appendix F – Crossroads East Planning Unit VII Master Water Report

MASTER WATER REPORT

CROSSROADS EAST PLANNING UNIT VII

CASE 124-SA-2018

Prepared for:

Princess Hayden LLC  
6623 North Scottsdale Road  
Scottsdale, AZ 85250

Prepared by:

Kimley-Horn & Associates, Inc.  
7740 North 16<sup>th</sup> Street, Suite 300  
Phoenix, AZ 85020



Expires: 9/30/20



# Crossroads East Planning Unit VII

MASTER WATER REPORT

JULY 2018

Prepared By:

**Kimley»»Horn**

## Contents

1.0 Introduction .....	1
1.1 Project Description .....	1
1.2 Site Location .....	1
1.3 Purpose .....	1
1.4 Objectives .....	1
2.0 Design Documentation .....	2
2.1 Design Procedures, Policies, and Methodologies.....	2
2.2 Previous Studies .....	2
3.0 Description of Existing Water Infrastructure.....	3
3.1 Existing Water Infrastructure .....	3
4.0 Demands .....	4
4.1 General.....	4
4.2 sale parcel water demands.....	4
4.3 remainder of planning unit vii water demands .....	5
5.0 DATA ANALYSIS METHODS .....	6
5.1 DESIGN CRITERIA.....	6
6.0 results .....	7
6.1 proposed water system layout .....	7
6.2 Water system analysis results .....	7
6.3 conformance to previous studies .....	8
6.4 proposed special water facilities .....	9
6.5 project phasing.....	9
8.0 Conclusion .....	10
8.1 Overall Project .....	10
9.0 References.....	11

## Appendices

Appendix A – Vicinity Map

Appendix B – Land Use Map, Planning Unit Layout, and ASLD Proposed Zoning Districts

Appendix C – Existing Conditions Water Infrastructure Exhibit and City of Scottsdale Quarter Section Maps

Appendix D – Proposed Conditions Water Infrastructure Exhibit

Appendix E – Crossroads East Preliminary Planning Analysis by Coe and Van Loo Consultants, June 2009

Appendix F – Fire Flow Test Results and WaterCAD Analysis Results

## 1.0 INTRODUCTION

### 1.1 PROJECT DESCRIPTION

A new development will be located on a portion of Arizona State Land Department (ASLD) Crossroads East Planning Unit VII that was purchased at public auction on February 13, 2018. The project will include a multi-family development as well as supporting roadway, utility, drainage, and site infrastructure.

### 1.2 SITE LOCATION

Planning Unit VII encompasses approximately 111 acres in north Scottsdale, near the northwest corner of Hayden Road and the Princess Boulevard alignment. Approximately 47 acres of Planning Unit VII (hereinafter known as the Sale Parcel) was purchased from ASLD by Princess-Hayden LLC. The Sale Parcel is located in a portion of the Northeast Quarter of Section 35, Township 4 North, Range 4 East of the Gila and Salt River Base and Meridian in Maricopa County, Arizona. See **Appendix A** for the Vicinity Map. The Sale Parcel is zoned PDC (R-5 and C-2). More specifically, the Sale Parcel is bounded by the future Mayo Boulevard alignment and vacant undeveloped desert to the north, Hayden Road to the east, Princess Boulevard and existing multi-family and hotel developments to the south, and vacant undeveloped desert to the west. The site slopes from the northeast to the southwest at approximately 1.8%. Refer to **Appendix B** for the Land Use Map.

### 1.3 PURPOSE

This Master Water Report for Crossroads East Planning Unit VII is intended to satisfy the City of Scottsdale water master planning requirement of the Development Agreement recorded against the property (19-ZN-2002#2) for Planning Unit VII, as well as more specific guidelines for the Sale Parcel development in accordance with the City of Scottsdale sewer guidelines and standards. It provides a description of the water system requirements (demands), infrastructure location and sizing, and phasing for Planning Unit VII.

### 1.4 OBJECTIVES

This Master Water Report provides an infrastructure plan for the development of Planning Unit VII that will meet the City of Scottsdale guidelines. The report will demonstrate the following:

1. Water demands for the Sale Parcel development and the remainder of Planning Unit VII
2. Location and size of proposed water infrastructure improvements necessary to serve the Sale Parcel development and future development of the surrounding Planning Unit VII

## 2.0 DESIGN DOCUMENTATION

### 2.1 DESIGN PROCEDURES, POLICIES, AND METHODOLOGIES.

The existing and proposed water network surrounding Planning Unit VII was analyzed using the computer program WaterCAD by Bentley. The water analysis utilizes the Hazen-Williams equation for pressurized pipes. The existing water system pressures and flows are based on two fire flow tests performed on May 2, 2018. After calibration of the water system to the flow tests, the average daily demand, maximum daily demand, peak hour demand, and maximum daily demand plus fire flow were analyzed to determine the size of the water infrastructure in accordance with the following standards as outlined in Chapter 6 of the 2018 City of Scottsdale Design Standards and Policy Manual (DS&PM).

Refer to **Appendix F** for the Fire Flow Test Results.

### 2.2 PREVIOUS STUDIES

Previous studies of the area include the Crossroads East Preliminary Planning Analysis prepared by Coe and Van Loo, dated June 2009 (CVL Study). This study examined the Crossroads East land area, which includes Planning Unit VII. The Crossroads East Planning Units cover approximately 900 acres; and the limits of this area is depicted on the Planning Unit Layout in **Appendix B**. This study calculated the demands of the parcels based upon maximum floor area ratios and rates determined in the City of Scottsdale Integrated Wastewater Report. See **Appendix E** for the Crossroads East Preliminary Planning Analysis by Coe and Van Loo Consultants, Inc.

## 3.0 DESCRIPTION OF EXISTING WATER INFRASTRUCTURE

### 3.1 EXISTING WATER INFRASTRUCTURE

Planning Unit VII currently consists of vacant desert and a gravel parking area that has previously been used for regional event parking. No water infrastructure currently exists on-site.

A 12-inch PVC water main exists in Princess Boulevard on the southwest portion of the Sale Parcel. This 12-inch water main provides water service to the residential developments on the south side of Princess Boulevard. The water main continues west along Princess Boulevard.

A 12-inch DIP water main is located in Hayden Road along the east side of Planning Unit VII. This 12-inch water main increases to a 16-inch DIP north of Mayo Boulevard.

A 66-inch SCP water transmission main is located in Haden Road adjacent to the Sale Parcel. This transmission main is not available for connection and will not be affected with this development.

The water main infrastructure surrounding Planning Unit VII is within Pressure Zone 4 of the City of Scottsdale water system. Refer to **Appendix C** for the Existing Conditions Water Infrastructure Exhibit and the City of Scottsdale Quarter Section Maps.

## 4.0 DEMANDS

### 4.1 GENERAL

The projected water demands for Planning Unit VII will be determined based on parcel size, the allowable zoning districts, and the ASLD land use budget. This report will review the demands for the Sale Parcel, as well as the remainder of Planning Unit VII, which encompasses approximately 64 acres and is hereinafter referred to as the Remainder Parcel. Refer to **Appendix B** for the ASLD Proposed Zoning Districts. These districts are anticipated to be approved by the City of Scottsdale in mid-2018. As shown on the ASLD Proposed Zoning Districts exhibit, the southern portion of Planning Unit VII is restricted to R-5 zoning, and the remainder is permitted for I-1, PRC, PCP, C-2, C-3, C-O, and R-5.

For the purposes of this report, all areas of Planning Unit VII that are permitted for uses other than R-5 will be assumed to be I-1 with office park use, and a floor area ratio (FAR) of 0.60; except for the parcel at the southwest corner of Hayden Road and Mayo Boulevard. This parcel is assumed to be C-2 with a retail use and a FAR of 0.60. Refer to **Appendix B** for the Land Use Map.

The Average Daily Demand (ADD), Maximum Daily Demand (MDD), and Peak Hour Demand (PHD) will be calculated for each parcel in accordance with Chapter 6 of the DS&PM and the assumptions noted above. Additionally, this report will assume a maximum fire flow demand of 3,900 gallons per minute (gpm) at 20 psi. It is anticipated that any buildings which are large enough to require a fire flow greater than 3,900 gpm will provide a building fire pump to supplement the flow.

### 4.2 SALE PARCEL WATER DEMANDS

As noted above, the southern portion of the Sale Parcel is restricted to R-5 zoning, and based on the Development Agreement between the City of Scottsdale and ASLD, the maximum allowable density for the R-5 zoning areas is 23 dwelling units per acre. The northern portion of the Sale Parcel is designated for C-2 zoning, and it is assumed that the use for this portion of the Sale Parcel will be used for supervised senior living, and will also maintain a maximum density of 23 dwelling units per acre. The area of the Sale Parcel allotted to R-5 zoning is 37 acres, and the area of the Sale Parcel with C-2 zoning is 10 acres. Table 1 below provides the design water demands for the Sale Parcel per Figure 6-1.2 of the DS&PM:

**Table 1: Sale Parcel Water Demands**

Zoning	Area	Land Use	Allowable Density	Maximum Dwelling Units	Average Daily Demand <sup>1</sup>		Maximum Daily Demand <sup>2</sup>		Peak Hour Demand <sup>3</sup>	
	(Acres)		(DU/Acre)		GPD	GPM	GPD	GPM	GPD	GPM
C-2	10	Senior Living	23	230	42,619	30	85,238	59	149,167	104
R-5	37	Multi-Family	23	851	157,690	110	315,381	219	551,916	383
	47			1,081	200,309	139	400,619	278	701,083	487

1. ADD is 185.3 GPD/Unit based on Figure 6.1-2 of the DS&PM and includes Inside Use and Outside Use.
2. MDD is 2.0 times the ADD.
3. PHD is 3.5 times the ADD.

### 4.3 REMAINDER OF PLANNING UNIT VII WATER DEMANDS

As previously noted, the majority of the Remainder Parcel will be designated as I-1 zoning, with a portion designated as C-2 zoning. The I-1 portion of the Remainder Parcel includes 48 acres and the C-2 portion includes 16 acres. Table 2 below provides the design flow rates for the Remainder Parcel per Figure 6.1-2 of the DS&PM:

**Table 2: Remainder Parcel Water Demands**

Zoning	Area	Land Use	Maximum Building Area	Average Daily Demand <sup>1</sup>		Maximum Daily Demand <sup>2</sup>		Peak Hour Demand <sup>3</sup>	
	(Acres)		(SF)	GPD	GPM	GPD	GPM	GPD	GPM
I-1	48	Office Park	1,254,528	752,717	523	1,505,434	1,045	2,634,509	1,830
C-2	16	Retail	418,176	334,541	232	669,082	465	1,170,893	813
	64			1,087,258	755	2,174,515	1,510	3,805,402	2,643

1. ADD is 0.7 GPD/SF (Retail) and 0.6 GPD/SF (Office) based on Figure 6.1-2 of the DS&PM and includes Inside Use and Outside Use.
2. MDD is 2.0 times the ADD.
3. PHD is 3.5 times the ADD.

## 5.0 DATA ANALYSIS METHODS

### 5.1 DESIGN CRITERIA

In addition to the domestic and landscape water demands outlined in Section 4, the proposed water system model will consider a demand that is the sum of the MDD and the fire flow demand for each parcel. To be conservative, the demands will be placed at the most hydraulically remote locations in the model.

The existing water system pressure and available flow will be based on the fire flow tests performed on May 4, 2018. A reservoir and pump system will be calibrated into the model to simulate the available water flow and pressure at the connection points. Refer to **Appendix F** for the Fire Flow Test Results.

The following design criteria will be used for the proposed water system:

- Minimum pressure of 50 psi for ADD, MDD, and PHD model scenarios
- Minimum pressure of 30 psi for MDD + Fire Flow model scenario
- Maximum pipe velocity of five feet per second for ADD, MDD, and PHD scenarios

Section 6-1.400 of the DS&PM provides general requirements for water main sizes based on mile and half-mile streets, and the CVL Study also provided recommendations for water main sizing throughout the Crossroads East development area.

## 6.0 RESULTS

### 6.1 PROPOSED WATER SYSTEM LAYOUT

As previously noted, existing water mains are present in the adjacent portions of Princess Boulevard and Hayden Road. The proposed water system for the Sale Parcel and the Remainder Parcel will connect to these existing water mains. The water main infrastructure noted below is anticipated to include fire hydrants with spacing per Section 6-1.502 of the DS&PM.

#### Sale Parcel Water Infrastructure

An existing 12-inch PVC water main is present within Princess Boulevard, along the south half of the Sale Parcel. This 12-inch water main will be extended to the west approximately 1,950 linear feet to connect with the existing 12-inch DIP water main in the east side of Hayden Road.

A new 16-inch water main will be constructed in the south side of the future Mayo Boulevard alignment and will connect to the existing 16-inch DIP water main in Hayden Road. This new 16-inch water main will extend west approximately 1,600 linear feet in the future Mayo Boulevard alignment to the northwestern corner of the Sale Parcel.

A new 16-inch water main will connect the Princess Boulevard 12-inch water main and the 16-inch Mayo Boulevard water main. This new 16-inch water main will be placed within the east half of the future 78<sup>th</sup> Street alignment, which bisects the western portion of the Sale Parcel.

#### Remainder Parcel Water Infrastructure

The City of Scottsdale Integrated Water Resources Master Plan recommends a well site within Planning Unit VII. The well site is anticipated to require an area of approximately 150 feet by 150 feet, and is anticipated to be sited on the C-2 portion of the Remainder Parcel. The exact location and area of the well site will be determined at the time of the C-2 portion development.

No additional water infrastructure is anticipated for the C-2 portion of the Remainder Parcel. For development of the western portion of the Remainder Parcel, the 16-inch water main in the future Mayo Boulevard alignment will need to be extended west to the future intersection of the Mayo Boulevard alignment and the future Miller Road alignment. Additionally, it is anticipated that a 12-inch or larger water main will be installed in the future Miller Road alignment with the development of the western portion of the Remainder Parcel. This new 12-inch water main will connect the Princess Boulevard 12-inch water main with the Mayo Boulevard 16-inch water main.

Refer to **Appendix D** for the Proposed Conditions Water Infrastructure Layout.

### 6.2 WATER SYSTEM ANALYSIS RESULTS

The aforementioned water system was modeled using the WaterCAD computer program. The existing system pressure and flow was based on the fire flow test results from May 4, 2018. The following demand scenarios were modeled: Average Daily Demand (ADD), Maximum Daily Demand (MDD), Peak Hour Demand (PHD), and Maximum Daily Demand plus Fire Flow. Flow demands were placed at the north end

of the C-2 portion of the Sale Parcel, the midpoint of the R-5 portion of the Sale Parcel, and at the northwest corner of the Remainder Parcel. These locations were selected due to their hydraulically remote positions, as well as being higher in elevation than the connection points. These locations and demands are conservative and it is anticipated that actual future demands and locations will provide greater flow and pressure than is shown by this model. Refer to Table 3 for the Water System Model Results.

**Table 3: Water System Model Results**

Demand Node	ADD		MDD		PHD		MDD + Fire Flow	
	Flow (GPM)	Pressure (PSI)	Flow (GPM)	Pressure (PSI)	Flow (GPM)	Pressure (PSI)	Flow (GPM)	Pressure (PSI)
Sale Parcel C-2	30	68.9	59	63.8	104	57.2	59	33.3
Sale Parcel R-5	110	76.2	219	71.1	383	64.7	219	41.5
Remainder Parcel	755	69.5	1,510	64.1	2,643	56.6	5,410	30.2

Refer to **Appendix F** for the WaterCAD Analysis Results.

### 6.3 CONFORMANCE TO PREVIOUS STUDIES

As previously noted, Planning Unit VII was part of the CVL Study in 2009. Since the CVL Study was completed, ASLD has revised the configuration, size, and location of the various planning units within Crossroads East. Additionally, the future roadway alignments of Mayo Boulevard, Miller Road, and others have changed since the CVL Study was completed.

The CVL Study recommended a 16-inch water main in the future Mayo Boulevard alignment, and a 12-inch water main in the future Miller Road alignment, which is consistent with the recommendations presented herein. Additionally, these water mains conform to City of Scottsdale requirements for 12-inch water mains in mile and half-mile alignment streets.

The CVL did not provide recommendations for water mains within Princess Boulevard or the future 78<sup>th</sup> Street alignment. Refer to **Appendix E** for the CVL Study.

Kimley-Horn prepared a Master Water Report for Crossroads East Planning Unit IV in July 2012. This report covered the area bounded by Scottsdale Road, Mayo Boulevard, the future Miller Road alignment, and Princess Boulevard, which is currently known as Planning Unit III. At the time of this report, the alignment of Miller Road was planned to be further east than the current configuration, thereby decreasing area covered by the study.

The previous Kimley-Horn study recommended that a 16-inch water main be installed in Miller Road between Princess Boulevard and the Loop 101 freeway. The 16-inch water main recommendation was based on prior conversations with previous City of Scottsdale staff. Based on the analysis presented in this report, a 12-inch water main appears to be adequate to service future development along Miller Road.

## 6.4 PROPOSED SPECIAL WATER FACILITIES

Portions of the water main may need to be constructed with extra protection due to drainage channel, culvert, or other crossings as specified by Maricopa Association of Governments (MAG) Standard Detail 404.

## 6.5 PROJECT PHASING

The Sale Parcel infrastructure noted in Section 6.1 will be constructed first, and the infrastructure for the remainder of Planning Unit VII will be constructed at a later date. The Sale Parcel infrastructure will be installed prior to, or concurrently with, the on-site development which is anticipated in 2018 or 2019. Individual developments within Planning Unit VII will need to provide site-specific water system modelling to justify site demands and infrastructure sizing.

The timing and phasing of the water main infrastructure for the remainder of Planning Unit VII will depend upon the configuration of future sale parcels.

## 8.0 CONCLUSION

### 8.1 OVERALL PROJECT

Based on the results of this Water Master Plan, the following can be concluded:

- Water main extensions can be installed to provide adequate pressure and flow to Planning Unit VII.
- The water demand calculations are based on conservative land use assumptions, and the actual water demands will likely be less than the demands presented in this report.
- Future developments within Planning Unit VII will present site-specific demands and models.
- This Water Master Plan is generally consistent with the CVL Study that was prepared in 2009 for Crossroads East.

This Water Basis of Design Report is intended to provide a level of assurance that water service can be provided to the Sale Parcel and the Remainder Parcel portions of Planning Unit VII. It is also intended to provide guidance for future developments within Planning Unit VII.

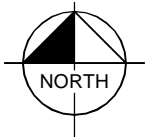
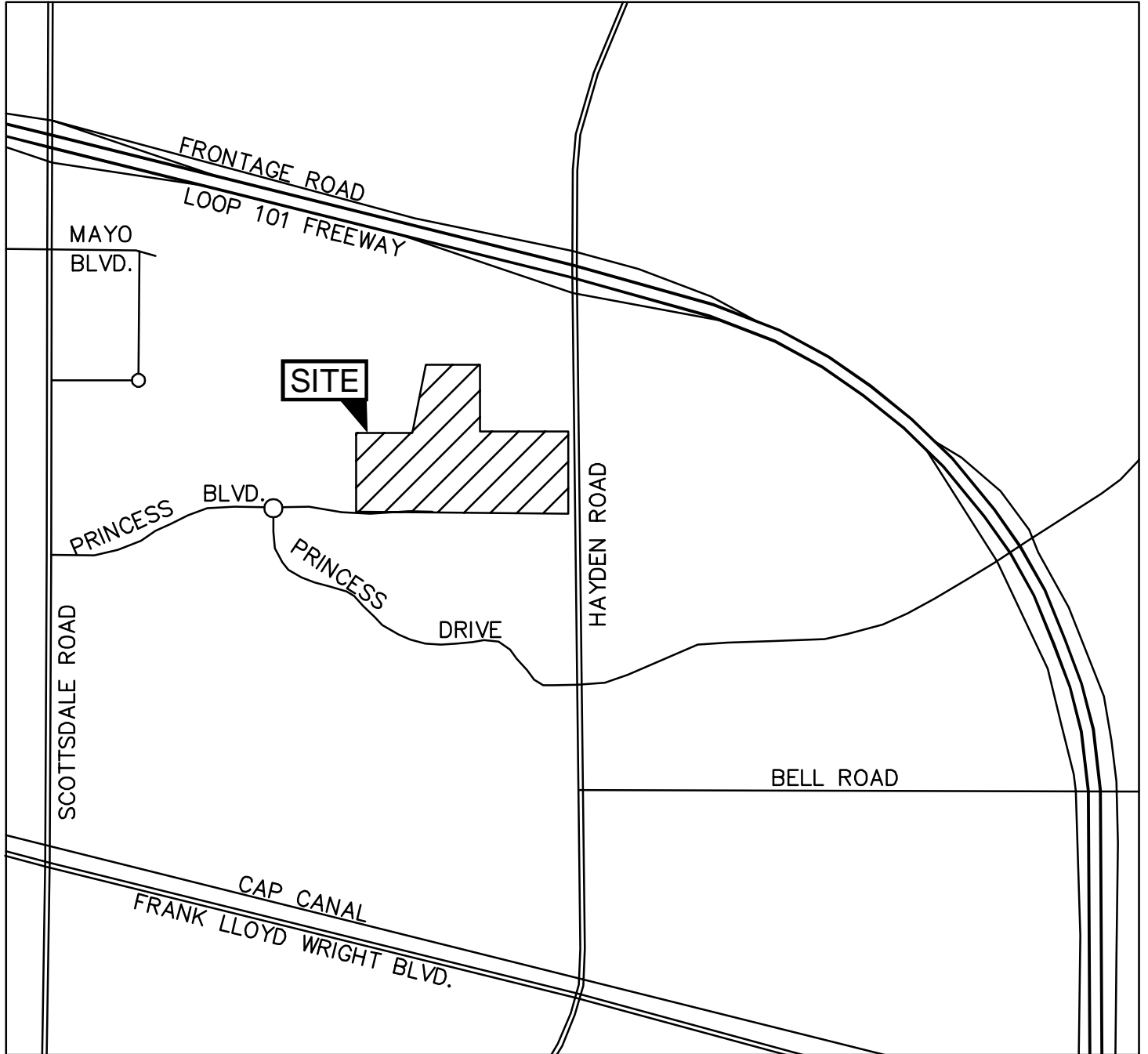
## 9.0 REFERENCES

City of Scottsdale, *Design Standards and Policies Manual, Chapter 6: Water*, January 2018.

Coe and Van Loo Consultants, Inc, *Crossroads East Preliminary Planning Analysis*, June 2009.

2017. WaterCAD v8i, Bentley Systems, Inc. and *WaterCAD User's Guide*.

## Appendix A – Vicinity Map

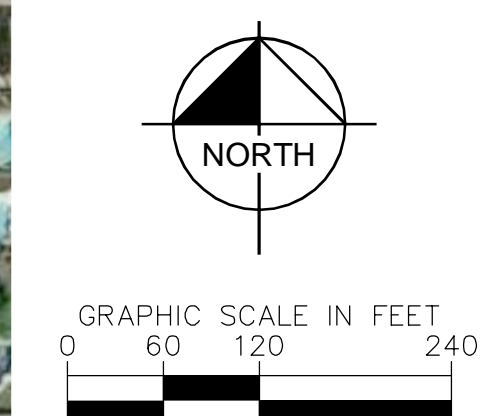
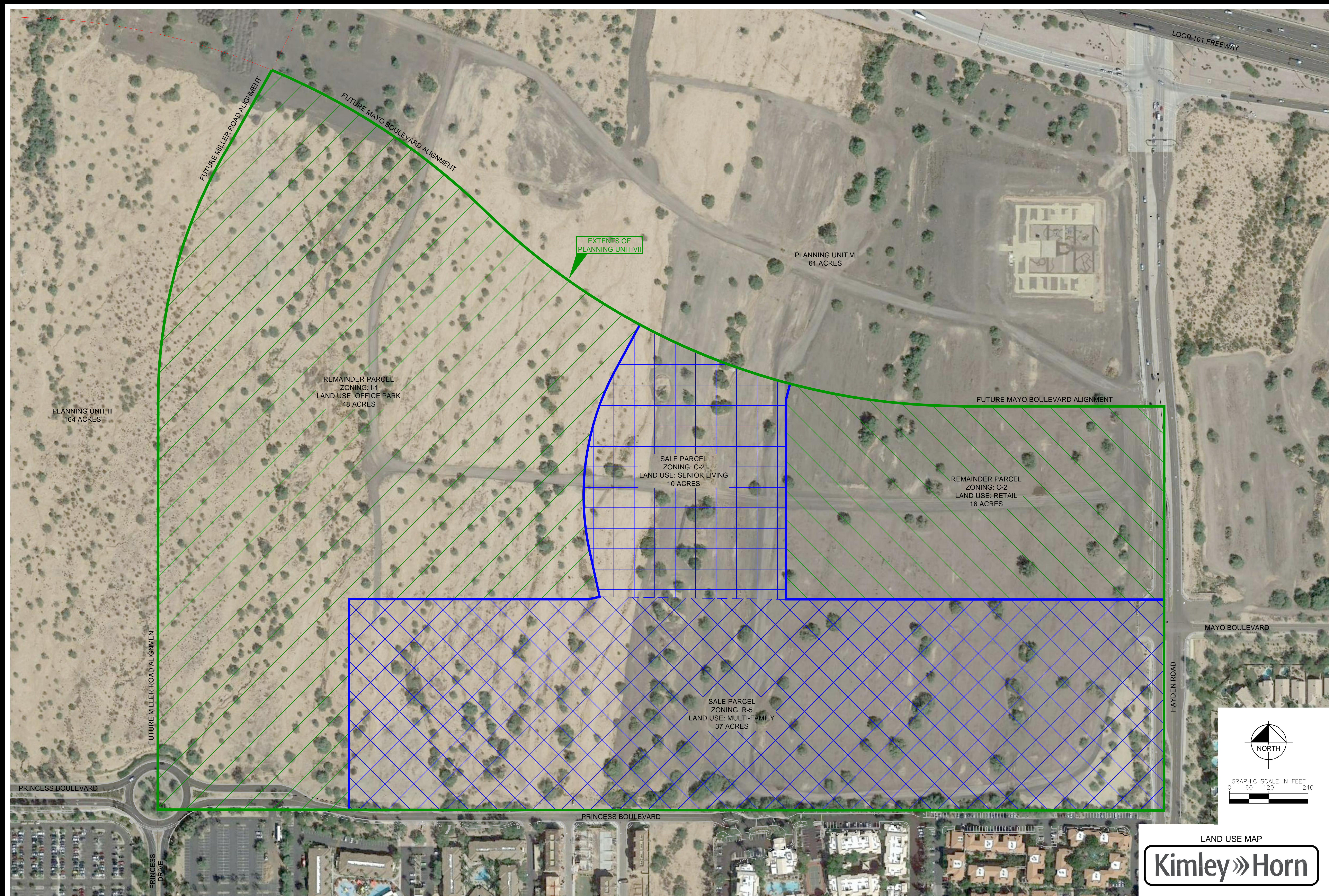


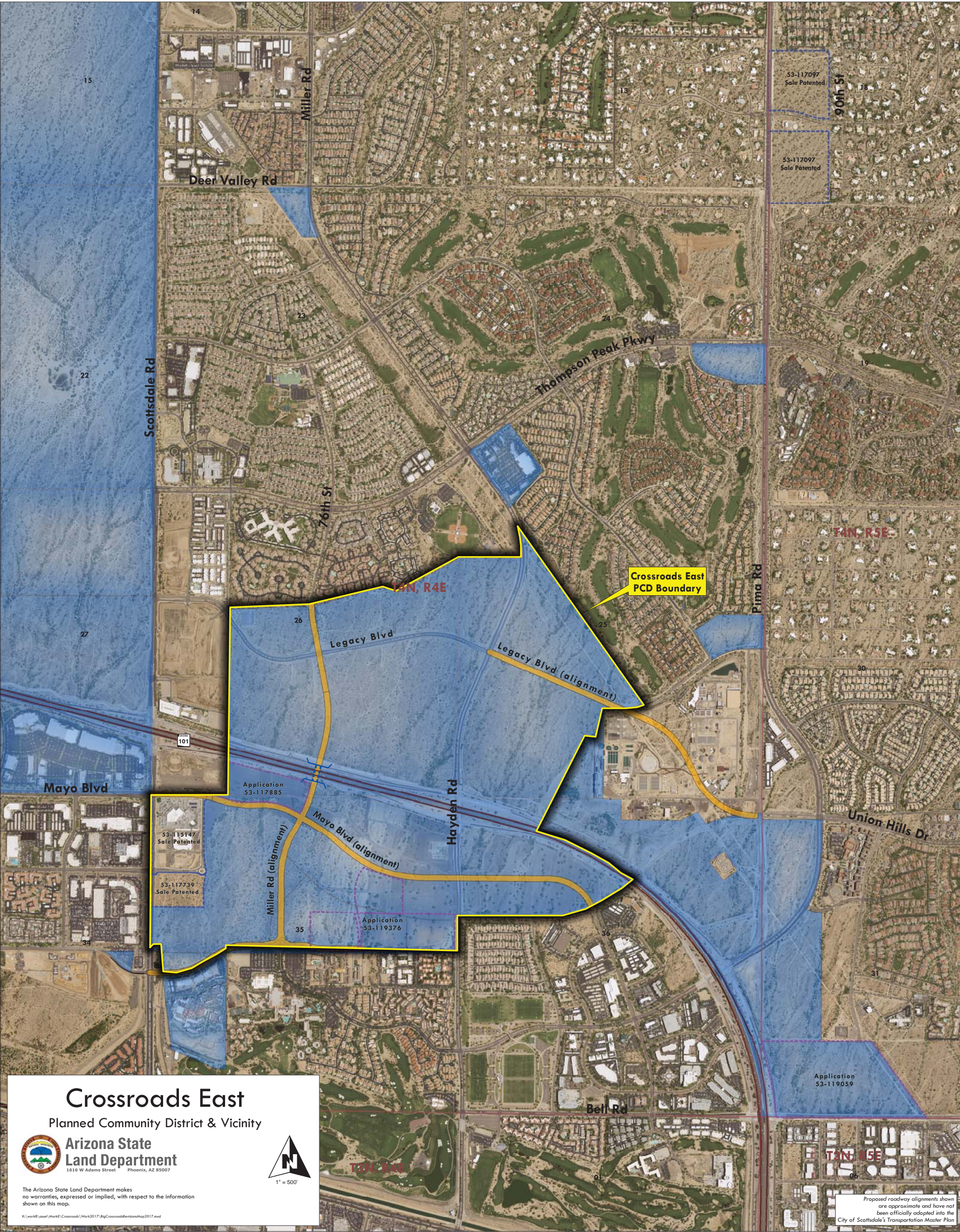
VICINITY MAP  
N.T.S.



Appendix B – Land Use Map, Planning  
Unit Layout, and ASLD Proposed  
Zoning Districts

K:\PHX\_Civil\191769004 - Hayden 50\CADD\Exhibits\2018-04-24 Land Use Map.dwg Apr. 30, 2018 trover.jones





# Crossroads East

Planned Community District & Vicinity



The Arizona State Land Department makes no warranties, expressed or implied, with respect to the information shown on this map.




1" = 500'

Proposed roadway alignments shown are approximate and have not been officially adopted into the City of Scottsdale's Transportation Master Plan

# PROPOSED PLANNING UNITS

## Roads & Alignments

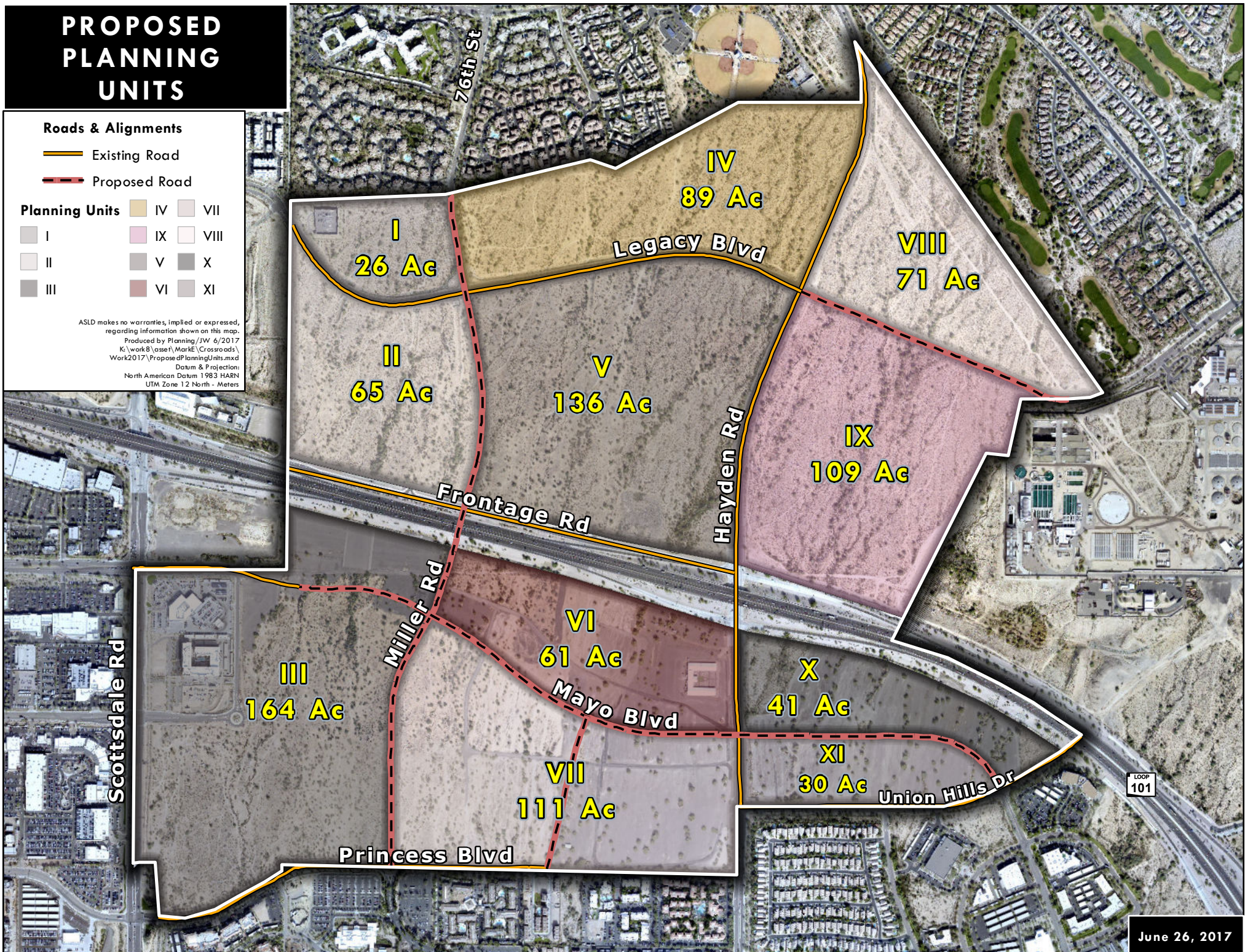
 Existing Road

 Proposed Road

## Planning Units

 I	 IX	 VIII
 II	 V	 X
 III	 VI	 XI

ASLD makes no warranties, implied or expressed, regarding information shown on this map.  
 Produced by Planning/JW\_6/2017  
 K:\work\8\asset\MapK\Crossroads\Work2017\ProposeDPlanningUnits.mxd  
 Datum & Projection:  
 North American Datum 1983 HARN  
 UTM Zone 12 North - Meters



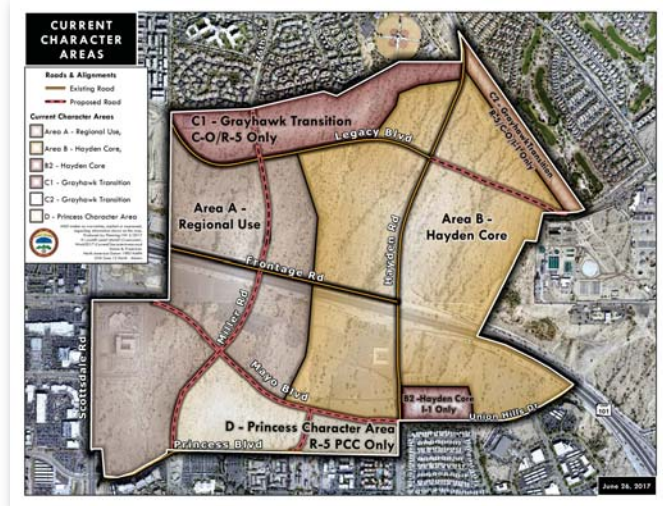
# WHERE ZONING CAN BE USED AT CROSSROADS EAST

JUNE 2017



## 2002

### CURRENT/EXISTING CHARACTER AREAS

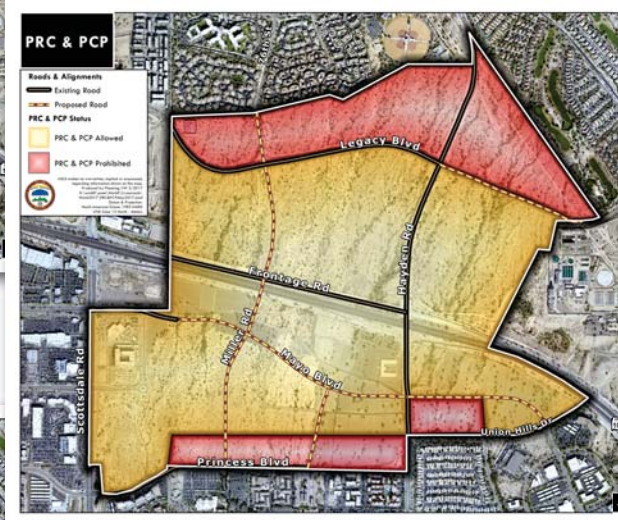
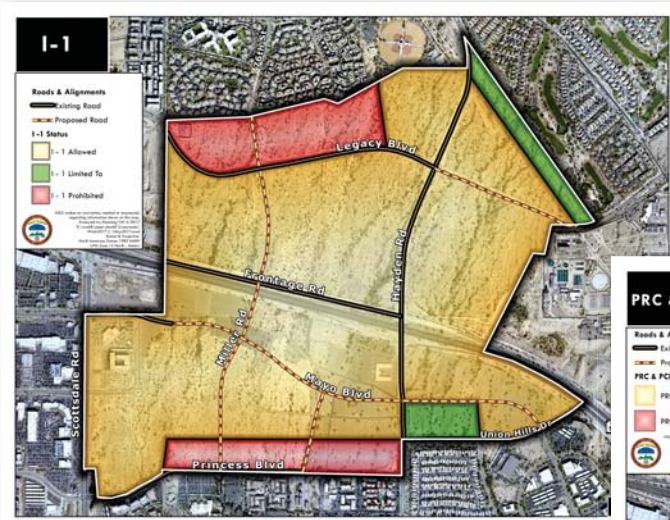


## TODAY

**LAND USE INDEX:** PRC/PCP - REGIONAL CENTER C-2/C-3 COMMERCIAL  
 R-5 MULTIFAMILY RESIDENTIAL I-1 INDUSTRIAL PARK C-O COMMERCIAL OFFICE

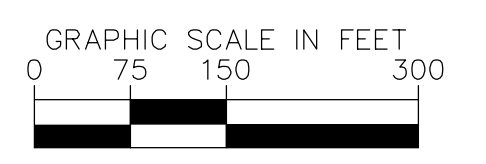
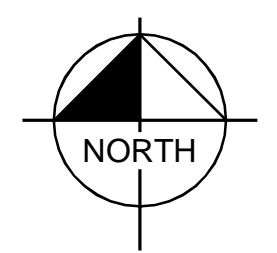
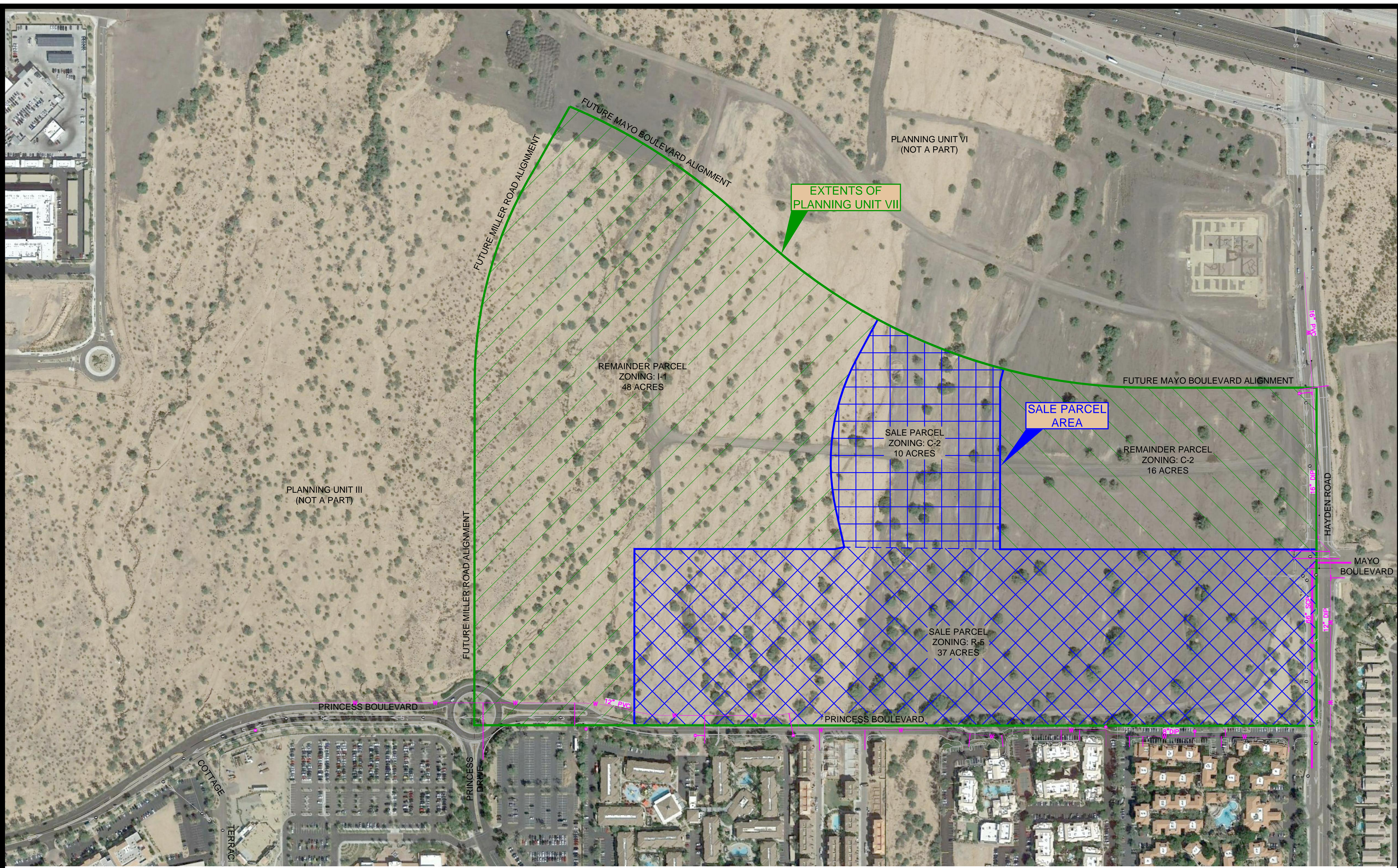
### PROPOSED ZONING DISTRICTS

LIMITED TO
  ALLOWED
  PROHIBITED



Appendix C – Existing Conditions  
Water Infrastructure Exhibit and City of  
Scottsdale Quarter Section Maps

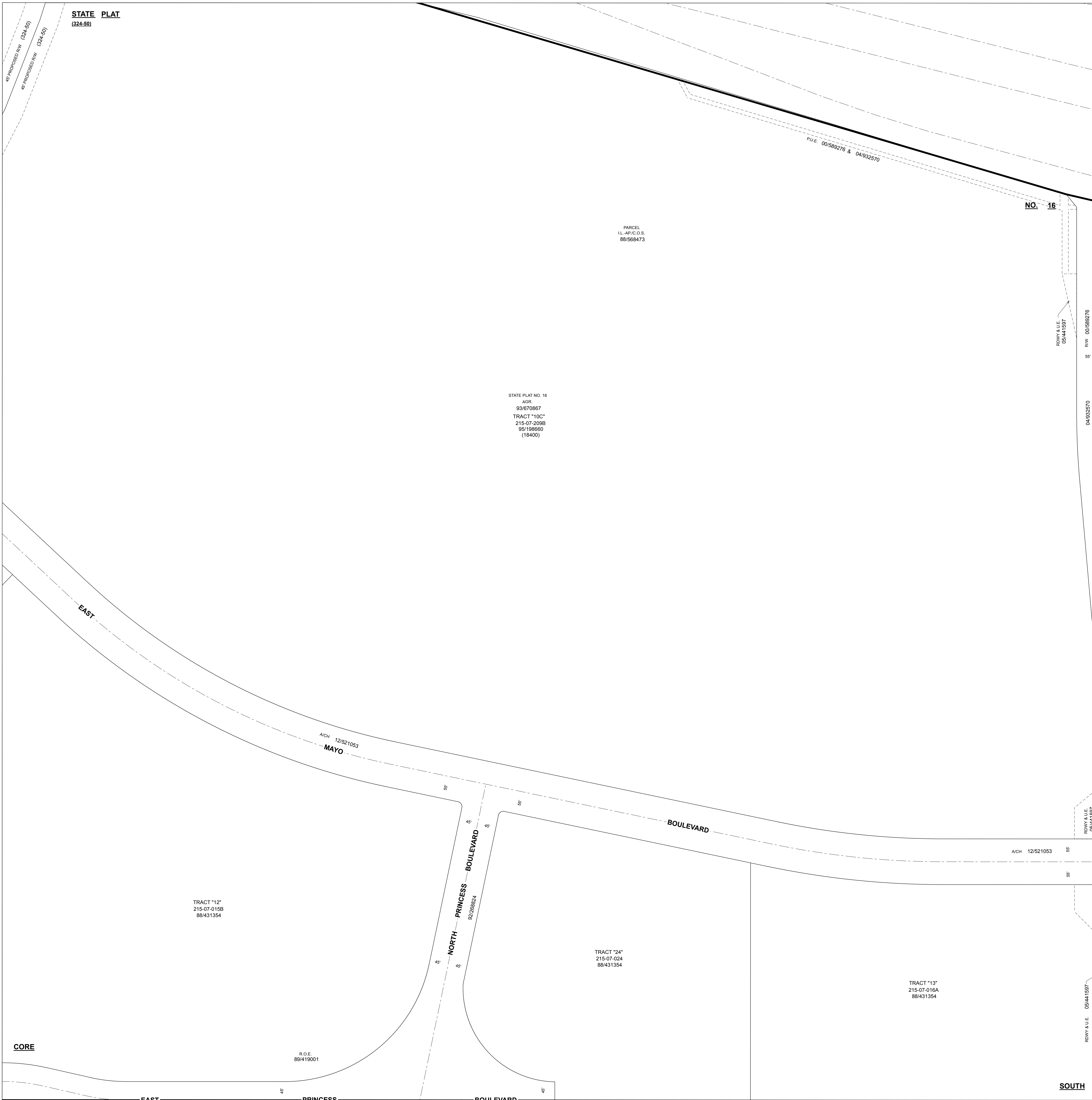
K:\PHX\_Civil\191769004 - Hayden 50\CADD\Exhibits\2018-05-04 - Exst. Water Infrastructure.dwg May 04, 2018 Garrett.Frame



EXISTING CONDITIONS WATER INFRASTRUCTURE



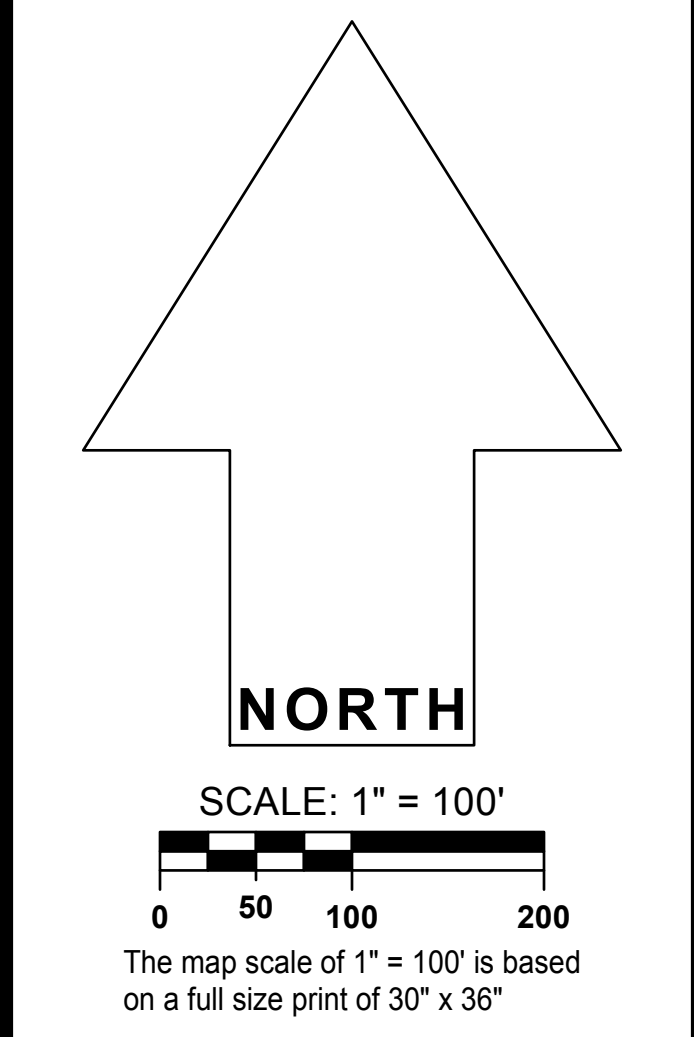
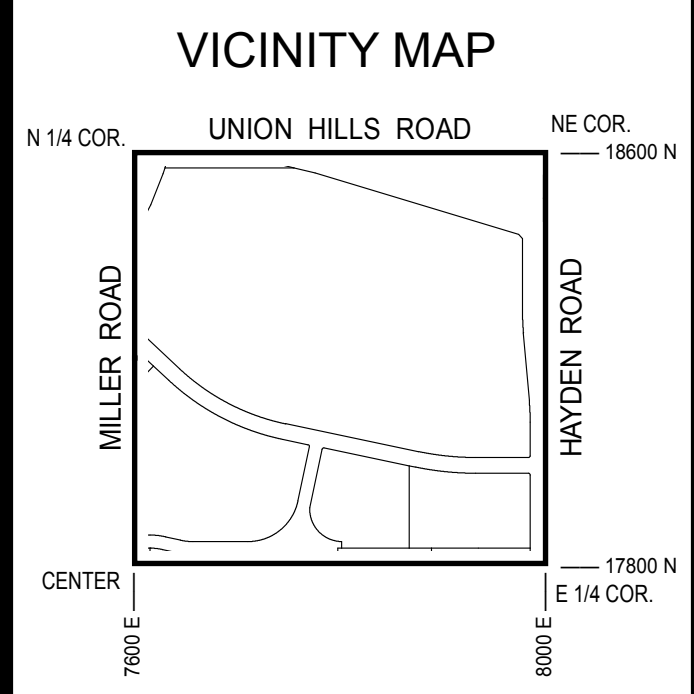
STATE PLAT  
(324-50)



**GENERAL NOTES:**

- THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7792.
- THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER, 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN AS 'CALCULATED' ON THE MAP. CORNERS AND ARE NOTED AS 'CALCULATED' ON THE MAP.

**LEGEND:**



**LAND**  
QUARTER SECTION MAP  
**38-46**  
NE 1/4 SEC. 35 T4N R4E

**CITY OF SCOTTSDALE** SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS  
3629 North Drinkwater Boulevard  
Scottsdale, Arizona 85251

**N O T I C E**

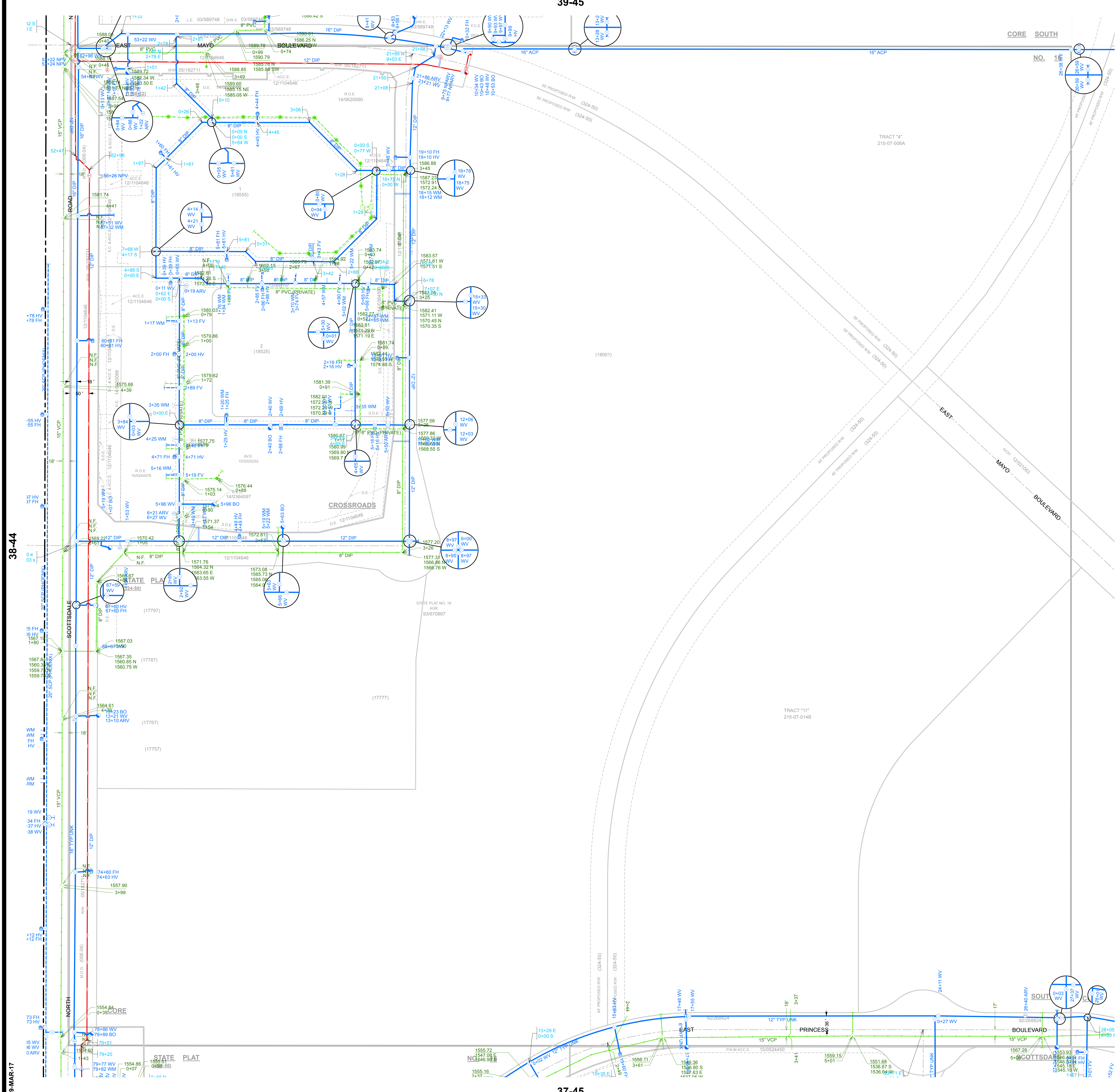
THIS DOCUMENT IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY. THE CITY OF SCOTTSDALE DOES NOT WARRANT ITS ACCURACY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE. IT SHOULD NOT BE RELIED UPON WITHOUT FIELD VERIFICATION.

THE CITY OF SCOTTSDALE

38-45

38-47

13-NOV-16

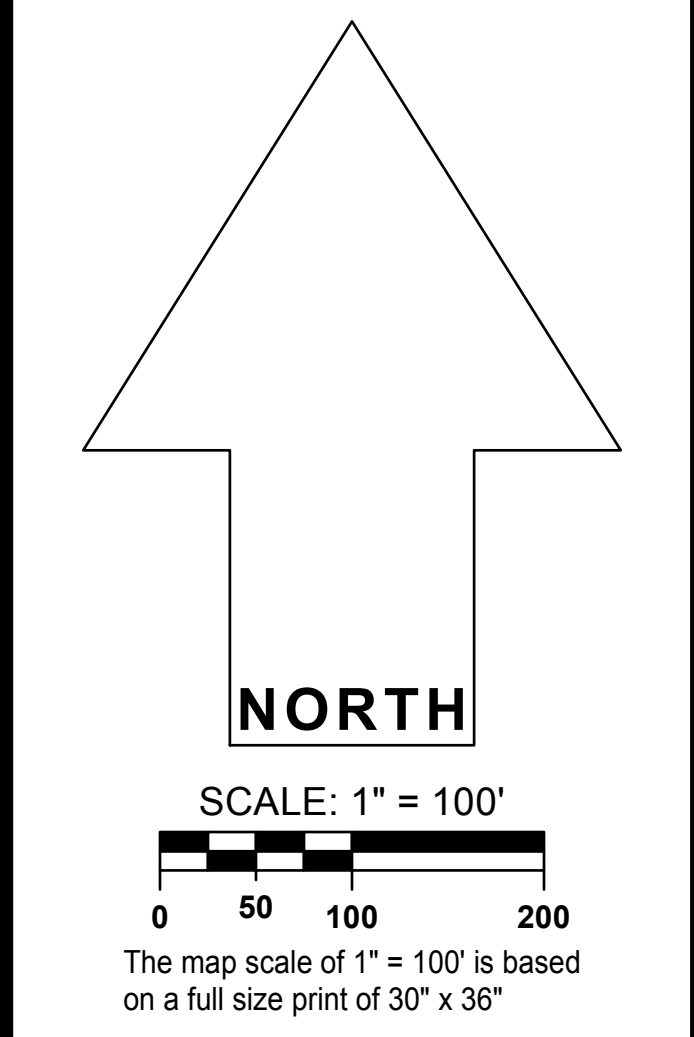
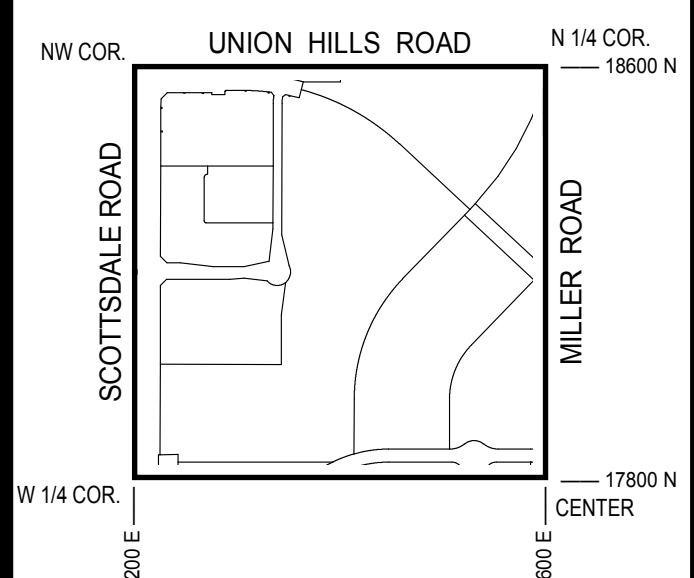


**GENERAL NOTES:**  
 \* THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7792.  
 \* THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER, 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS "CALCULATED" ON THE MAP.

**LEGEND:**

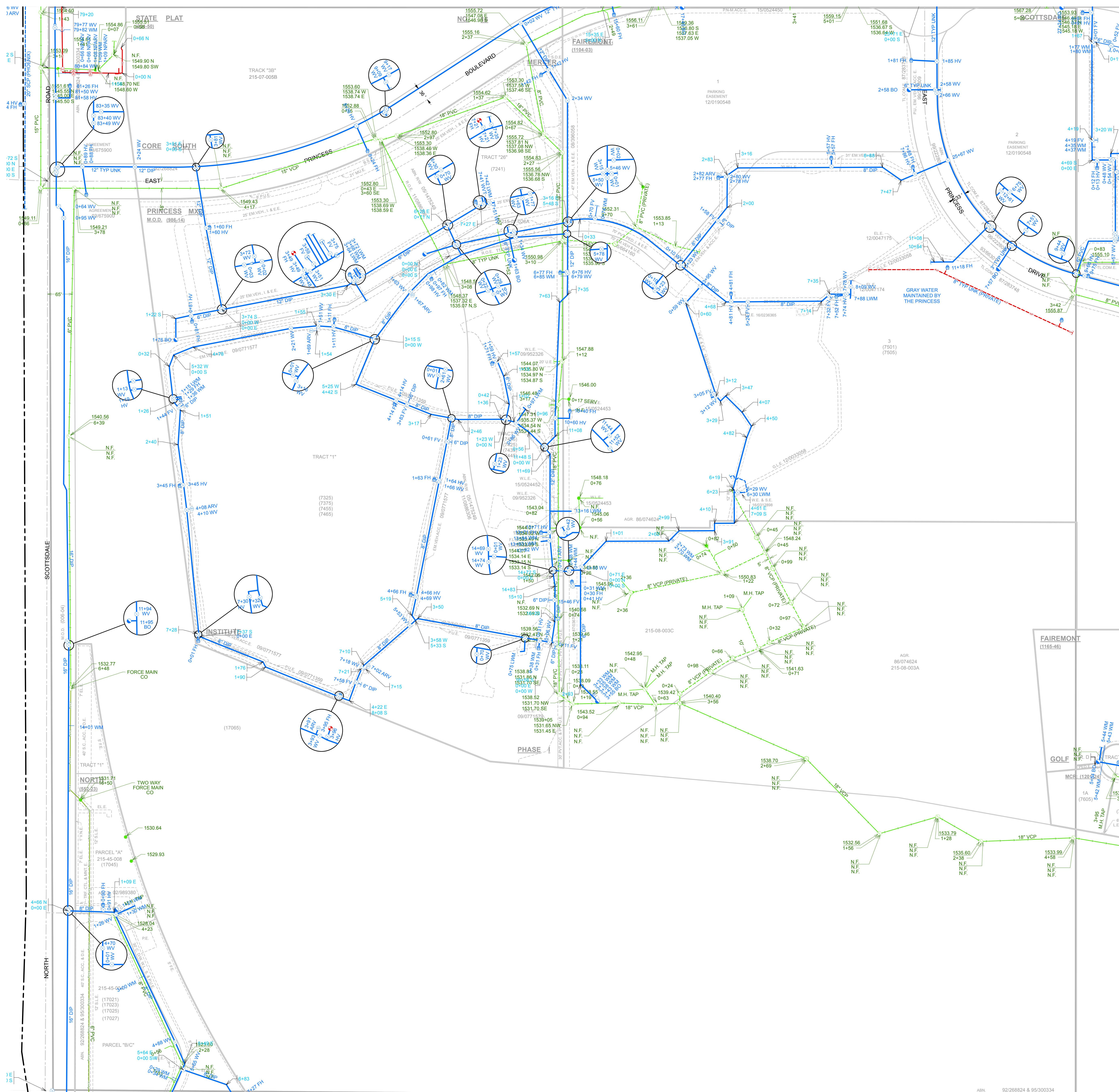
- Water Valve
- Non-potable Water Valve
- Fire Hydrant
- Water Blowoff
- Water Main Reducer
- Water Sample Station
- Water Air Release Valve
- Non-potable Water Air Release Valve
- Water Pressure Reducing Valve
- Water Vault
- Water Manhole
- Non-Potable Water Manhole
- Water Pump
- Water Main
- Non-Potable Water Main
- Fire Line
- Water Service
- Non-Scottsdale Water Main
- Sewer Manhole
- Sewer Cleanout
- Sewer Lift Station
- Sewer Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Non-Scottsdale Sewer Main
- Sewer Service

**VICINITY MAP**



**WATER & SEWER**  
 QUARTER SECTION MAP  
**38-45**  
 NW 1/4 SEC. 35 T4N R4E

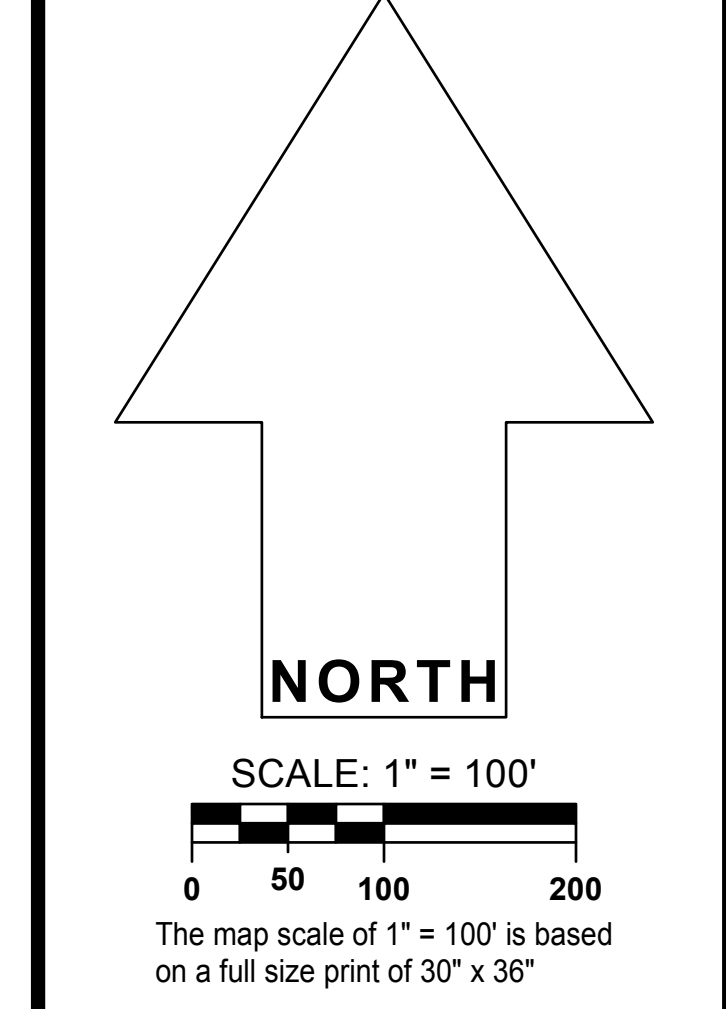
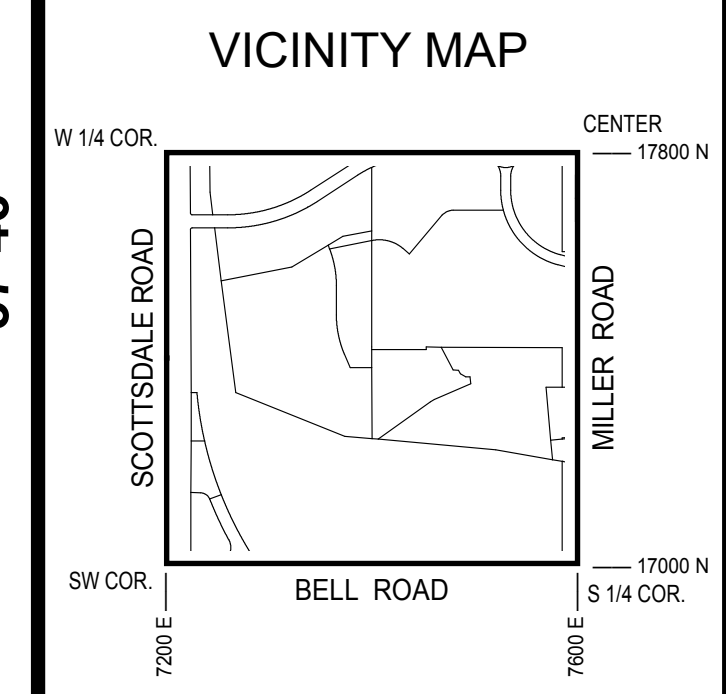
**NOTICE**  
 THIS DOCUMENT IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY. THE CITY OF SCOTTSDALE DOES NOT WARRANT ITS ACCURACY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE. IT SHOULD NOT BE RELIED UPON WITHOUT FIELD VERIFICATION.  
 THE CITY OF SCOTTSDALE  
 19-MAR-17



**GENERAL NOTES:**  
 \* THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7792.  
 \* THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER, 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS 'CALCULATED' ON THE MAP.

**LEGEND:**

Water Valve	
Non-potable Water Valve	
Fire Hydrant	
Water Blowoff	
Water Main Reducer	
Water Sample Station	
Water Air Release Valve	
Non-potable Water Air Release Valve	
Water Pressure Reducing Valve	
Water Vault	
Water Manhole	
Non-Potable Water Manhole	
Water Pump	
Water Main	
Non-Potable Water Main	
Fire Line	
Water Service	
Non-Scottsdale Water Main	
Sewer Manhole	
Sewer Cleanout	
Sewer Lift Station	
Sewer Treatment Plant	
Sewer Main - Gravity	
Sewer Main - Force	
Non-Scottsdale Sewer Main	
Sewer Service	

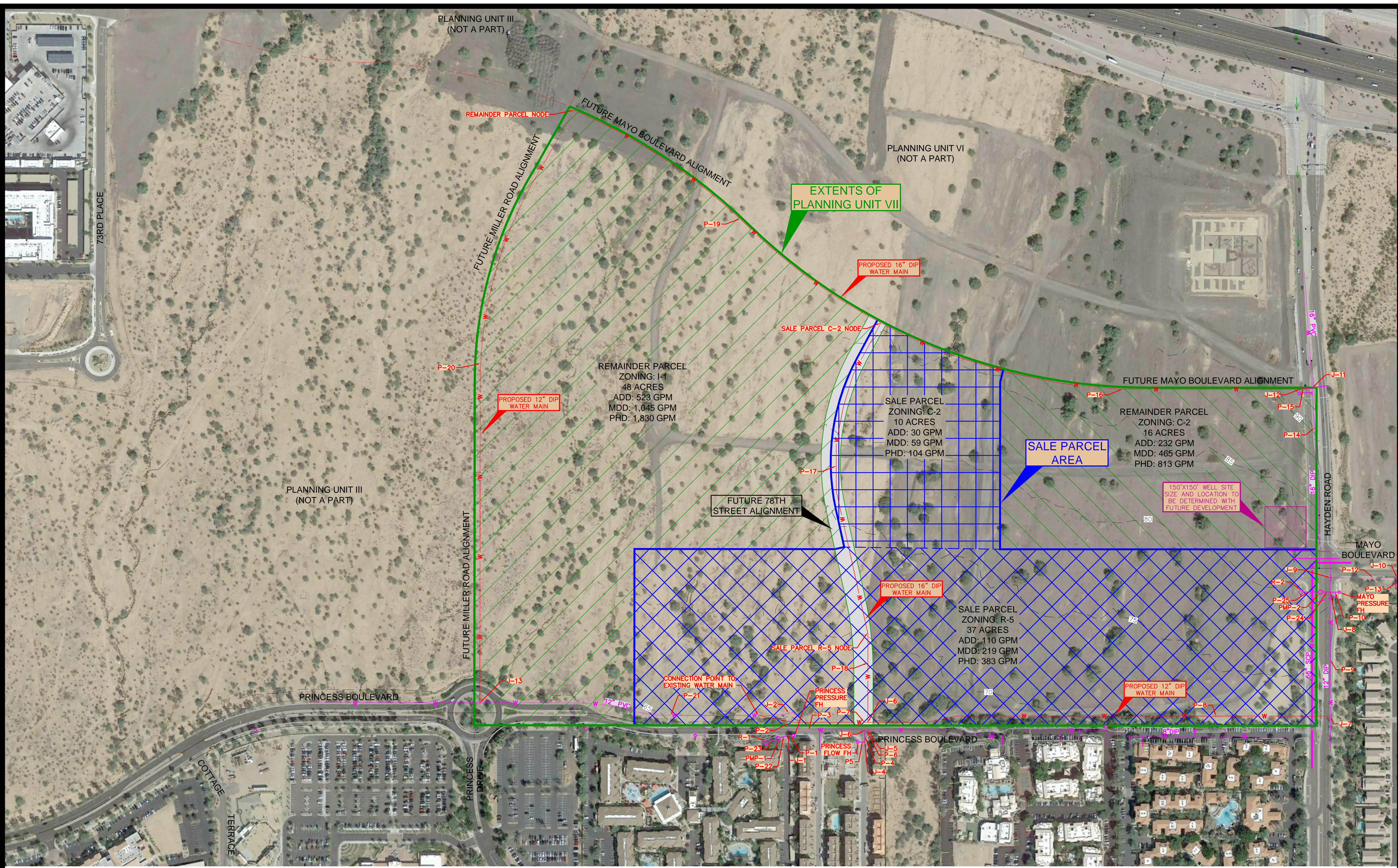


**WATER & SEWER**  
 QUARTER SECTION MAP  
**37-45**  
 SW 1/4 SEC. 35 T4N R4E

**NOTICE**  
 THIS DOCUMENT IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY. THE CITY OF SCOTTSDALE DOES NOT WARRANT ITS ACCURACY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE. IT SHOULD NOT BE RELIED UPON WITHOUT FIELD VERIFICATION.  
 THE CITY OF SCOTTSDALE

# Appendix D – Proposed Conditions Water Infrastructure Exhibit

K:\PHX\_Civil\191769004 - Hayden 50\CADD\Exhibits\2018-05-04 Prop Water Infrastructure.dwg Jul 25, 2018 traver\_jones



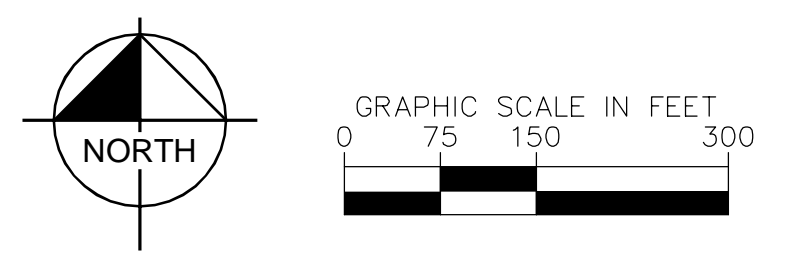
**LEGEND**

	PROPOSED SEWER MAIN
	EXISTING SEWER MAIN
	WATERCAD SYSTEM LABEL

**NOTES**

1. PROPOSED WATER MAIN LAYOUTS ARE SCHEMATIC ONLY.

ADD: AVERAGE DAILY DEMAND  
MDD: MAXIMUM DAILY DEMAND  
PHD: PEAK HOUR DEMAND



PROPOSED CONDITIONS WATER  
INFRASTRUCTURE AND WATERCAD LAYOUT

Appendix E – Crossroads East  
Preliminary Planning Analysis by Coe  
and Van Loo Consultants, June 2009

# Appendix F – Fire Flow Test Results and WaterCAD Analysis Results



# Flow Test Summary

Project Name: EJFT 18092-1  
 Project Address: 7887 E Princess Blvd, Scottsdale, AZ 85255  
 Date of Flow Test: 2018-05-04  
 Time of Flow Test: 7:30 AM  
 Data Reliable Until: 2018-11-04  
 Conducted By: Austin Gourley & Eder Cueva (EJ Flow Tests) 602.999.7637  
 Witnessed By: Jim Demarbiex (City of Scottsdale) 602.541.0586  
 City Forces Contacted: City of Scottsdale (602.228.2187)  
 Permit Number: C55277

**Note** Scottsdale requires a max static pressure of 72 psi for safety factor

## Raw Flow Test Data

Static Pressure: 88.0 PSI  
 Residual Pressure: 60.0 PSI  
 Flowing GPM: 2,227  
 GPM @ 20 PSI: 3,596

## Data with a 16 PSI Safety Factor



Static Pressure: 72.0 PSI  
 Residual Pressure: 44.0 PSI  
 Flowing GPM: 2,227  
 GPM @ 20 PSI: 3,111

## Hydrant F<sub>1</sub>

Pitot Pressure (1): 39 PSI  
 Coefficient of Discharge (1): 0.9  
 Hydrant Orifice Diameter (1): 4 inches  
 Additional Coefficient 0.83 on orifice #1

Note: These Flow Test results are from the 2018 Crossroads East Planning Unit VII Master Water Report. Flow Test results for the current project are included with Appendix G.



 Static-Residual Hydrant  
 Flow Hydrant  
 Distance Between F<sub>1</sub> and R  
 232 ft (measured linearly)  
 Static-Residual Elevation  
 1566 ft (above sea level)  
 Flow Hydrant (F<sub>1</sub>) Elevation  
 1566 ft (above sea level)  
 Elevation & distance values are approximate

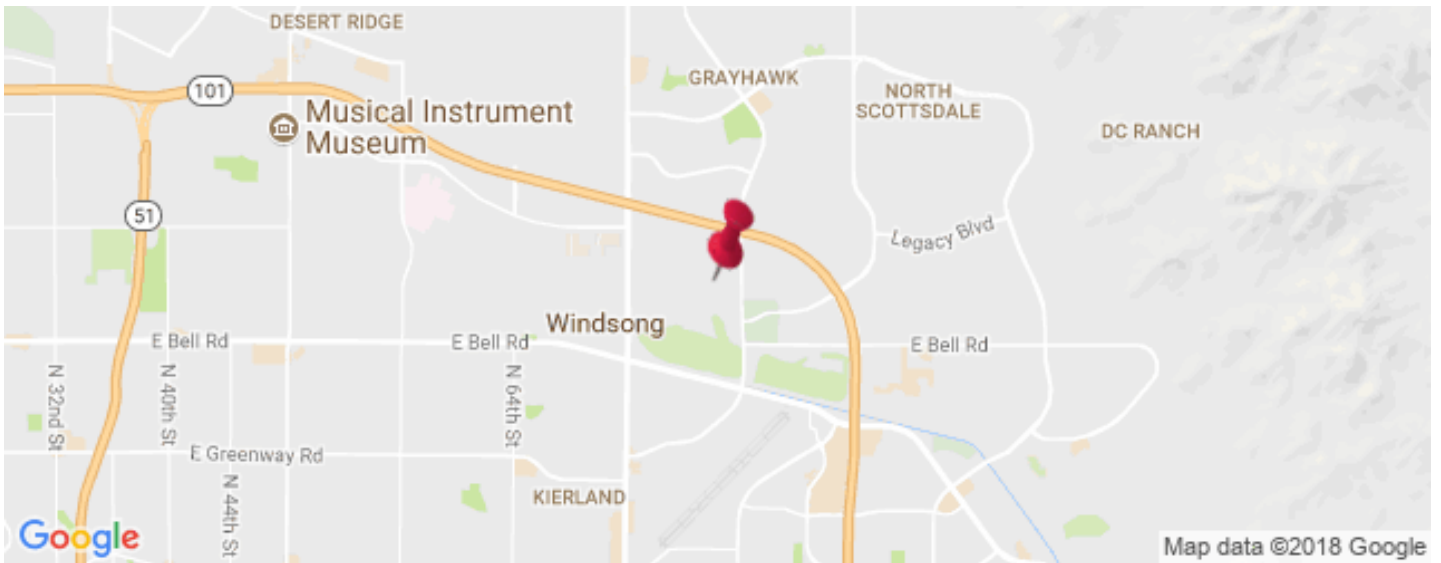
## Static-Residual Hydrant



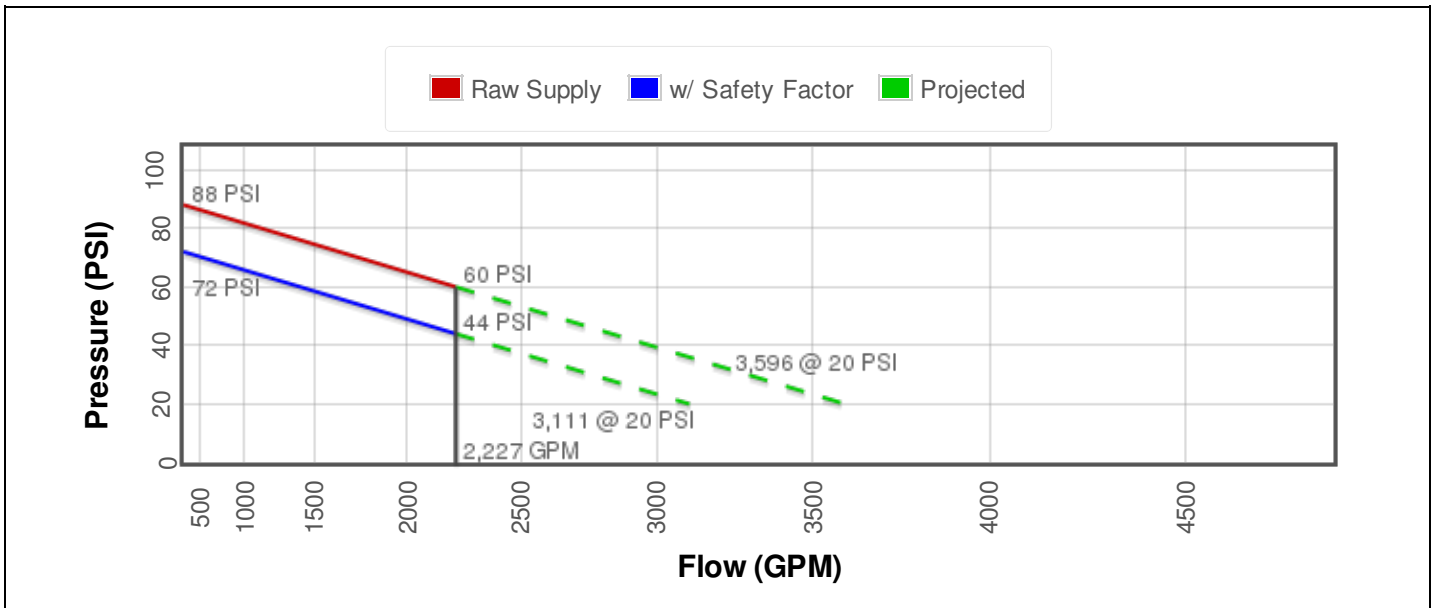
## Flow Hydrant (only hydrant F1 shown for clarity)



## Approximate Project Site



## Water Supply Curve N<sup>1.85</sup> Graph





# Flow Test Summary

Project Name: EJFT 18092-2  
Project Address: 7887 E Princess Blvd, Scottsdale, AZ 85255  
Date of Flow Test: 2018-05-04  
Time of Flow Test: 7:55 AM  
Data Reliable Until: 2018-11-04  
Conducted By: Austin Gourley & Eder Cueva (EJ Flow Tests) 602.999.7637  
Witnessed By: Jim Demarbiex (City of Scottsdale) 602.541.0586  
City Forces Contacted: City of Scottsdale (602.228.2187)  
Permit Number: C55277

**Note** Scottsdale requires a max static pressure of 72 psi for safety factor

## Raw Flow Test Data

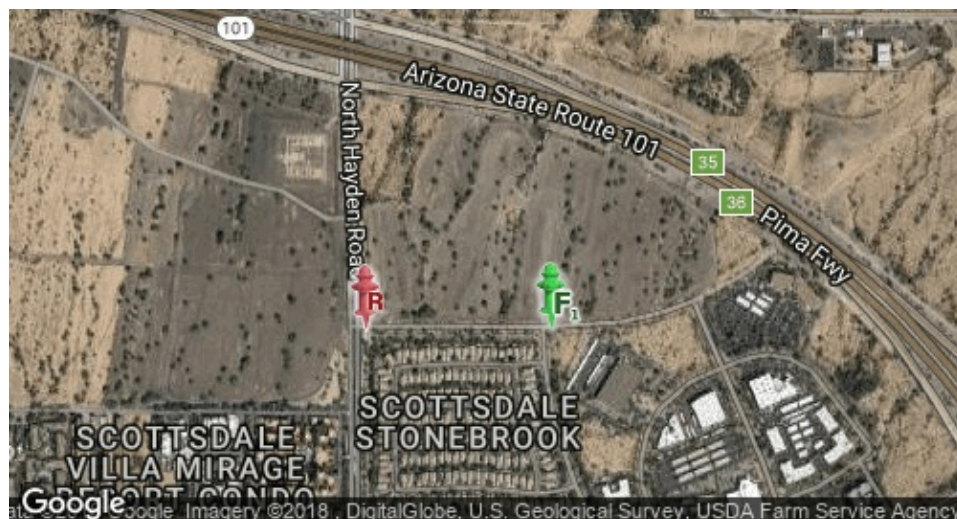
Static Pressure: 80.0 PSI  
Residual Pressure: 70.0 PSI  
Flowing GPM: 1,839  
GPM @ 20 PSI: 4,839

## Data with a 8 PSI Safety Factor

Static Pressure: 72.0 PSI  
Residual Pressure: 62.0 PSI  
Flowing GPM: 1,839  
GPM @ 20 PSI: 4,479

## Hydrant F<sub>1</sub>

Pitot Pressure (1): 30 PSI  
Coefficient of Discharge (1): 0.9  
Hydrant Orifice Diameter (1): 2.5 inches  
Pitot Pressure (2): 30 PSI  
Coefficient of Discharge (2): 0.9  
Hydrant Orifice Diameter (2): 2.5 inches



 Static-Residual Hydrant

 Flow Hydrant

Distance Between F<sub>1</sub> and R  
1268 ft (measured linearly)

Static-Residual Elevation  
1583 ft (above sea level)

Flow Hydrant (F<sub>1</sub>) Elevation  
1587 ft (above sea level)

Elevation & distance values are approximate

EJ Flow Tests, LLC

21505 North 78th Ave. | Suite 130 | Peoria, Arizona 85382 | (602) 999-7637 | www.ejengineering.com  
John L. Echeverri | NICET Level IV 078493 SME | C-16 FP Contractor ROC 271705 AZ | NFPA CFPS 1915

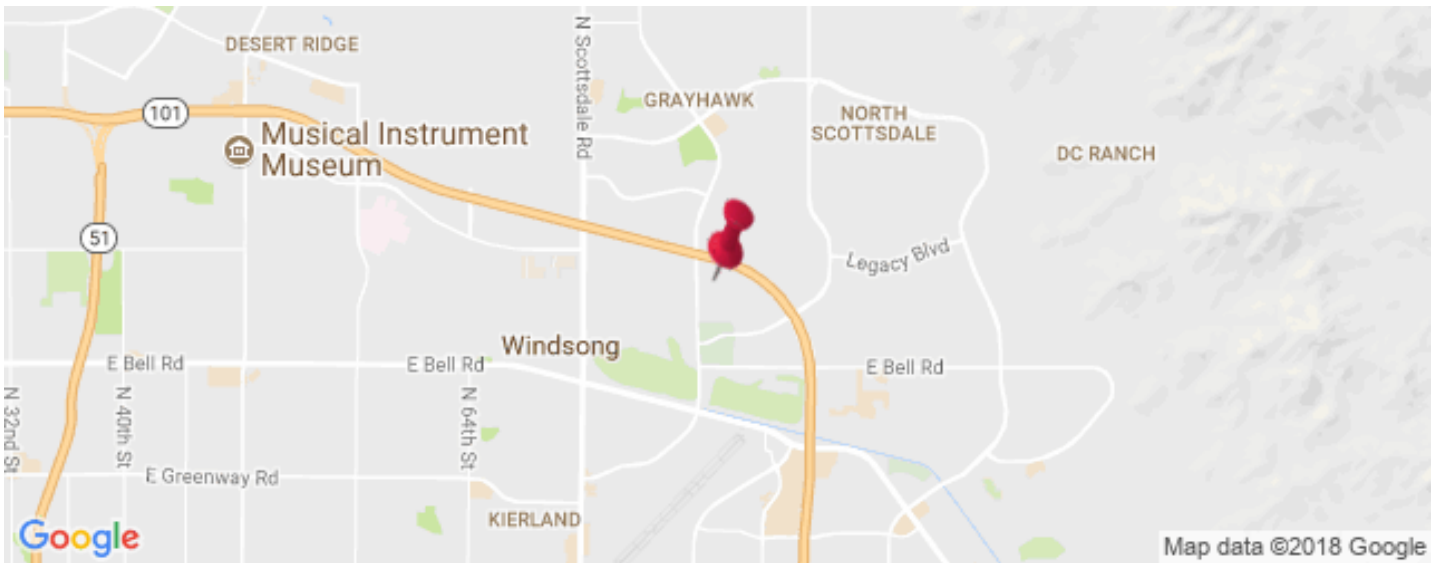
## Static-Residual Hydrant



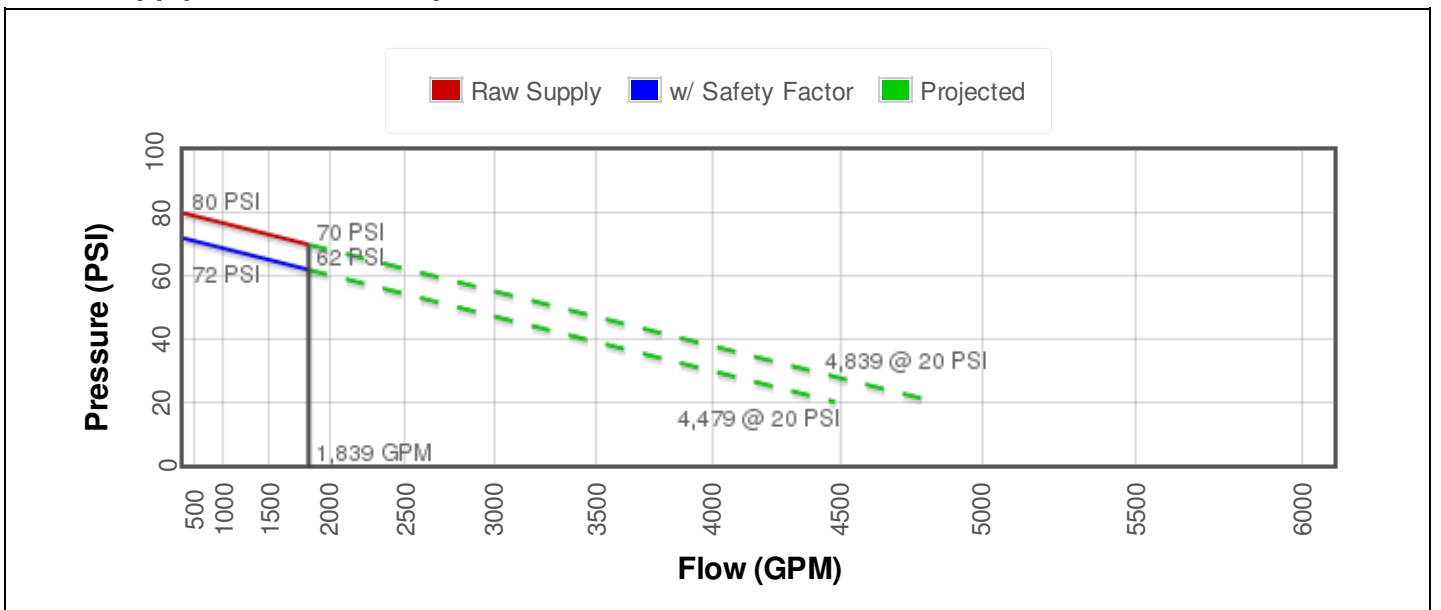
## Flow Hydrant (only hydrant F1 shown for clarity)



## Approximate Project Site



## Water Supply Curve N<sup>1.85</sup> Graph



Active Scenario: Average Day  
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	59.00	0	241.03	78.8
J-2	60.00	0	241.03	78.3
J-3	60.60	0	241.06	78.1
J-4	59.80	0	241.06	78.4
J-5	60.50	0	241.07	78.1
J-6	60.30	0	241.07	78.2
J-7	68.00	0	241.51	75.1
J-8	76.40	0	241.63	71.5
J-9	76.80	0	241.63	71.3
J-10	76.80	0	241.63	71.3
J-11	96.90	0	241.45	62.5
J-12	86.60	0	241.44	67.0
J-13	59.00	0	240.93	78.7
Remainder Parcel	80.00	755	240.73	69.5
Sale Parcel C-2	81.80	30	241.06	68.9
Sale Parcel R-5	64.91	110	241.06	76.2

Active Scenario: Average Day  
FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (in)	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P-1	PRINCESS PRESSURE FH	J-1	6.0	13	Ductile Iron	130.0	0	0.00	0.00
P-2	J-1	J-2	8.0	82	Ductile Iron	130.0	0	0.00	0.00
P-3	J-2	J-3	12.0	333	Ductile Iron	130.0	-164	0.46	0.03
P-4	J-3	J-4	8.0	28	Ductile Iron	130.0	0	0.00	0.00
P-5	J-4	PRINCESS FLOW FH	6.0	13	Ductile Iron	130.0	0	0.00	0.00
P-6	J-3	J-5	12.0	11	Ductile Iron	130.0	-164	0.46	0.00
P-7	J-6	J-5	16.0	26	Ductile Iron	130.0	164	0.26	0.00
P-8	J-7	J-6	12.0	1,691	Ductile Iron	130.0	293	0.83	0.44
P-9	J-8	J-7	12.0	481	Ductile Iron	130.0	293	0.83	0.13
P-10	J-8	MAYO PRESSURE FH	6.0	21	Ductile Iron	130.0	0	0.00	0.00
P-11	J-9	J-8	16.0	24	Ductile Iron	130.0	-602	0.96	0.01
P-12	J-9	J-10	12.0	171	Ductile Iron	130.0	0	0.00	0.00
P-13	J-10	MAYO FLOW FH	6.0	11	Ductile Iron	130.0	0	0.00	0.00
P-14	J-11	J-9	16.0	712	Ductile Iron	130.0	-602	0.96	0.17
P-15	J-12	J-11	16.0	47	Ductile Iron	130.0	-602	0.96	0.01
P-16	Sale Parcel C-2	J-12	16.0	1,567	Ductile Iron	130.0	-602	0.96	0.38
P-17	Sale Parcel R-5	Sale Parcel C-2	16.0	1,184	Ductile Iron	130.0	20	0.03	0.00
P-18	J-6	Sale Parcel R-5	16.0	323	Ductile Iron	130.0	130	0.21	0.00
P-19	Remainder Parcel	Sale Parcel C-2	16.0	1,382	Ductile Iron	130.0	-591	0.94	0.33
P-20	J-13	Remainder Parcel	12.0	2,240	Ductile Iron	130.0	164	0.46	0.20
P-21	J-2	J-13	12.0	1,146	Ductile Iron	130.0	164	0.46	0.10
P-22	J-1	PMP-1	100.0	1	Ductile Iron	130.0	0	0.00	0.00
P-23	PMP-1	R-1	100.0	100	Ductile Iron	130.0	0	0.00	0.00
P-24	J-8	PMP-2	100.0	1	Ductile Iron	130.0	-895	0.04	0.00
P-25	PMP-2	R-2	100.0	1	Ductile Iron	130.0	-895	0.04	0.00

Active Scenario: Max Day  
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	59.00	0	229.48	73.8
J-2	60.00	0	229.37	73.3
J-3	60.60	0	229.39	73.0
J-4	59.80	0	229.39	73.4
J-5	60.50	0	229.39	73.1
J-6	60.30	0	229.39	73.2
J-7	68.00	0	230.58	70.3
J-8	76.40	0	230.92	66.9
J-9	76.80	0	230.90	66.7
J-10	76.80	0	230.90	66.7
J-11	96.90	0	230.42	57.8
J-12	86.60	0	230.39	62.2
J-13	59.00	0	228.97	73.5
Remainder Parcel	80.00	1,510	228.18	64.1
Sale Parcel C-2	81.80	59	229.32	63.8
Sale Parcel R-5	64.91	219	229.35	71.1

Active Scenario: Max Day  
FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (in)	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P-1	PRINCESS PRESSURE FH	J-1	6.0	13	Ductile Iron	130.0	0	0.00	0.00
P-2	J-1	J-2	8.0	82	Ductile Iron	130.0	239	1.53	0.11
P-3	J-2	J-3	12.0	333	Ductile Iron	130.0	-106	0.30	0.01
P-4	J-3	J-4	8.0	28	Ductile Iron	130.0	0	0.00	0.00
P-5	J-4	PRINCESS FLOW FH	6.0	13	Ductile Iron	130.0	0	0.00	0.00
P-6	J-3	J-5	12.0	11	Ductile Iron	130.0	-106	0.30	0.00
P-7	J-6	J-5	16.0	26	Ductile Iron	130.0	106	0.17	0.00
P-8	J-7	J-6	12.0	1,691	Ductile Iron	130.0	501	1.42	1.19
P-9	J-8	J-7	12.0	481	Ductile Iron	130.0	501	1.42	0.34
P-10	J-8	MAYO PRESSURE FH	6.0	21	Ductile Iron	130.0	0	0.00	0.00
P-11	J-9	J-8	16.0	24	Ductile Iron	130.0	-1,047	1.67	0.02
P-12	J-9	J-10	12.0	171	Ductile Iron	130.0	0	0.00	0.00
P-13	J-10	MAYO FLOW FH	6.0	11	Ductile Iron	130.0	0	0.00	0.00
P-14	J-11	J-9	16.0	712	Ductile Iron	130.0	-1,047	1.67	0.48
P-15	J-12	J-11	16.0	47	Ductile Iron	130.0	-1,047	1.67	0.03
P-16	Sale Parcel C-2	J-12	16.0	1,567	Ductile Iron	130.0	-1,047	1.67	1.07
P-17	Sale Parcel R-5	Sale Parcel C-2	16.0	1,184	Ductile Iron	130.0	177	0.28	0.03
P-18	J-6	Sale Parcel R-5	16.0	323	Ductile Iron	130.0	396	0.63	0.04
P-19	Remainder Parcel	Sale Parcel C-2	16.0	1,382	Ductile Iron	130.0	-1,165	1.86	1.14
P-20	J-13	Remainder Parcel	12.0	2,240	Ductile Iron	130.0	345	0.98	0.79
P-21	J-2	J-13	12.0	1,146	Ductile Iron	130.0	345	0.98	0.40
P-22	J-1	PMP-1	100.0	1	Ductile Iron	130.0	-239	0.01	0.00
P-23	PMP-1	R-1	100.0	100	Ductile Iron	130.0	-239	0.01	0.00
P-24	J-8	PMP-2	100.0	1	Ductile Iron	130.0	-1,549	0.06	0.00
P-25	PMP-2	R-2	100.0	1	Ductile Iron	130.0	-1,549	0.06	0.00

Active Scenario: Peak Hour  
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	59.00	0	216.15	68.0
J-2	60.00	0	214.69	66.9
J-3	60.60	0	214.57	66.6
J-4	59.80	0	214.57	67.0
J-5	60.50	0	214.56	66.7
J-6	60.30	0	214.56	66.7
J-7	68.00	0	216.53	64.3
J-8	76.40	0	217.09	60.9
J-9	76.80	0	217.06	60.7
J-10	76.80	0	217.06	60.7
J-11	96.90	0	216.14	51.6
J-12	86.60	0	216.08	56.0
J-13	59.00	0	213.41	66.8
Remainder Parcel	80.00	2,643	210.93	56.6
Sale Parcel C-2	81.80	104	214.05	57.2
Sale Parcel R-5	64.91	383	214.36	64.7

Active Scenario: Peak Hour  
FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (in)	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P-1	PRINCESS PRESSURE FH	J-1	6.0	13	Ductile Iron	130.0	0	0.00	0.00
P-2	J-1	J-2	8.0	82	Ductile Iron	130.0	989	6.31	1.46
P-3	J-2	J-3	12.0	333	Ductile Iron	130.0	348	0.99	0.12
P-4	J-3	J-4	8.0	28	Ductile Iron	130.0	0	0.00	0.00
P-5	J-4	PRINCESS FLOW FH	6.0	13	Ductile Iron	130.0	0	0.00	0.00
P-6	J-3	J-5	12.0	11	Ductile Iron	130.0	348	0.99	0.00
P-7	J-6	J-5	16.0	26	Ductile Iron	130.0	-348	0.56	0.00
P-8	J-7	J-6	12.0	1,691	Ductile Iron	130.0	658	1.87	1.97
P-9	J-8	J-7	12.0	481	Ductile Iron	130.0	658	1.87	0.56
P-10	J-8	MAYO PRESSURE FH	6.0	21	Ductile Iron	130.0	0	0.00	0.00
P-11	J-9	J-8	16.0	24	Ductile Iron	130.0	-1,484	2.37	0.03
P-12	J-9	J-10	12.0	171	Ductile Iron	130.0	0	0.00	0.00
P-13	J-10	MAYO FLOW FH	6.0	11	Ductile Iron	130.0	0	0.00	0.00
P-14	J-11	J-9	16.0	712	Ductile Iron	130.0	-1,484	2.37	0.92
P-15	J-12	J-11	16.0	47	Ductile Iron	130.0	-1,484	2.37	0.06
P-16	Sale Parcel C-2	J-12	16.0	1,567	Ductile Iron	130.0	-1,484	2.37	2.03
P-17	Sale Parcel R-5	Sale Parcel C-2	16.0	1,184	Ductile Iron	130.0	623	0.99	0.31
P-18	J-6	Sale Parcel R-5	16.0	323	Ductile Iron	130.0	1,006	1.61	0.20
P-19	Remainder Parcel	Sale Parcel C-2	16.0	1,382	Ductile Iron	130.0	-2,003	3.20	3.12
P-20	J-13	Remainder Parcel	12.0	2,240	Ductile Iron	130.0	640	1.82	2.49
P-21	J-2	J-13	12.0	1,146	Ductile Iron	130.0	640	1.82	1.27
P-22	J-1	PMP-1	100.0	1	Ductile Iron	130.0	-989	0.04	0.00
P-23	PMP-1	R-1	100.0	100	Ductile Iron	130.0	-989	0.04	0.00
P-24	J-8	PMP-2	100.0	1	Ductile Iron	130.0	-2,141	0.09	0.00
P-25	PMP-2	R-2	100.0	1	Ductile Iron	130.0	-2,141	0.09	0.00

Active Scenario: Max Day + Fire Flow

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	59.00	0	170.55	48.3
J-2	60.00	0	164.45	45.2
J-3	60.60	0	163.89	44.7
J-4	59.80	0	163.89	45.0
J-5	60.50	0	163.87	44.7
J-6	60.30	0	163.86	44.8
J-7	68.00	0	168.34	43.4
J-8	76.40	0	169.62	40.3
J-9	76.80	0	169.54	40.1
J-10	76.80	0	169.54	40.1
J-11	96.90	0	167.06	30.4
J-12	86.60	0	166.90	34.7
J-13	59.00	0	159.50	43.5
Remainder Parcel	80.00	5,410	149.82	30.2
Sale Parcel C-2	81.80	59	161.46	34.5
Sale Parcel R-5	64.91	219	163.24	42.5

## Active Scenario: Max Day + Fire Flow

### FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (in)	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P-1	PRINCESS PRESSURE FH	J-1	6.0	13	Ductile Iron	130.0	0	0.00	0.00
P-2	J-1	J-2	8.0	82	Ductile Iron	130.0	2,138	13.65	6.10
P-3	J-2	J-3	12.0	333	Ductile Iron	130.0	804	2.28	0.56
P-4	J-3	J-4	8.0	28	Ductile Iron	130.0	0	0.00	0.00
P-5	J-4	PRINCESS FLOW FH	6.0	13	Ductile Iron	130.0	0	0.00	0.00
P-6	J-3	J-5	12.0	11	Ductile Iron	130.0	804	2.28	0.02
P-7	J-6	J-5	16.0	26	Ductile Iron	130.0	-804	1.28	0.01
P-8	J-7	J-6	12.0	1,691	Ductile Iron	130.0	1,025	2.91	4.48
P-9	J-8	J-7	12.0	481	Ductile Iron	130.0	1,025	2.91	1.28
P-10	J-8	MAYO PRESSURE FH	6.0	21	Ductile Iron	130.0	0	0.00	0.00
P-11	J-9	J-8	16.0	24	Ductile Iron	130.0	-2,526	4.03	0.08
P-12	J-9	J-10	12.0	171	Ductile Iron	130.0	0	0.00	0.00
P-13	J-10	MAYO FLOW FH	6.0	11	Ductile Iron	130.0	0	0.00	0.00
P-14	J-11	J-9	16.0	712	Ductile Iron	130.0	-2,526	4.03	2.47
P-15	J-12	J-11	16.0	47	Ductile Iron	130.0	-2,526	4.03	0.16
P-16	Sale Parcel C-2	J-12	16.0	1,567	Ductile Iron	130.0	-2,526	4.03	5.44
P-17	Sale Parcel R-5	Sale Parcel C-2	16.0	1,184	Ductile Iron	130.0	1,610	2.57	1.78
P-18	J-6	Sale Parcel R-5	16.0	323	Ductile Iron	130.0	1,829	2.92	0.62
P-19	Remainder Parcel	Sale Parcel C-2	16.0	1,382	Ductile Iron	130.0	-4,076	6.50	11.64
P-20	J-13	Remainder Parcel	12.0	2,240	Ductile Iron	130.0	1,334	3.78	9.68
P-21	J-2	J-13	12.0	1,146	Ductile Iron	130.0	1,334	3.78	4.95
P-22	J-1	PMP-1	100.0	1	Ductile Iron	130.0	-2,138	0.09	0.00
P-23	PMP-1	R-1	100.0	100	Ductile Iron	130.0	-2,138	0.09	0.00
P-24	J-8	PMP-2	100.0	1	Ductile Iron	130.0	-3,550	0.15	0.00
P-25	PMP-2	R-2	100.0	1	Ductile Iron	130.0	-3,550	0.15	0.00

# Appendix G – Fire Flow Test Results and WaterCAD Analysis Results



# Flow Test Summary

Project Name: EJFT 22516-1 - Hayden 101  
Project Address: E Mayo Blvd & Scottsdale Rd, Scottsdale, AZ 85255  
Date of Flow Test: 2022-12-13  
Time of Flow Test: 6:50 AM  
Data Reliable Until: 2023-06-13  
Conducted By: Steven Saethre & Erick Preciado (EJ Flow Test) 602.999.7637  
Witnessed By: Sonny Schreiner (City of Scottsdale) 602.819.7718  
City Forces Contacted: City of Scottsdale (602.819.7718)  
Permit Number: C70909

## Raw Flow Test Data

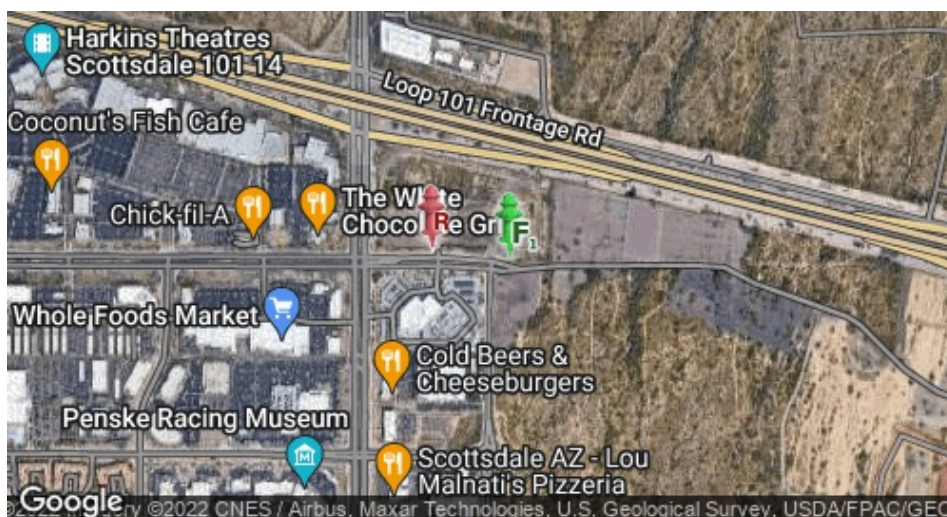
Static Pressure: 70.0 PSI  
Residual Pressure: 64.0 PSI  
Flowing GPM: 1,985  
GPM @ 20 PSI: 6,238


## Data with a 10 % Safety Factor


Static Pressure: 63.0 PSI  
Residual Pressure: 57.0 PSI  
Flowing GPM: 1,985  
GPM @ 20 PSI: 5,750

## Hydrant F<sub>1</sub>

Pitot Pressure (1): 37 PSI  
Coefficient of Discharge (1): 0.9  
Hydrant Orifice Diameter (1): 2.5 inches  
Pitot Pressure (2): 33 PSI  
Coefficient of Discharge (2): 0.9  
Hydrant Orifice Diameter (2): 2.5 inches



 Static-Residual Hydrant

 Flow Hydrant

Distance Between F<sub>1</sub> and R  
548 ft (measured linearly)

Static-Residual Elevation  
1590 ft (above sea level)

Flow Hydrant (F<sub>1</sub>) Elevation  
1593 ft (above sea level)

Elevation & distance values are approximate

## Static-Residual Hydrant



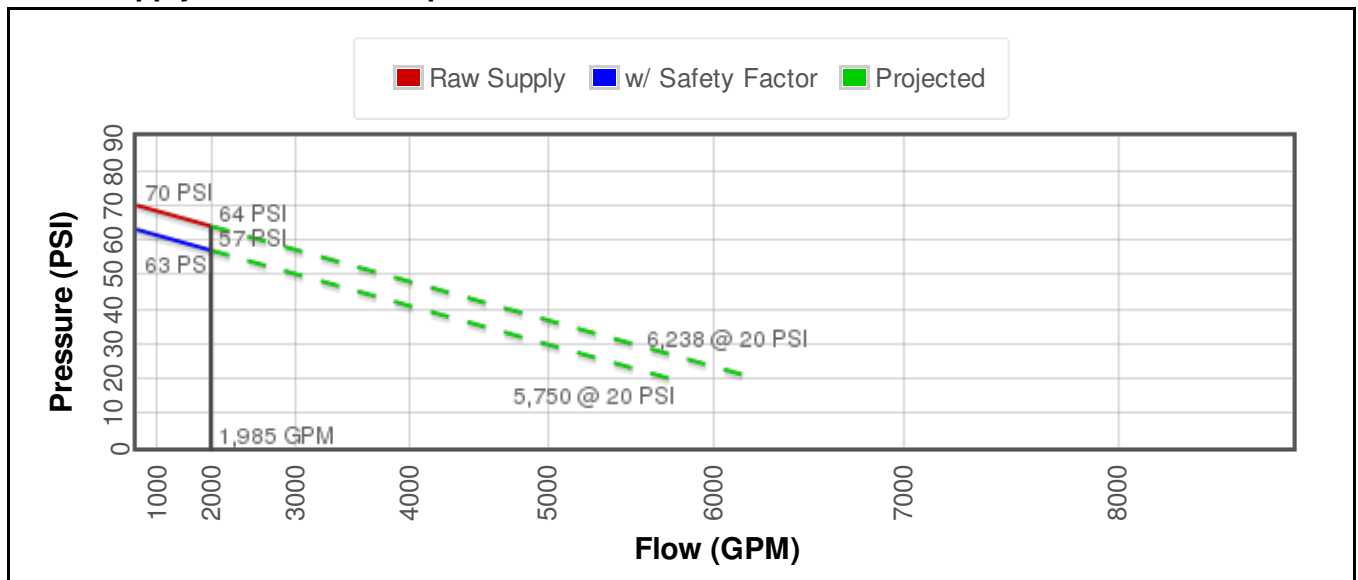
## Flow Hydrant (only hydrant F1 shown for clarity)



## Approximate Project Site



## Water Supply Curve N<sup>1.85</sup> Graph





# Flow Test Summary

Project Name: EJFT 22516-2 - Hayden 101  
Project Address: N 78th St & E Mayo Blvd, Scottsdale, AZ 85255  
Date of Flow Test: 2022-12-13  
Time of Flow Test: 7:15AM  
Data Reliable Until: 2023-06-13  
Conducted By: Steven Saethre & Erick Preciado (EJ Flow Test) 602.999.7637  
Witnessed By: Sonny Schreiner (City of Scottsdale) 602.819.7718  
City Forces Contacted: City of Scottsdale (602.819.7718)  
Permit Number: C70910

## Raw Flow Test Data

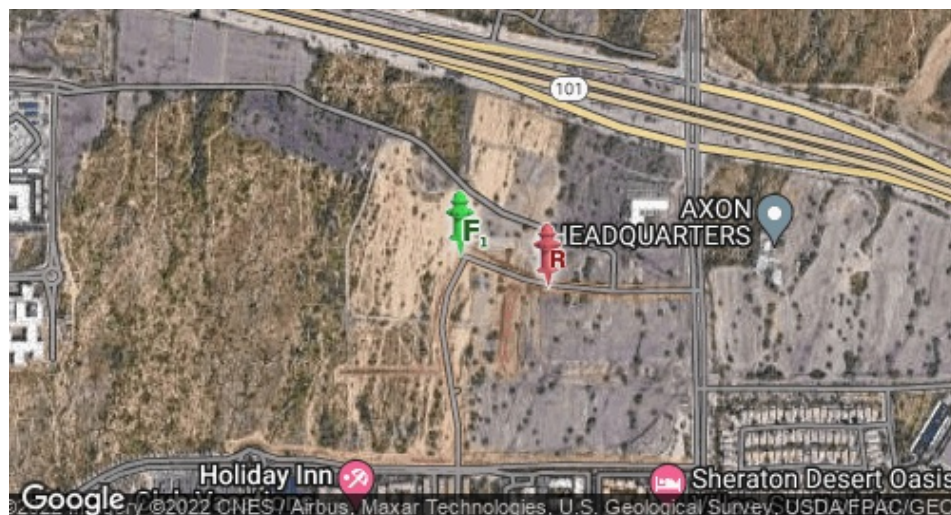
Static Pressure: 71.0 PSI  
Residual Pressure: 65.0 PSI  
Flowing GPM: 2,175  
GPM @ 20 PSI: 6,908


## Data with a 10 % Safety Factor

Static Pressure: 63.9 PSI  
Residual Pressure: 57.9 PSI  
Flowing GPM: 2,175  
GPM @ 20 PSI: 6,371

## Hydrant F<sub>1</sub>

Pitot Pressure (1): 44 PSI  
Coefficient of Discharge (1): 0.9  
Hydrant Orifice Diameter (1): 2.5 inches  
Pitot Pressure (2): 40 PSI  
Coefficient of Discharge (2): 0.9  
Hydrant Orifice Diameter (2): 2.5 inches



 Static-Residual Hydrant

 Flow Hydrant

Distance Between F<sub>1</sub> and R  
639 ft (measured linearly)

Static-Residual Elevation  
1585 ft (above sea level)

Flow Hydrant (F<sub>1</sub>) Elevation  
1585 ft (above sea level)

Elevation & distance values are approximate

## Static-Residual Hydrant



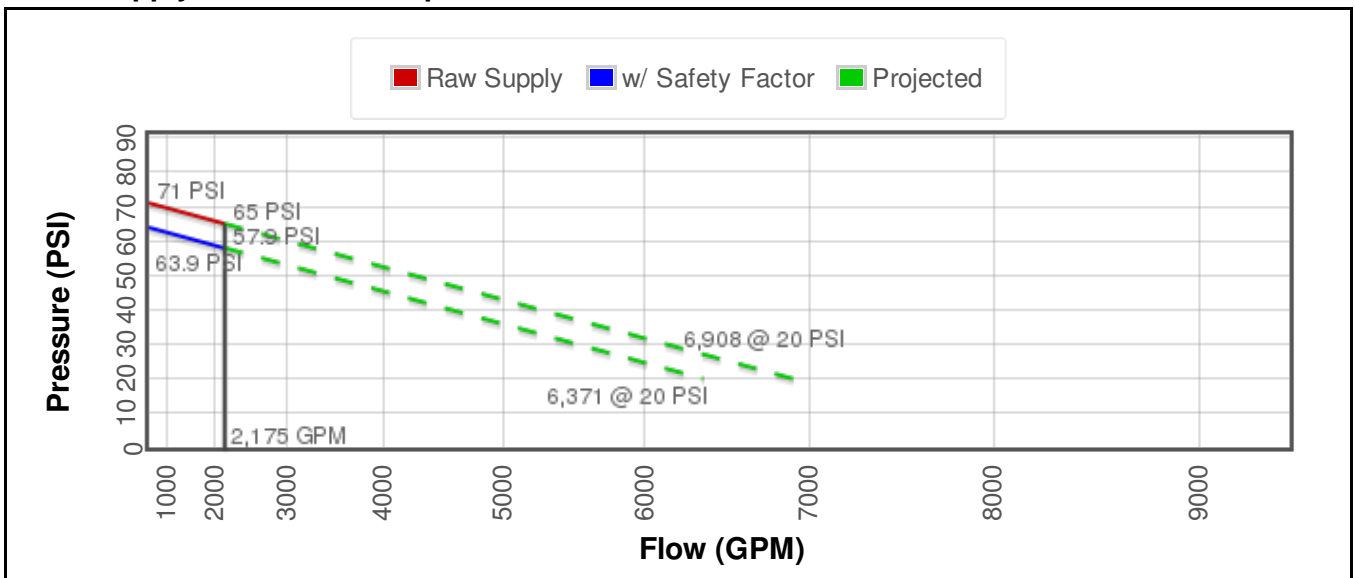
## Flow Hydrant (only hydrant F1 shown for clarity)



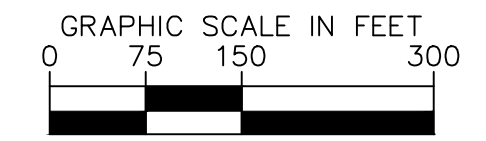
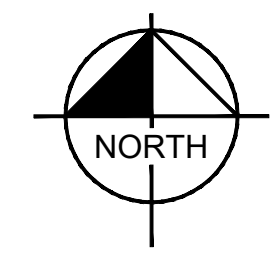
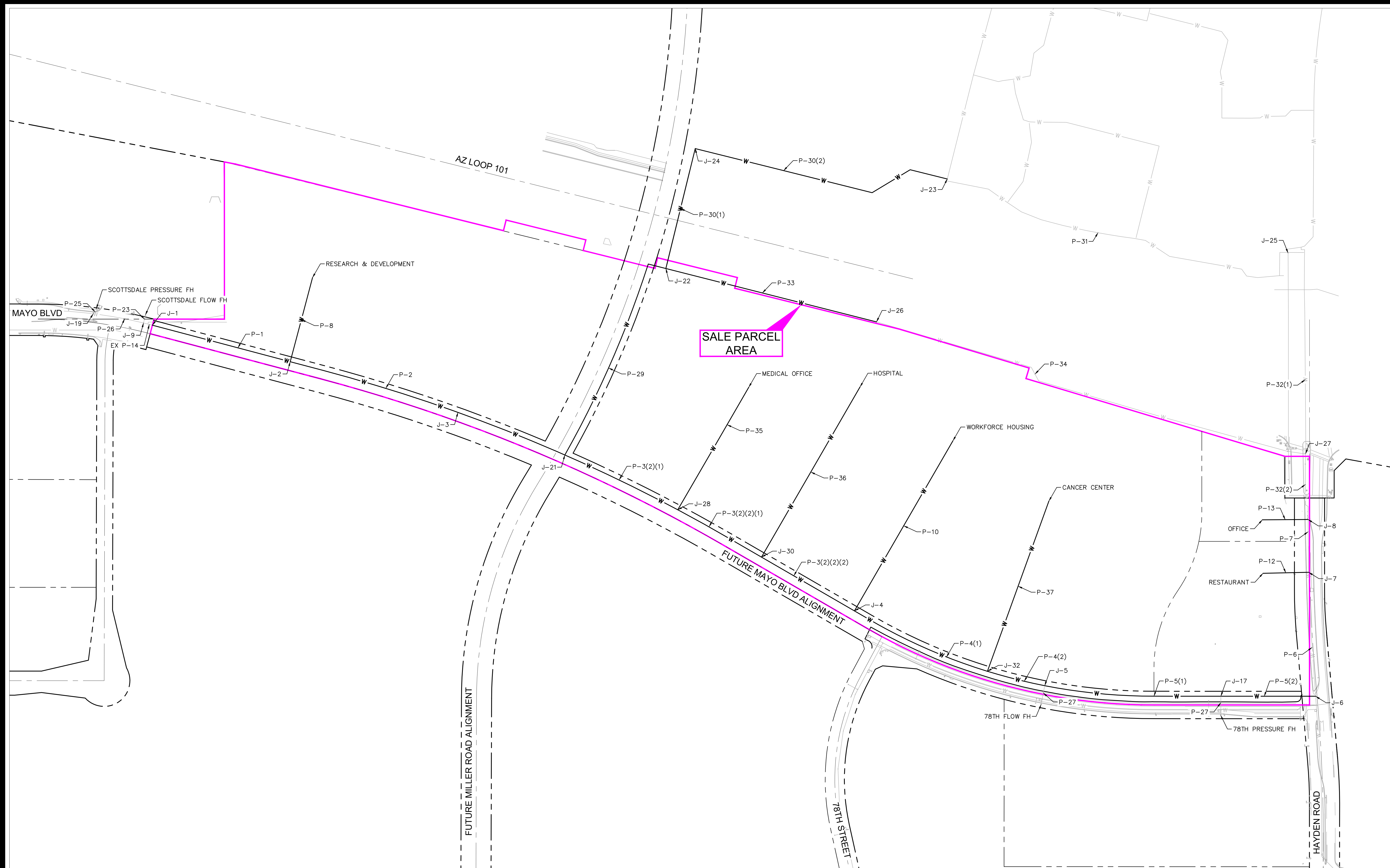
## Approximate Project Site



## Water Supply Curve N<sup>1.85</sup> Graph



K:\PHX\_Civil\291268016 Hayden 101\CADD\Exhibits\2023-07-29 WaterCAD Layout.dwg Jul 29, 2023 traver.jones



AVERAGE DAILY DEMAND  
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
CANCER CENTER	96.66	71	236.63	61
HOSPITAL	96.39	222	236.56	61
J-1	93.00	0	237.04	62
J-2	91.00	0	236.92	63
J-3	91.00	0	236.79	63
J-4	87.00	0	236.65	65
J-5	89.00	0	236.65	64
J-6	92.00	0	236.67	63
J-7	99.00	0	236.67	60
J-8	103.00	0	236.68	58
J-9	92.00	0	237.09	63
J-17	89.42	0	236.66	64
J-19	90.00	0	237.09	64
J-21	89.98	0	236.71	63
J-22	102.17	0	236.70	58
J-23	110.71	0	236.70	55
J-24	108.94	0	236.70	55
J-25	117.10	0	236.69	52
J-26	102.77	0	236.70	58
J-27	106.08	0	236.69	57
J-28	89.22	0	236.68	64
J-30	88.19	0	236.65	64
J-32	87.73	0	236.65	64
MEDICAL OFFICE	98.00	146	236.59	60
OFFICE	100.00	27	236.68	59
RESEARCH & DEVELOPMENT	96.00	38	236.92	61
RESTAURANT	96.00	54	236.67	61
WORKFORCE HOUSING	96.31	25	236.68	61

## AVERAGE DAILY DEMAND

### FlexTable: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen- Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
EX P-14	220	J-9	J-1	16.0	Ductile Iron	130.0	583	0.93	0.05
P-1	541	J-1	J-2	16.0	Ductile Iron	130.0	583	0.93	0.12
P-2	636	J-2	J-3	16.0	Ductile Iron	130.0	545	0.87	0.13
P-3(1)	411	J-3	J-21	16.0	Ductile Iron	130.0	545	0.87	0.08
P-3(2)(1)	334	J-21	J-28	16.0	Ductile Iron	130.0	345	0.55	0.03
P-3(2)(2) (1)	335	J-28	J-30	16.0	Ductile Iron	130.0	320	0.51	0.03
P-3(2)(2) (2)	533	J-30	J-4	16.0	Ductile Iron	130.0	98	0.16	0.00
P-4(1)	628	J-4	J-32	16.0	Ductile Iron	130.0	-48	0.08	0.00
P-4(2)	139	J-32	J-5	16.0	Ductile Iron	130.0	-119	0.19	0.00
P-5(1)	232	J-5	J-17	16.0	Ductile Iron	130.0	-119	0.19	0.01
P-5(2)	777	J-17	J-6	16.0	Ductile Iron	130.0	-119	0.19	0.01
P-6	486	J-6	J-7	16.0	Ductile Iron	130.0	-119	0.19	0.01
P-7	192	J-7	J-8	16.0	Ductile Iron	130.0	-173	0.28	0.00
P-8	367	J-2	RESEARCH & DEVELOPMENT	12.0	Ductile Iron	130.0	38	0.11	0.00
P-10	766	J-4	MEDICAL OFFICE	12.0	Ductile Iron	130.0	146	0.41	0.06
P-12	167	J-7	RESTAURANT	12.0	Ductile Iron	130.0	54	0.15	0.00
P-13	166	J-8	OFFICE	12.0	Ductile Iron	130.0	27	0.08	0.00
P-15	14	R-1	PMP-1	16.0	Ductile Iron	130.0	583	0.93	0.00
P-19	33	R-2	PMP-2	16.0	Ductile Iron	130.0	0	0.00	0.00
P-22	17	J-17	78TH PRESSURE FH	6.0	Ductile Iron	130.0	0	0.00	0.00
P-23	24	SCOTTSDALE FLOW FH	J-9	6.0	Ductile Iron	130.0	0	0.00	0.00
P-24	32	PMP-1	J-9	100.0	Ductile Iron	130.0	583	0.02	0.00
P-25	24	SCOTTSDALE PRESSURE FH	J-19	6.0	Ductile Iron	130.0	0	0.00	0.00
P-26	133	J-19	J-9	16.0	Ductile Iron	130.0	0	0.00	0.00
P-27	42	78TH FLOW FH	J-5	6.0	Ductile Iron	130.0	0	0.00	0.00
P-28	37	PMP-2	J-5	100.0	Ductile Iron	130.0	0	0.00	0.00
P-29	876	J-21	J-22	24.0	Ductile Iron	130.0	200	0.14	0.00
P-30(1)	451	J-22	J-24	16.0	Ductile Iron	130.0	113	0.18	0.00
P-30(2)	968	J-24	J-23	24.0	Ductile Iron	130.0	113	0.08	0.00
P-31	1,464	J-23	J-25	24.0	Ductile Iron	130.0	113	0.08	0.00
P-32(1)	734	J-25	J-27	16.0	Ductile Iron	130.0	113	0.18	0.01

### FlexTable: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen- Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P-32(2)	241	J-27	J-8	16.0	Ductile Iron	130.0	200	0.32	0.01
P-33	796	J-22	J-26	16.0	Ductile Iron	130.0	87	0.14	0.01
P-34	1,655	J-26	J-27	16.0	Ductile Iron	130.0	87	0.14	0.01
P-35	458	J-28	WORKFORCE HOUSING	12.0	Ductile Iron	130.0	25	0.07	0.00
P-36	557	J-30	HOSPITAL	12.0	Ductile Iron	130.0	222	0.63	0.09
P-37	768	J-32	CANCER CENTER	12.0	Ductile Iron	130.0	71	0.20	0.01

## MAX DAY DEMAND

### FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
CANCER CENTER	96.66	142	232.52	59
HOSPITAL	96.39	444	232.26	59
J-1	93.00	0	233.81	61
J-2	91.00	0	233.41	62
J-3	91.00	0	233.01	61
J-4	87.00	0	232.56	63
J-5	89.00	0	232.58	62
J-6	92.00	0	232.63	61
J-7	99.00	0	232.64	58
J-8	103.00	0	232.66	56
J-9	92.00	0	233.97	61
J-17	89.42	0	232.60	62
J-19	90.00	0	233.97	62
J-21	89.98	0	232.74	62
J-22	102.17	0	232.73	56
J-23	110.71	0	232.71	53
J-24	108.94	0	232.72	54
J-25	117.10	0	232.71	50
J-26	102.77	0	232.72	56
J-27	106.08	0	232.68	55
J-28	89.22	0	232.65	62
J-30	88.19	0	232.57	62
J-32	87.73	0	232.57	63
MEDICAL OFFICE	98.00	292	232.36	58
OFFICE	100.00	54	232.66	57
RESEARCH & DEVELOPMENT	96.00	75	233.41	59
RESTAURANT	96.00	108	232.64	59
WORKFORCE HOUSING	96.31	51	232.65	59

MAX DAY DEMAND

FlexTable: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
EX P-14	220	J-9	J-1	16.0	Ductile Iron	130.0	1,088	1.74	0.16
P-1	541	J-1	J-2	16.0	Ductile Iron	130.0	1,088	1.74	0.39
P-2	636	J-2	J-3	16.0	Ductile Iron	130.0	1,013	1.62	0.41
P-3(1)	411	J-3	J-21	16.0	Ductile Iron	130.0	1,013	1.62	0.26
P-3(2)(1)	334	J-21	J-28	16.0	Ductile Iron	130.0	646	1.03	0.09
P-3(2)(2)(1)	335	J-28	J-30	16.0	Ductile Iron	130.0	595	0.95	0.08
P-3(2)(2)(2)	533	J-30	J-4	16.0	Ductile Iron	130.0	151	0.24	0.01
P-4(1)	628	J-4	J-32	16.0	Ductile Iron	130.0	-141	0.23	0.01
P-4(2)	139	J-32	J-5	16.0	Ductile Iron	130.0	-283	0.45	0.01
P-5(1)	232	J-5	J-17	16.0	Ductile Iron	130.0	-205	0.33	0.02
P-5(2)	777	J-17	J-6	16.0	Ductile Iron	130.0	-205	0.33	0.03
P-6	486	J-6	J-7	16.0	Ductile Iron	130.0	-205	0.33	0.02
P-7	192	J-7	J-8	16.0	Ductile Iron	130.0	-313	0.50	0.01
P-8	367	J-2	RESEARCH & DEVELOPMENT	12.0	Ductile Iron	130.0	75	0.21	0.01
P-10	766	J-4	MEDICAL OFFICE	12.0	Ductile Iron	130.0	292	0.83	0.20
P-12	167	J-7	RESTAURANT	12.0	Ductile Iron	130.0	108	0.31	0.01
P-13	166	J-8	OFFICE	12.0	Ductile Iron	130.0	54	0.15	0.00
P-15	14	R-1	PMP-1	16.0	Ductile Iron	130.0	1,088	1.74	0.01
P-19	33	R-2	PMP-2	16.0	Ductile Iron	130.0	78	0.12	0.00
P-22	17	J-17	78TH PRESSURE FH	6.0	Ductile Iron	130.0	0	0.00	0.00
P-23	24	SCOTTSDALE FLOW FH	J-9	6.0	Ductile Iron	130.0	0	0.00	0.00
P-24	32	PMP-1	J-9	100.0	Ductile Iron	130.0	1,088	0.04	0.00
P-25	24	SCOTTSDALE PRESSURE FH	J-19	6.0	Ductile Iron	130.0	0	0.00	0.00
P-26	133	J-19	J-9	16.0	Ductile Iron	130.0	0	0.00	0.00
P-27	42	78TH FLOW FH	J-5	6.0	Ductile Iron	130.0	0	0.00	0.00
P-28	37	PMP-2	J-5	100.0	Ductile Iron	130.0	78	0.00	0.00
P-29	876	J-21	J-22	24.0	Ductile Iron	130.0	367	0.26	0.01
P-30(1)	451	J-22	J-24	16.0	Ductile Iron	130.0	207	0.33	0.02
P-30(2)	968	J-24	J-23	24.0	Ductile Iron	130.0	207	0.15	0.00
P-31	1,464	J-23	J-25	24.0	Ductile Iron	130.0	207	0.15	0.01
P-32(1)	734	J-25	J-27	16.0	Ductile Iron	130.0	207	0.33	0.02

MAX DAY DEMAND

FlexTable: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen- Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P-32(2)	241	J-27	J-8	16.0	Ductile Iron	130.0	367	0.59	0.02
P-33	796	J-22	J-26	16.0	Ductile Iron	130.0	160	0.26	0.02
P-34	1,655	J-26	J-27	16.0	Ductile Iron	130.0	160	0.26	0.03
P-35	458	J-28	WORKFORCE HOUSING	12.0	Ductile Iron	130.0	51	0.14	0.00
P-36	557	J-30	HOSPITAL	12.0	Ductile Iron	130.0	444	1.26	0.31
P-37	768	J-32	CANCER CENTER	12.0	Ductile Iron	130.0	142	0.40	0.05

PEAK HOUR DEMAND

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
CANCER CENTER	96.66	248	229.95	58
HOSPITAL	96.39	778	229.08	57
J-1	93.00	0	231.72	60
J-2	91.00	0	231.15	61
J-3	91.00	0	230.60	60
J-4	87.00	0	229.97	62
J-5	89.00	0	230.16	61
J-6	92.00	0	230.15	60
J-7	99.00	0	230.15	57
J-8	103.00	0	230.16	55
J-9	92.00	0	231.95	61
J-17	89.42	0	230.15	61
J-19	90.00	0	231.95	61
J-21	89.98	0	230.24	61
J-22	102.17	0	230.23	55
J-23	110.71	0	230.21	52
J-24	108.94	0	230.22	52
J-25	117.10	0	230.21	49
J-26	102.77	0	230.21	55
J-27	106.08	0	230.18	54
J-28	89.22	0	230.09	61
J-30	88.19	0	229.97	61
J-32	87.73	0	230.10	62
MEDICAL OFFICE	98.00	510	229.41	57
OFFICE	100.00	95	230.15	56
RESEARCH & DEVELOPMENT	96.00	132	231.13	58
RESTAURANT	96.00	325	230.10	58
WORKFORCE HOUSING	96.31	89	230.08	58

PEAK HOUR DEMAND

FlexTable: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
EX P-14	220	J-9	J-1	16.0	Ductile Iron	130.0	1,326	2.12	0.23
P-1	541	J-1	J-2	16.0	Ductile Iron	130.0	1,326	2.12	0.57
P-2	636	J-2	J-3	16.0	Ductile Iron	130.0	1,194	1.90	0.55
P-3(1)	411	J-3	J-21	16.0	Ductile Iron	130.0	1,194	1.90	0.36
P-3(2)(1)	334	J-21	J-28	16.0	Ductile Iron	130.0	834	1.33	0.15
P-3(2)(2)(1)	335	J-28	J-30	16.0	Ductile Iron	130.0	745	1.19	0.12
P-3(2)(2)(2)	533	J-30	J-4	16.0	Ductile Iron	130.0	-33	0.05	0.00
P-4(1)	628	J-4	J-32	16.0	Ductile Iron	130.0	-543	0.87	0.13
P-4(2)	139	J-32	J-5	16.0	Ductile Iron	130.0	-791	1.26	0.06
P-5(1)	232	J-5	J-17	16.0	Ductile Iron	130.0	60	0.10	0.00
P-5(2)	777	J-17	J-6	16.0	Ductile Iron	130.0	60	0.10	0.00
P-6	486	J-6	J-7	16.0	Ductile Iron	130.0	60	0.10	0.00
P-7	192	J-7	J-8	16.0	Ductile Iron	130.0	-265	0.42	0.01
P-8	367	J-2	RESEARCH & DEVELOPMENT	12.0	Ductile Iron	130.0	132	0.37	0.02
P-10	766	J-4	MEDICAL OFFICE	12.0	Ductile Iron	130.0	510	1.45	0.56
P-12	167	J-7	RESTAURANT	12.0	Ductile Iron	130.0	325	0.92	0.05
P-13	166	J-8	OFFICE	12.0	Ductile Iron	130.0	95	0.27	0.01
P-15	14	R-1	PMP-1	16.0	Ductile Iron	130.0	1,326	2.12	0.01
P-19	33	R-2	PMP-2	16.0	Ductile Iron	130.0	851	1.36	0.02
P-22	17	J-17	78TH PRESSURE FH	6.0	Ductile Iron	130.0	0	0.00	0.00
P-23	24	SCOTTSDALE FLOW FH	J-9	6.0	Ductile Iron	130.0	0	0.00	0.00
P-24	32	PMP-1	J-9	100.0	Ductile Iron	130.0	1,326	0.05	0.00
P-25	24	SCOTTSDALE PRESSURE FH	J-19	6.0	Ductile Iron	130.0	0	0.00	0.00
P-26	133	J-19	J-9	16.0	Ductile Iron	130.0	0	0.00	0.00
P-27	42	78TH FLOW FH	J-5	6.0	Ductile Iron	130.0	0	0.00	0.00
P-28	37	PMP-2	J-5	100.0	Ductile Iron	130.0	851	0.03	0.00
P-29	876	J-21	J-22	24.0	Ductile Iron	130.0	360	0.25	0.01
P-30(1)	451	J-22	J-24	16.0	Ductile Iron	130.0	203	0.32	0.01
P-30(2)	968	J-24	J-23	24.0	Ductile Iron	130.0	203	0.14	0.00
P-31	1,464	J-23	J-25	24.0	Ductile Iron	130.0	203	0.14	0.01
P-32(1)	734	J-25	J-27	16.0	Ductile Iron	130.0	203	0.32	0.02

PEAK HOUR DEMAND

FlexTable: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen- Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P-32(2)	241	J-27	J-8	16.0	Ductile Iron	130.0	360	0.57	0.02
P-33	796	J-22	J-26	16.0	Ductile Iron	130.0	157	0.25	0.02
P-34	1,655	J-26	J-27	16.0	Ductile Iron	130.0	157	0.25	0.03
P-35	458	J-28	WORKFORCE HOUSING	12.0	Ductile Iron	130.0	89	0.25	0.01
P-36	557	J-30	HOSPITAL	12.0	Ductile Iron	130.0	778	2.21	0.89
P-37	768	J-32	CANCER CENTER	12.0	Ductile Iron	130.0	248	0.70	0.15

## MAXIMUM DAILY DEMAND + FIRE FLOW

### Fire Flow Node FlexTable: Fire Flow Report

Label	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Calculated Residual) (psi)	Junction w/ Minimum Pressure (System)	Pressure (Calculated Zone Lower Limit) (psi)
CANCER CENTER	True	4,000	4,786	4,142	4,928	30	J-25	38
HOSPITAL	True	4,000	5,025	4,444	5,469	30	J-25	37
MEDICAL OFFICE	True	4,000	4,562	4,292	4,854	30	J-25	39
OFFICE	True	4,000	6,223	4,054	6,277	30	J-25	30
RESEARCH & DEVELOPMENT	True	4,000	5,981	4,075	6,056	30	J-25	34
RESTAURANT	True	4,000	6,260	4,108	6,368	31	J-25	30
WORKFORCE HOUSING	True	4,000	5,541	4,051	5,592	30	J-25	34

The Total Flow reflects the Fire Flow (4,000 GPM) plus the MDD for each node.

## Appendix H: City of Scottsdale IIP

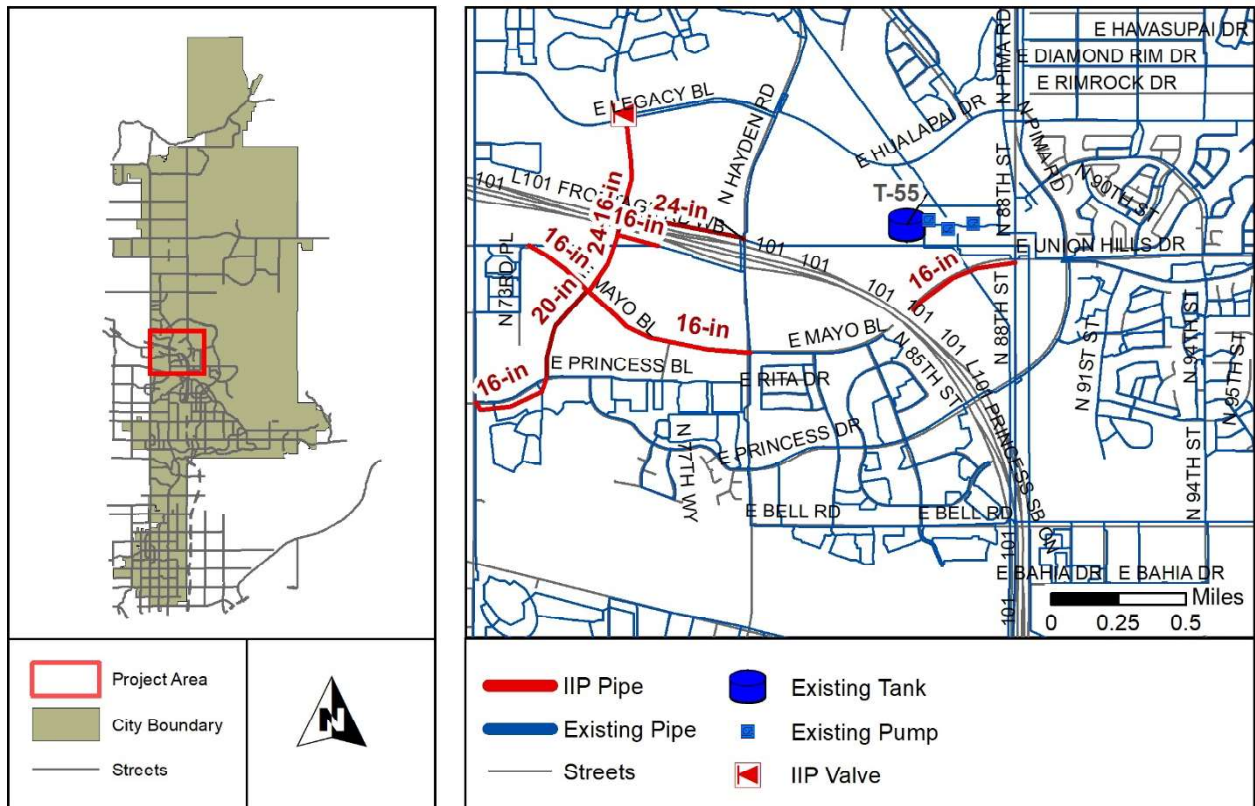
**System:** Water **Estimated Start:** On-going  
**Project Number:** W IIP-020  
**Project Name:** Crossroads East - Water System Improvements  
**Location:** Vicinity of Loop 101 and Hayden Road  
**Project Reference:** 2013 IIP  
**Description:** 3.5 miles of pipeline and pressure reducing valve stations west of Hayden Road and north of Princess Blvd. Add new water mains and pressure reducing valves to serve current and future connections in the Greater Airpark area. The 2020 IIP analysis identified several mains in this project that require upsizing from the diameters that were previously identified in the 2013 IIP.

**Project Details:**

**Project Elements** **Project Cost**  
 Water mains, 12-inch diameter, 290 linear feet; 16-inch diameter, 11,720 linear feet; 20-inch diameter, 2,000 linear feet; 24-inch diameter, 2,840 linear feet; 1 PRV. \$8,937,000

**Cost Allocation**

Existing Equivalent Demand Units (EDUs) – Rates	17%	\$1,528,000
EDUs through year 2030 – Development Fees	33%	\$2,969,000
EDUs beyond year 2030 – Development Fees	50%	\$4,440,000



**System:** Water **Estimated Start:** On-going  
**Project Number:** W IIP-020  
**Project Name:** Crossroads East - Water System Improvements  
**Location:** Vicinity of Loop 101 and Hayden Road  
**Project Reference:** 2013 IIP  
**Description:** 3.5 miles of pipeline and pressure reducing valve stations west of Hayden Road and north of Princess Blvd: Add new water mains and pressure reducing valves to serve current and future connections in the Greater Airpark area. The 2020 IIP analysis identified several mains in this project that require upsizing from the diameters that were previously identified in the 2013 IIP.

**Project Details:**

**Project Elements**

Water mains, 12-inch diameter, 290 linear feet; 16-inch diameter, 11,720 linear feet; 20-inch diameter, 2,000 linear feet; 24-inch diameter, 2,840 linear feet; 1 PRV. **Project Cost**  
\$8,937,000

**Cost Allocation**

Existing Equivalent Demand Units (EDUs) – Rates	17%	\$1,528,000
EDUs through year 2030 – Development Fees	33%	\$2,969,000
EDUs beyond year 2030 – Development Fees	50%	\$4,440,000

