CITY OF SCOTTSDALE

Water and Wastewater Study
Combined

CROSSROADS EAST - PLANNING UNITS X & XI

MASTER WASTEWATER PLAN

AT THE N.E. CORNER OF HAYDEN ROAD AND UNION HILLS DR.

A PORTION OF THE NORTH 1/2 OF SECTION 36, TOWNSHIP 4 NORTH, RANGE 4 EAST
OF THE GILA AND SALT RIVER MERIDIAN, MARICOPA COUNTY, ARIZONA

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455 NORTH THIRD STREET
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PHOENIX, AZ 85004
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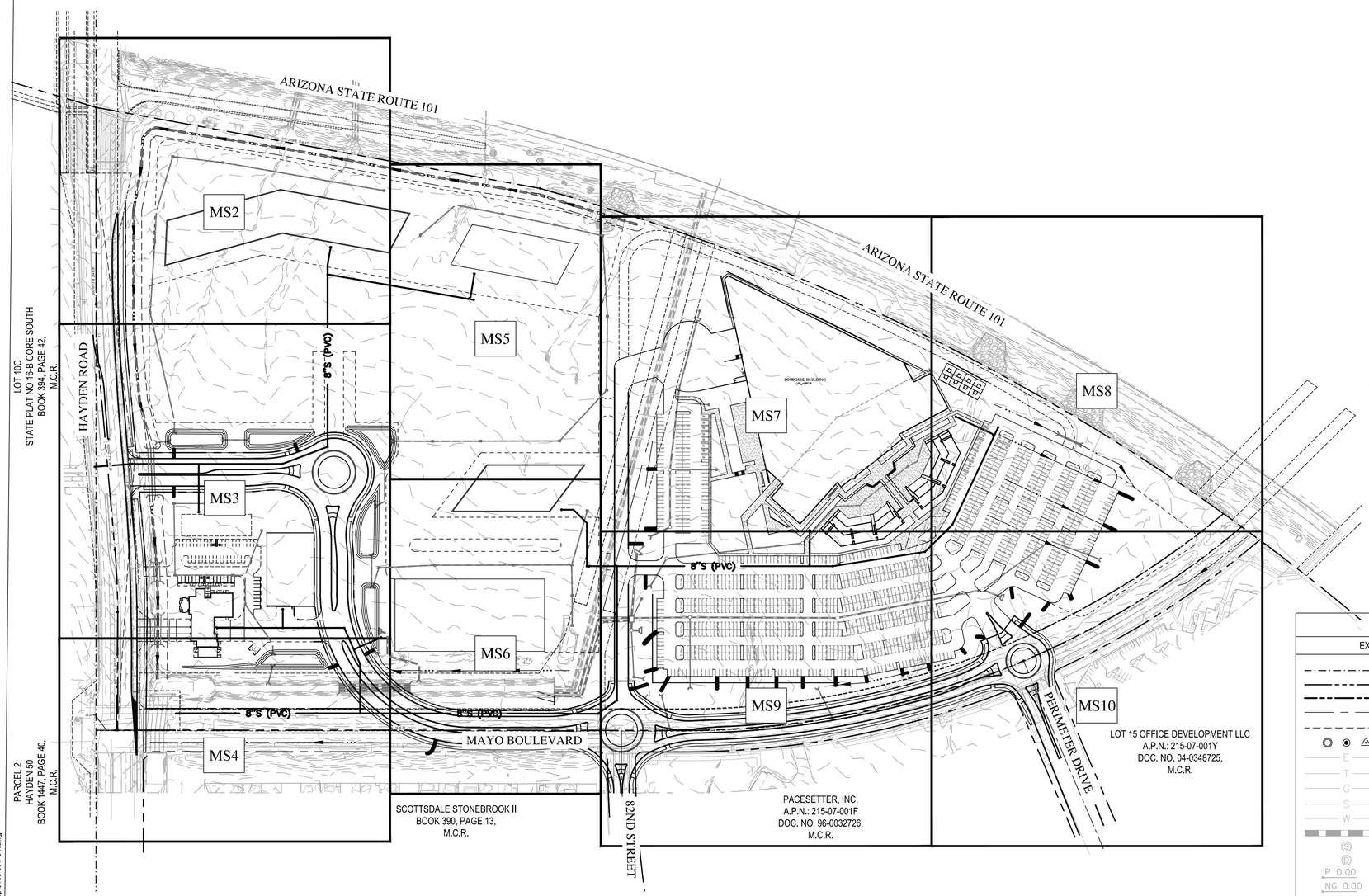

N

0 150 300
Horz. 1 in. = 150 ft.

LEGEND

MSX — MASTER WASTEWATER PLAN

PROPERTY LINE

OWNER / DEVELOPER

AXON
P.O. BOX 1833
TEMPE, AZ 85280
CONTACT: CHARLES HUELLMANTEL
PHONE: (480) 921-2800
E-MAIL: CHARLES@HUELLMANTEL.COM

ENGINEER

WOOD, PATEL & ASSOCIATES, INC.
2051 W NORTHERN AVE. SUITE 100
PHOENIX, AZ 85021
CONTACT: NICHOLAS BROWN, P.E.
PHONE: (602) 335-8503
E-MAIL: NBROWN@WOODPATEL.COM

ARCHITECT

SMITH GROUP
455 NORTH THIRD STREET SUITE 250
PHOENIX, AZ 85004
CONTACT: LYLE STEELY AIA LEED AP
PHONE: (602) 824-5348
EMAIL: WWW.LYLE.STEELY@SMITHGROUP.COM

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ARIZONA811
Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)
In Maricopa County: (602) 263-1100

PROJECT SITE DATA

ASSESSOR PARCEL NUMBER(S):
215-07-210B
PROJECT SITE ADDRESS:
17800 NORTH 85TH STREET
SCOTTSDALE, AZ 85255
PROJECT SITE AREA(S):
NET AREA = 71.07 AC
ZONING:
PCD

NOT FOR CONSTRUCTION

SHEET INDEX

LEGEND/ABBREVIATIONS

EXISTING SURVEY

- SECTION LINE
- RIGHT OF WAY
- PROPERTY LINE
- ROAD CENTERLINE
- EASEMENT
- SURVEY MARKER
- E — ELECTRIC
- T — TELEPHONE
- G — GAS LINE
- S — SEWER LINE
- W — WATER LINE
- STORM DRAIN PIPE
- (S) SEWER MANHOLE
- (D) STORM DRAIN MANHOLE
- P 0.00 PAVEMENT ELEVATION
- NG 0.00 NATURAL GROUND ELEVATION
- C 0.00 CONCRETE ELEVATION
- TC 0.00 TOP OF CURB ELEVATION
- JUNCTION BOX/RISER
- FIRE HYDRANT
- WATER VALVE
- STREET/PARKING LIGHT

PROPOSED GRADING, DRAINAGE & PAVING

- SLOPE ARROW
- WALL

PROPOSED WATER & SEWER

- —S— SEWER LNE
- —12"W— WATER LINE
- PLUG
- SEWER CLEANOUT
- AREA DRAIN
- CATCH BASIN

A.L.	AREA LIGHT
C	CONCRETE ELEVATION
C.B.	CATCH BASIN
DE	DRAINAGE EASEMENT
D.W.	DRYWELL
E.O.L.	EDGE OF LANDSCAPE
J.B.	JUNCTION BOX
FH	FIRE HYDRANT
E.C.B.	ELECTRICAL CABINET BOX
HW	HEAD WALL
INV	INVERT ELEVATION
LFF	LOWEST FINISHED FLOOR ELEVATION
WE	WATER EASEMENT
LF88=	LOWEST FINISH FLOOR ELEVATION
TC 0.00	TOP OF CURB
FG 0.00	FINISH GRADE ELEVATION
C 0.00	CONCRETE ELEVATION
C.A	CROSS ACCESS
E.S.A	EMERGENCY SERVICE ACCESS
P.U.E	PUBLIC UTILITY EASEMENT
U.E	UTILITY EASEMENT
P.A.E	PUBLIC ACCESS EASEMENT

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MS
1
COVER SHEET

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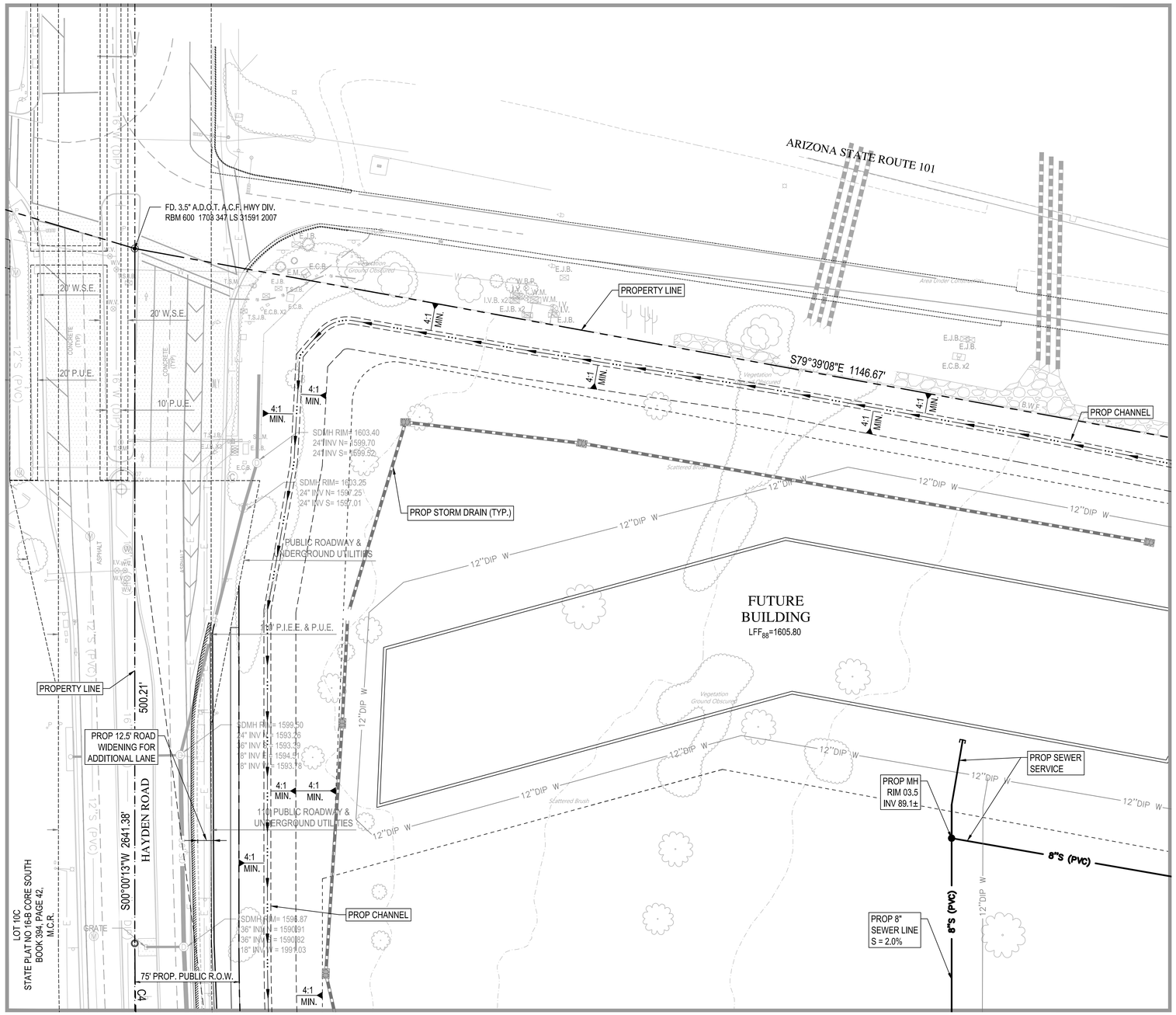

MATCH SHEET MS3

MATCH SHEET MS5

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0 40 80

Horz. 1 in. = 40 ft.

CURVE TABLE (M)			
CURVE	DELTA	RADIUS	ARC
C2	40°08'46"	2200.00'	1,541.50'
C3	5°02'30"	1800.00'	158.39'
C4	5°02'30"	1800.00'	158.39'

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MS 2

MASTER WASTEWATER PLAN

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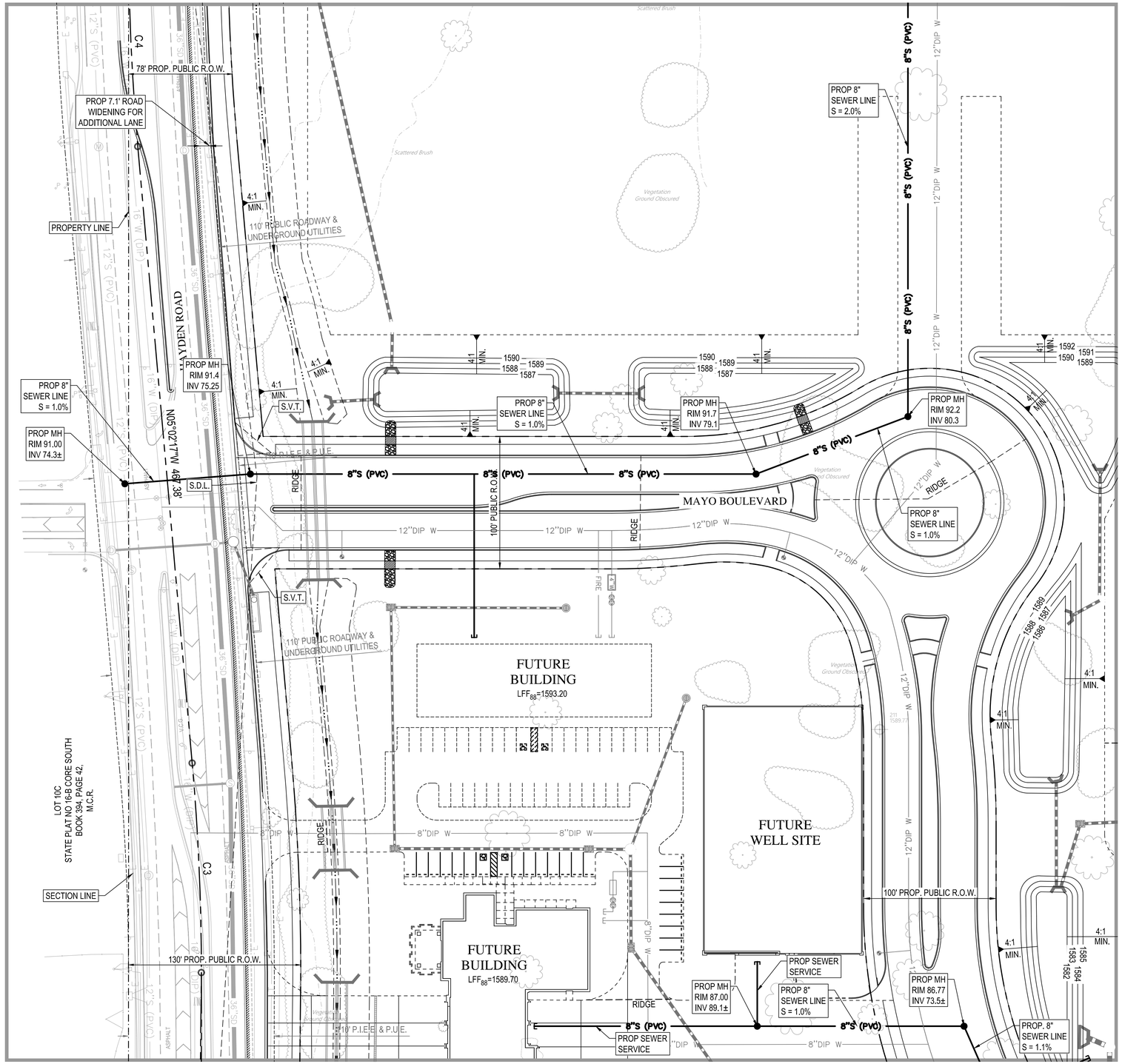
MATCH SHEET MS2



MATCH SHEET MS4

MATCH SHEET MS5

MATCH SHEET MS6

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0 40 80

Horz. 1 in. = 40 ft.

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C2	40°08'46"	2200.00'	1,541.50'
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MS 3

MASTER WASTEWATER PLAN

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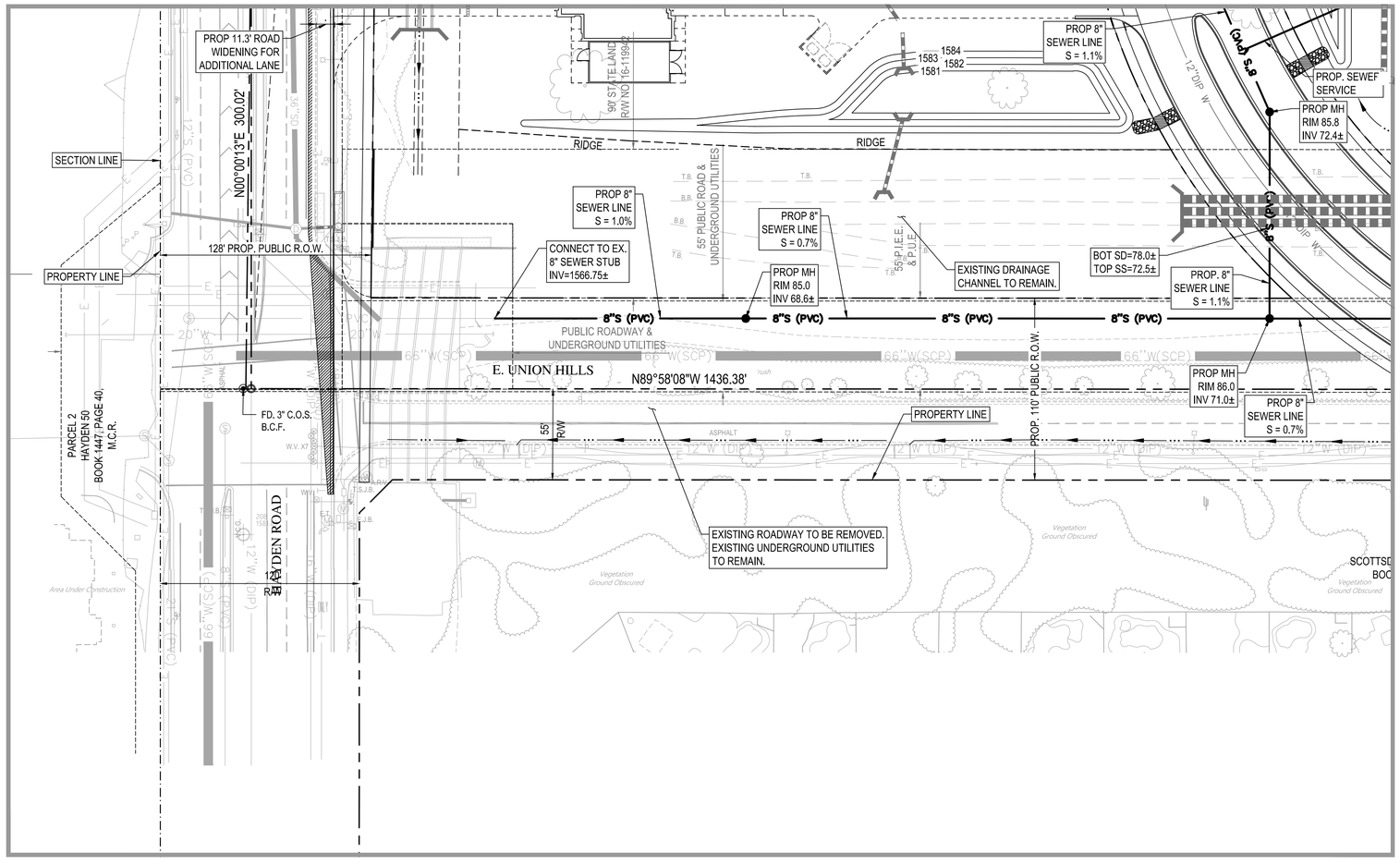

MATCH SHEET MS6

N

0 40 80

Horz. 1 in. = 40 ft.

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MS 4

MASTER WASTEWATER PLAN

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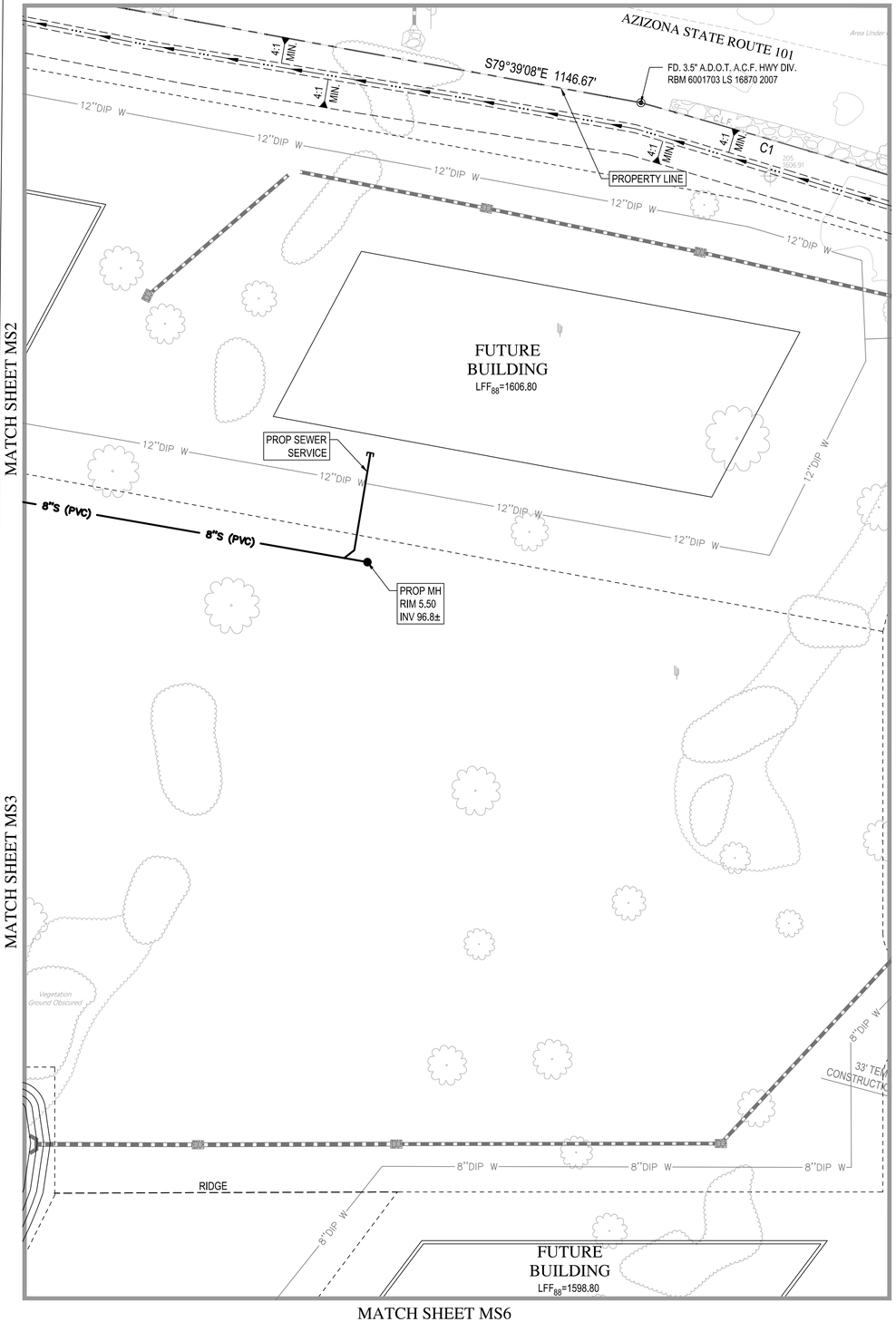

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MS 5

MASTER WASTEWATER PLAN

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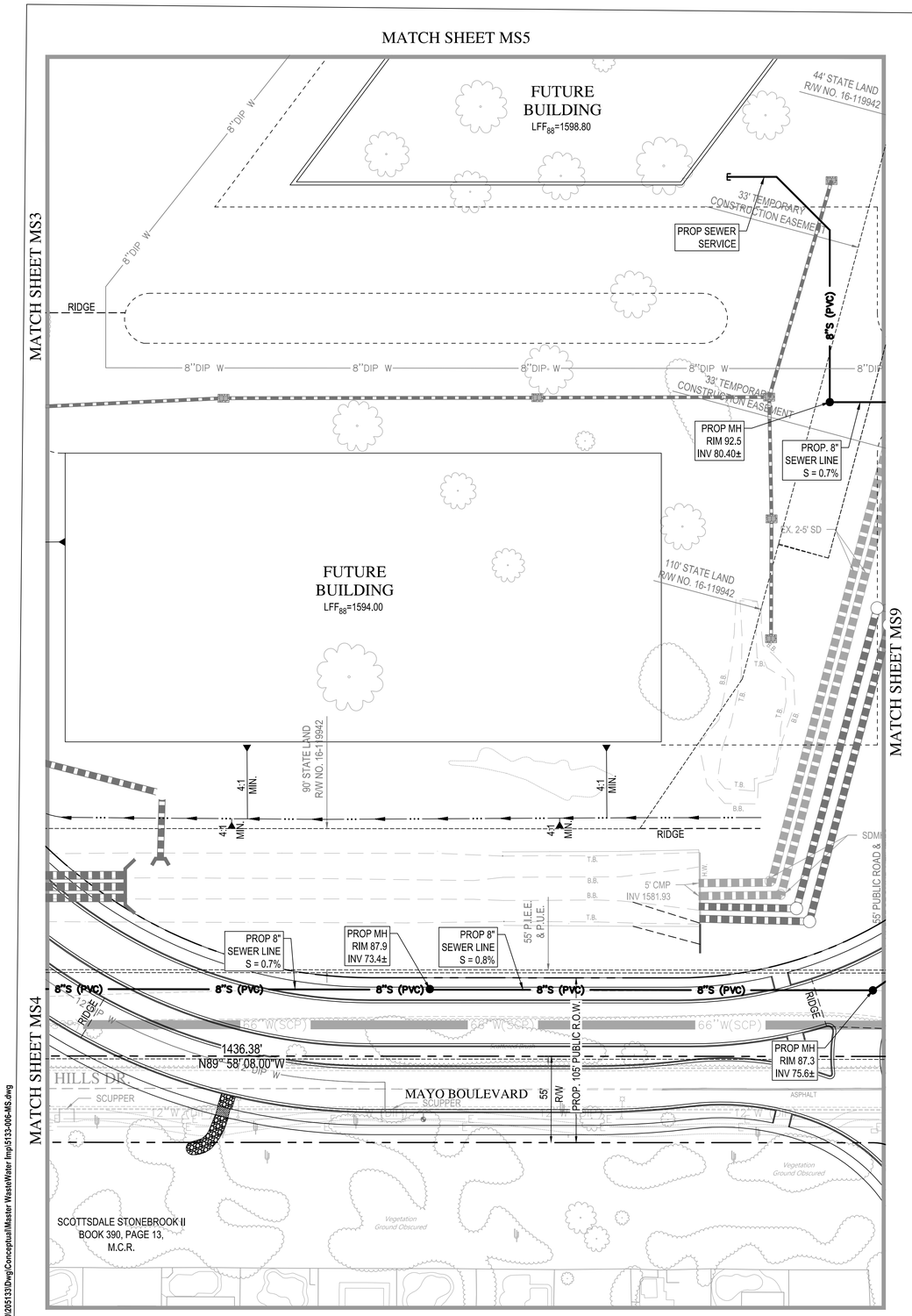

N

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MS 6

MASTER WASTEWATER PLAN

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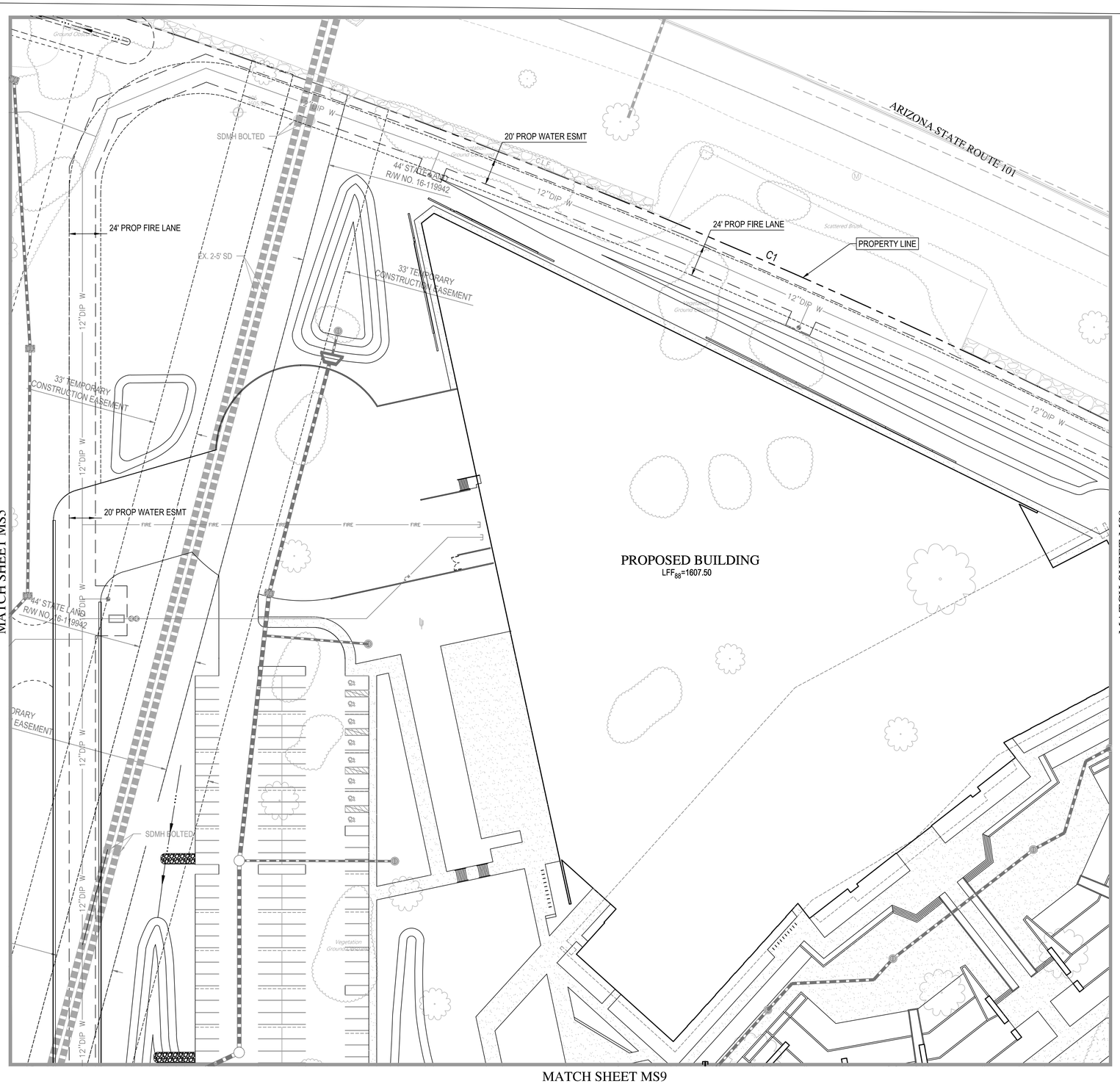

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MS 7

MASTER WASTEWATER PLAN

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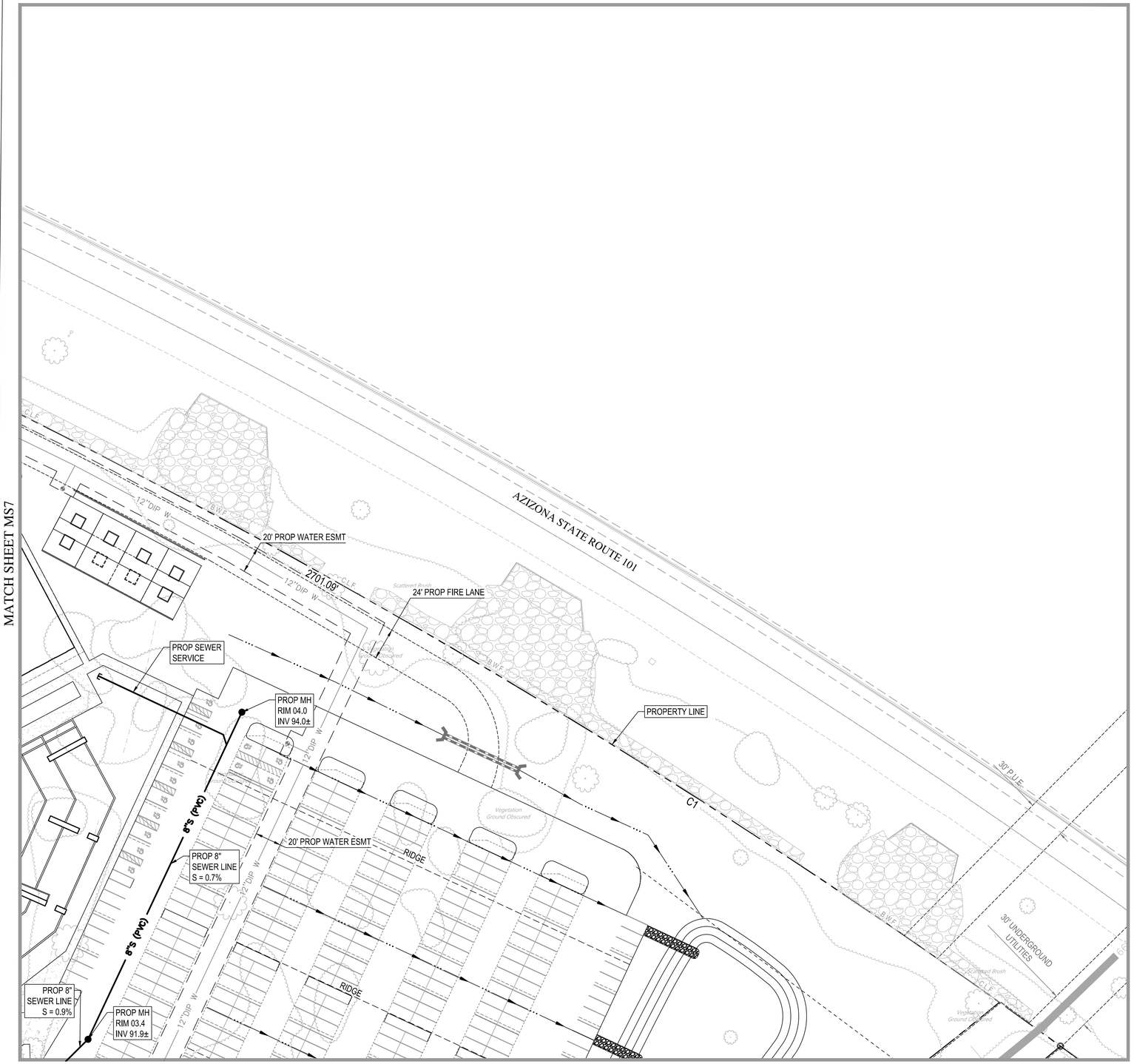
MATCH SHEET MS7



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MS 8

MASTER WASTEWATER PLAN

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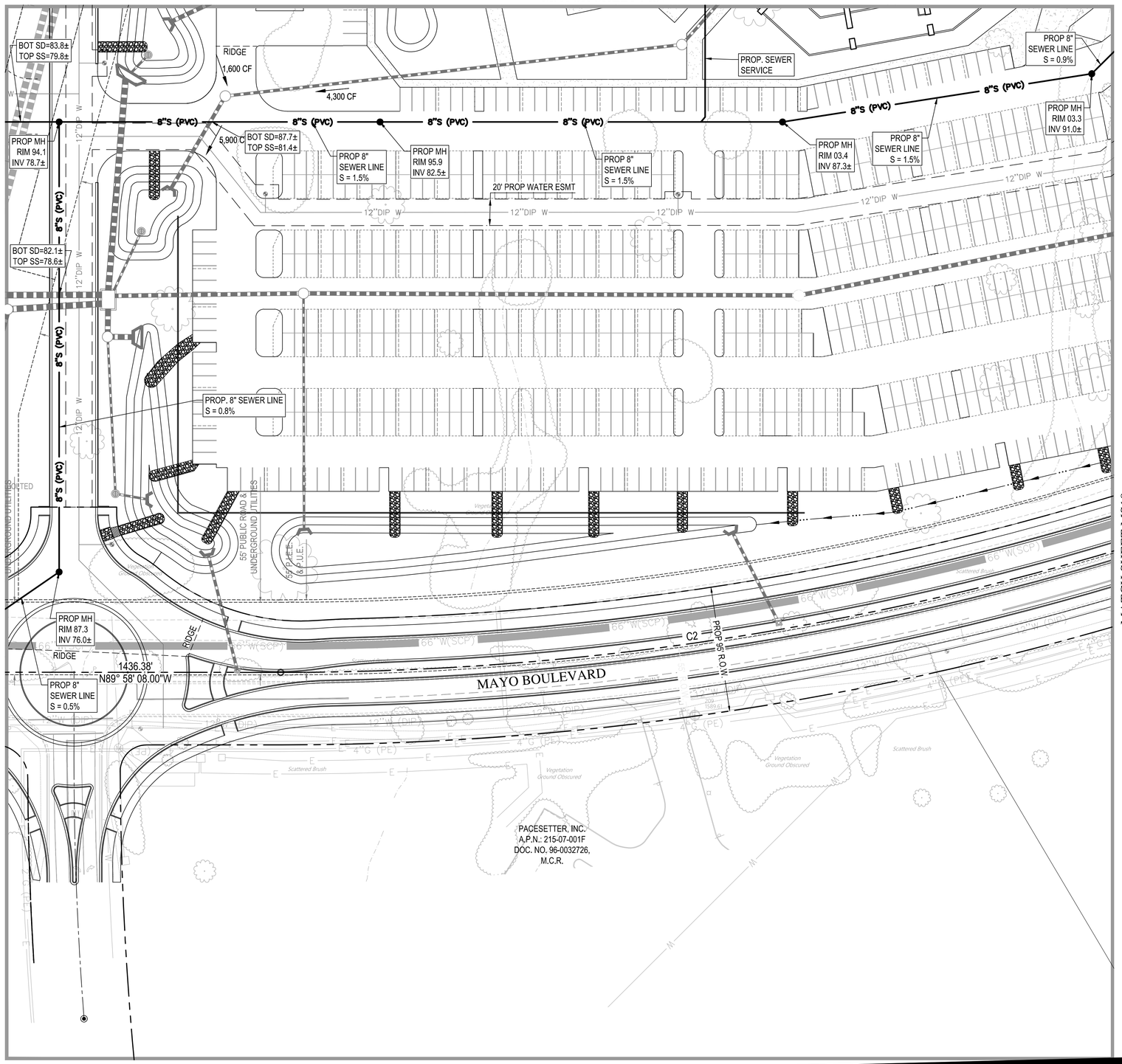

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Horz. 1 in. = 40 ft.

CURVE TABLE (M)			
CURVE	DELTA	RADIUS	ARC
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MS 9

MASTER WASTEWATER PLAN

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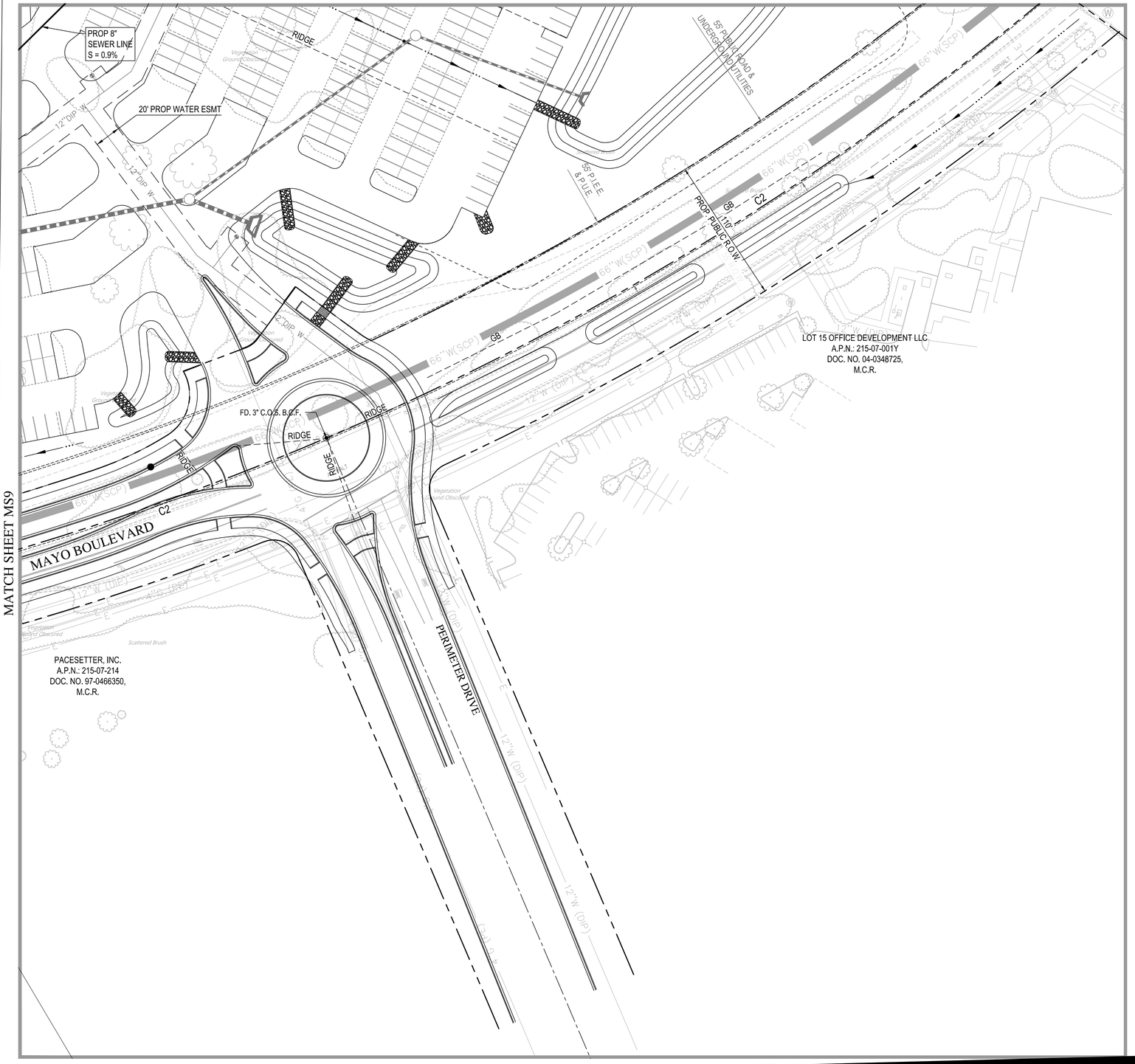
MATCH SHEET MS8



MATCH SHEET MS9

N

0 40 80

Horz. 1 in. = 40 ft.

CURVE TABLE (M)			
CURVE	DELTA	RADIUS	ARC
C2	40°08'46"	2200.00'	1,541.50'
C3	5°02'30"	1800.00'	158.39'
C4	5°02'30"	1800.00'	158.39'

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MS 10

MASTER WASTEWATER PLAN

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WOOD PATEL

MASTER WASTEWATER COLLECTION SYSTEM

BASIS OF DESIGN REPORT

FOR

CROSSROADS EAST - PLANNING UNITS X AND XI

October 2, 2020
WP# 205133

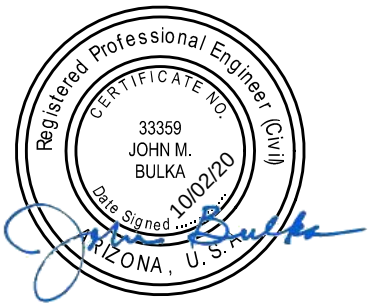
Registered Professional Engineer (Civil)
CERTIFICATE NO.
33359
JOHN M.
BULKA
Date Signed 10/02/20
ARIZONA, U.S.A.

EXPIRES 03-31-23

TABLE OF CONTENTS

APPENDICES

EXHIBITS



EXPIRES 03-31-23

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Y:\WP\Reports\Commercial\205133 Crossroads East Planning Units X and XI Master Wastewater Basis of Design Report.docx

1.0 INTRODUCTION

Crossroads East Planning Units X and XI (Site) is currently an undeveloped parcel that is part of the Crossroads East Planned Community District. The parcel, Tract 14A of State Plat No. 16-B Core South, consists of a portion of the north half of Section 36, Township 4 North, Range 4 East, in the City of Scottsdale, Arizona. The parcel is approximately 74.44 acres in size and is located northeast of the intersection of Hayden Road and Union Hills Drive in Scottsdale, Arizona. The parcel's western boundary has frontage along the east side of Hayden Road, and the parcel's southern boundary has frontage along the north side of Union Hills Drive. Additionally, the north side of the parcel parallels a portion of Arizona Department of Transportation (ADOT) State Route 101. The proposed improvements include six (6) proposed office / industrial buildings, a fire station, a well site, and the associated parking, roadways, hardscape and landscape.

The design criteria used to estimate wastewater flows and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (WOODPATEL) understanding of the published City of Scottsdale *Design Standards and Policies Manual*, 2018 and City of Phoenix *Design Standards Manual for Water and Wastewater Systems*, 2017.

The following is a summary of the primary design criteria utilized:

Average Day Wastewater Demand, Office:	0.4 gpd / sq. ft
Average Day Wastewater Demand, Industrial (Phoenix):	50 gpd / 1,000 sq. ft
Peak Factor, Office:	3
Peak Factor, Industrial:	$1+14/(4+P^{1/2})$
Minimum Mean Full Flow Velocity:	2.50 fps
Minimum Peak Full Flow Velocity:	10.0 fps
Minimum Peak Flow d/D Ratio (12-inch diameter or less sewers):	d/D = 0.65

Abbreviations: gpd = gallons per day; fps = feet per second; P = population/1,000

2.0 EXISTING WASTEWATER INFRASTRUCUTRE

2.1 On-Site Infrastructure (Pre-Development)

Significant portions of the parcel have been cleared and covered with recycled asphalt millings to provide dust control. Reportedly, the parcel has previously served as overflow parking. Portions of the parcel that have not been cleared or disturbed display native desert terrain, common to the area. The parcel slopes to the southwest at an average slope of 1.5%. Contour elevations range from approximately 1,605 feet to 1,583 feet.

Existing wastewater infrastructure adjacent to the Site includes a public 12-inch sewer line within Hayden Road. One (1) existing sewer stub extends from the 12-inch sewer line to the Site. Refer to the attached Wastewater Exhibit within Exhibit 2 for a depiction of the existing wastewater infrastructure surrounding the Site.

3.0 PROPOSED WASTEWATER INFRASTRUCUTRE

3.1 On-Site Infrastructure (Post Development)

Wastewater flows from the proposed Axon site, located on the east side of the project, will discharge to a proposed 8-inch on-site sewer line. The proposed 8-inch onsite sewer line will connect to a proposed 8-inch off-site/public sewer line (south collection system) in Mayo Boulevard along the south side of the Site. This proposed 8-inch off-site/public sewer line (south collection system) will also collect wastewater from Future Buildings 3 & 4 as well as the Fire Station. The proposed 8-inch off-site/public sewer line will connect to an existing 8-inch stub at the intersection of Hayden Road and Mayo Boulevard, which outfalls to an existing manhole in Hayden Road.

For the west side of the Site, a proposed 8-inch off-site/public sewer line (north collection system) will be constructed in the realigned Mayo Boulevard, and is intended to serve future buildings 1, 2, 3 & 5 on the Site. This proposed 8-inch off-site/public sewer line will outfall to the existing 12-inch sewer line in Hayden Road. Refer to the attached Wastewater Exhibit (Exhibit 2) for a depiction of the existing and proposed wastewater infrastructure for the Site.

3.2 Modeling and Results

Based on the above design criteria, the projected average-day flow for the proposed Site is calculated to be 154,494 gallons per day (gpd), or 107 gallons per minute (gpm). The peak flow is projected to be 478,932 gpd, or 333 gpm. Of the peak flow, the southern line will accept 347,742 gpd, and the northern line will accept 132,730 gpd. The proposed sewer slopes, projected flow velocities, and pipe flow capacities are summarized on the attached spreadsheets within Appendix A.

It is assumed the infiltration and inflow from wet weather has been accounted for in the published design flow rates for the development and the maximum d/D. Therefore, those flows have not been included in the calculations.

4.0 CONCLUSIONS

Based on our analysis of the Site, the following conclusions can be made:

1. The design criteria used to estimate wastewater flows and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (WOODPATEL) understanding of the published City of Scottsdale *Design Standards and Policies Manual*, 2018 and City of Phoenix *Design Standards Manual for Water and Wastewater Systems*, 2017.

2. Based on the above design criteria, the projected average-day flow for the proposed Site is calculated to be 154,494 gallons per day (gpd), or 107 gallons per minute (gpm). The peak flow is projected to be 478,932 gpd, or 333 gpm. Of the peak flow, the southern line will accept 347,742 gpd, and the northern line will accept 132,730 gpd.

APPENDIX A – CALCULATIONS AND HYDRAULIC MODELING RESULTS

WOOD PATEL

TABLE 1
WASTEWATER DESIGN CRITERIA

Project	Crossroads East - Planning Unit X & XI
Location	Scottsdale AZ
Project Number	205133
Project Engineer	John Bulka, P.E.
References	City of Scottsdale Design Standards and Policy Manual (2018)
	Arizona Administrative Code, Title 18, Chapter 9
	City of Phoenix Design Standards Manual for Water and Wastewater Systems (2017)

RESIDENTIAL WASTEWATER DEMANDS

LAND USE	AVERAGE DAILY DEMAND (ADD)		POPULATION[1]
	VALUE	UNITS	
Single Family Residential	250	gpd/DU	2.5 Persons per DU
Multi-Family Residential	220	gpd/DU	2.2 Persons per DU

NON-RESIDENTIAL WASTEWATER DEMANDS

LAND USE	AVERAGE DAILY DEMAND (ADD)		POPULATION[1]	Peaking Factor (PF)
	VALUE	UNITS		
Commercial/Retail	0.5	gpd/sf	0.005 Persons per sf	3
Office	0.4	gpd/sf	0.004 Persons per sf	3
Resturant	1.2	gpd/sf	0.012 Persons per sf	6
High Density Condominium	140	gpd/unit	1.4 Persons per unit	4.5
Resort Hotel	380	gpd/room	3.8 Persons per room	4.5
School: without cafeteria	30	gpd/student	0.3 Persons per Student	6
School: with cafeteria	50	gpd/student	0.5 Persons per Student	6
Cultural	0.1	gpd/sf	0.001 Persons per sf	3
Clubhouse for Subdivision Golf Course	200	gpd/DU	2 Persons per patron x2 patrons per du per day	4.5
Fitness Center/ Spa/ Health Club	0.8	gpd/sf	0.008 Persons per sf	3.5
Industrial	50	gpd/1,000 sf	0.5 Persons per 1,000 sf	See Below

HYDRAULIC MODELING CRITERIA

DESCRIPTION	VALUE
INDUSTRIAL PEAK FLOW[3]	
Peak Flow = Peaking Factor (PF) x ADD	$[1+14/(4+P^{1/2})]$ x ADD
(PF is based on upstream population, P = Population/1,000)	
HYDRAULICS	
Minimum Pipe Diameter (in)	8
Manning's "n" value	8
Maximum d/D ratio at peak flow (D ≤ 12")	0.013
Maximum d/D ratio at peak flow (D > 12")	0.65

PIPE SIZE	MEAN VELOCITY[2]		DESIGN SLOPE[2]	
(in)	Minimum (ft/sec)	Maximum (ft/sec)	Minimum (%)	Maximum (%)
8	2.5	10.0	0.520	6.980
10	2.5	10.0	0.390	5.121
12	2.5	10.0	0.310	3.919

Notes

1. Based on Arizona Administrative Code, Title 18, Chapter 9 value of 100 gallons per capita per day.
2. Per City of Scottsdale Design Standards and Policy Manual (2018)
3. Per City of Phoenix Design Standards Manual for Water and Wastewater Systems (2017)

WOOD PATEL

TABLE 2
WASTEWATER MODEL

Project Crossroads East - Planning Unit X & XI
Location Scottsdale AZ
Project Number 205133
Project Engineer John Bulka, P.E.
References City of Scottsdale Design Standards and Policy Manual (2018)
Arizona Administrative Code, Title 18, Chapter 9
City of Phoenix Design Standards Manual for Water and Wastewater Systems (2017)

		LAND USE																	
FROM NODE	**TO NODE**	**Single Family Residential (DU)**	**Multi-Family Residential (DU)**	**Commercial/Retail (sf)**	**Office (sf)**	**Resturant (sf)**	**High Density Condominium (unit)**	**Resort Hotel (room)**	**School: without cafeteria (student)**	**School: with cafeteria (student)**	**Cultural (sf)**	**Clubhouse for Subdivision Golf Course (DU)**	**Industrial (1,000 sf)**	**SEWER NODE ADD (gpd)**	**TOTAL ADD (gpd)**	**TOTAL ADD (gpm)**	**WEIGHTED PEAKING FACTOR[1]**	**PEAK FLOW (gpd)**	**PEAK FLOW (gpm)**
Outfall 1 SOUTH																			
MH-1	MH-2				216,225								147.85	93,883	93,883	65	3.1	292,681	203
MH-2	MH-3													0	93,883	65	3.1	292,681	203
MH-3	MH-4													0	93,883	65	3.1	292,681	203
MH-4	MH-5													0	93,883	65	3.1	292,681	203
MH-5	MH-7													0	93,883	65	3.1	291,036	202
MH-6	MH-7				29,992									11,997	105,879	74	3.1	328,226	228
MH-7	MH-8													0	105,879	74	3.1	328,226	228
MH-8	MH-9													0	105,879	74	3.1	328,226	228
MH-9	MH-10													0	105,879	74	3.1	328,226	228
MH-10	MH-13													0	105,879	74	3.1	328,226	228
MH-FS	MH-11				11,677								22.54	5,798	111,677	78	3.1	346,199	240
MH-11	MH-12													--	111,677	78	3.1	346,199	240
MH-12	MH-13													--	111,677	78	3.1	346,199	240
MH-13	MH-14													1	111,678	78	3.1	346,202	240
MH-14	EX MH-1													0	111,678	78	3.1	346,202	240
Total Outfall 1		**0**	**0**	**0**	**257,894**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**170.39**	**111,678**	**111,678**	78	**3.1**	**347,742**	**241**

Note:
1. Weighted peaking factor based upon City of Scottsdale Design Standards and Policy Manual (2018) & City of Phoenix Design Standards Manual for Water and Wastewater Systems (2017) peaking factors for various land uses. The peaking factors are weighted in relation to total Average Day Demand for each use.

WOOD PATEL

TABLE 2
WASTEWATER MODEL

Project Crossroads East - Planning Unit X & XI
Location Scottsdale AZ
Project Number 205133
Project Engineer John Bulka, P.E.
References City of Scottsdale Design Standards and Policy Manual (2018)
Arizona Administrative Code, Title 18, Chapter 9
City of Phoenix Design Standards Manual for Water and Wastewater Systems (2017)

		LAND USE																	
FROM NODE	**TO NODE**	**Single Family Residential (DU)**	**Multi-Family Residential (DU)**	**Commercial/Retail (sf)**	**Office (sf)**	**Resturant (sf)**	**High Density Condominium (unit)**	**Resort Hotel (room)**	**School: without cafeteria (student)**	**School: with cafeteria (student)**	**Cultural (sf)**	**Clubhouse for Subdivision Golf Course (DU)**	**Industrial (1,000 sf)**	**SEWER NODE ADD (gpd)**	**TOTAL ADD (gpd)**	**TOTAL ADD (gpm)**	**WEIGHTED PEAKING FACTOR[1]**	**PEAK FLOW (gpd)**	**PEAK FLOW (gpm)**
Outfall 2 NORTH																			
MH-F2	MH-F1				30,230									12,092	12,092	8	3.1	37,485	26
MH-F1	MH-15				67,078									26,831	38,923	27	3.1	120,662	84
MH-15	MH-16													0	38,923	27	3.1	120,662	84
MH-16	MH-17				9,732									3,893	42,816	30	3.1	132,730	92
MH-17	MH-18													0	42,816	30	3.1	132,730	92
Total Outfall 2		**0**	**0**	**0**	**9,732**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**42,816**	**42,816**	30	3.1	**132,730**	**92**
Total Proposed Flow		**0**	**0**	**0**	**267,626**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**170.39**		**154,494**	**107**	3.1	**478,932**	**333**

WOOD PATEL

TABLE 3
CALCULATED PIPE CAPACITIES

Project Crossroads East - Planning Unit X & XI
Location Scottsdale AZ
Project Number 205133
Project Engineer John Bulka, P.E.
References City of Scottsdale Design Standards and Policy Manual (2018)
ADEQ Bulletin No. 11
City of Phoenix Design Standards Manual for Water and Wastewater Systems (2017)

						PEAK FLOW RESULTS					
FROM NODE	**TO NODE**	**PIPE SIZE**	**MODELED PIPE SLOPE**	**PIPE CAPACITY (0.65 FULL)**		**PEAK FLOW**		**d/D**	**Peak Flow Velocity**	**SURPLUS CAPACITY**	**PERCENT OF CAPACITY**
		(in)	**(ft/ft)**	**(gpd)**	**(gpm)**	**(gpd)**	**(gpm)**		**(ft/sec)**	**(gpd)**	**(%)**
Outfall 1 SOUTH											
MH-1	MH-2	8	0.0070	495,635	344	292,681	203	0.47	2.82	202,954	59.1%
MH-2	MH-3	8	0.0090	561,997	390	292,681	203	0.44	3.10	269,316	52.1%
MH-3	MH-4	8	0.0150	725,535	504	292,681	203	0.38	3.73	432,854	40.3%
MH-4	MH-5	8	0.0150	725,535	504	292,681	203	0.38	3.73	432,854	40.3%
MH-5	MH-7	8	0.0150	725,535	504	291,036	202	0.38	3.73	434,499	40.1%
MH-6	MH-7	8	0.0070	495,635	344	328,226	228	0.50	2.91	167,409	66.2%
MH-7	MH-8	8	0.0080	529,856	368	328,226	228	0.48	3.05	201,630	61.9%
MH-8	MH-9	8	0.0052	427,183	297	328,226	228	0.55	2.60	98,957	76.8%
MH-9	MH-10	8	0.0080	529,856	368	328,226	228	0.48	3.05	201,630	61.9%
MH-10	MH-13	8	0.0070	495,635	344	328,226	228	0.50	2.91	167,409	66.2%
MH-FS	MH-11	8	0.0200	8,377,753	5818	346,199	240	0.12	22.23	8,031,554	4.1%
MH-11	MH-12	8	0.0110	621,311	431	346,199	240	0.45	3.48	275,112	55.7%
MH-12	MH-13	8	0.0110	621,311	431	346,199	240	0.45	3.48	275,112	55.7%
MH-13	MH-14	8	0.0070	495,635	344	346,202	240	0.52	2.94	149,432	69.9%
MH-14	EX MH-1	8	0.0100	592,397	411	346,202	240	0.47	3.36	246,194	58.4%

WOOD PATEL

TABLE 3
CALCULATED PIPE CAPACITIES

Project	Crossroads East - Planning Unit X & XI
Location	Scottsdale AZ
Project Number	205133
Project Engineer	John Bulka, P.E.
References	City of Scottsdale Design Standards and Policy Manual (2018)
	ADEQ Bulletin No. 11
	City of Phoenix Design Standards Manual for Water and Wastewater Systems (2017)

						PEAK FLOW RESULTS					
FROM NODE	**TO NODE**	**PIPE SIZE**	**MODELED PIPE SLOPE**	**PIPE CAPACITY (0.65 FULL)**		**PEAK FLOW**		**d/D**	**Peak Flow Velocity**	**SURPLUS CAPACITY**	**PERCENT OF CAPACITY**
		(in)	**(ft/ft)**	**(gpd)**	**(gpm)**	**(gpd)**	**(gpm)**		**(ft/sec)**	**(gpd)**	**(%)**
Outfall 2 NORTH											
MH-F2	MH-F1	8	0.0150	959,184	666	37,485	26	0.45	4.07	921,699	3.9%
MH-F1	MH-15	8	0.0200	1,107,570	769	132,730	92	0.52	4.98	974,840	12.0%
MH-15	MH-16	8	0.0100	783,170	544	132,730	92	0.47	3.36	650,441	16.9%
MH-16	MH-17	8	0.0100	783,170	544	132,730	92	0.45	3.32	650,441	16.9%
MH-17	MH-18	8	0.0100	783,170	544	132,730	92	0.52	3.52	650,441	16.9%

APPENDIX B – CRE WASTEWATER MASTER PLAN UPDATE
BY COE & VAN LOO CONSULTANTS INC., DATED FEBRUARY 22, 2012

/SYFIZ

COE & VAN LOO
CONSULTANTS, INC.

CROSSROADS EAST
SCOTTSDALE, ARIZONA

WASTEWATER MASTER PLAN UPDATE

Accepted For:
City of Scottsdale
Water Resources Department
9379 E. San Salvador
Scottsdale, Arizona

By: Doug Mann
Date: Apr 13 2012

February 22, 2012

Prepared for

Arizona State Land Department
Planning & Engineering Sections
1616 W. Adams Street
Phoenix Arizona 85007
602-542-4631 Phone
602-364-0406 Fax

Prepared by:

Coe & Van Loo Consultants Inc.
4550 North 12th Street
Phoenix, Arizona 85014
602-264-6831 Phone
602-264-0928 Fax

Registered Professional Engineer (Civil) CERTIFICATE NO. 37178 LAURIN Date Signed 8 March '12 ARIZONA, U.S.A.

CVL Project No.: 1.07.0196501 Expires: 6/30/12

TABLE OF CONTENTS

TABLES

Registered Professional Engineer (Civil)
CERTIFICATE NO. 14478
ERIC LAURIN
Date Signed 8 March 12
ARIZONA, U.S.A.
Expires: 6/30/12

FIGURES

APPENDIX

1.0 INTRODUCTION

1.1 Scope

This Wastewater Master Report Update (Report) has been prepared to calculate expected wastewater generation quantities and to determine infrastructure sizing requirements for the future development of Crossroads East. It includes the increased residential dwelling unit count allowed by the City's recent approval of an amendment to the zoning for this project. See Section 1.4. This Report has been prepared using information and findings contained in a previous report by CVL named "Wastewater Master Plan," dated September 15, 2011, and approved by the City of Scottsdale on November 3, 2011.

The Report for the Site will follow the guide line presented in Chapter 7 "Wastewater-Design Standards & Policies Manual" and the requirements set forth by the City of Scottsdale, dated January 2010.

1.1 General Background

Crossroads East (site) is located north of the central City of Scottsdale central area, on both sides of the dynamic Loop 101/Pima Freeway corridor, see Figure 1. The site represents a long-term opportunity for a significant commercial, office, and mixed use development. It 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 883 gross acres and features excellent visibility and access.

1.3 Site Location

The Site is located within Section 25, 26, 35 & 36, Range 4 East, Township 4 North of the Gila and Salt River Base and Meridian, City of Scottsdale, Maricopa County, Arizona.

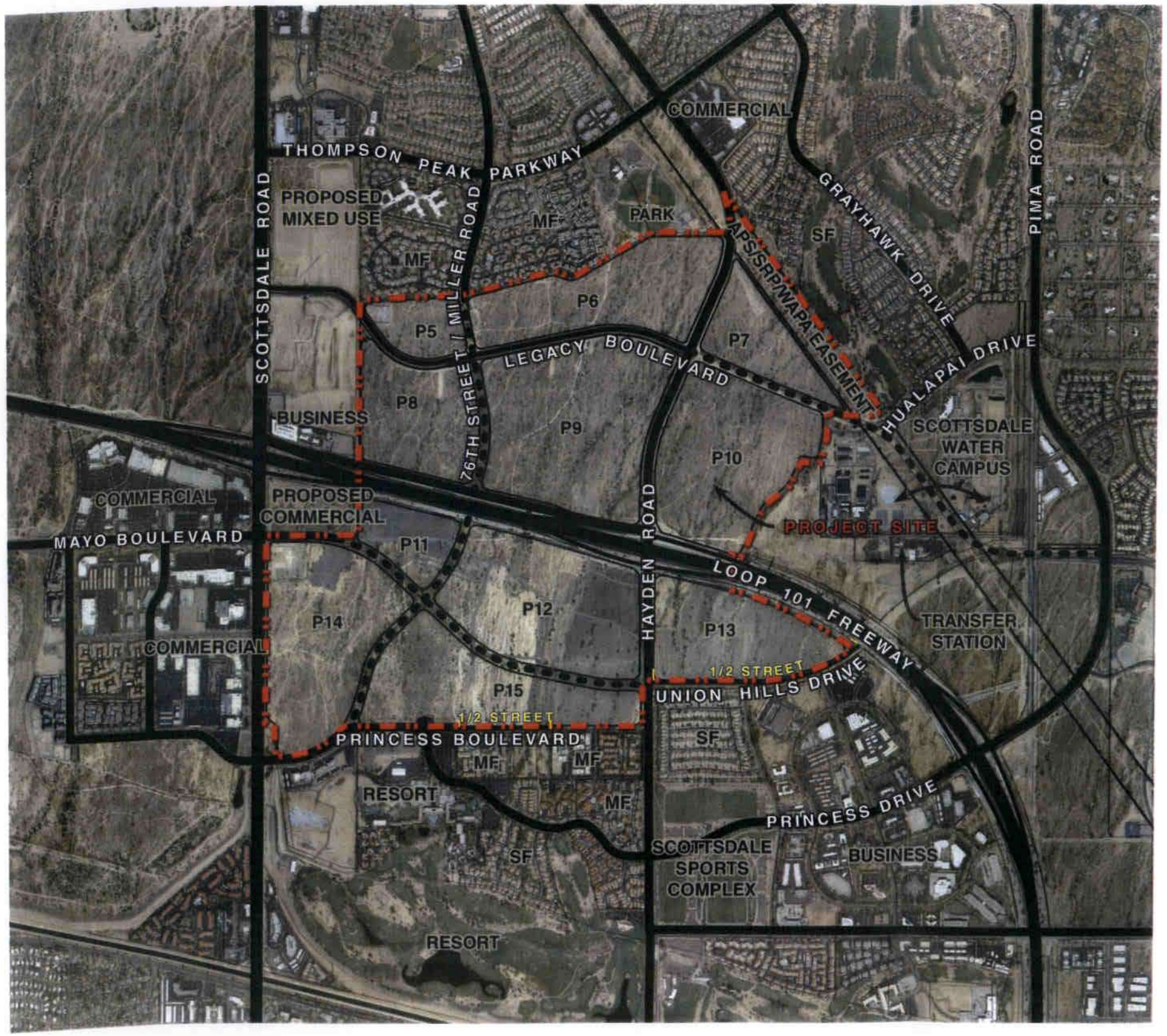
State Route Loop 101 (SR 101) bisects the Site and divides it into two parts, North and South. Scottsdale Road forms the boundary between the City of Scottsdale and the City of Phoenix.

North of SR 101, the Site is bounded by the Greyhawk community. An existing APS/SRP/WAPA power line easement forms on the northeast boundary. Also, the City of Scottsdale Water Treatment Facility and a solid waste transfer station are located along the east boundary of the site.

The Princess Resort, single family homes and the Perimeter Center Business Park are on the south. On the west and north of SR101, the parcel is adjacent to "One Scottsdale", a mixed-use project to be developed by DMB. South of SR101, a retail center and a series of auto dealerships are located along the side's west boundary.

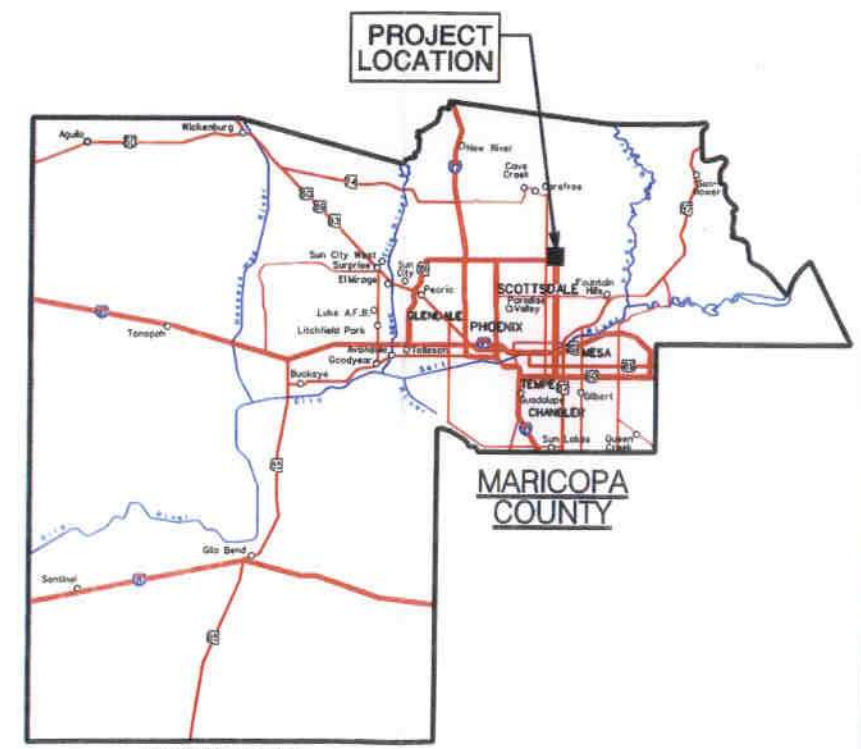
The existing Hayden Road traffic interchange with L101 is in the center of the site, which is located approximately one mile east of Scottsdale Road, see Figure 2 for a location of parcels adjacent to the project.

CITY OF PHOENIX ← → CITY OF SCOTTSDALE



LEGEND

- PROJECT BOUNDARY
- EXISTING ROADWAY ALIGNMENT
- ROADWAY ALIGNMENTS UNDER CONSTRUCTION
- PROPOSED ROADWAY ALIGNMENT
- P7 PARCEL NUMBERS (SEE FIGURE 2)



VICINITY MAP
SCALE: NONE

CVL

750' 0' 1500'

CROSSROADS EAST

COE & VAN LOO
PLANNING ENGINEERING LANDSCAPE ARCHITECTURE

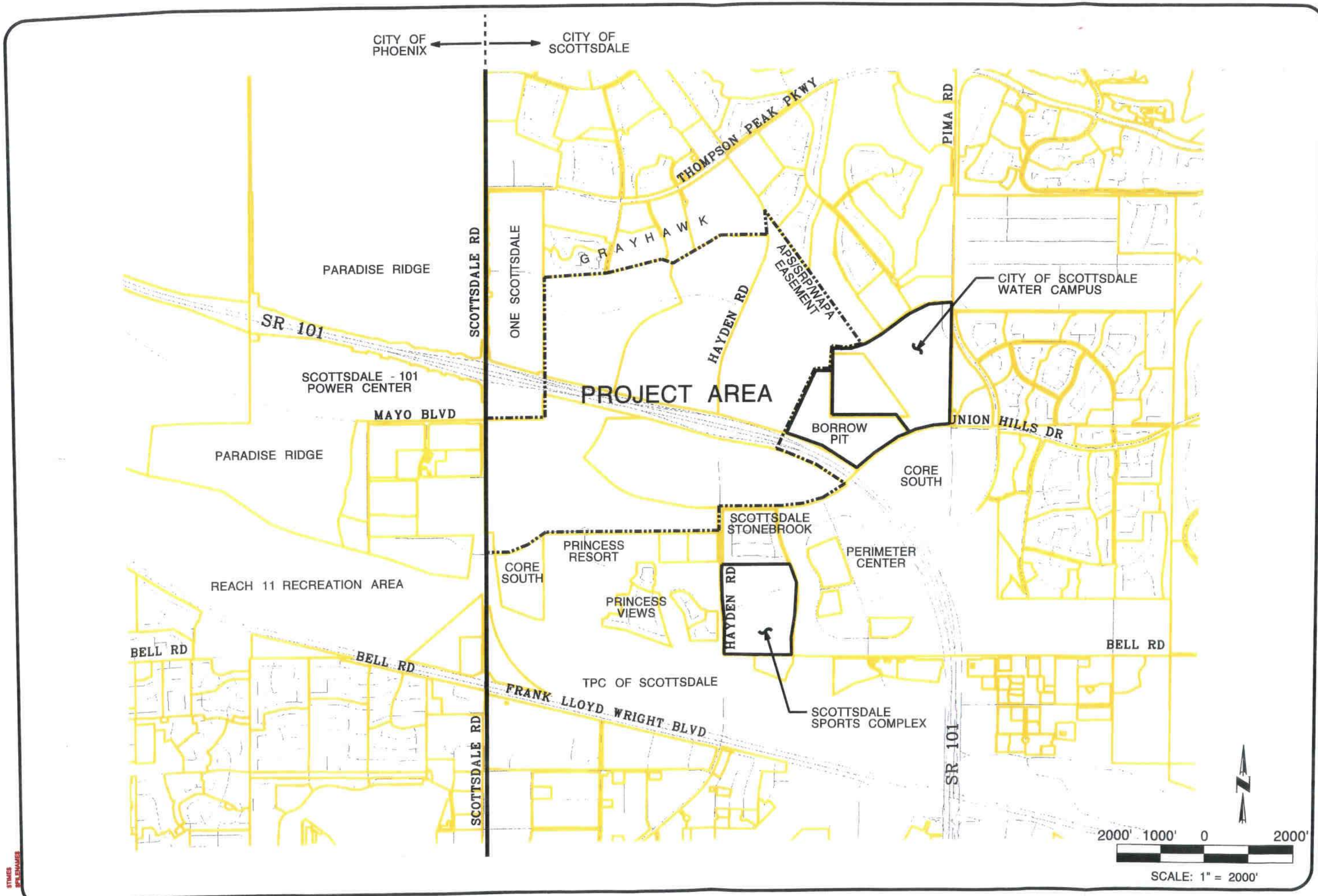
VICINITY MAP

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

JOB NO
07-0196501

FIGURE
1

FILE:N:\01\0220001\GRAPHICS\PL\EXHIBIT\01-0220001 - CROSSROADS EAST.INDD 2 FEBRUARY 2012



CROSSROADS EAST

COE & VAN LOO
PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

PROJECT AREA & VICINITY PARCELS

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PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

JOB NO
1.07.0196501

FIGURE
2

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1.4 Zoning / 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 and outlined the terms of reimbursement for City-installed roadway and infrastructure improvements by ASLD's future buyers and lessees.

An application for an amendment to the property's development plan was approved by the City of Scottsdale on October 18, 2011. The changes to the development plan are described in "Crossroads East Planned Community District Master Development Plan 19-ZN-2002 "2" and consists of the following:

- Development standards for C-3 are comparable to those for zoning district C-2 and may replace C2 zoning.
- The maximum dwelling unit per gross acre for R-5 has been increased to 23, resulting in an increase in allowable DUs for R-5 to 2,806. The total allowable dwelling units within Crossroads East is now 4,378 an increase of 935 from the previously approved zoning.

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.

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 and amended in October 2011. 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 change in maximum allowable R-5 densities to 23 DU/acre results in a net increase of 935 units for the project. The final concept places commercial uses (C-2 and C-3) at the Hayden/ SR101 intersection to provide a node of commercial activity at this important junction.

The FAR ratios approved in the zoning development agreement and used in the Crossroads East Wastewater Mater Plan, dated September 15, 2011, were kept for this study. Calculations were based on net parcel area, which is gross area less proposed street rights-of-way. Table 1 lists the proposed land use calculations.

Figure 3 is a site conditions map that identifies current planned and proposed uses and development for the project.

ASLD has received a sales application for approximately 29 gross acres located at the southeast corner of Scottsdale Road and Union Hills Drive. The flows for this 29 acre piece have been calculated as a proportion of Parcel 14 (PRC) total demand based on gross area. See Table 1 for the Floor Area Ratio (FAR).

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]
North							
P5	C-O	25.5	22.7	593,287			25.5
P6	R-5	84.2	77.7		77.7	1,936	
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/C-3	34.2	32.4	423,403			130.5
P10	C-2/C-3	28.7	26.9	351,529			
P10	I-1	74.1	69.9	1,522,422			102.8
Subtotal	**-**	**477.6**	**439.9**	**7,217,456**	**77.7**	**2,479**	**477.6**
South							
P11	C-2/C-3	29.8	26.6	347,609			29.8
P12	I-1	70.4	66.2	1,441,836			
P12	C-2/C-3	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	870	
P15	C-O	38.2	35.0	914,760			88.0
Subtotal	**-**	**404.9**	**371.3**	**6,421,615**	**35.7**	**1,899**	**404.9**
Grand Total		**882.5**	**811.2**	**13,639,072**	**113.4**	**4,378**	**882.5**

		max allowed (based on net area, less ROW's)	
Notes: Yield per Development Agreement	I-1	0.5 FAR	
	C-0	0.6 FAR	
	C-2/C3	0.3 FAR	
	PCC	0.3 FAR	
	PCoC	0.3 FAR	
	PRC	0.8 FAR	50% of FAR is for Non-Res
	R-5	23 DU/ac	

ZONING/LAND USE PLAN

R-5	MULTIPLE FAMILY
C-2/C-3	CENTRAL BUSINESS/HIGHWAY COMMERCIAL
C-0	COMMERCIAL/OFFICE
PCC	PLANNED COMMUNITY CENTER
PCoC	PLANNED CONVENIENCE CENTER
PRC	PLANNED REGIONAL CENTER (MIXED USE)
I-1	INDUSTRIAL PARK
———	PROJECT BOUNDARY (GROSS)
P8	PARCEL NUMBER

NOTES:

1.) SEC OF SCOTTSDALE ROAD AND UNION HILLS / MAYO (APPROXIMATELY 29 ACRES)

CVL

600' 0' 1200'

CROSSROADS EAST

COE & VAN LOO
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LAND USE PLAN

4550 NORTH 12TH STREET
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JOB NO
07-0196501

FIGURE
3

FILE:N:\01\0220001\GRAPHICS\PL\EXHIBIT\01-0220001 - CROSSROADS EAST.INDD

2 FEBRUARY 2012

3.0 EXISTING CONDITIONS

3.1 Topographic Conditions

A two-foot contour interval topographic map was obtained from the Flood Control District of Maricopa County (FCDMC) for the project site. The existing topography indicates a general slope of 0.013 ft/ft from the north to the south-southwest. Given the natural slope of the site, it was determined that gravity lines internal to the project can serve the project area, and feasibly connect to the main interceptor trunk lines owned by the City of Scottsdale.

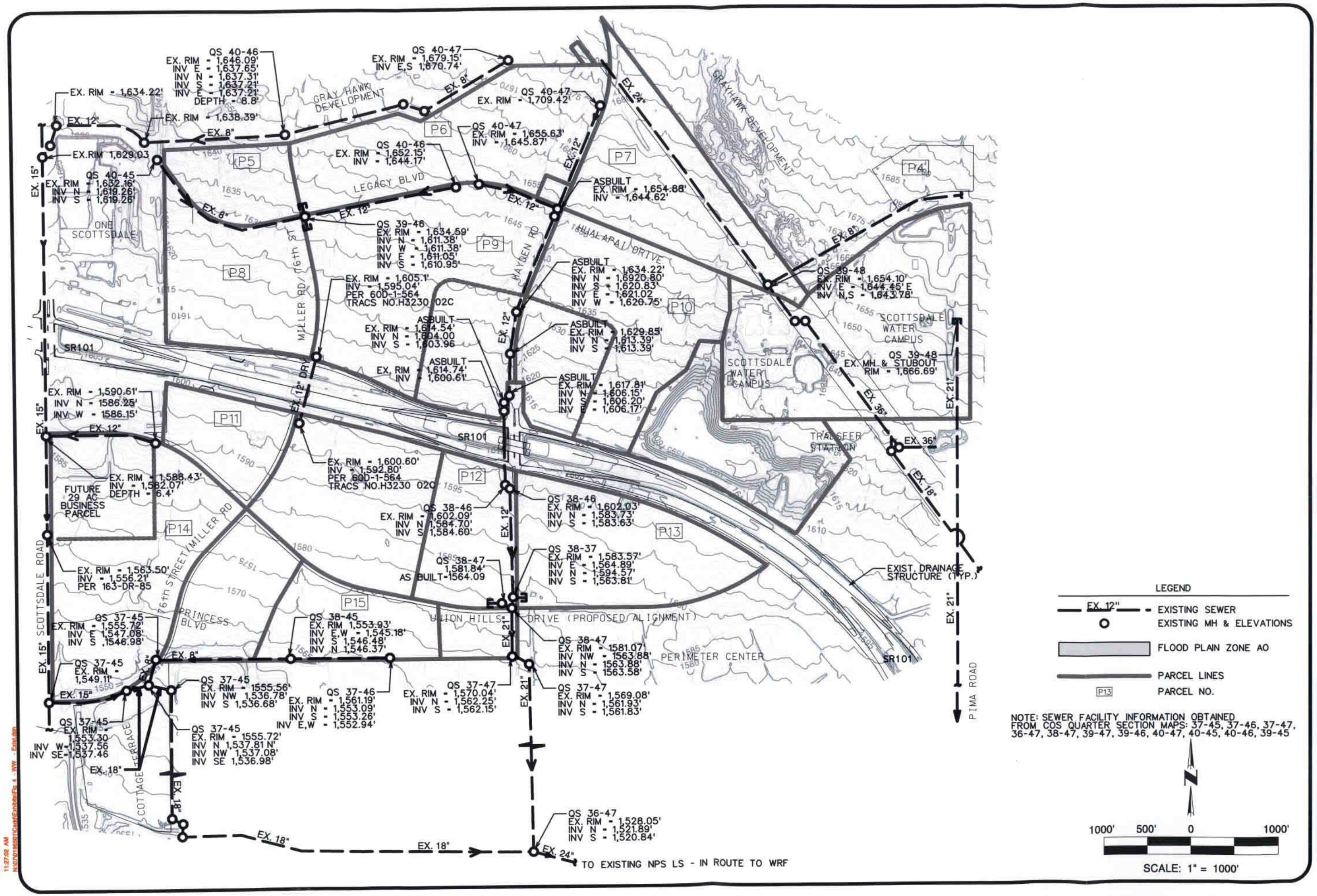
The existing rim and invert elevations at the existing manholes shown on the report's figures have been taken from Quarter Section Utility Maps of the City of Scottsdale, obtained in April and December 2011. The maximum elevation of the site, 1,655 feet is noted at Hayden and Legacy Boulevard. The minimum elevation of 1,575 feet is located approximately one-quarter mile west of Hayden Road along the Union Hills proposed alignment. The elevations shown in the City Quarter Section Maps are typically based on the 1929 datum. This datum is approximately 1.8 feet lower than the presently used 1988 datum. Inverts of terminal manholes in key reaches are to be field verified prior to design.

3.2 Existing Wastewater Infrastructure

The area's existing infrastructure is identified in Figure 4. The wastewater collection lines shown in the map are based on conversations and correspondence with the City of Scottsdale during the preparation of the 2011 Wastewater Master Plan, review of 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.

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 8- and 12-inch sewer lines that are constructed to flow into the future Miller Road sewer and are ready for use. 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 30-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 to 18 mgd during peak periods.



CROSSROADS EAST

COE & VAN LOO
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EXISTING SEWER FACILITIES

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1.07.0196501

FIGURE
4

..\Fig 4 - WW - Exist.dgn 2/24/2012 11:27:02 AM

It should be noted that the invert elevation of several manholes on the City of Scottsdale quarter section maps were indicated as being "not found", especially along Hayden Road. Inverts of the existing sewer line should be verified in the field prior to performing additional design

3.3 FEMA Map

Review of current FEMA maps reveals that most of the project is within zone AO, indicating that these areas are subjected to inundation by a 1 percent annual chance of shallow flooding. Sheet flows of between 1 and 3 feet are anticipated. A wedge of land extending north from Union Hills Drive to the northern boundary of the site is outside the 100 year floodplain, see Figure 4.

4.0 FLOW CALCULATIONS

4.1 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 A). As recommended by the City, Table 2 lists unit factors interpreted to be representative of the proposed land use allocations shown in Table 1.

Table 2 – Wastewater Generation Unit Factors

CVL Land Use Designations	City Land Use Type Designations	ADDMM[1] [gpapd]	Peak Flow[2] [gpapd]
C-2/C-3	Business – General	1,173	2,346
C-O	Office – Minor	878	1,756
I-1	Industrial – Minor	561	1,122
R-5	Residential MF	3,090	6,180
PRC	Regional Center	680	1,360
PCC	Community Center	656	1,312
PCoC	Retail – Community	656	1,312

[1] ADDMM = Average Day Demand of Maximum Month
[2] Peak Flow = ADDMM x 2.0

These unit flow factors are based on a FAR of 0.25.

The wastewater use factors for those parcels having an R-5 zoning designation were recalculated as follows. The base unit flow estimates of 2,060 gpapd were multiplied by a factor of 1.5 to reflect the proportional increase in dwelling units of 935 units as calculated from the increased density from 15 to 23 DU/acre. The revised AADMM for R-5 parcels is now 3,090 gpapd.

4.2 Wastewater Generation Estimates

Wastewater generation estimates for the entire development by parcel, as based on the unit factors shown in Table 2 above, are summarized in Table 3.

Table 3 – Wastewater Generation Estimates

Parcel	Land Use	Area [ac]	FAR (proposed)	FAR[1] (Eq.)	Adjusted[2] Area [ac]	DU	AADF [gpm]	PF [gpm]	AADF [gpd]	PF [gpd]
Areas North of the Loop 101										
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	1,936	180.7	361.4	260,178	520,356
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/C-3	34.2	0.3	1.2	41.0	-	33.4	66.9	48,140	96,280
P10	C-2/C-3	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
Subtotal		478			901	2,479	560.6	1,121.2	807,230	1,614,460
Areas South of the Loop 101										
P11	C-2/C-3	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/C-3	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	870	81.1	162.2	116,802	233,604
P15	C-O	38.2	0.6	2.4	91.7	-	55.9	111.8	80,495	160,990
Subtotal		405	-	-	853	1,899	483.4	966.8	696,045	1,392,092
GRAND TOTALS		**883**	**-**	**-**	**1,754**	**4,378**	**1,044**	**2,088**	**1,503,360**	**3,006,720**

[1] FAR (Eq.) = FAR (Proposed)/0.25
[2] See Table 1: Adjust Area = Gross Area x FAR (eq)

The Sewer Collection System flows are calculated based on the City of Scottsdale Criteria for Wastewater System Design (see Design Standards Policies Manual dated January 2010) and shown in Table 4.

5.0 PROPOSED COLLECTION SYSTEM

CVL assessed five (5) alternatives for conveying the development's effluent to the City's existing wastewater reclamation facilities. The criteria described above in Section 4.3 served as the basis for this preliminary layout.

Due to the existing conditions and additional flows from the increased R-5 residential units, the following improvements will be necessary for all options:

- Install a new, deep 6-feet diameter manhole at the intersection of Princess Boulevard and Miller Road to capture flow from north and east (MH S5A1).
- The existing 8-inch sewer along Princess Boulevard shall be removed and replaced by the new 10-inch sewer.
- Install a new 12-inch sewer in Miller Road from Princess Boulevard/Miller Road to the existing manhole (MH S2BB) along the 18-inch Cottage Terrace/Core South interceptor. However, the new sewer will be 15 inch for Option 5.

A description of each option is shown below.

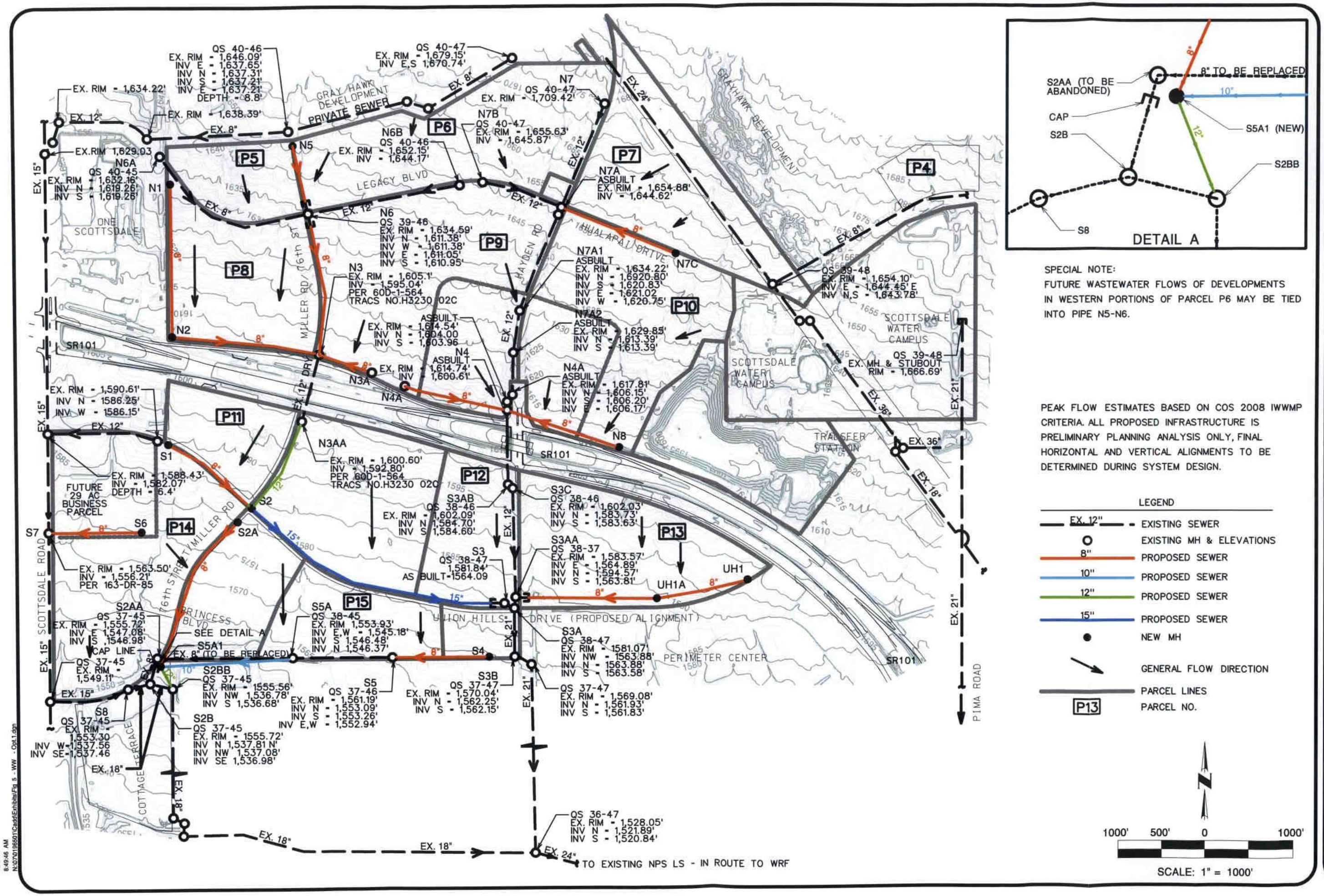
5.1 Option 1: Gravity Flow to Hayden Road and Union Hills Drive

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 the northern section of the project would drain into collection sewers within Miller and Hayden Roads, as depicted in Figure 5. 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. See Appendix B for calculations.

The following changes will be made in the Princess Boulevard/Miller Road area:

- Install a new, deeper 6-foot diameter manhole at the intersection of Princess Boulevard and Miller Road to capture flows from the north and east (MH S5A1).
- Install a new 12-inch sewer in Miller Road from Princess Boulevard/Miller Road to the existing manhole (MHS2BB) along the 18-inch Cottage Terrace/Core South interceptor.
- The existing 8-inch sewer along Princess Boulevard shall be removed and replaced by the new 10-inch sewer.

The Cost estimate for Option 1 is shown in Table 5 below.



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WASTEWATER SERVICE ANALYSIS
OPTION 1

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FIGURE
5

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Table 5 – Option 1 Cost Estimate

Description	Unit	Quantity	Unit Price	Amount
8" Sewer Line	LF	18,755	$55	$1,031,525
10" Sewer Line	LF	1,500	$60	$90,000
12" Sewer Line	LF	1,550	$75	$116,250
Connection to Existing Sewer	EA	9	$15,000	$135,000
5 ft Diameter Manhole	EA	34	$8,000	$272,000
6 ft Diameter Manhole	EA	1	$15,000	$15,000
			Subtotal	**$1,659,775**
			Contingency 20%	$331,955
			Engineering 10%	$165,978
			Administration 5%	$82,989
			Total	**$2,240,696**

Advantages
- Gravity sewer service for entire development is provided.
- Connections are to nearby City of Scottsdale sewers.
- L101 crossings previously installed (Hayden and Miller Roads).
- Least costly to implement.

Disadvantages
- Parcels north of L101 and west of Hayden Road must install considerable infrastructure to be connected to City of Scottsdale sewers.
- Difficult to phase.
- The proposed sewer in the Union Hills Drive west of Hayden Road is at minimum slope with minimal cover in places. It is recommended that a topographical survey of the proposed alignment be performed to confirm the existence of sufficient grades to provide gravity service to Parcels 11 and 12. CVL notes that it may be necessary to create a high point just east of Miller with a sewer line flowing west to Miller Road and south along an extended Miller Road sewer that would be extended north from new MH S5A1. The sewer extending east of this highpoint would tie-in to the Hayden Road sewer. This alternative is further explored in Option 5.

5.2 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 6. 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 new manhole or junction structure (N4) in route to the proposed lift station within Parcel 10. The junction structure's inlet sewer flow line is estimated to be 24-feet deep, which is 10-feet under the existing Hayden Road sewer. The lift station is estimated to have an ultimate capacity of 1,125 gpm with dual 10-inch force mains (one redundant). These force mains would connect to the existing City of Scottsdale 24-inch sewer in the APS/SRP/WAPA located immediately northeast of the project. Flows would be transported to Pima Road Interceptor. The southern portion of the project is designed exactly as described within the gravity flow option, Option 1.

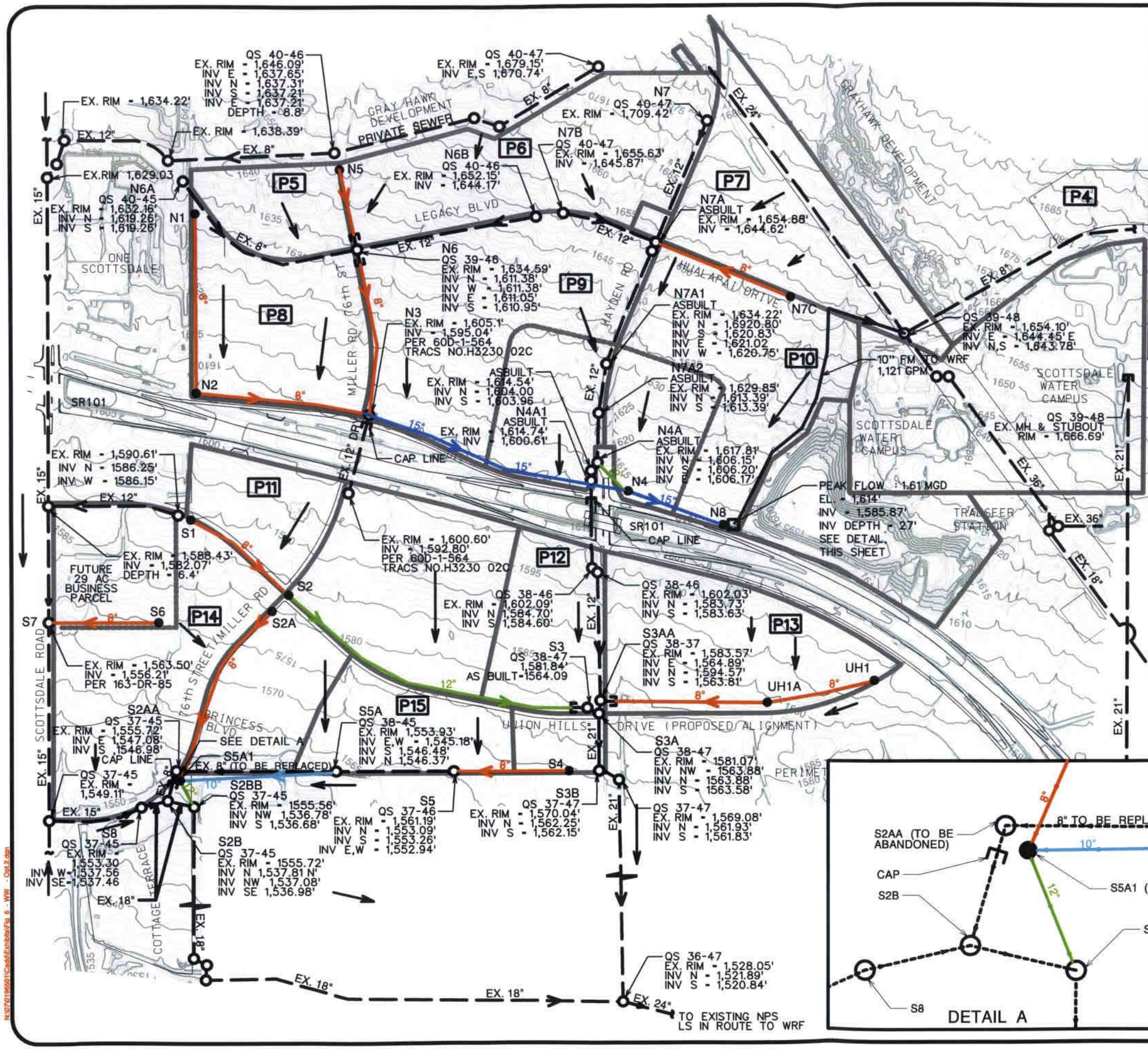
The Cost estimate for Option 2 is shown in Table 6 below. See Appendix B for calculations.

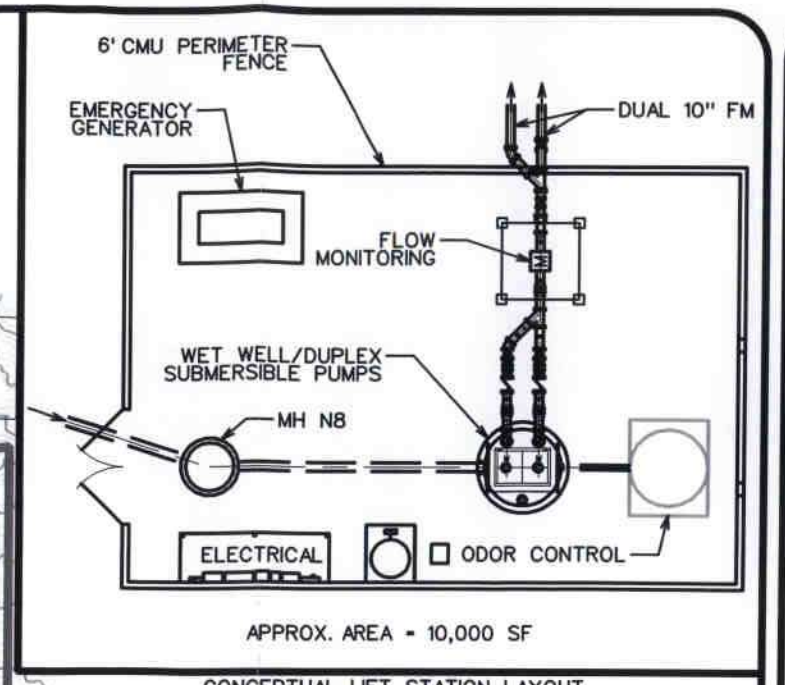
Table 6 – Option 2 Cost Estimate

Description	Unit	Quantity	Unit Price	Amount
8" Sewer Line	LF	15,290	$55	$840,950
10" Sewer Line	LF	1500	$60	$90,000
12" Sewer Line	LF	4,160	$75	$312,000
15" Sewer Line	LF	3,545	$90	$319,050
Connection to Existing Sewer	EA	9	$15,000	$135,000
5 ft Diameter Manhole	EA	33	$8,000	$264,000
6 ft Diameter Manhole	EA	1	$15,000	$15,000
Hayden Road Junction Structure	EA	1	$25,000	$25,000
Dual 10" Force Main – Lined DIP	LF	7,000	$65	$455,000
1,121 gpm Lift Station	LS	1	$900,000	$900,000
			Subtotal	**$3,356,000**
			Contingency 20%	$671,800
			Engineering 10%	$335,600
			Administration 5%	$167,800
			Total	**$4,531,200**

Advantages
- Good phasing opportunities. The City of Scottsdale may consider the temporary tie-in of the 15-inch sewer from Miller to the existing Hayden Road sewer until such time as the regional lift station is constructed.
- Gravity sewer service for south parcels.
- Lift station and force mains eligible as a wastewater development fee credit.

Disadvantages
- Construction of a junction structure in Hayden Road/SR101 area to divert flows from existing 12-inch Hayden Road sewer to the proposed lift station.





CONCEPTUAL LIFT STATION LAYOUT
SCALE: NONE

SPECIAL NOTE:
FUTURE WASTEWATER FLOWS OF DEVELOPMENTS IN WESTERN PORTIONS OF PARCEL P6 MAY BE TIED INTO PIPE N5-N6.

PEAK FLOW ESTIMATES BASED ON COS 2008 IWWMP CRITERIA. ALL PROPOSED INFRASTRUCTURE IS PRELIMINARY PLANNING ANALYSIS ONLY, FINAL HORIZONTAL AND VERTICAL ALIGNMENTS TO BE DETERMINED DURING SYSTEM DESIGN.

- EX. 12" — EXISTING SEWER
- 8" — PROPOSED SEWER
- 10" — PROPOSED SEWER
- 12" — PROPOSED SEWER
- 15" — PROPOSED SEWER
- NEW MH
- LS — PROPOSED LIFT STATION
- GENERAL FLOW DIRECTION
- PARCEL LINES
- P13 — PARCEL NO.

1000' 500' 0 1000'
SCALE: 1" = 1000'

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WASTEWATER SERVICE ANALYSIS
OPTION 2

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FIGURE
6

...\Fig 6 - WW - Opt.2.dgn 2/23/2012 2:50:24 PM

- Requires lift station and lengthy force main to connect north parcels to City of Scottsdale sewer. Most costly option.
- See discussion concerning the Union Hills sewer in Option 1: Disadvantages.

5.3 Option 3: Parcel 9 Lift Station

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 and west of Hayden Road to the wastewater reclamation facility; while the southern portion of the project flows by gravity to the City's collection system. The proposed 604 gpm lift station would be located within Parcel P9, near Miller Road. Dual 8-inch force mains would be provided, discharging to the existing City of Scottsdale 24-inch sewer in the APS/SRP/WAPA easement. Flows would then be transported to the Pima Road interceptor and the WRF. See Figure 7. The southern portion of the project is designed exactly as described in the gravity flow option, Option 1. See Appendix B for calculations.

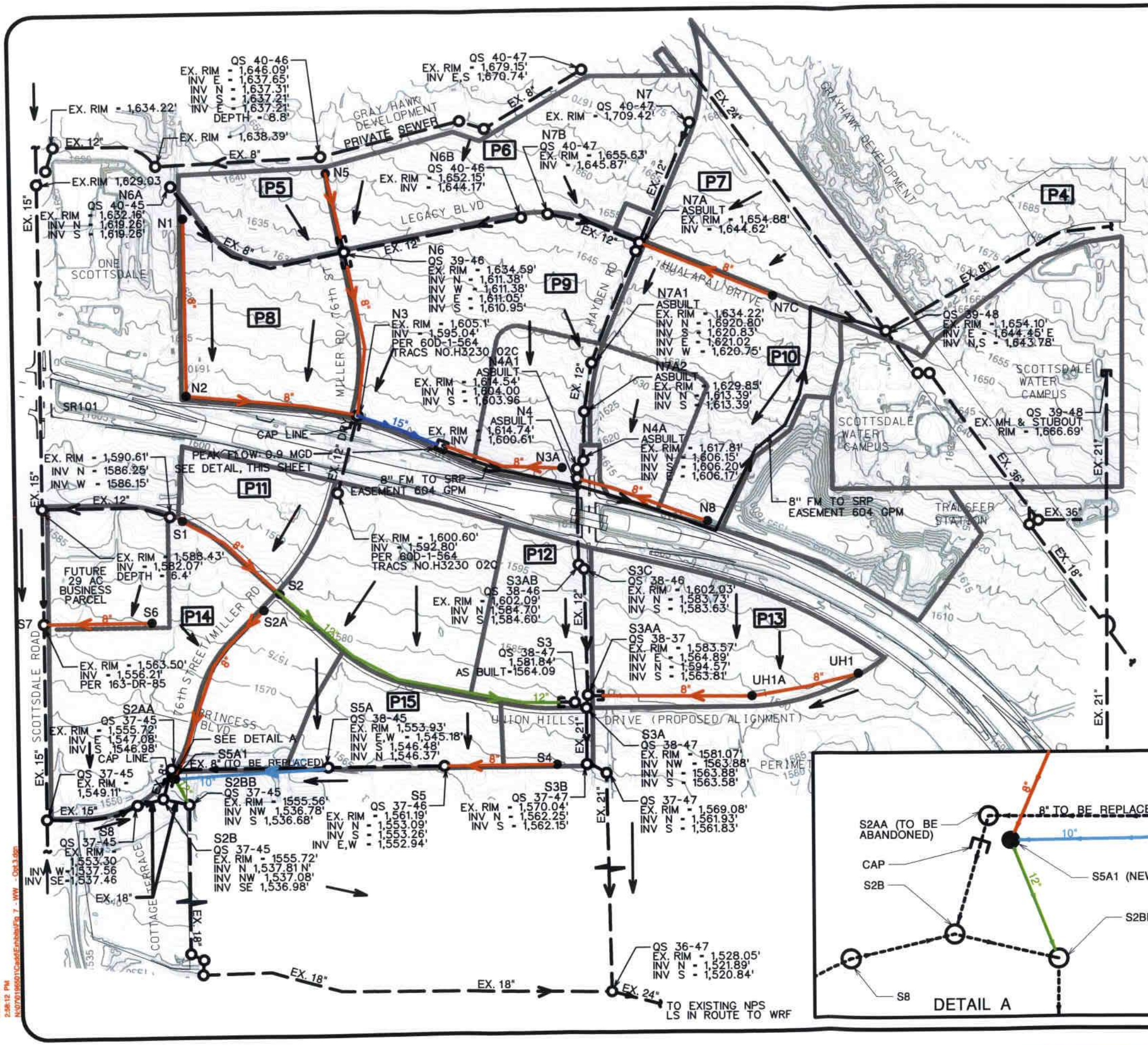
The Cost estimate for Option 3 is shown in Table 7 below.

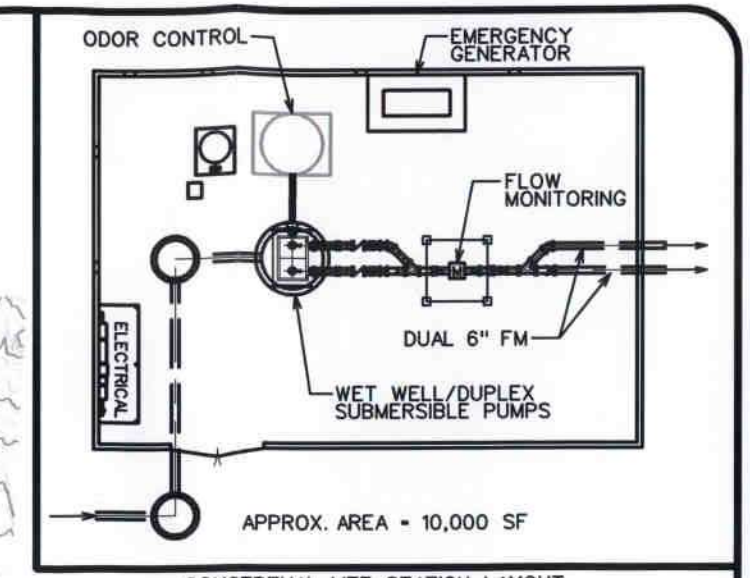
Table 7 – Option 3 Cost Estimate

Description	Unit	Quantity	Unit Price	Amount
8" Sewer Line	LF	16,475	$55	$906,125
10" Sewer Line	LF	1,300	$60	$78,000
12" Sewer Line	LF	3,760	$75	$282,000
15" Sewer Line	LF	570	$90	$51,300
Connection to Existing Sewer	EA	9	$15,000	$135,000
5 ft Diameter Manhole	EA	34	$8,000	$272,000
6 ft Diameter Manhole	EA	1	$15,000	$15,000
Dual 8" Force Main – Lined DIP	LF	13,000	$60	$780,000
604 gpm Lift Station	LS	1	$750,000	$750,000
			Subtotal	**$3,269,425**
			Contingency 20%	$653,885
			Engineering 10%	$326,943
			Administration 5%	$163,471
			Total	**$4,413,724**

Advantages
- Good phasing opportunities. As for Option 2, City of Scottsdale may allow for a temporary connection to the Hayden Road sewer until the completion of the lift station and force main system.
- Gravity sewer service for south parcels.
- L101 crossing previously installed (Hayden Road).
- Parcels P7, P10, and eastern portions of P6 and P9 may be served by gravity to the existing Hayden Road sewer.
- Lift station and force mains are eligible as a wastewater development fee credit.

Disadvantages
- Service for parcels P5, P8, and western portions of P6 and P9 require the installation of a lift station.
- More costly than Option 1.
- See discussion concerning the Union Hills sewer in Option 1: Disadvantages.





CONCEPTUAL LIFT STATION LAYOUT
SCALE: NONE

SPECIAL NOTE:
FUTURE WASTEWATER FLOWS OF DEVELOPMENTS IN WESTERN PORTIONS OF PARCEL P6 MAY BE TIED INTO PIPE N5-N6.

PEAK FLOW ESTIMATES BASED ON COS 2008 IWWMP CRITERIA. ALL PROPOSED INFRASTRUCTURE IS PRELIMINARY PLANNING ANALYSIS ONLY, FINAL HORIZONTAL AND VERTICAL ALIGNMENTS TO BE DETERMINED DURING SYSTEM DESIGN.

LEGEND

- EX. 12" — EXISTING SEWER
- EXISTING MH & ELEVATIONS
- 8" — PROPOSED SEWER
- 10" — PROPOSED SEWER
- 12" — PROPOSED SEWER
- 15" — PROPOSED SEWER
- NEW MH
- LS — PROPOSED LIFT STATION
- GENERAL FLOW DIRECTION
- PARCEL LINES
- P13 — PARCEL NO.

1000' 500' 0 1000'
SCALE: 1" = 1000'

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OPTION 3

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FIGURE
7

5.4 Option 4: North Crossroads East Gravity Flow to Pima Road

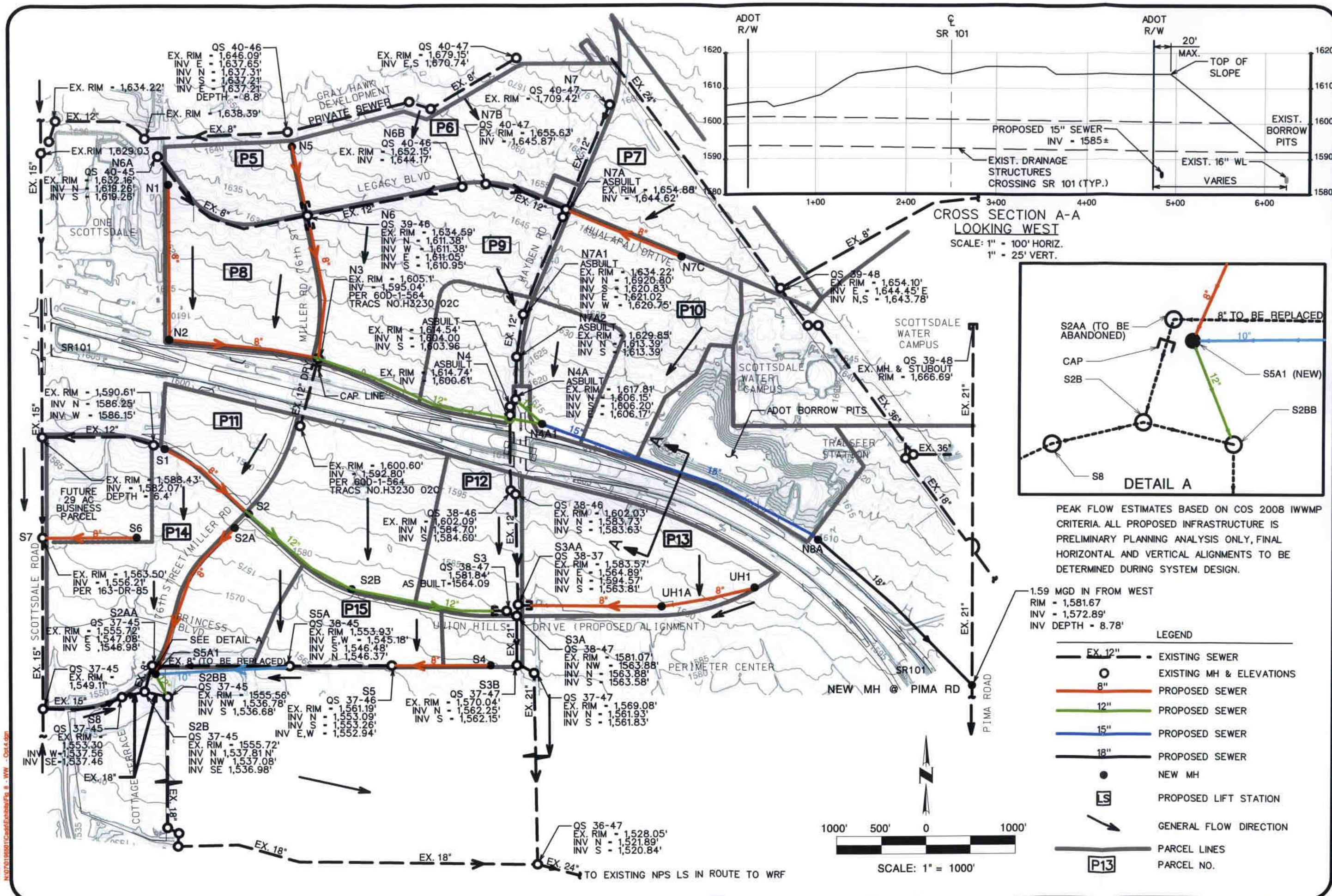
This option entails draining the portion of Crossroads north of the SR101 by gravity to an existing 21-inch sewer located south of Pima Road along the east side of the L101. The 21-inch then crosses under the 101 Freeway and continues south to the NPS. The southern portion of the project is designed exactly as described within the gravity flow option. Refer to Figure 8.

This option proposes to extend a 15-inch gravity sewer from the Hayden Road/L101 intersection (node N4 in Figure 8) east in an alignment that is north of and parallel to L101 to the existing 21-inch Pima Road interceptor. Connection to the existing interceptor would require the construction of a new manhole/junction structure.

Review of existing maps and topography reveals that a borrow pit has been excavated by ADOT for use in constructing this reach of the L101. The borrow pit is approximately 25-feet deep and its top of slope is approximately 20 feet from the L101 north right-of-way. See Figure 8 for a location of this pit.

The proposed 15-inch sewer will be approximately 25- to 30-feet deep, requiring deep sewer installation techniques consisting of stacked trench boxes and the benching and lay-back of trench side slopes. The available area between the L101 right-of-way and the top of pit is narrow, approximately 20 feet and will not accommodate the installation of the deep 15-inch sewer without impacting the L101 roadway or the pit's side slopes.

Accordingly, CVL has determined that this option is not constructable and recommends that it be dropped from further consideration.



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WASTEWATER SERVICE ANALYSIS
OPTION 4

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FIGURE
8

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5.5 Option 5: South Miller Road Sewer

This option had its genesis at a meeting between CVL, COS and ASLD in July 2011 in which opportunities to provide additional flexibility to the phasing of the Crossroads East development south of L101 was explored. It was also recognized that the topography along the proposed alignment of Union Hills Road could present challenges to the installation of a gravity sewer between Hayden and Miller Roads. (See Option 1: Disadvantages, as well.)

In this option Parcel 11 and the western half of Parcel 12 flow by gravity to the proposed Miller Road sewer and then south to the existing 18-inch sewer along the 76th Street alignment. The eastern half of Parcel 12 flows by gravity to the Hayden Road sewer as outlined in Option 1. See Figure 9 and Appendix B for flow analyses.

As stated in Section 5.0 above, the following improvements will be necessary:

- Install a new, deeper 6-foot diameter manhole at the intersection of Princess Boulevard and Miller Road to capture flows from the north and east (MH S5A1).
- Install a new 15-inch sewer in Miller Road from Princess Boulevard/Miller Road to the existing manhole (MH S2BB) along the 18-inch Cottage Terrace/Core South interceptor.
- The existing 8-inch sewer along Princess Blvd. shall be removed and replaced by the new 10-inch sewer.

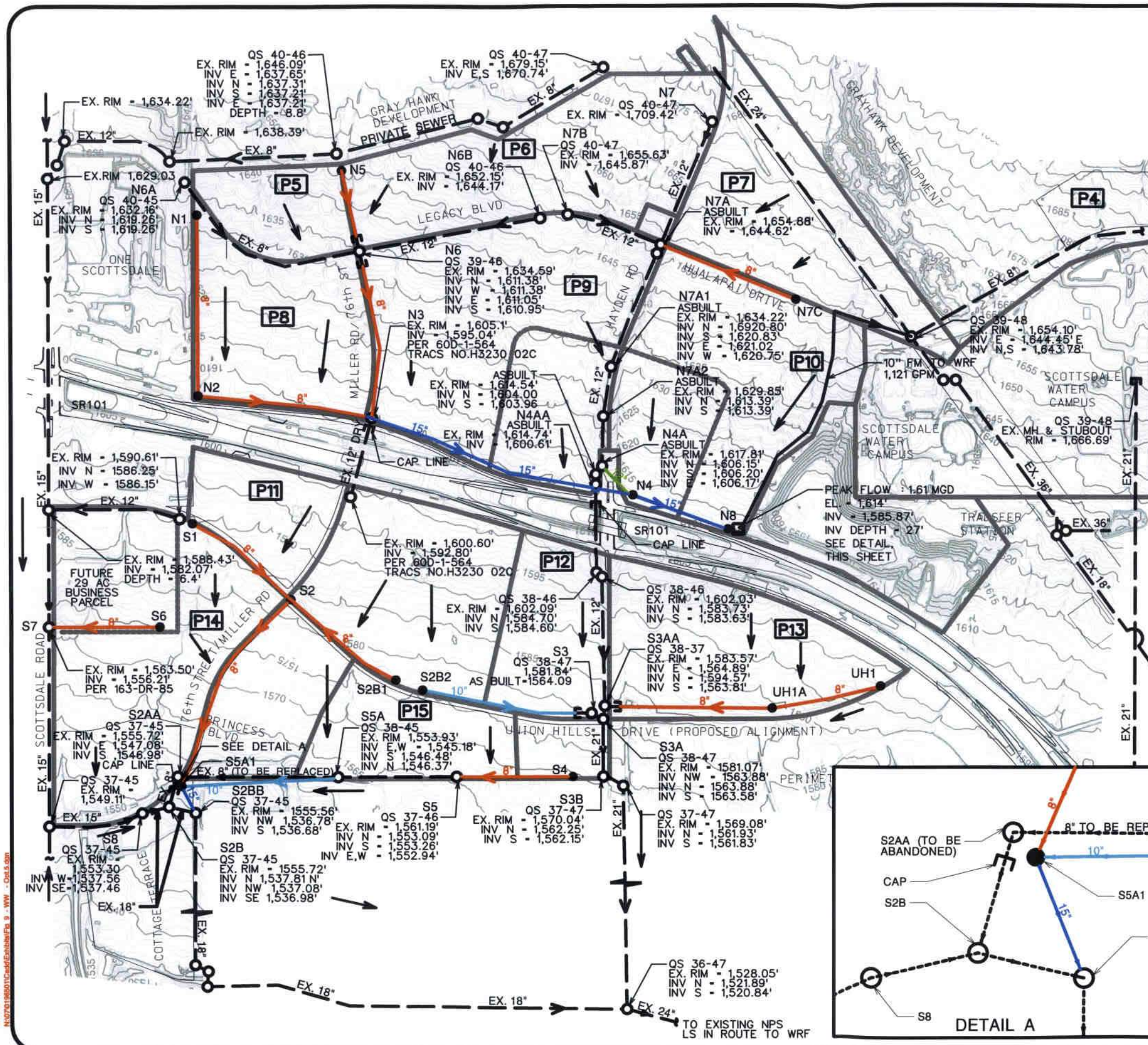
The Cost Estimate for Option 5 is shown in Table 8, below.

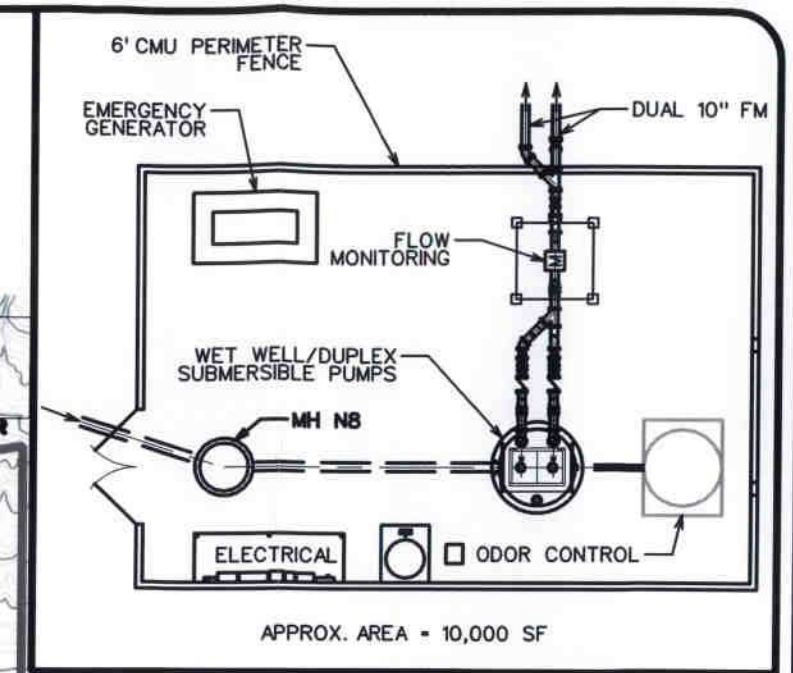
Table 8 – Option 5 Cost Estimate

Description	Unit	Quantity	Unit Price	Amount
8" Sewer Line	LF	16,475	$55	$906,125
10" Sewer Line	LF	3,100	$60	$186,000
12" Sewer Line	LF	400	$75	$30,000
15" Sewer Line	LF	1,465	$90	$131,850
Connection to Existing Sewer	EA	9	$15,000	$135,000
5 ft Diameter Manhole	EA	33	$8,000	$264,000
6 ft Diameter Manhole	EA	1	$15,000	$15,000
Hayden Road Junction Structure	EA	1	$25,000	$25,000
Dual 10" Force Main – Lined DIP	LF	13,000	$65	$845,000
1,121 gpm Lift Station	LS	1	$900,000	$900,000
			Subtotal	**$3,437,975**
			Contingency 20%	$687,595
			Engineering 10%	$343,797
			Administration 5%	$171,898
			Total	**$4,641,265**

Advantages

- Good phasing opportunities in areas north and south of L101. As for Option 2, City of Scottsdale may allow for a temporary connection to the Hayden Road sewer until the completion of the lift station and force main system.
- Gravity sewer service for south parcels.

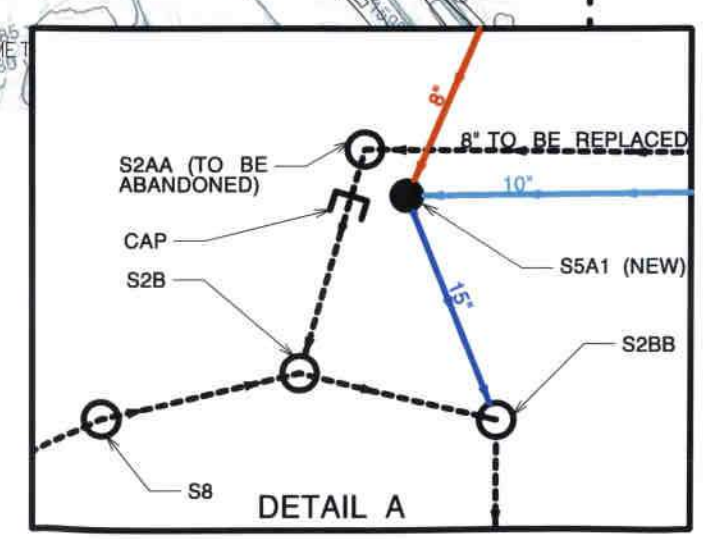




CONCEPTUAL LIFT STATION LAYOUT
SCALE: NONE

SPECIAL NOTE:
FUTURE WASTEWATER FLOWS OF DEVELOPMENTS IN WESTERN PORTIONS OF PARCEL P6 MAY BE TIED INTO PIPE N5-N6.

PEAK FLOW ESTIMATES BASED ON COS 2008 IWWMP CRITERIA. ALL PROPOSED INFRASTRUCTURE IS PRELIMINARY PLANNING ANALYSIS ONLY, FINAL HORIZONTAL AND VERTICAL ALIGNMENTS TO BE DETERMINED DURING SYSTEM DESIGN.



EX. 12" — EXISTING SEWER
8" — PROPOSED SEWER
10" — PROPOSED SEWER
12" — PROPOSED SEWER
15" — PROPOSED SEWER
NEW MH
LS — PROPOSED LIFT STATION
GENERAL FLOW DIRECTION
PARCEL LINES
P13 — PARCEL NO.

1000' 500' 0 1000'
SCALE: 1" = 1000'

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FIGURE
9

- L101 crossing previously installed (Hayden Road).
- Parcels P7, P10, and eastern portions of P6 and P9 may be served by gravity to the existing Hayden Road sewer.
- The split of Parcel 12 allows for shorter sewers and steeper slopes in the Union Hills Drive interceptor.
- Lift station and force mains are eligible as a wastewater development fee credit.

Disadvantages

- Construction of a junction structure in Hayden Road/SR101 area to divert flows from the existing 12-inch Hayden Road sewer to the proposed lift station.
- Service for parcels north of L101 require the installation of a lift station.
- Existing infrastructure in Miller Road/Princess Boulevard area is undersized and is to be replaced.
- More costly than Option 1.

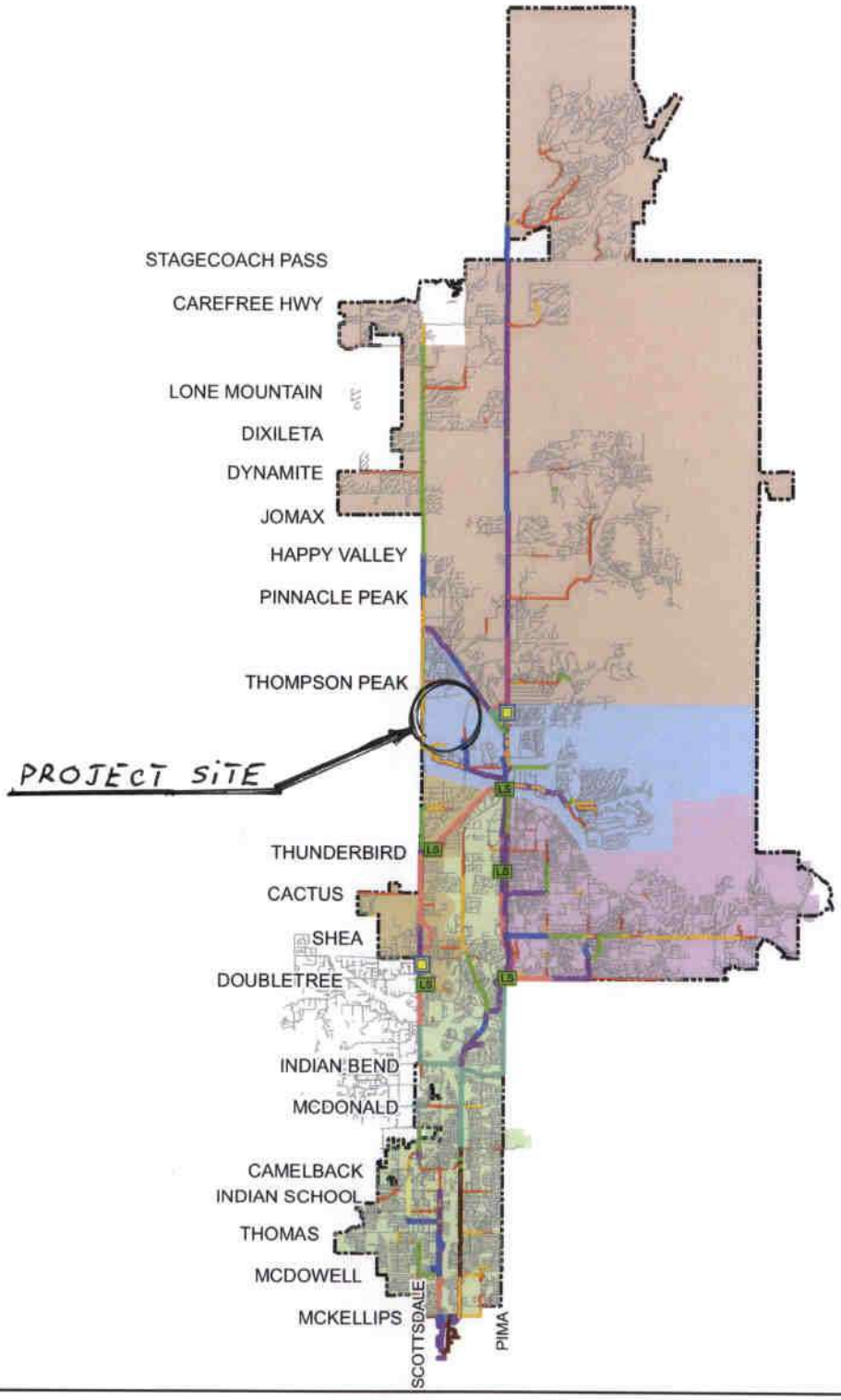
6.0 SUMMARY AND RECOMMENDATIONS

The following observations and recommendations are made:

- The demands calculated in this report reflect the Zoning Case amendment (19-ZN-2002 #2")
- Discharges were calculated using City of Scottsdale approved factors developed for Crossroads East based on approved "Crossroads East – Wastewater Master Plan 2011" report.
- Wastewater discharges and sewer system infrastructure improvements have been presented in this report as a template for the orderly expansion of the City's wastewater system. It will be the responsibility of the future developers of Crossroads East to install the required sewer system improvements in accordance with City of Scottsdale requirements and as presented herein.
- Five sewer options were investigated as discussed in Section 5.0. CVL recommends that Option 5 be implemented as it provides the necessary flexibility to the phased development of Crossroads East.
- The increased flows from Parcels P6 and P15 resulting from the increase of an additional 935 residential units has resulted in sewer line size increases when compared to the 2011 Wastewater Master Plan report. The proposed lift station capacities in Options 2, 3 and 5 has been increased, as well.
- It is also noted that various mechanisms exist for the City of Scottsdale's reimbursement of the installation costs of sewer system improvements provided certain conditions are met. Eligibility will be determined by the City of Scottsdale payback agreements administered through the applicable sections of the City Code or amendments to the Development Agreement. Examples of creditable infrastructure improvements are as follows:
  - Oversizing as directed by the City of Scottsdale.
  - Construction of regional lift stations and force mains.
  - Regional infrastructure improvements benefiting the City of Scottsdale System outside of Crossroads East.
- As properties are leased within the Crossroads East development, the duration of the term of the water/sewer easements for the water/sewer infrastructure need to be no less than the term of the lease of the leased properties.

Appendix A

2008 City of Scottsdale Integrated Master Planning Exhibits



WRP

Pumpback Stations

Scottsdale Boundary

Interceptors Diameter

< 12"

12"

15"

16"

18"

21"

24"

27"

30"

33"

36"

39"

42"

Sub-Basins

1

2

3

4

5

Miles

0 2.5 5

CITY OF SCOTTSDALE

WASTEWATER COLLECTION SYSTEM AND SUB-BASINS

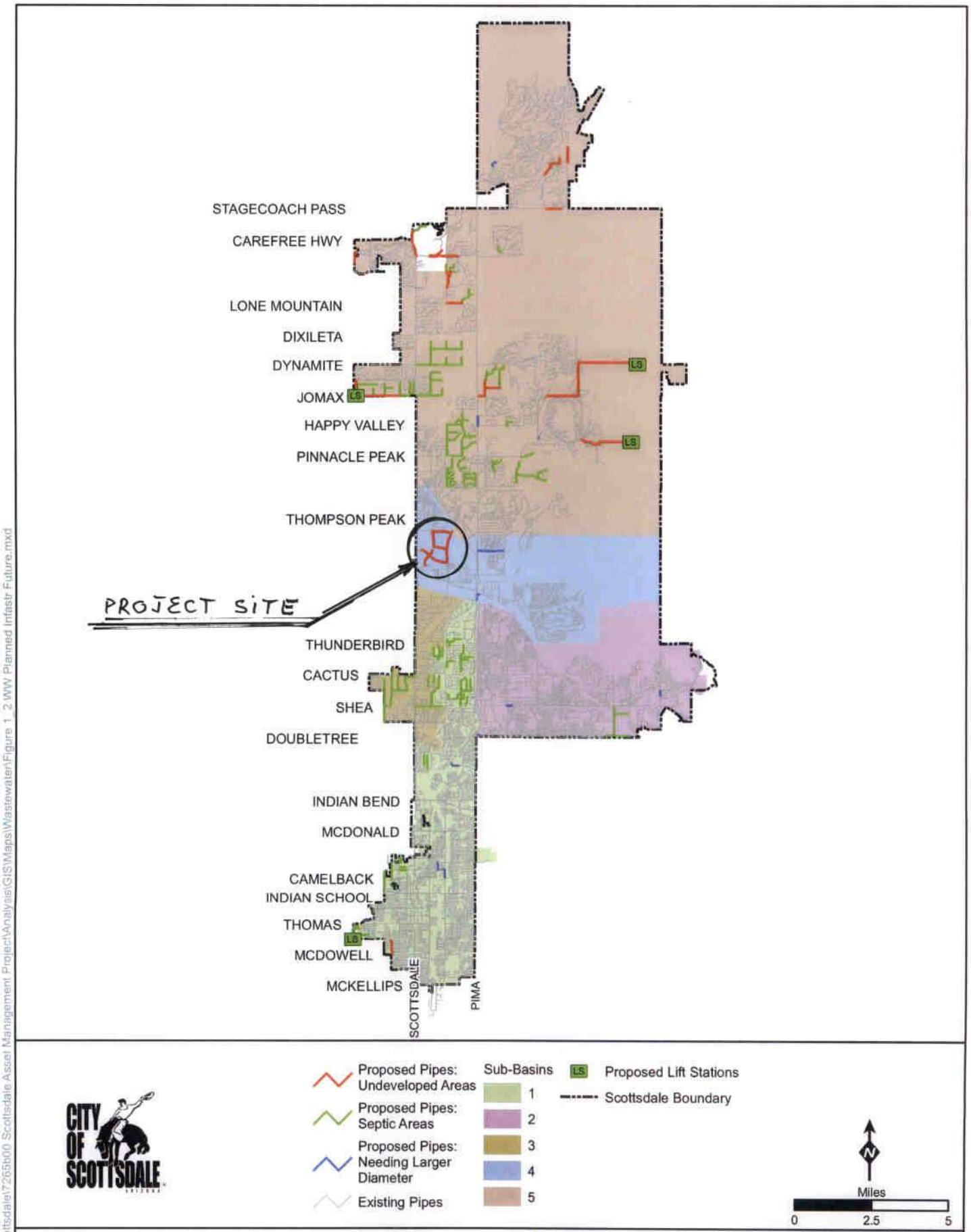
2008 Scottsdale Integrated Wastewater Master Plan

carollo

Figure 1.2

Page 1-14

M:\Client\Scottsdale\7265b00 Scottsdale Asset Management Project\Analysis\GIS\Maps\Wastewater\Figure 1_1 WW Collection Sys Plan Areas.mxd



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

2008 Scottsdale Integrated Wastewater Master Plan

carollo

Figure 1.5

Appendix B
CVL Calculations

Collection System Calculations - See Figure 5: Option 1

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)	Cumulative Average Day Flow (gpd)	Peaking Factor	Total Peak Flow (gpd)	Sewer Line Capacity (gpd)	Actual Peak Velocity (fps)	Velocity Flowing Full (fps)	d/D	% Full (Q/Qf)
NORTH																		
N1	N2	1,750	8	0.0130	1,633.00	1,627.33	1,604.23	5.0	0.4		65,280	2.00	130,560	889,518	2.8	3.9	0.26	15%
N2	N3	1,620	8	0.0053	1,610.00	1,604.13	1,595.19	5.0	0.4	0.1	130,560	2.00	261,120	566,954	2.5	2.5	0.48	46%
N5	N6	965	8	0.0256	1,645.00	1,636.33	1,611.38	8.0	0.2	0.5	0	2.00	0	1,250,775	0.0	5.5	0.00	0%
N6B	N6	1,750	12	0.0189	1,652.15	1,644.17	1,611.05	7.0	0.0		130,089	2.00	260,178	3,167,843	3.8	6.2	0.19	8%
N6	N3	1,620	8	0.0101	1,634.59	1,610.95	1,595.04	23.0	0.4	0.1	183,823	2.00	367,645	783,665	3.4	3.5	0.48	47%
N3A	N3	1,000	8	0.0091	1,610.00	1,604.33	1,595.04	5.0	0.2		72,032	2.00	144,065	744,634	2.6	3.3	0.30	19%
N4A	N4	1,300	8	0.0053	1,613.50	1,607.83	1,600.61	5.0	0.3		48,140	2.00	96,280	569,826	1.9	2.5	0.28	17%
N7	N7A	660	12	0.0233	1,675.00	1,660.00	1,644.62	14.0	0.1		43,363	2.00	86,726	3,515,149	2.9	6.9	0.11	2%
N7B	N7A	900	12	0.0030	1,655.63	1,645.87	1,643.07	8.8	0.1		88,300	2.00	176,601	1,261,241	1.8	2.5	0.25	14%
N7C	N7A	1,395	8	0.0053	1,651.00	1,645.33	1,637.64	5.0	0.3	0.3	81,457	2.00	162,914	568,589	2.2	2.5	0.37	29%
N7A	N7A1	1,300	12	0.0127	1,654.88	1,637.31	1,620.80	16.6			213,121	2.00	426,241	2,594,737	3.8	5.1	0.27	16%
N7A1	N7A2	500	12	0.0146	1,634.22	1,620.70	1,613.39	12.5	0.1	0.1	249,137	2.00	498,274	2,784,269	4.2	5.5	0.29	18%
N7A2	N4A	500	12	0.0145	1,629.85	1,613.39	1,606.15	15.5	0.1	0.1	249,137	2.00	498,274	2,770,906	4.1	5.5	0.29	18%
N3	N3AA	900	12	0.0025	1,605.00	1,595.04	1,592.80	9.0			386,415	2.00	772,830	1,148,789	2.4	2.3	0.60	67%
N8	N4	1,185	8	0.0050	1,612.50	1,606.83	1,600.61	5.0	0.3		123,538	2.00	247,077	552,025	2.4	2.4	0.47	45%
N4	S3AB	900	12	0.0177	1,614.74	1,600.61	1,584.70	13.1			420,815	2.00	841,630	3,061,620	5.2	6.0	0.36	27%
SOUTH																		
N3AA	S2	1,200	12	0.0123	1,600.60	1,592.80	1,577.71	6.8	0.3		386,415	2.00	772,830	2,556,413	4.4	5.0	0.38	30%
S1	S2	1,150	8	0.0053	1,590.00	1,584.33	1,577.94	5.0	0.3		41,946	2.00	83,893	568,589	1.8	2.5	0.26	15%
S2	S3	3,410	15	0.0038	1,585.00	1,577.61	1,564.09	6.1	0.6		561,965	2.00	1,123,930	2,569,912	3.1	3.2	0.46	44%
S2A	S5A1	1,990	8	0.0172	1,579.00	1,573.33	1,538.66	5.0	0.4		150,411	2.00	300,822	1,024,973	4.0	4.5	0.37	29%
UH1	UH1A	1,100	8	0.0075	1,595.00	1,584.33	1,575.78	10.0	0.3	0.1	39,046	2.00	78,091	676,381	2.0	3.0	0.23	12%
UH1A	S3AA	1,600	8	0.0063	1,590.00	1,575.68	1,565.22	14.3	0.4		78,091	2.00	156,182	619,298	2.3	2.7	0.34	25%
S3C	S3AA	1,300	12	0.0151	1,602.03	1,583.63	1,564.00	17.4			420,815	2.00	841,630	2,829,606	4.9	5.6	0.37	30%
S3A	S3B	600	21	0.0027	1,581.07	1,563.58	1,561.93	15.7			1,060,871	2.00	2,121,743	5,370,383	3.3	3.5	0.44	40%
S4	S5	1,100	8	0.0091	1,569.00	1,563.33	1,553.00	5.0	0.30		67,847	2.00	135,695	745,787	2.5	3.3	0.29	18%
S5	S5A	1,250	8	0.0053	1,561.19	1,552.94	1,546.27	7.6	0.30	0.3	126,248	2.00	252,497	570,517	2.5	2.5	0.47	44%
S5A	S5A1	1,500	10	0.0049	1,553.93	1,546.17	1,538.49	6.9	0.30		206,743	2.00	413,487	993,276	2.7	2.8	0.45	42%
S6	S7	1,000	8	0.0119	1,574.00	1,568.33	1,556.21	5.0	0.2		17,000	2.00	34,000	852,705	1.8	3.8	0.14	4%
S5A1	S2BB	350	12	0.0030	1,555.72	1,538.33	1,537.28	16.4			357,154	2.00	714,308	1,261,241	2.6	2.5	0.54	57%

n = 0.013

COS Criteria
d/D < 0.65 FOR SEWER PIPE 12 INCHES AND LESS
d/D < 0.70 FOR SEWER PIPES GREATER THAN 12 INCHES
Velocity Flowing Full > 2.5

Note **Future 29 Acres Business's Flow is generated porportionately from Parcel P14 and is 17,000 gpd**

At Parcel 14: Proposed approximate flow of 68,250 gpd will flow south to ex 15" Princess Blvd sewer line, and 150,411 gpd will flow to proposed Line S2A-S5A1

Parcel	Land Use	ADMM	PFMM
-	-	[gpd]	[gpd]
P5	C-O	53,734	107,467
P6	**R-5**	**260,178**	**520,356**
P6	PCoC	1,574	3,149
P7	I-1	81,457	162,914
P8	PRC	130,560	261,120
P9	I-1	108,049	216,097
P9	C-2	48,140	96,280
P10	C-2	40,398	80,796
P10	I-1	83,140	166,280
P11	C-2	41,946	83,893
P12	I-1	78,989	157,978
P12	C-2	54,615	109,230
P13	I-1	78,091	156,182
P14	PRC	235,661	471,322
P15	PCC	9,446	18,893
P15	**R-5**	**116,802**	**233,604**
P15	C-O	80,495	160,990

Collection System Calculations - See Figure 6: Option 2

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)	Cumulative Average Day Flow (gpd)	Peaking Factor	Total Peak Flow (gpd)	Sewer Line Capacity (gpd)	Actual Peak Velocity (fps)	Velocity Flowing Full (fps)	d/D	% Full (Q/Qf)
NORTH																		
N1	N2	1,750	8	0.0130	1,633.00	1,627.33	1,604.23	5.0	0.4		65,280	2.00	130,560	889,518	2.8	3.9	0.26	15%
N2	N3	1,620	8	0.0053	1,610.00	1,604.13	1,595.19	5.0	0.4	0.1	130,560	2.00	261,120	566,954	2.5	2.5	0.48	46%
N5	N6	965	8	0.0256	1,645.00	1,636.33	1,611.38	8.0	0.2	0.5	0	2.00	0	1,250,775	0.0	5.5	0.00	0%
N6B	N6	1,750	12	0.0189	1,652.15	1,644.17	1,611.05	7.0			130,089	2.00	260,178	3,167,843	3.8	6.2	0.19	8%
N6	N3	1,620	8	0.0101	1,634.59	1,610.95	1,595.04	23.0	0.4	0.1	183,823	2.00	367,645	783,665	3.4	3.5	0.48	47%
N7	N7A	660	12	0.0233	1,675.00	1,660.00	1,644.62	14.0	0.1		43,363	2.00	86,726	3,515,149	2.9	6.9	0.11	2%
N7B	N7A	900	12	0.0030	1,655.63	1,645.87	1,643.07	8.8	0.1		88,300	2.00	176,601	1,261,241	1.8	2.5	0.25	14%
N7C	N7A	1,395	8	0.0053	1,651.00	1,645.33	1,637.64	5.0	0.3	0.3	81,457	2.00	162,914	568,589	2.2	2.5	0.37	29%
N7A	N7A1	1,300	12	0.0127	1,654.88	1,637.31	1,620.80	16.6			213,121	2.00	426,241	2,594,737	3.8	5.1	0.27	16%
N7A1	N7A2	500	12	0.0146	1,634.22	1,620.70	1,613.39	12.5	0.1	0.1	249,137	2.00	498,274	2,784,269	4.2	5.5	0.29	18%
N7A2	N4A	500	12	0.0145	1,629.85	1,613.39	1,606.15	15.5	0.1	0.1	249,137	2.00	498,274	2,770,906	4.1	5.5	0.29	18%
N3	N4	2,600	15	0.0024	1,610.00	1,594.61	1,587.86	14.0	0.5	0.1	434,555	2.00	869,110	2,045,360	2.5	2.6	0.45	42%
N4A	N4	400	12	0.0458	1,617.81	1,606.17	1,587.86	10.6			249,137	2.00	498,274	4,926,649	6.2	9.7	0.21	10%
N4	LS	1,115	15	0.0023	1,614.00	1,587.76	1,585.00	25.0	0.2	0.1	807,230	2.00	1,614,460	2,002,295	2.8	2.5	0.68	81%
LS	-	-	10	-	1,614.00	1,585.41	-	27.8	-				1,614,460					
SOUTH																		
S1	S2	1,150	8	0.0053	1,590.00	1,584.33	1,577.94	5.0	0.3	0.1	41,946	2.00	83,893	568,589	1.8	2.5	0.26	15%
S2	S3	3,410	12	0.0038	1,585.00	1,577.61	1,564.09	6.4	0.6		175,550	2.00	351,100	1,417,397	2.3	2.8	0.34	25%
S2A	S5A1	1,990	8	0.0173	1,579.00	1,573.33	1,538.58	5.0	0.4		150,411	2.00	300,822	1,026,169	4.0	4.5	0.37	29%
UH1	UH1A	1,100	8	0.0075	1,595.00	1,584.33	1,575.78	10.0	0.3	0.1	39,046	2.00	78,091	676,381	2.0	3.0	0.23	12%
UH1A	S3AA	1,600	8	0.0063	1,590.00	1,575.68	1,565.22	14.3	0.4		78,091	2.00	156,182	619,298	2.3	2.7	0.34	25%
S3A	S3B	600	21	0.0027	1,581.07	1,563.58	1,561.93	15.7			253,641	2.00	507,283	5,370,383	2.2	3.5	0.21	9%
S4	S5	1,100	8	0.0091	1,569.00	1,563.33	1,553.00	5.0	0.3		67,847	2.00	135,695	745,911	2.5	3.3	0.29	18%
S5	S5A	1,250	8	0.0053	1,561.20	1,552.94	1,546.27	7.6	0.3	0.2	126,248	2.00	252,497	570,517	2.5	2.5	0.47	44%
S5A	S5A1	1,500	10	0.0053	1,553.93	1,546.17	1,538.25	6.9			206,743	2.00	413,487	1,028,974	2.8	2.9	0.44	40%
S6	S7	1,000	8	0.0119	1,574.00	1,568.33	1,556.21	5.0	0.2		17,000	2.00	34,000	852,705	1.8	3.8	0.14	4%
S5A1	S2BB	350	12	0.0030	1,555.72	1,538.33	1,537.28	16.4			357,154	2.00	714,308	1,261,241	2.6	2.5	0.54	57%

COS Criteria
d/D < 0.65 FOR SEWER PIPE 12 INCHES AND LESS
d/D < 0.70 FOR SEWER PIPES GREATER THAN 12 INCHES
Velocity Flowing Full > 2.5

n = 0.013

Note: **Future 29 Acres Business's Flow is generated porportionately from Parcel P14 and is 17,000 gpd**

At Parcel 14: Proposed approximate flow of 68,250 gpd will flow south to ex 15" Princess Blvd sewer line, and 150,411 gpd will flow to proposed Line S2A-S5A1

Parcel	Land Use	ADMM	PFMM
-	-	[gpd]	[gpd]
P5	C-O	53,734	107,467
P6	R-5	260,178	520,356
P6	PCoC	1,574	3,149
P7	I-1	81,457	162,914
P8	PRC	130,560	261,120
P9	I-1	108,049	216,097
P9	C-2	48,140	96,280
P10	C-2	40,398	80,796
P10	I-1	83,140	166,280
P11	C-2	41,946	83,893
P12	I-1	78,989	157,978
P12	C-2	54,615	109,230
P13	I-1	78,091	156,182
P14	PRC	235,661	471,322
P15	PCC	9,446	18,893
P15	R-5	116,802	233,604
P15	C-O	80,495	160,990

Collection System Calculations - See Figure 7: Option 3

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)	Cumulative Average Day Flow (gpd)	Peaking Factor	Total Peak Flow (gpd)	Sewer Line Capacity (gpd)	Actual Peak Velocity (fps)	Velocity Flowing Full (fps)	d/D	% Full (Q/Qf)
NORTH																		
N1	N2	1,750	8	0.0130	1,633.00	1,627.33	1,604.23	5.0	0.4		65,280	2.00	130,560	889,518	2.8	3.9	0.26	15%
N2	N3	1,620	8	0.0053	1,610.00	1,604.13	1,595.19	5.0	0.4	0.1	130,560	2.00	261,120	566,954	2.5	2.5	0.48	46%
N5	N6	965	8	0.0256	1,646.00	1,637.11	1,612.16	8.2	0.2		0	2.00	0	1,250,775	0.0	5.5	0.00	0%
N6B	N6	1,750	12	0.0189	1,652.15	1,644.17	1,611.05	7.0	0.0		130,089	2.00	260,178	3,167,843	3.8	6.2	0.19	8%
N6	N3	1,620	8	0.0101	1,634.59	1,610.95	1,595.04	23.0	0.4	0.1	183,823	2.00	367,645	783,665	3.4	3.5	0.48	47%
N7	N7A	660	12	0.0255	1,675.00	1,660.00	1,643.17	14.0	0.1		43,363	2.00	86,726	3,677,118	3.0	7.2	0.11	2%
N7B	N7A	900	12	0.0030	1,655.63	1,645.87	1,643.17	8.8	0.1		88,300	2.00	176,601	1,261,241	1.8	2.5	0.25	14%
N7C	N7A	1,395	8	0.0053	1,651.00	1,645.33	1,637.64	5.0	0.3	0.3	81,457	2.00	162,914	568,589	2.2	2.5	0.37	29%
N7A	N7A1	1,300	12	0.0170	1,654.88	1,642.87	1,620.80	11.0			213,121	2.00	426,241	3,000,316	4.2	5.9	0.25	14%
N7A1	N7A2	500	12	0.0146	1,634.22	1,620.70	1,613.39	12.5	0.1		249,137	2.00	498,274	2,784,269	4.2	5.5	0.29	18%
N7A2	N4A	500	12	0.0145	1,629.85	1,613.39	1,606.15	15.5	0.1		249,137	2.00	498,274	2,770,906	4.1	5.5	0.29	18%
N3	LS	570	15	0.0025	1,610.00	1,594.36	1,592.83	14.4	0.1	0.1	386,415	2.00	772,830	2,087,537	2.4	2.6	0.42	37%
NA3	LS	1,300	8	0.0075	1,614.50	1,602.83	1,592.83	11.0	0.3		48,140	2.00	96,280	674,760	2.1	3.0	0.25	14%
LS		-	8	-	1,610.00	1,592.83	-	17.2	-				869,110					
N8	N4	1,185	8	0.0056	1,610.00	1,604.33	1,597.41	5.0	0.3		123,538	2.00	247,077	583,755	2.5	2.6	0.45	42%
N4	S3AB	900	12	0.0177	1,614.74	1,600.61	1,584.70	13.1	-		372,675	2.00	745,350	3,061,620	2.5	6.0	0.34	24%
SOUTH																		
S3C	S3AA	1,300	12	0.0151	1,602.03	1,583.63	1,564.00	17.4			372,675	2.00	745,350	2,829,606	2.5	5.6	0.35	26%
S2A	S5A1	1,990	8	0.0172	1,579.00	1,573.33	1,538.66	5.0	0.4		150,411	2.00	300,822	1,024,973	2.4	4.5	0.37	29%
UH1	UH1A	1,100	8	0.0075	1,595.00	1,584.33	1,575.78	10.0	0.3	0.1	39,046	2.00	78,091	676,381	2.7	3.0	0.23	12%
UH1A	S3AA	1,600	8	0.0063	1,590.00	1,575.68	1,565.22	14.3	0.4		78,091	2.00	156,182	619,298	2.3	2.7	0.34	25%
S1	S2	1,150	8	0.0053	1,590.00	1,584.33	1,577.94	5.0	0.3		41,946	2.00	83,893	568,589	1.8	2.5	0.26	15%
S2	S3	3,410	12	0.0041	1,585.00	1,577.61	1,564.09	6.4	0.6		175,550	2.00	351,100	1,481,584	2.4	2.9	0.33	24%
S3A	S3B	600	21	0.0027	1,581.07	1,563.58	1,561.93	15.7			626,316	2.00	1,252,633	5,370,383	2.8	3.5	0.33	23%
S4	S5	1,100	8	0.0091	1,569.00	1,563.33	1,553.00	5.0	0.3		67,847	2.00	135,695	745,911	1.4	3.3	0.29	18%
S5	S5A	1,250	8	0.0053	1,561.19	1,552.94	1,546.27	7.6	0.3	0.2	126,248	2.00	252,497	570,517	1.4	2.5	0.47	44%
S5A	S5A1	1,500	10	0.0049	1,553.93	1,546.17	1,538.49	6.9	0.3		206,743	2.00	413,487	993,276	1.4	2.8	0.45	42%
S6	S7	1,000	8	0.0119	1,574.00	1,568.33	1,556.21	5.0	0.2		17,000	2.00	34,000	852,705	1.9	3.8	0.14	4%
S5A1	S2BB	350	12	0.0030	1,555.72	1,538.33	1,537.28	16.4			357,154	2.00	714,308	1261241	1.9	2.5	0.54	57%

n = 0.013

COS Criteria
d/D < 0.65 FOR SEWER PIPE 12 INCHES AND LESS
d/D < 0.70 FOR SEWER PIPES GREATER THAN 12 INCHES
Velocity Flowing Full > 2.5

Note **Future 29 Acres Business's Flow is generated porportionately from Parcel P14 and is 17,000 gpd**

At Parcel 14: Proposed approximate flow of 68,250 gpd will flow south to ex 15" Princess Blvd sewer line, and 150,411 gpd will flow to proposed Line S2A-S5A1

Parcel	Land Use	ADMM	PFMM
-	-	[gpd]	[gpd]
P5	C-O	53,734	107,467
P6	R-5	260,178	520,356
P6	PCoC	1,574	3,149
P7	I-1	81,457	162,914
P8	PRC	130,560	261,120
P9	I-1	108,049	216,097
P9	C-2	48,140	96,280
P10	C-2	40,398	80,796
P10	I-1	83,140	166,280
P11	C-2	41,946	83,893
P12	I-1	78,989	157,978
P12	C-2	54,615	109,230
P13	I-1	78,091	156,182
P14	PRC	235,661	471,322
P15	PCC	9,446	18,893
P15	R-5	116,802	233,604
P15	C-O	80,495	160,990

Wastewater Collection System Depth Calculations

Collection System Calculations - See Figure 8: Option 4

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)	Cumulative Average Day Flow (gpd)	Peaking Factor	Total Peak Flow (gpd)	Sewer Line Capacity (gpd)	Actual Peak Velocity (fps)	Velocity Flowing Full (fps)	d/D	% Full (Q/Qf)
North																		
N1	**N2**	1,750	8	0.0169	1,640.00	1,634.33	1,604.33	5.0	0.4		65,280	2.00	130,560	1,015,752	3.1	4.5	0.24	13%
N2	**N3**	1,620	8	0.0053	1,610.00	1,604.23	1,595.24	5.1	0.4	0.1	130,560	2.00	261,120	568,589	2.5	2.5	0.47	46%
N5	**N6**	965	8	0.0125	1,646.10	1,637.31	1,625.00	8.1	0.2		0	2.00	0	874,922	0.0	3.9	0.00	0%
N6	**N3**	1,620	8	0.0163	1,635.00	1,624.90	1,598.16	9.4	0.4	0.1	165,485	2.00	330,970	995,890	4.0	4.4	0.40	33%
N3	**N4**	2,435	12	0.0026	1,610.00	1,598.06	1,591.23	10.9	0.5	0.1								
N4	**N5**	3,610	15	0.0023	1,614.00	1,590.98	1,582.67	21.8	0.8		807,230	2.00	1,614,460	2,002,295	3.1	2.5	0.63	81%
N5	**PIMA**	2,280	18	0.0040	1,608.00	1,582.42	1,572.93	33.6	0.5		807,230	2.00	1,614,460	4,272,570	3.8	3.7	0.40	38%
South																		
S1	**S2**	1,150	8	0.0053	1,585.00	1,579.33	1,573.00	5.0	0.2		41,946	2.00	83,893	568,589	1.8	2.5	0.26	15%
S2	**S3**	3,410	12	0.0050	1,585.00	1,572.57	1,554.83	11.4	0.7	0.1	175,550	2.00	351,100	1,628,255		3.2		
S3	-	-	21	-	1,581.00	1,553.98	-	25.3	-	0.1								
UH1	**S3**	2,660	8	0.0097	1,600.00	1,591.33	1,564.95	8.0	0.5		78,091	2.00	156,182	769,896	2.7	3.4	0.31	20%
S3	-	-	21	-	1,583.00	1,563.77	-	17.5	-	0.1								

n = 0.013

COS Criteria
d/D < 0.65 FOR SEWER PIPE 12 INCHES AND LESS
d/D < 0.70 FOR SEWER PIPES GREATER THAN 12 INCHES
Velocity Flowing Full > 2.5

Taken from September 15, 2011 WWMP
Option not considered per Section 5.4

Wastewater Collection System Depth Calculations

Collection System Calculations - See Figure 9: Option 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)	Cumulative Average Day Flow (gpd)	Peaking Factor	Total Peak Flow (gpd)	Sewer Line Capacity (gpd)	Actual Peak Velocity (fps)	Velocity Flowing Full (fps)	d/D	% Full (Q/Qf)
NORTH																		
N1	N2	1,750	8	0.0130	1,633.00	1,627.33	1,604.23	5.0	0.4		65,280	2.00	130,560	889,518	2.8	3.9	0.26	15%
N2	N3	1,620	8	0.0053	1,610.00	1,604.13	1,595.19	5.0	0.4	0.1	130,560	2.00	261,120	566,954	2.5	2.5	0.48	46%
N3	N4	2,600	15	0.0023	1,610.00	1,594.61	1,588.51	14.0	0.5	0.1	434,555	2.00	869,110	2,002,295	2.4	2.5	0.46	43%
N7B	N7A	900	12	0.0030	1,655.63	1,645.87	1,643.17	8.8	0.1		88,300	2.00	176,601	1,261,241	1.8	2.5	0.25	14%
N7	N7A	660	12	0.0255	1,675.00	1,660.00	1,643.17	14.0	0.1		43,363	2.00	86,726	3,677,118	3.0	7.2	0.11	2%
N7C	N7A	1,395	8	0.0053	1,651.00	1,645.33	1,637.64	5.0	0.3	0.3	81,457	2.00	162,914	568,589	2.2	2.5	0.37	29%
N7A	N7A1	1,300	12	0.0170	1,654.88	1,642.87	1,620.80	11.0	0.2		213,121	2.00	426,241	3,000,316	4.2	5.9	0.25	14%
N7A1	N7A2	500	12	0.0146	1,634.22	1,620.70	1,613.39	12.5	0.1	0.1	213,121	2.00	426,241	2,784,269	4.0	5.5	0.26	15%
N7A2	N4A	500	12	0.0145	1,629.85	1,613.39	1,606.15	15.5	0.1	0.1	249,137	2.00	498,274	2,770,906	4.1	5.5	0.29	18%
N4A	N4	400	12	0.0444	1,617.81	1,606.17	1,588.40	10.6			249,137	2.00	498,274	4,853,457	6.2	9.6	0.22	10%
N4	LS	1,115	15	0.0025	1,614.00	1,588.31	1,585.32	24.4	0.2	0.2	807,230	2.00	1,614,460	2,087,537	2.9	2.6	0.66	77%
LS	-	-	15	-	1,614.00	1,585.32	-	27.4	-				1,614,460					
N5	N6	965	8	0.0256	1,645.00	1,636.33	1,611.38	8.0	0.2	0.5	0	2.00	0	1,250,775	0.0	5.5	0.00	0%
N6B	N6	1,750	12	0.0187	1,652.15	1,644.17	1,611.05	7.0	0.4		130,089	2.00	260,178	3,148,655	3.8	6.2	0.19	8%
N6	N3	1,620	8	0.0094	1,635.00	1,610.85	1,595.19	23.5	0.4		183,823	2.00	367,645	758,020	3.3	3.4	0.49	49%
SOUTH																		
UH1	UH1A	1,100	8	0.0075	1,595.00	1,584.33	1,575.78	10.0	0.3	0.1	39,046	2.00	78,091	676,381	2.0	3.0	0.23	12%
UH1A	S3AA	1,600	8	0.0063	1,590.00	1,575.68	1,565.22	14.3	0.4		78,091	2.00	156,182	619,298	2.3	2.7	0.34	25%
S1	S2	1,150	8	0.0093	1,590.00	1,575.33	1,564.33	14.0	0.3	0.1	41,946	2.00	83,893	753,479	2.2	3.3	0.22	11%
S2B1	S2	1,300	8	0.0053	1,577.00	1,571.33	1,564.14	5.0	0.3	0.1	39,494	2.00	78,989	568,727	1.8	2.5	0.25	14%
S2	S5A1	2,100	8	0.0120	1,585.00	1,564.04	1,538.38	20.3	0.5		231,852	2.00	463,703	854,883	3.9	3.8	0.52	54%
S4	S5	1,100	8	0.0092	1,569.00	1,563.33	1,553.00	5.0	0.2		67,847	2.00	135,695	749,619	2.5	3.3	0.29	18%
S5	S5A	1,250	8	0.0053	1,561.17	1,552.94	1,546.27	7.6	0.3	0.1	126,248	2.00	252,497	570,517	2.5	2.5	0.47	44%
S5A	S5A1	1,500	10	0.0051	1,553.90	1,546.17	1,538.21	6.9		0.3	206,743	2.00	413,487	1,011,943	2.7	2.9	0.44	41%
S2B2	S3	1,600	10	0.0042	1,577.00	1,571.33	1,564.19	5.0	0.4	0.3	94,109	2.00	188,219	919,316	2.1	2.6	0.31	20%
S3A	S3B	600	21	0.0027	1,581.07	1,563.58	1,561.93	15.7			172,200	2.00	344,401	5,370,383	1.9	3.5	0.17	6%
S6	S7	1,000	8	0.0119	1,574.00	1,568.33	1,556.21	5.0	0.2		17,000	2.00	34,000	852,705	1.8	3.8	0.14	4%
S5A1	S2BB	350	15	0.0022	1,555.72	1,537.80	1,537.03	16.7			438,595	2.00	877,190	1,958,283	2.4	2.5	0.47	45%

n = 0.013

COS Criteria
d/D < 0.65 FOR SEWER PIPE 12 INCHES AND LESS
d/D < 0.70 FOR SEWER PIPES GREATER THAN 12 INCHES
Velocity Flowing Full > 2.5

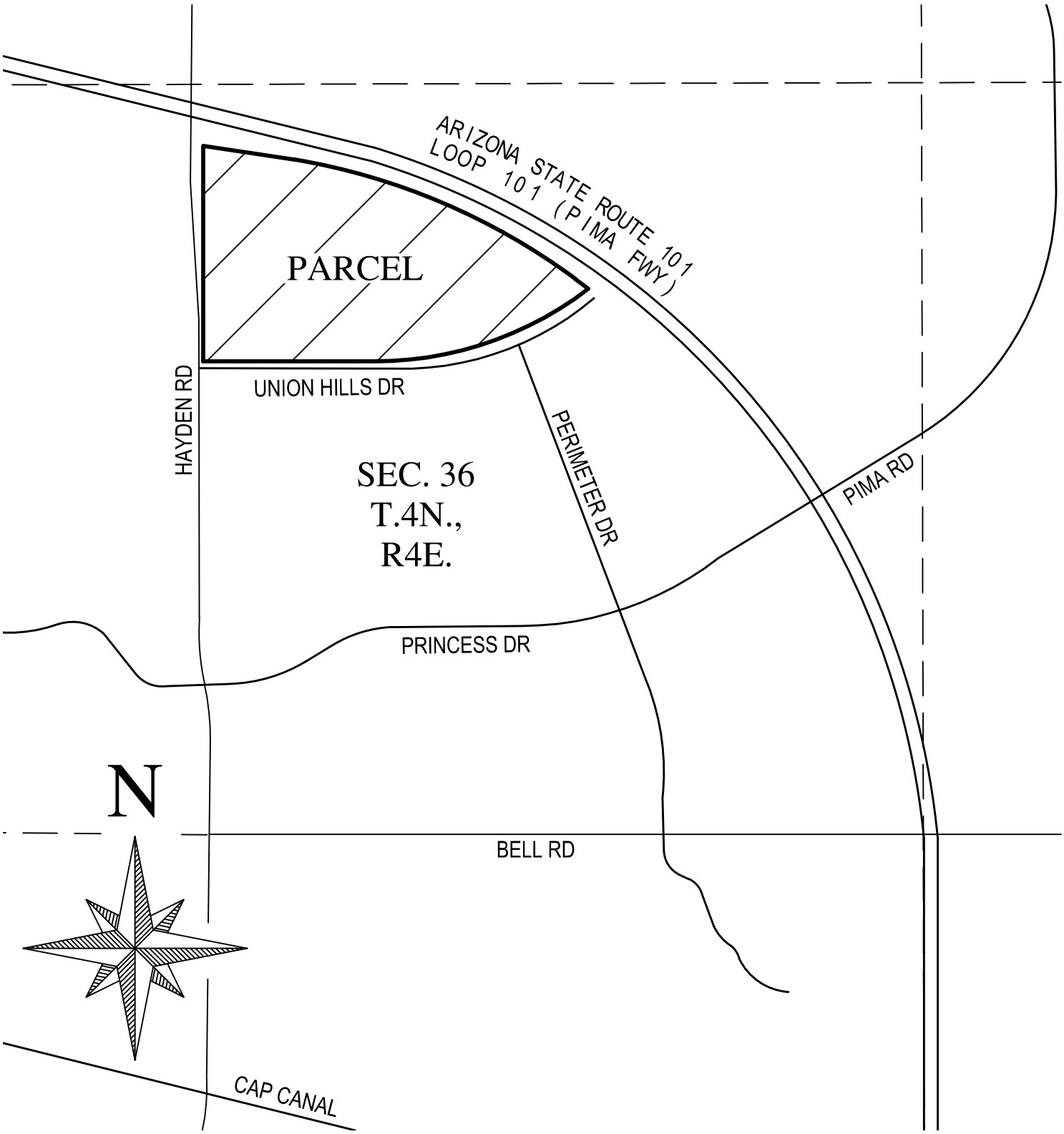
Note: **Future 29 Acres Business's Flow is generated porportionately from Parcel P14 and is 17,000 gpd**

At Parcel 14: Proposed approximate flow of 68,250 gpd will flow south to ex 15" Princess Blvd sewer line, and 150,411 gpd will flow to proposed Line S2A-S5A1

P12a= 43.45 AC 48751 gpd
P12b= 26.95 AC 30238 gpd

Parcel	Land Use	ADMM	PFMM
-	-	[gpd]	[gpd]
P5	C-O	53,734	107,467
P6	R-5	260,178	520,356
P6	PCoC	1,574	3,149
P7	I-1	81,457	162,914
P8	PRC	130,560	261,120
P9	I-1	108,049	216,097
P9	C-2	48,140	96,280
P10	C-2	40,398	80,796
P10	I-1	83,140	166,280
P11	C-2	41,946	83,893
P12	I-1	78,989	157,978
P12	C-2	54,615	109,230
P13	I-1	78,091	156,182
P14	PRC	235,661	471,322
P15	PCC	9,446	18,893
P15	R-5	116,802	233,604
P15	C-O	80,495	160,990

EXHIBIT 1 – VICINITY MAP



WOOD PATEL

CRE - PLANNING UNIT X & XI

VICINITY MAP

DATE	10/02/2020	SCALE	1" = 1000'	SHEET	1 OF 1
JOB NO.	205133	DESIGN	BJ	CHECK	NEB
		DRAWN	ACH		

Z:\2020\205133\Project Support\Reports\Sewer BOD\Exhibits\5133-Vicinity Map.dwg

EXHIBIT 2 – WASTEWATER EXHIBIT

FUTURE BUILDING 1

FUTURE BUILDING 2

FUTURE BUILDING 3

FUTURE BUILDING 4

PROPOSED BUILDING
LFF_{88}=1607.50

HAYDEN ROAD

MAYO BOULEVARD

82ND STREET

PERIMETER DRIVE

FUTURE BLDG 5

FUTURE WELL SITE

PROPOSED FIRE STATION

MH-F1
MH-F2
MH-1
MH-2
MH-3
MH-4
MH-5
MH-6
MH-7
MH-8
MH-9
MH-10
MH-11
MH-12
MH-13
MH-14
MH-15
MH-16
MH-17
MH-18
MH-FS
EX MH-1

PROP SEWER SERVICE
PROP 8" SEWER LINE S = 2.0%
PROPOSED 8" SEWER S=1.0%
PROPOSED 8" SEWER S=1.0%
PROPOSED 8" SEWER S=1.0%
PROP SEWER SERVICE
PROP SEWER SERVICE
PROPOSED 8" SEWER S=0.7%
PROPOSED 8" SEWER S=1.0%
PROP 8" SEWER LINE S = 1.0%
PROPOSED SERVICE
PROPOSED 8" SEWER S=1.1%
PROPOSED SERVICE
PROPOSED 8" SEWER S=0.7%
PROPOSED 8" SEWER S=1.1%
PROPOSED 8" SEWER S=0.8%
PROPOSED 8" SEWER S=0.9%
PROPOSED 8" SEWER S=1.5%
PROPOSED 8" SEWER S=0.7%
PROPOSED 8" SEWER S=1.5%
PROPOSED 8" SEWER S=1.5%
PROPOSED 8" SEWER S=0.8
PROPOSED 8" SEWER S=0.5%
8"S (PVC)
CONNECT TO EXISTING SEWER STUB-OUT
PROPOSED 8" SEWER S=0.7%
EXISTING 8" SEWER S=1.0%

N

0 50 100
Horz. 1 in. = 100 ft.

LEGEND

- EXISTING SEWER PIPE
- PROPOSED SEWER PIPE
- PROPERTY BOUNDARY
- EXISTING SEWER MANHOLE
- PROPOSED SEWER MANHOLE

NOT FOR CONSTRUCTION OR RECORDING

WOOD PATEL

CRE - PLANNING UNIT X & XI

MASTER WASTEWATER SYSTEM MAP

DATE	10-02-2020	SCALE	1" = 100'	SHEET	1 OF 1
JOB NO.	205133	DESIGN	JB	DRAWN	ZR

Z:\2020\205133\Project Support\Reports\Sewer BOD\Exhibits\5133-Sewer Layout-Master.dwg

CROSSROADS EAST - PLANNING UNITS X & XI

MASTER WATER PLAN

AT THE N.E. CORNER OF HAYDEN ROAD AND UNION HILLS DR.

A PORTION OF THE NORTH 1/2 OF SECTION 36, TOWNSHIP 4 NORTH, RANGE 4 EAST
OF THE GILA AND SALT RIVER MERIDIAN, MARICOPA COUNTY, ARIZONA

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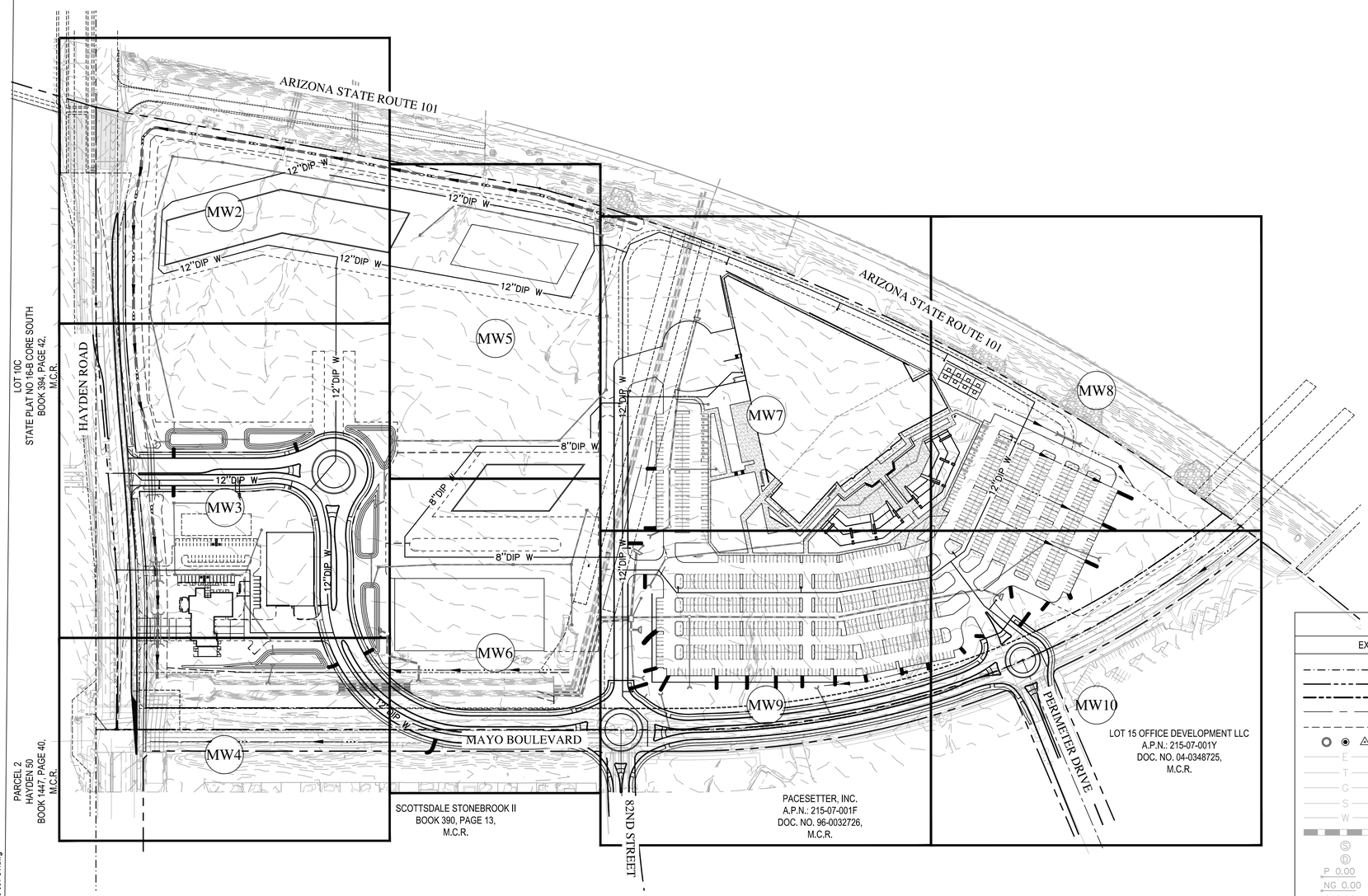
PHOENIX, AZ 85004
602.265.2200
www.smithgroup.com

AXON

WOOD PATEL



N

0 150 300
Horz. 1 in. = 150 ft.

LEGEND

MWX — MASTER WATER PLAN

PROPERTY LINE

OWNER / DEVELOPER

AXON
P.O. BOX 1833
TEMPE, AZ 85280
CONTACT: CHARLES HUELLMANTEL
PHONE: (480) 921-2800
E-MAIL: CHARLES@HUELLMANTEL.COM

ENGINEER

WOOD, PATEL & ASSOCIATES, INC.
2051 W NORTHERN AVE. SUITE 100
PHOENIX, AZ 85021
CONTACT: NICHOLAS BROWN, P.E.
PHONE: (602) 335-8503
E-MAIL: NBROWN@WOOPATEL.COM

ARCHITECT

SMITH GROUP
455 NORTH THIRD STREET SUITE 250
PHOENIX, AZ 85004
CONTACT: LYLE STEELY AIA LEED AP
PHONE: (602) 824-5348
EMAIL: WWW.LYLE.STEELY@SMITHGROUP.COM

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Water Resources
Land Survey
Construction Management

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Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)
In Maricopa County: (602) 263-1100

PROJECT SITE DATA

ASSESSOR PARCEL NUMBER(S):
215-07-210B
PROJECT SITE ADDRESS:
17800 NORTH 85TH STREET
SCOTTSDALE, AZ 85255
PROJECT SITE AREA(S):
NET AREA = 71.07 AC
ZONING:
PCD

NOT FOR CONSTRUCTION

SHEET INDEX

LEGEND/ABBREVIATIONS

EXISTING SURVEY

- SECTION LINE
- RIGHT OF WAY
- PROPERTY LINE
- ROAD CENTERLINE
- EASEMENT
- SURVEY MARKER
- E — ELECTRIC
- T — TELEPHONE
- G — GAS LINE
- S — SEWER LINE
- W — WATER LINE
- STORM DRAIN PIPE
- SEWER MANHOLE
- STORM DRAIN MANHOLE
- P 0.00 — PAVEMENT ELEVATION
- NG 0.00 — NATURAL GROUND ELEVATION
- C 0.00 — CONCRETE ELEVATION
- TC 0.00 — TOP OF CURB ELEVATION
- JUNCTION BOX/RISER
- FIRE HYDRANT
- WATER VALVE
- STREET/PARKING LIGHT

PROPOSED GRADING, DRAINAGE & PAVING

- SLOPE ARROW
- WALL

PROPOSED WATER & SEWER

- S — SEWER LNE
- 12"W — WATER LINE
- PLUG
- SEWER CLEANOUT
- AREA DRAIN
- CATCH BASIN

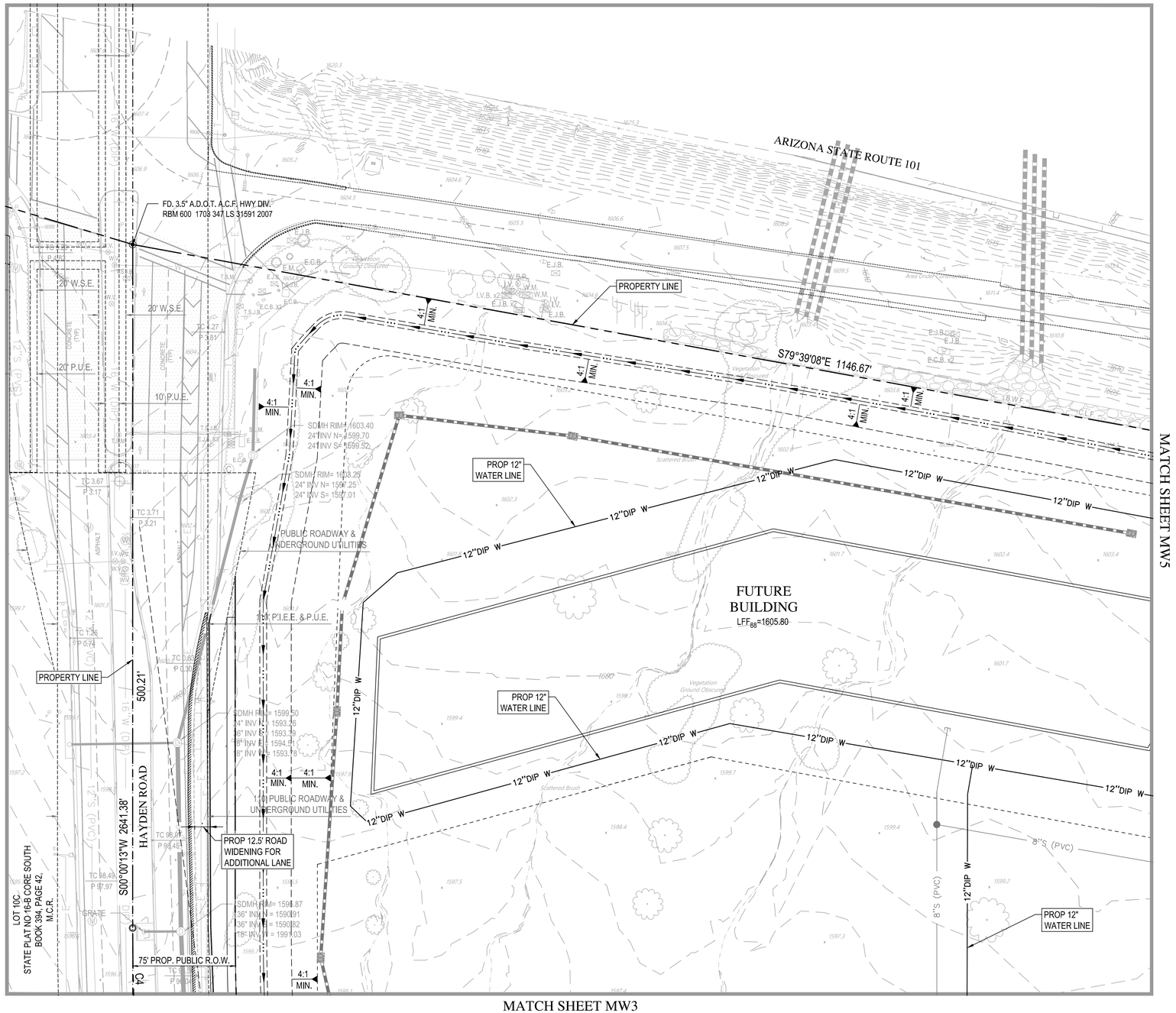
A.L.	AREA LIGHT
C	CONCRETE ELEVATION
C.B.	CATCH BASIN
DE	DRAINAGE EASEMENT
D.W.	DRYWELL
E.O.L.	EDGE OF LANDSCAPE
J.B.	JUNCTION BOX
FH	FIRE HYDRANT
E.C.B.	ELECTRICAL CABINET BOX
HW	HEAD WALL
INV	INVERT ELEVATION
LFF	LOWEST FINISHED FLOOR ELEVATION
WE	WATER EASEMENT
LF_{88}=	LOWEST FINISH FLOOR ELEVATION
TC 0.00	TOP OF CURB
FG 0.00	FINISH GRADE ELEVATION
C 0.00	CONCRETE ELEVATION
C.A	CROSS ACCESS
E.S.A	EMERGENCY SERVICE ACCESS
P.U.E	PUBLIC UTILITY EASEMENT
U.E	UTILITY EASEMENT
P.A.E	PUBLIC ACCESS EASEMENT

ISSUED FOR	YR	DATE
---	-	----

MW
1
COVER SHEET

Z:\2020\205133\Dwg\Conceptual\Master Water Imp\5133-001-CV.dwg

CHECKED BY: NB/JB DESIGNED BY: JB/AF DRAFTED BY: AF/SH



N

0 40 80

Horz. 1 in. = 40 ft.

CURVE TABLE (M)			
CURVE	DELTA	RADIUS	ARC
C2	40°08'46"	2200.00'	1,541.50'
C3	5°02'30"	1800.00'	158.39'
C4	5°02'30"	1800.00'	158.39'

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In Maricopa County: (602) 263-1100

NOT FOR CONSTRUCTION

ISSUED FOR	YR	DATE
---	--	---

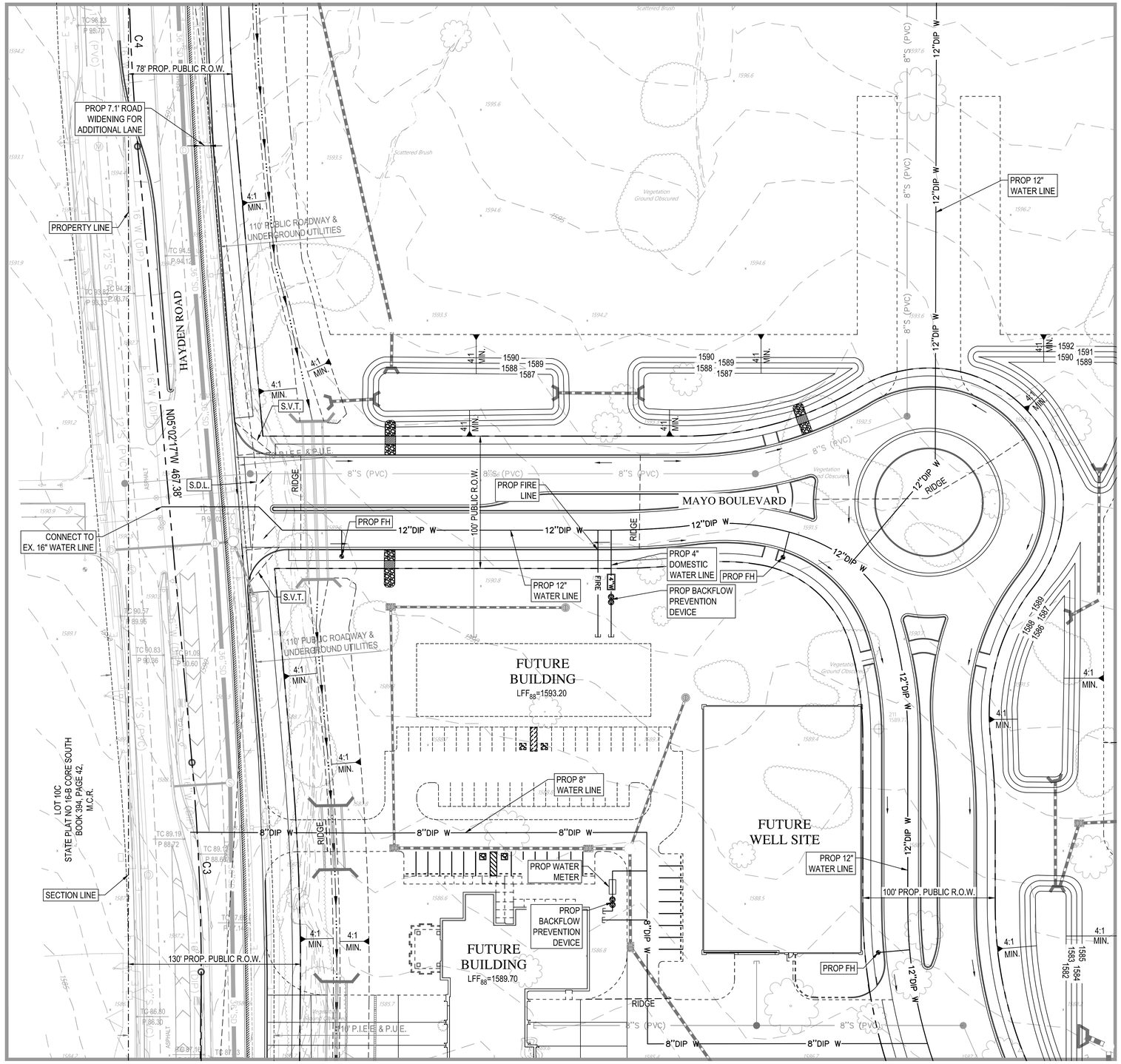
MW 2

MASTER WATER PLAN

CHECKED BY: NB/JB DESIGNED BY: JB/AF DRAFTED BY: AF/SH

Z:\2020\205133\Dwg\Conceptual\Master Water Imp\5133-002-MW.dwg

MATCH SHEET MW2



MATCH SHEET MW5

MATCH SHEET MW6

MATCH SHEET MW4

N

0 40 80

Horz. 1 in. = 40 ft.

CURVE TABLE (M)			
CURVE	DELTA	RADIUS	ARC
C2	40°08'46"	2200.00'	1,541.50'
C3	5°02'30"	1800.00'	158.39'
C4	5°02'30"	1800.00'	158.39'

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NOT FOR CONSTRUCTION

ISSUED FOR	YR	DATE

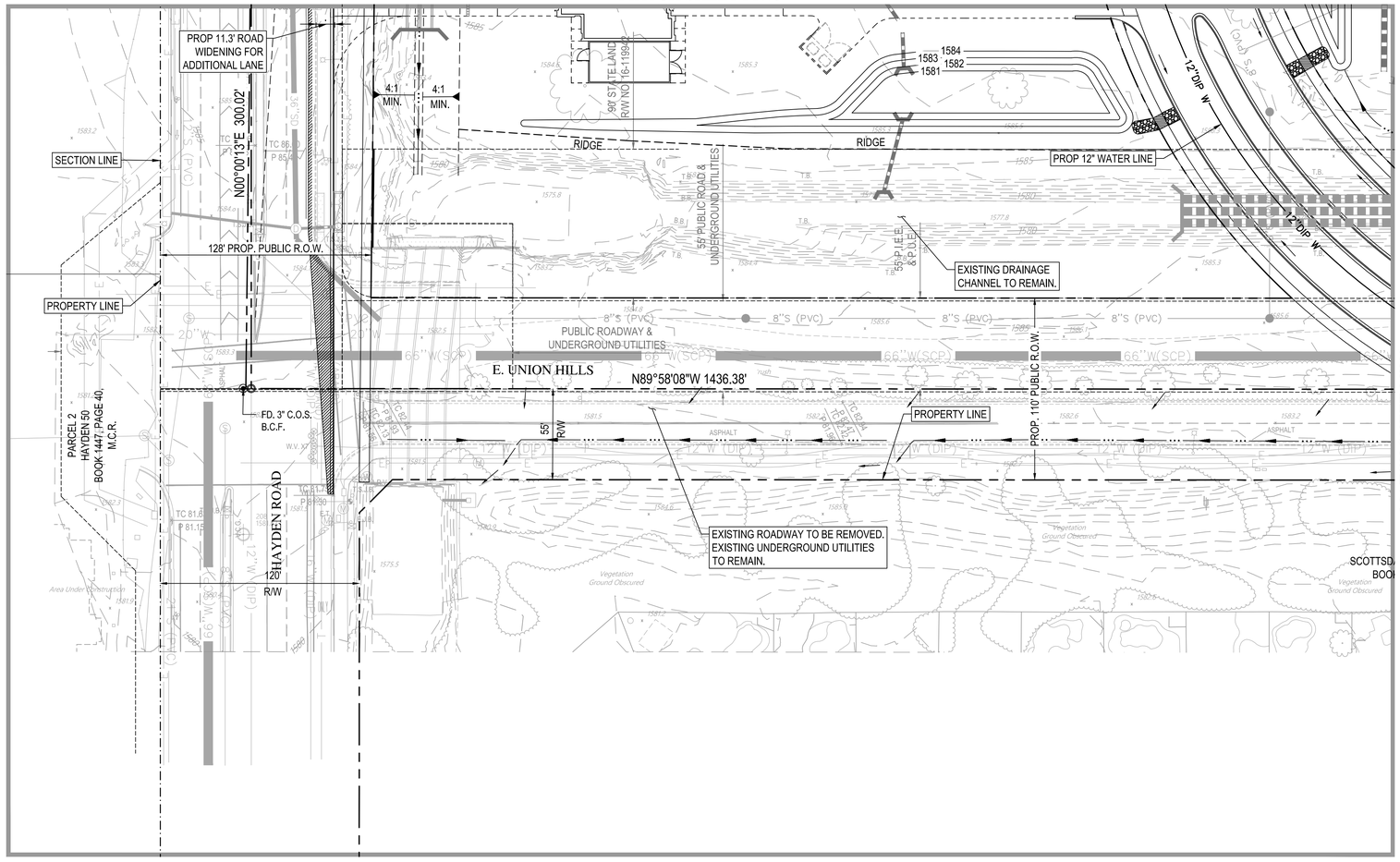
MW 3

MASTER WATER PLAN

CHECKED BY: NB/JB DESIGNED BY: JB/AF DRAFTED BY: AF/SH

Z:\2020\205133\Dwg\Conceptual\Master Water Imp\5133-003-MW.dwg

MATCH SHEET MW3



MATCH SHEET MW6

N

0 40 80

Horz. 1 in. = 40 ft.

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SUITE 250
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AXON

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In Maricopa County: (602) 263-1100

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ISSUED FOR	YR	DATE
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MW 4

MASTER WATER PLAN

CHECKED BY: NB/JB DESIGNED BY: JB/AF DRAFTED BY: AF/SH

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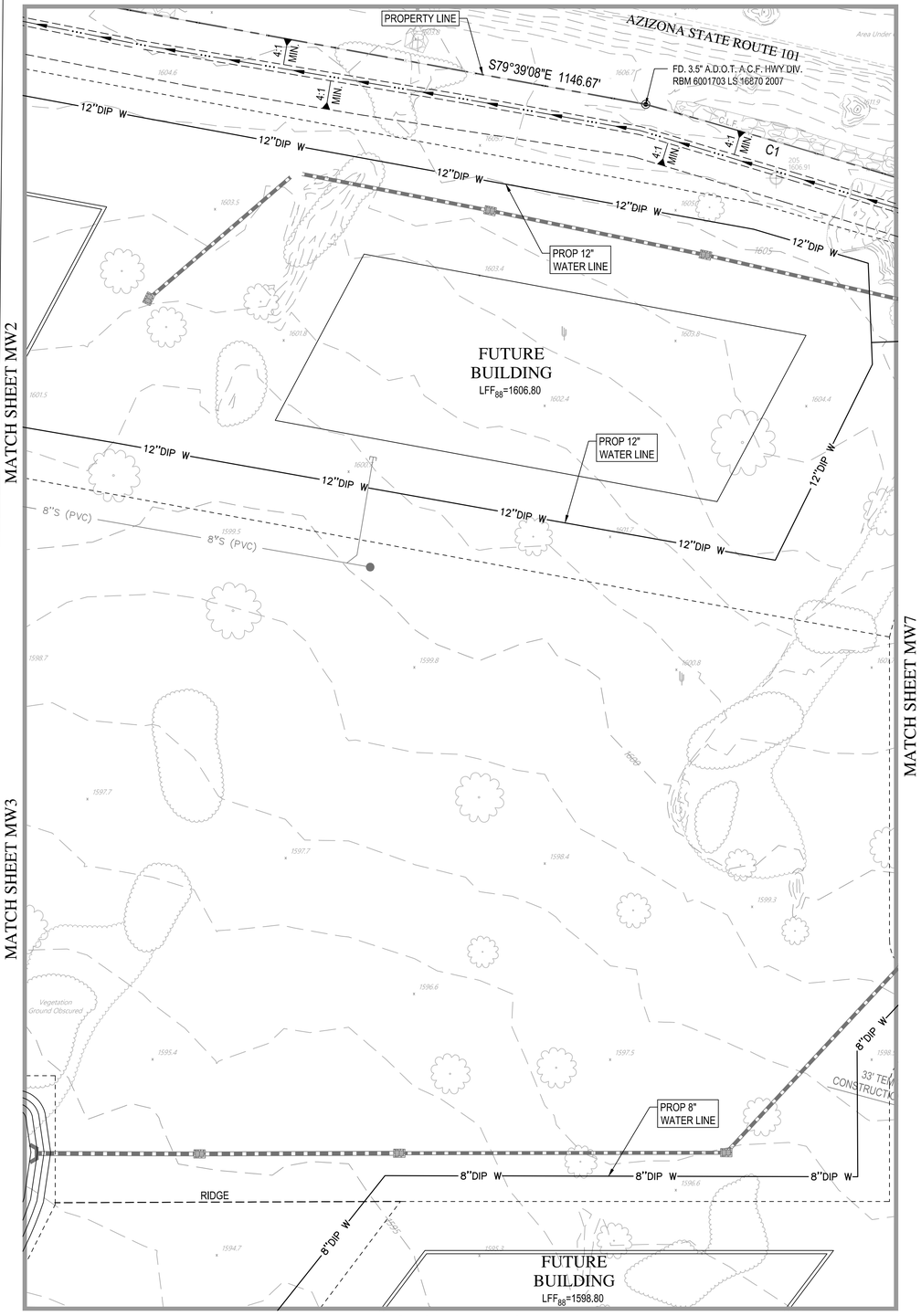

N

0 40 80

Horz. 1 in. = 40 ft.

CURVE TABLE (M)			
CURVE	DELTA	RADIUS	ARC
C2	40°08'46"	2200.00'	1,541.50'
C3	5°02'30"	1800.00'	158.39'
C4	5°02'30"	1800.00'	158.39'

SMITHGROUP
455 NORTH THIRD STREET
SUITE 250
PHOENIX, AZ 85004
602.265.2200
www.smithgroup.com

AXON

WOOD PATEL

Wood, Patel & Associates, Inc.

Civil Engineering
Water Resources
Land Survey
Construction Management

602.335.8500

www.woodpatel.com

Call at least two full working days before you begin excavation.
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Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)
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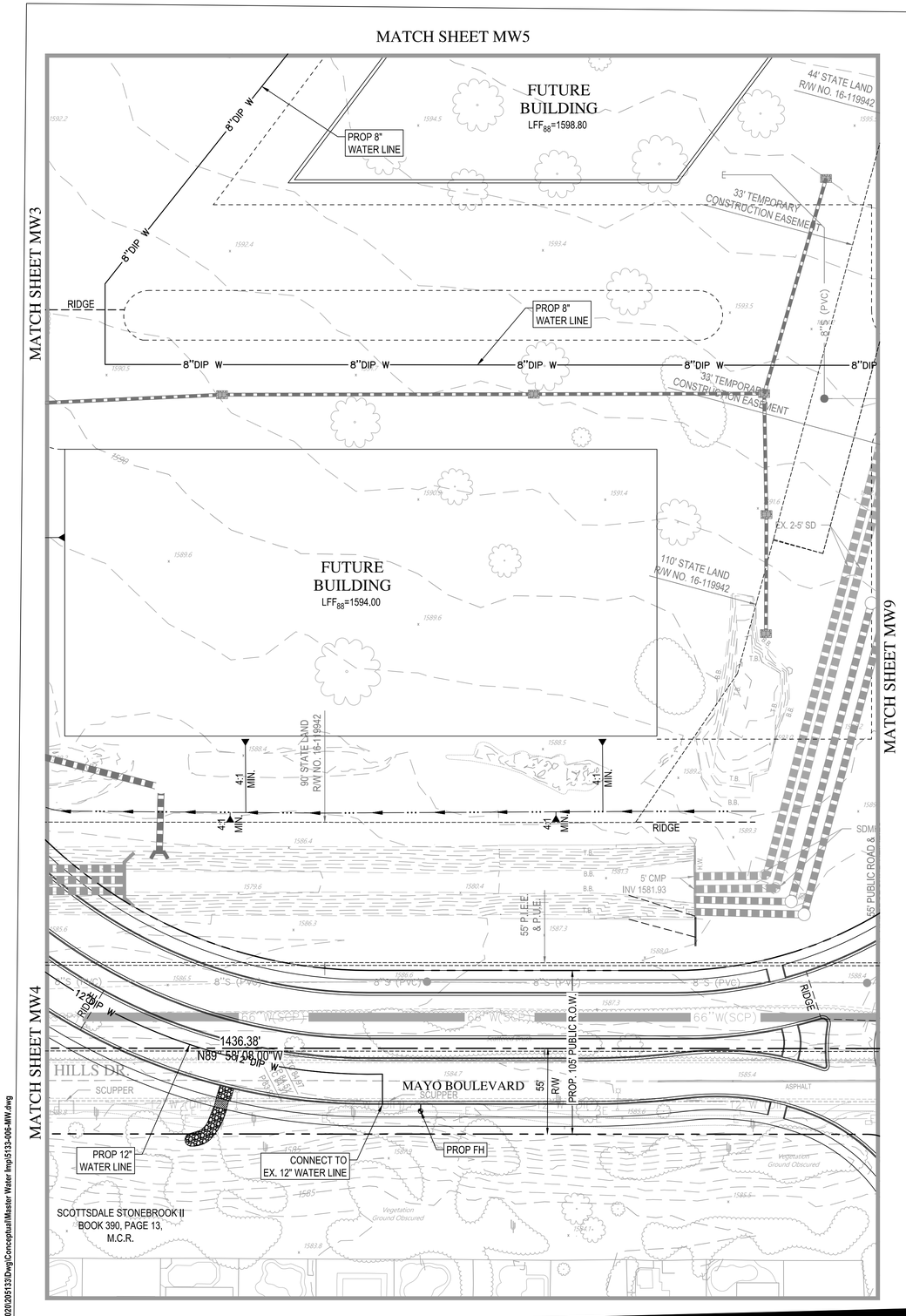
MW 5

MASTER WATER PLAN

CHECKED BY: NB/JB DESIGNED BY: JB/AF DRAFTED BY: AF/SH



N

0 40 80

Horz. 1 in. = 40 ft.

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MW 6

MASTER WATER PLAN

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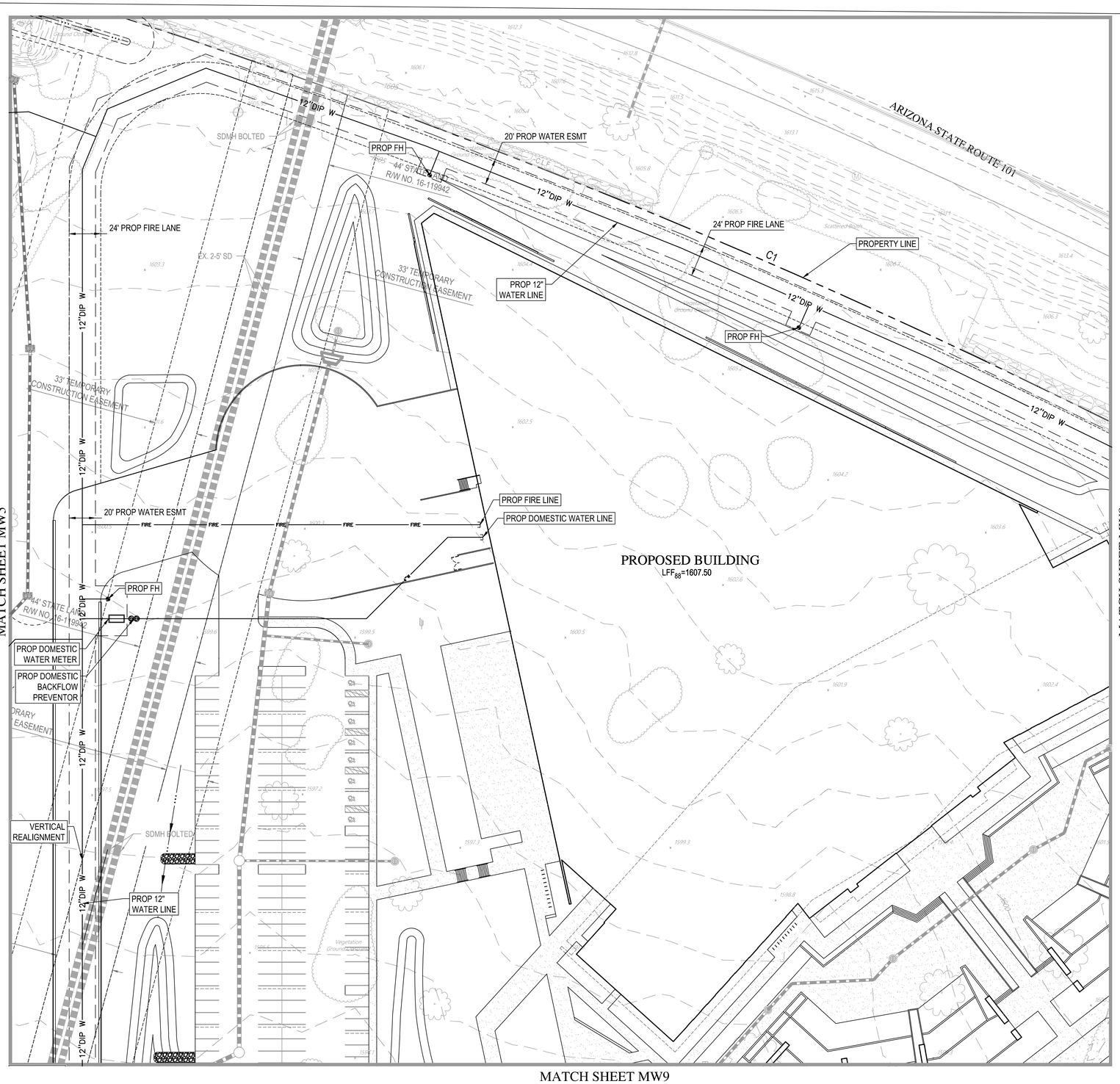

N

0 40 80

Horz. 1 in. = 40 ft.

CURVE TABLE (M)			
CURVE	DELTA	RADIUS	ARC
C2	40°08'46"	2200.00'	1,541.50'
C3	5°02'30"	1800.00'	158.39'
C4	5°02'30"	1800.00'	158.39'

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MW 7

MASTER WATER PLAN

CHECKED BY: NB/JB DESIGNED BY: JB/AF DRAFTED BY: AF/SH

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N

0 40 80

Horz. 1 in. = 40 ft.

CURVE TABLE (M)			
CURVE	DELTA	RADIUS	ARC
C2	40°08'46"	2200.00'	1,541.50'
C3	5°02'30"	1800.00'	158.39'
C4	5°02'30"	1800.00'	158.39'

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MW 8

MASTER WATER PLAN

CHECKED BY: NB/JB DESIGNED BY: JB/AF DRAFTED BY: AF/SH

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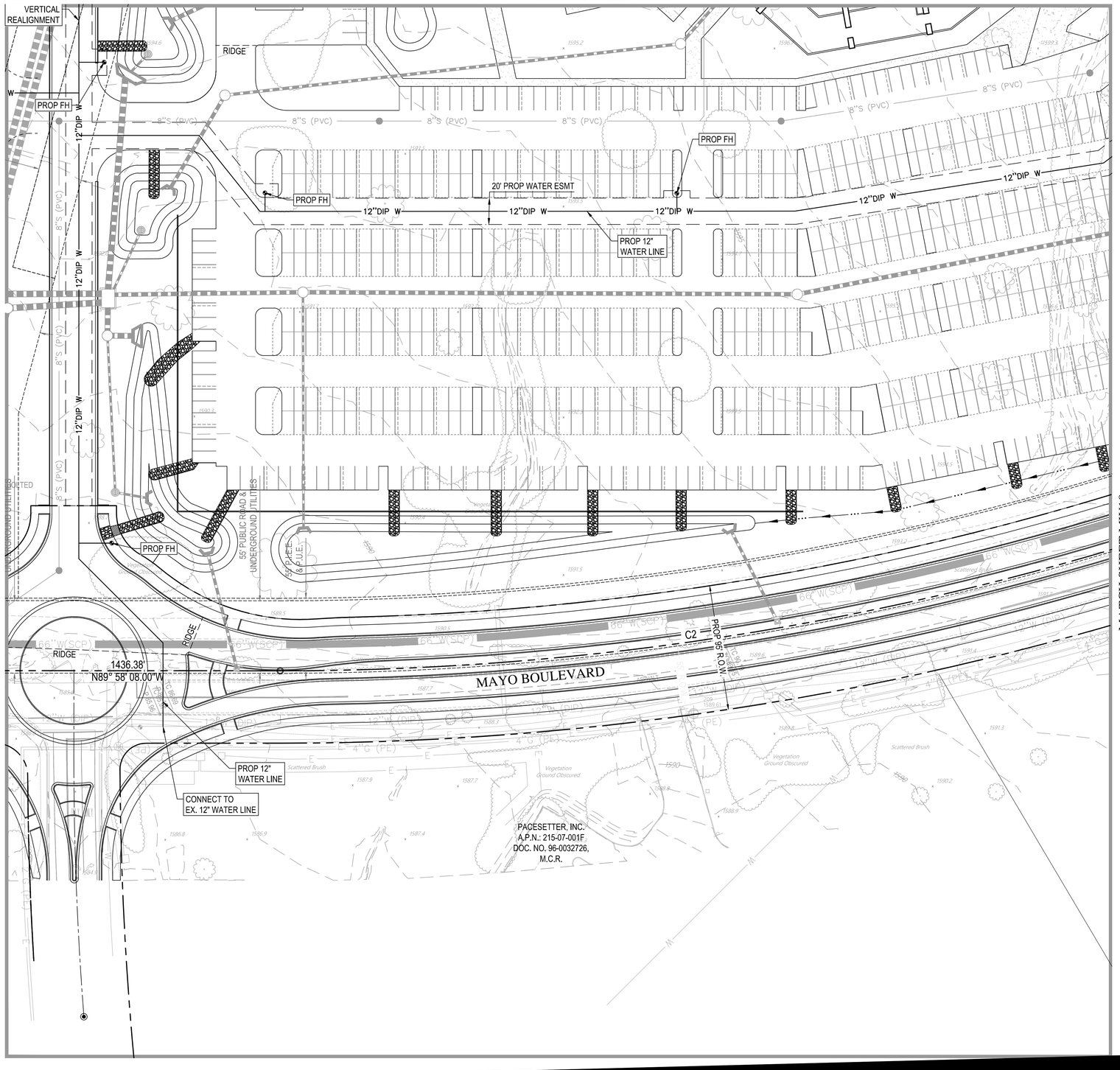
MATCH SHEET MW7



MATCH SHEET MW6

MATCH SHEET MW10

N

0 40 80

Horz. 1 in. = 40 ft.

CURVE TABLE (M)			
CURVE	DELTA	RADIUS	ARC
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C3	5°02'30"	1800.00'	158.39'
C4	5°02'30"	1800.00'	158.39'

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MW 9

MASTER WATER PLAN

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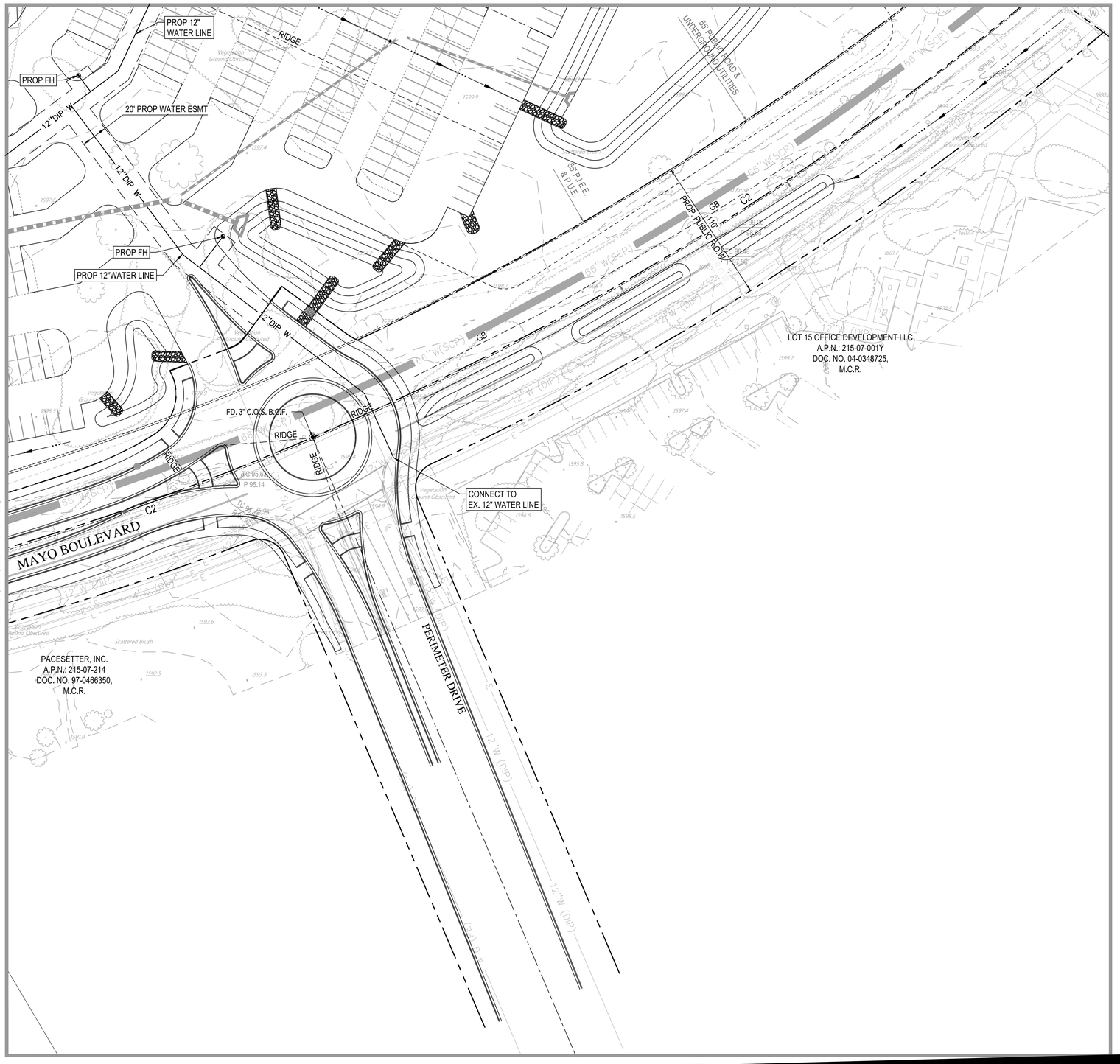
MATCH SHEET MW8



MATCH SHEET MW9

N

0 40 80

Horz. 1 in. = 40 ft.

CURVE TABLE (M)			
CURVE	DELTA	RADIUS	ARC
C2	40°08'46"	2200.00'	1,541.50'
C3	5°02'30"	1800.00'	158.39'
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MW 10

MASTER WATER PLAN

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WOOD PATEL

MASTER WATER DISTRIBUTION SYSTEM

BASIS OF DESIGN REPORT

FOR

CROSSROADS EAST - PLANNING UNITS X AND XI

October 2, 2020
WP# 205133

Registered Professional Engineer (Civil)
CERTIFICATE NO.
33359
JOHN M.
BULKA
Date Signed 10/02/20
ARIZONA, U.S.A.

EXPIRES 03-31-23

TABLE OF CONTENTS

APPENDICES

EXHIBITS

EXPIRES 03-31-23

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Y:\WP\Reports\Commercial\205133 Crossroads East Planning Units X and XI Master Water Basis of Design Report.docx

1.0 INTRODUCTION

Crossroads East Planning Units X and XI (Site) is currently an undeveloped parcel that is part of the Crossroads East Planned Community District. The parcel, Tract 14A of State Plat No. 16-B Core South, consists of a portion of the north half of Section 36, Township 4 North, Range 4 East, in the City of Scottsdale, Arizona. The parcel is approximately 74.44 acres in size and is located northeast of the intersection of Hayden Road and Union Hills Drive in Scottsdale, Arizona. The parcel's western boundary has frontage along the east side of Hayden Road, and the parcel's southern boundary has frontage along the north side of Union Hills Drive. Additionally, the north side of the parcel parallels a portion of Arizona Department of Transportation (ADOT) State Route 101. The proposed improvements include six (6) proposed office / industrial buildings, a fire station, a well site, and the associated parking, roadways, hardscape and landscape.

The design criteria used to estimate potable water demands and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (WOODPATEL) understanding of the published City of Scottsdale *Design Standards and Policies Manual*, 2018, the City of Phoenix *Design Standards Manual for Water and Wastewater Systems*, 2017, and the *International Fire Code,* 2015.

The following is a summary of the design criteria utilized:

Average Day Water Demand, Office:	8.34×10^{-4} gpm/ sq. ft*
Average Day Water Demand, Industrial (Phoenix):	9.03×10^{-2} gpm/ 1,000 sq. ft
Maximum Day Demand:	2.0 x ADD
Peak Hour Demand:	3.5 x ADD
Fire Flow Demand:	3,625 gpm (7,250 gpm * 50% reduction)
Minimum Residual Pressure, Peak Hour:	50 psi
Minimum Residual Pressure, Maximum Day + Fire Flow:	30 psi
Maximum System Pressure:	120 psi
Maximum Pipe Head Loss, Maximum Day Demand:	8 ft / 1000 ft
Maximum Pipe Head Loss, Peak Hour Demand:	10 ft / 1000 ft
Minimum Pipe Diameter, Public Waterline:	8 inches

Abbreviations: gpd = gallons per day; sf = square feet; ADD = average day demand; psi = pounds per square inch

*Includes both inside and outside use, per Figure 6-1.2, City of Scottsdale *Design Standards and Policies Manual*

2.0 EXISTING WATER INFRASTRUCUTRE

2.1 On-Site Infrastructure (Pre-Development)

Significant portions of the parcel have been cleared and covered with recycled asphalt millings to provide dust control. Reportedly, the parcel has previously served as overflow parking. Portions of the parcel that have not been cleared or disturbed display native desert terrain, common to the area. The parcel slopes to the southwest at an average slope of 1.5%. Contour elevations range from approximately 1,605 feet to 1,583 feet.

Existing water infrastructure adjacent to the Site includes a public 16-inch waterline within Hayden Road and a public 12-inch waterline within Mayo Boulevard. Two (2) existing water stubs extend from the 12-inch waterline to the Site. Refer to the attached Water Exhibit in Exhibit 2 for a depiction of the existing water infrastructure surrounding the Site. These improvements were approved as part of the CRE Water Master Plan Update, by Coe & Van Loo Consultants Inc., dated February 22, 2012 (refer to Appendix C).

3.0 PROPOSED WATER INFRASTRUCUTRE

3.1 On-Site Infrastructure (Post Development)

Proposed water infrastructure includes two (2) interconnected 12-inch waterline loops. The east loop which will serve the Axon site will connect to the existing waterlines in Hayden Road and Mayo Boulevard. Water demands for the proposed office and warehouse buildings will be served by the second proposed 12-inch waterline loop that ties into the existing 12-inch waterline within Mayo Boulevard at two (2) locations. Domestic water services will be provided by a 4-inch domestic meter. Fire protection for the project will be provided by a combination of a fire service for building fire sprinklers, a proposed remote fire department connection, and 15 proposed fire hydrants that have been located to meet City of Scottsdale coverage requirements.

The second proposed 12-inch loop will be located at the southwest corner of the Site within the realigned Mayo Boulevard, and is intended to serve future site improvements. In addition, two (2) 8-inch loops that tie into the 12-inch lines have been proposed for redundancy. Future buildings will be provided appropriate sized domestic water services and meters upon design. Fire protection will be provided by a fire service for each building's fire sprinklers, and proposed fire hydrants will be located to meet City of Scottsdale coverage requirements.

3.2 Modeling and Results

The average-day water demand for the Site is projected to be approximately 376 gallons per minute (gpm). Maximum-day demands and peak-hour demands are projected to be 752 gpm and 1,317 gpm, respectively (refer to the calculations within Appendix A). The CRE Water Master Plan Update - by Coe & Van Loo Consultants Inc., dated February 22, 2012 states that Parcel 13 (Site) has an Average Day Demand (ADD), Max Day Demand (MDD) and Peak Hour Demand (PHD) of approximately 88.5 gpm, 97.3 gpm and 136.2 gpm (Appendix C – Table 3:Water Demand Uses) using a Floor to Area Ration Calculation. Since proposed demands derived by City of Scottsdale Standards are more conservative than the CRE Master Plan Update, the derived values were used in our model.

WaterCAD V10i, by Haestad Methods, was utilized to analyze the existing water distribution system and proposed improvements. Results from a fire hydrant flow test, conducted on March 12, 2020, by Arizona Flow Testing LLC, were utilized to simulate the City of Scottsdale water supply for the project (refer to modeling results within Appendix A).

The hydraulic modeling results indicate the proposed system is capable of delivering peak-hour demands, totaling 1,317 gpm, to the proposed Site, with pressures ranging from 61 to 71 pounds per square inch (psi).

The fire flow plus max day results from the model indicate that while using the reduced flow test results, per City of Scottsdale requirements, the residual pressure in the system does not reach the required 30 psi at the tee of the operating hydrant when applying the entire required fire flow at a single hydrant. However, when splitting the flow evenly between six (6) of the nine (9) fire hydrants adjacent to the building, the minimum residual pressure at the tee of an operating hydrant reached the required 30 psi. When using the raw flow test results, and applying the entire fire flow to a single hydrant, the residual pressure at the tee of the operating hydrant was 39 psi. It is believed the system is adequate in serving the fire flow requirements for the Site. Refer to the hydraulic modeling results, calculations, and exhibits involved in the water system analysis within Appendix A.

4.0 CONCLUSIONS

Based on our analysis of the Site, the following conclusions can be made:

1. The system is adequate in serving the fire flow requirements for the Site.
2. The hydraulic modeling results indicate the proposed system is capable of delivering peak-hour demands, totaling 1,317 gpm, to the proposed Site, with pressures ranging from 61 to 71 pounds per square inch (psi).
3. The design criteria used to estimate potable water demands and evaluate system hydraulics are based on Wood, Patel & Associates, Inc.'s (WOODPATEL) understanding of the published City of Scottsdale *Design Standards and Policies Manual*, 2018, the City of Phoenix *Design Standards Manual for Water and Wastewater Systems*, 2017, and the *International Fire Code,* 2015.

APPENDIX A – CALCULATIONS AND HYDRAULIC MODELING RESULTS

WOOD PATEL

TABLE 1
WATER DISTRIBUTION SYSTEM DESIGN CRITERIA

Project	Crossroads East - Planning Units X & XI
Location	Scottsdale Arizona
Project Number	205133
Project Engineer	John Bulka, P.E.
References	City of Scottsdale Design Standards & Policies Manual (2018)

RESIDENTIAL WATER DEMANDS			
LAND USE	**AVERAGE DAILY DEMAND (ADD)**		**NOTES**
	VALUE	**UNITS**	
< 2 dwelling DU/ac	0.69	gpm/unit	Note 1
2-2.9 dwelling DU/ac	0.66	gpm/unit	Note 1
3-7.9 dwelling DU/ac	0.36	gpm/unit	Note 1
8-11.9 dwelling DU/ac	0.33	gpm/unit	Note 1
12-22 2 dwelling DU/ac	0.33	gpm/unit	Note 1
High Density Condominium (condo)	0.27	gpm/unit	Note 1
Resort Hotel (includes site amenities)	0.63	gpm/unit	Note 1

NON-RESIDENTIAL WATER DEMANDS			
LAND USE	**AVERAGE DAILY DEMAND (ADD)**		**NOTES**
	VALUE	**UNITS**	
Restaurant	0.00181	gpm/sf	Note 1
Commercial/Retail	0.00111	gpm/sf	Note 1
Commercial High Rise	0.000834	gpm/sf	Note 1
Office	0.000834	gpm/sf	Note 1
Institutional	1.88	gpm/acre	Note 1
Industrial	0.0903	gpm/1,000 sf	Note 5
Research and Development	1.79	gpm/acre	Note 1

LANDSCAPE WATER DEMANDS			
LAND USE	**AVERAGE DAILY DEMAND (ADD)**		**NOTES**
	VALUE	**UNITS**	
Natural Area Open Space	0.00	gpm/acre	Note 1
Developed Open Space - Parks	2.49	gpm/acre	Note 1
Developed Open Space - Golf Course	5.96	gpm/acre	Note 1

HYDRAULIC MODELING CRITERIA				
	DESCRIPTION	**VALUE**	**UNITS**	**NOTES**
MAX DAY FLOW				
	Max Day Flow = Peaking Factor (PF) x ADD	3.5 x ADD	gpm	Note 1
PEAK HOUR FLOW				
	Peak Hour Flow = Peaking Factor (PF) x ADD	4 x ADD	gpm	Note 1
MODELED FIRE HYDRANT FLOW (MINIMUM)				
☐	Residential, 0 - 3,600 sf fire-flow calculation area	1,000	gpm	Note 3
☐	Residential, 3,601 - 4,800 sf fire-flow calculation area	1,750	gpm	Note 4
☐	Residential, 4,801 - 6,200 sf fire-flow calculation area	2,000	gpm	Note 4
☐	Residential, 6,201 - 7,700 sf fire-flow calculation area	2,250	gpm	Note 4
☐	Residential, 7,701 - 9,400 sf fire-flow calculation area	2,500	gpm	Note 4
☐	Residential, 9,401 - 11,300 sf fire-flow calculation area	2,750	gpm	Note 4
☐	Multi-Family Residential	-	gpm	Note 2
☑	Commercial	3,625	gpm	Note 2
HYDRAULICS				
	Residual Pressure Range, Peak Hour	50-150	psi	Note 1
	Minimum Residual Pressure, Max Day + Fire Flow (Hydrant TEE)	30	psi	Note 1
	Minimum Residual Pressure, Max Day + Fire Flow (Domestic Service)	15	psi	Note 1
	Minimum Pipe Diameter, Looped System	6	in	Note 1
	Hazen-Williams C-value	130	-	Note 1

Notes:
1. Per City of Scottsdale Design Standards & Policies Manual (2018)
2. Per 2015 International Fire Code as adopted by the City of Scottsdale. Utilizes construction type IIB, 114,535 sf area (Building 2), 50% reduction applied.
3. Residential limited to one- and two-family dwellings, assumes Type V-B construction, and has a 1-hour fire duration
4. Residential limited to one- and two-family dwellings, assumes Type V-B construction, and has a 2-hour fire duration
5. Per City of Phoenix Design Standards Manual for Water and Wastewater Systems (2017) modified to City of Scotttsdale standards.

WOOD PATEL

TABLE 2
WATER DEMAND DESIGN FLOWS

Project Crossroads East - Planning Units X & XI
Location Scottsdale Arizona
Project Number 205133
Project Engineer John Bulka, P.E.
References City of Scottsdale Design Standards & Policies Manual (2018)

HYDRAULIC MODEL NODE	ELEVATION (ft)	PRESSURE ZONE	Building	LAND USE	APPLICABLE UNIT	NUMBER OF UNITS	GPM/APPLICABLE UNIT[1]	AVERAGE DAILY DEMAND		MAX DAY DEMAND		PEAK HOUR DEMAND		Fire Flow
								(gpm)	Total (gpm)	(gpm)	Total (gpm)	(gpm)	Total (gpm)	(gpm)
J-A	1,601.9	4	1	Office	gpm/sf	216,225	0.00083	179.5	192.8	359.0	752.4	628.3	628.3	3,625.0
				Industrial	gpm/1,000 sf	33.31	0.0903	3.0		6.0		10.5		
			2	Industrial	gpm/1,000 sf	114.54	0.0903	10.3		20.6		36.1		
J-F1	1,601.9	4	1	Office	gpm/sf	67,078	0.00083	55.7	55.7	111.4	111.4	195.0	195.0	3,500.0
J-F2	1,601.9	4	1	Office	gpm/sf	30,230	0.00083	25.1	25.1	50.2	50.2	87.9	87.9	2,375.0
J-F3	1,601.9	4	1	Office	gpm/sf	29,992	0.00083	24.9	24.9	49.8	49.8	87.2	87.2	2,375.0
J-F4	1,601.9	4	1	Office	gpm/sf	69,899	0.00083	58.0	58.0	116.0	116.0	203.0	203.0	3,625.0
J-FS	1,601.9	4	1	Office	gpm/sf	11,677	0.00083	9.7	19.8	19.4	19.4	34.0	34.0	1,500.0
			1	Industrial	gpm/1,000 sf	22.54	0.0903	2.0		4.0		7.0		
J-F5	1,601.9	4	1	Office	gpm/sf	9,732	0.00083	8.1	8.1	16	16.0	28.4	28.4	1,500.0
Total			**10**					**376.3**		**752.4**		**1,317.1**		

Notes
1. GPM values are based on a 12-hour active water used period per 24-hour day per the City of Scottsdale Design Standards and Policy Manual.

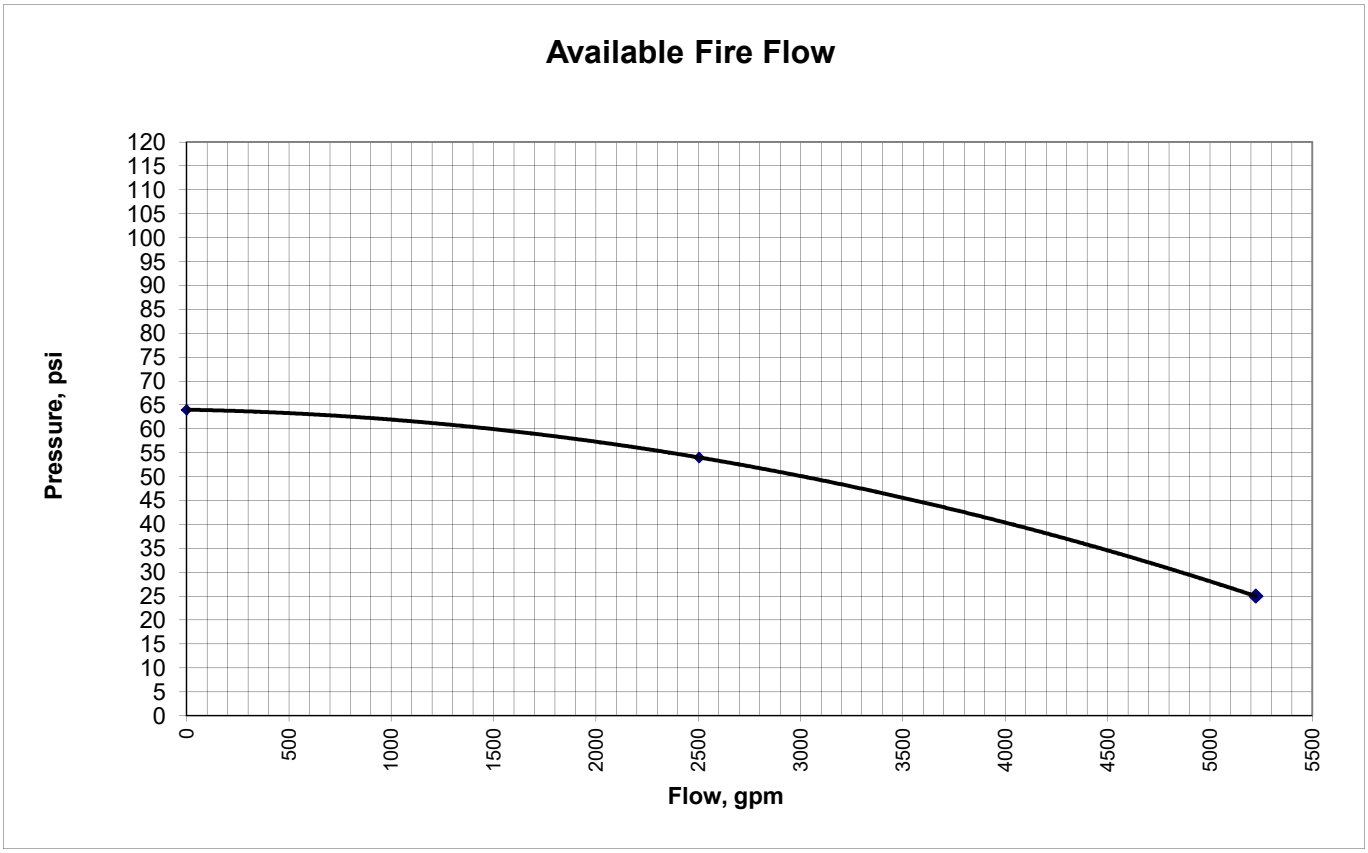
WOOD PATEL

EXISTING WATER SYSTEM PRESSURES

Project	Crossroads East - Planning Units X & XI
Location	Scottsdale Arizona
Project Number	205133
Project Engineer	John Bulka, P.E.

Flow Test Location
Date of Flow Test

Pressure Hydrant		**Flow Hydrant**	
Static Pressure (psi)	64.0		
Residual Pressure (psi)	54.0	Flow (gpm)	2505
Calculated Flow at 25 psi	5224 gpm	Calculated Flow at	25 psi



Discharge (gpm)	**Pressure (psi)**	**Head (ft)**
0	64	147.8
2505	54	124.7
5224	25	57.7

Notes
1. Values provided from a flow test by the City of Phoenix

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Calibration Static

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX FH-1 (FLOW B)	1,595.30	0	1,757.30	70
EX FH-2 (TEST)	1,590.98	0	1,757.30	72
EX FH-3 (FLOW A)	1,586.00	0	1,757.30	74
EX J-10	1,595.30	0	1,757.30	70
EX J-20	1,595.10	0	1,757.30	70
EX J-30	1,592.18	0	1,757.30	71
EX J-50	1,586.00	0	1,757.30	74
EX J-70	1,584.45	0	1,757.30	75
EX J-80	1,581.95	0	1,757.30	76
EX J-90	1,583.61	0	1,757.30	75
EX J-100	1,584.83	0	1,757.30	75
EX J-110	1,591.24	0	1,757.30	72
EX. J-105	1,588.42	0	1,757.30	73
FH-12	1,584.48	0	1,757.30	75

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Calibration Residual

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX FH-1 (FLOW B)	1,595.30	2,314	1,684.68	39
EX FH-2 (TEST)	1,590.98	0	1,690.31	43
EX FH-3 (FLOW A)	1,586.00	1,595	1,686.61	44
EX J-10	1,595.30	0	1,684.91	39
EX J-20	1,595.10	0	1,686.24	39
EX J-30	1,592.18	0	1,688.86	42
EX J-50	1,586.00	0	1,686.66	44
EX J-70	1,584.45	0	1,686.61	44
EX J-80	1,581.95	0	1,686.61	45
EX J-90	1,583.61	0	1,686.61	45
EX J-100	1,584.83	0	1,686.61	44
EX J-110	1,591.24	0	1,686.61	41
EX. J-105	1,588.42	0	1,686.61	42
FH-12	1,584.48	0	1,686.61	44

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Calibration Max

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX FH-1 (FLOW B)	1,595.30	3,172	1,627.08	14
EX FH-2 (TEST)	1,590.98	0	1,637.18	20
EX FH-3 (FLOW A)	1,586.00	2,187	1,630.54	19
EX J-10	1,595.30	0	1,627.49	14
EX J-20	1,595.10	0	1,629.88	15
EX J-30	1,592.18	0	1,634.59	18
EX J-50	1,586.00	0	1,630.62	19
EX J-70	1,584.45	0	1,630.54	20
EX J-80	1,581.95	0	1,630.54	21
EX J-90	1,583.61	0	1,630.54	20
EX J-100	1,584.83	0	1,630.54	20
EX J-110	1,591.24	0	1,630.54	17
EX. J-105	1,588.42	0	1,630.54	18
FH-12	1,584.48	0	1,630.54	20

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Average Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX FH-1 (FLOW B)	1,595.30	0	1,756.34	70
EX FH-2 (TEST)	1,590.98	0	1,756.38	72
EX FH-3 (FLOW A)	1,586.00	0	1,756.30	74
EX J-10	1,595.30	0	1,756.34	70
EX J-20	1,595.10	0	1,756.35	70
EX J-30	1,592.18	0	1,756.37	71
EX J-50	1,586.00	0	1,756.30	74
EX J-70	1,584.45	0	1,756.28	74
EX J-80	1,581.95	0	1,756.28	75
EX J-90	1,583.61	0	1,756.28	75
EX J-100	1,584.83	0	1,756.28	74
EX J-110	1,591.24	0	1,756.28	71
EX. J-105	1,588.42	0	1,756.28	73
FH-1	1,596.50	0	1,756.32	69
FH-2	1,601.60	0	1,756.30	67
FH-3	1,602.00	0	1,756.29	67
FH-4	1,605.00	0	1,756.28	65
FH-5	1,605.50	0	1,756.27	65
FH-6	1,604.50	0	1,756.27	66
FH-7	1,599.70	0	1,756.25	68
FH-8	1,594.00	0	1,756.27	70
FH-9	1,586.50	0	1,756.29	73
FH-10	1,594.53	0	1,756.29	70
FH-11	1,592.38	0	1,756.28	71
FH-12	1,584.48	0	1,756.28	74
FH-13	1,588.09	0	1,756.28	73
FH-14	1,591.62	0	1,756.27	71
FH-15	1,589.30	0	1,756.27	72
J-10	1,596.00	0	1,756.33	69
J-20	1,596.50	0	1,756.32	69
J-30	1,601.60	0	1,756.30	67
J-46	1,601.90	0	1,756.30	67
J-60	1,605.30	0	1,756.29	65
J-100	1,605.50	0	1,756.26	65
J-110	1,605.00	0	1,756.26	65
J-120	1,600.64	0	1,756.26	67
J-130	1,599.26	0	1,756.25	68
J-145	1,593.58	0	1,756.27	70
J-150	1,593.00	0	1,756.28	71
J-170	1,588.19	0	1,756.30	73
J-220	1,584.87	0	1,756.28	74
J-230	1,586.00	0	1,756.28	74
J-235	1,587.50	0	1,756.28	73
J-240	1,591.06	0	1,756.27	71

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Average Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-250	1,604.50	0	1,756.26	66
J-260	1,605.80	0	1,756.26	65
J-A	1,599.49	193	1,756.25	68
J-F1	1,604.50	56	1,756.26	66
J-F2	1,604.50	25	1,756.26	66
J-F3	1,597.50	25	1,756.25	69
J-F4	1,593.00	58	1,756.25	71
J-F5	1,590.78	8	1,756.27	72
J-FS	1,588.70	20	1,756.27	73

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Average Day Demand

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-05	12.0	Ductile Iron	EX J-10	EX FH-1 (FLOW B)	130.0	0	0.00
EX P-15	12.0	Ductile Iron	EX J-20	EX J-10	130.0	174	0.49
EX P-25	12.0	Ductile Iron	EX J-30	EX J-20	130.0	174	0.49
EX P-35	12.0	Ductile Iron	EX FH-2 (TEST)	EX J-30	130.0	174	0.49
EX P-45	12.0	Ductile Iron	EX J-50	EX FH-2 (TEST)	130.0	-211	0.60
EX P-55	12.0	Ductile Iron	EX FH-3 (FLOW A)	EX J-50	130.0	-101	0.29
EX P-65	12.0	Ductile Iron	FH-12	EX FH-3 (FLOW A)	130.0	-101	0.29
EX P-67	12.0	Ductile Iron	EX J-70	FH-12	130.0	-101	0.29
EX P-75	12.0	Ductile Iron	EX J-80	EX J-70	130.0	-41	0.12
EX P-85	12.0	Ductile Iron	EX J-90	EX J-80	130.0	-41	0.12
EX P-95	12.0	Ductile Iron	EX J-100	EX J-90	130.0	-41	0.12
EX P-105	16.0	Ductile Iron	EX. J-105	EX J-100	130.0	-41	0.07
EX P-115	16.0	Ductile Iron	EX J-110	EX. J-105	130.0	-34	0.05
P-05	12.0	Ductile Iron	J-10	EX J-10	130.0	-174	0.49
P-15	12.0	Ductile Iron	FH-1	J-10	130.0	-174	0.49
P-17	12.0	Ductile Iron	J-20	FH-1	130.0	-174	0.49
P-25	12.0	Ductile Iron	J-30	J-20	130.0	-174	0.49
P-35	12.0	Ductile Iron	FH-2	J-30	130.0	-87	0.25
P-45	12.0	Ductile Iron	J-46	FH-2	130.0	-87	0.25
P-47	12.0	Ductile Iron	FH-3	J-46	130.0	-87	0.25
P-55	12.0	Ductile Iron	J-60	FH-3	130.0	-87	0.25
P-65	12.0	Ductile Iron	J-60	FH-4	130.0	87	0.25
P-75	12.0	Ductile Iron	FH-4	FH-5	130.0	87	0.25
P-85	12.0	Ductile Iron	FH-5	FH-6	130.0	87	0.25
P-95	12.0	Ductile Iron	J-100	FH-6	130.0	-87	0.25
P-105	12.0	Ductile Iron	J-110	J-100	130.0	-87	0.25
P-115	12.0	Ductile Iron	J-120	J-110	130.0	-87	0.25
P-125	12.0	Ductile Iron	FH-7	J-120	130.0	-79	0.22
P-129	12.0	Ductile Iron	J-A	FH-7	130.0	-79	0.22
P-130	12.0	Ductile Iron	J-130	J-A	130.0	114	0.32
P-140	12.0	Ductile Iron	J-145	FH-8	130.0	134	0.38
P-140(1)	12.0	Ductile Iron	FH-8	J-130	130.0	134	0.38
P-145	12.0	Ductile Iron	J-150	J-145	130.0	197	0.56
P-155	12.0	Ductile Iron	FH-9	J-150	130.0	110	0.31
P-165	12.0	Ductile Iron	J-170	FH-9	130.0	110	0.31
P-175	12.0	Ductile Iron	EX J-50	J-170	130.0	110	0.31
P-185	12.0	Ductile Iron	J-30	FH-10	130.0	87	0.25
P-195	12.0	Ductile Iron	FH-10	FH-11	130.0	87	0.25
P-205	12.0	Ductile Iron	FH-11	J-150	130.0	87	0.25
P-215	12.0	Ductile Iron	J-220	EX J-70	130.0	-60	0.17
P-225	12.0	Ductile Iron	J-230	J-220	130.0	-60	0.17

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Average Day Demand

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-235	12.0	Ductile Iron	J-235	J-230	130.0	-60	0.17
P-240	12.0	Ductile Iron	FH-13	J-235	130.0	-48	0.13
P-245	12.0	Ductile Iron	J-240	FH-13	130.0	-48	0.13
P-250	12.0	Ductile Iron	FH-14	J-240	130.0	26	0.07
P-254	12.0	Ductile Iron	J-F5	FH-14	130.0	26	0.07
P-255	12.0	Ductile Iron	FH-15	J-F5	130.0	34	0.10
P-265	12.0	Ductile Iron	EX J-110	FH-15	130.0	34	0.10
P-275	12.0	Ductile Iron	J-240	J-250	130.0	73	0.21
P-285	12.0	Ductile Iron	J-250	J-F1	130.0	44	0.12
P-295	12.0	Ductile Iron	J-F1	J-260	130.0	-12	0.03
P-305	12.0	Ductile Iron	J-F2	J-260	130.0	4	0.01
P-315	12.0	Ductile Iron	J-250	J-F2	130.0	29	0.08
P-325	8.0	Ductile Iron	J-FS	J-235	130.0	-12	0.08
P-325	12.0	Ductile Iron	J-260	J-120	130.0	-8	0.02
P-335	8.0	Ductile Iron	EX. J-105	J-FS	130.0	8	0.05
P-345	8.0	Ductile Iron	J-F3	J-130	130.0	-20	0.13
P-355	8.0	Ductile Iron	J-F4	J-F3	130.0	5	0.03
P-365	8.0	Ductile Iron	J-145	J-F4	130.0	63	0.40
P-PMP-1	48.0	Ductile Iron	PMP-1	EX FH-2 (TEST)	130.0	385	0.07
P-R-1	48.0	Ductile Iron	R-1	PMP-1	130.0	385	0.07

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Max Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX FH-1 (FLOW B)	1,595.30	0	1,753.83	69
EX FH-2 (TEST)	1,590.98	0	1,754.00	71
EX FH-3 (FLOW A)	1,586.00	0	1,753.68	73
EX J-10	1,595.30	0	1,753.83	69
EX J-20	1,595.10	0	1,753.87	69
EX J-30	1,592.18	0	1,753.95	70
EX J-50	1,586.00	0	1,753.69	73
EX J-70	1,584.45	0	1,753.63	73
EX J-80	1,581.95	0	1,753.61	74
EX J-90	1,583.61	0	1,753.61	74
EX J-100	1,584.83	0	1,753.61	73
EX J-110	1,591.24	0	1,753.60	70
EX. J-105	1,588.42	0	1,753.60	71
FH-1	1,596.50	0	1,753.76	68
FH-2	1,601.60	0	1,753.70	66
FH-3	1,602.00	0	1,753.67	66
FH-4	1,605.00	0	1,753.63	64
FH-5	1,605.50	0	1,753.60	64
FH-6	1,604.50	0	1,753.57	64
FH-7	1,599.70	0	1,753.51	67
FH-8	1,594.00	0	1,753.60	69
FH-9	1,586.50	0	1,753.66	72
FH-10	1,594.53	0	1,753.66	69
FH-11	1,592.38	0	1,753.63	70
FH-12	1,584.48	0	1,753.63	73
FH-13	1,588.09	0	1,753.60	72
FH-14	1,591.62	0	1,753.60	70
FH-15	1,589.30	0	1,753.60	71
J-10	1,596.00	0	1,753.82	68
J-20	1,596.50	0	1,753.75	68
J-30	1,601.60	0	1,753.70	66
J-46	1,601.90	0	1,753.68	66
J-60	1,605.30	0	1,753.66	64
J-100	1,605.50	0	1,753.55	64
J-110	1,605.00	0	1,753.54	64
J-120	1,600.64	0	1,753.54	66
J-130	1,599.26	0	1,753.51	67
J-145	1,593.58	0	1,753.60	69
J-150	1,593.00	0	1,753.62	69
J-170	1,588.19	0	1,753.68	72
J-220	1,584.87	0	1,753.63	73
J-230	1,586.00	0	1,753.62	73
J-235	1,587.50	0	1,753.61	72
J-240	1,591.06	0	1,753.59	70

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Max Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-250	1,604.50	0	1,753.55	64
J-260	1,605.80	0	1,753.54	64
J-A	1,599.49	386	1,753.51	67
J-F1	1,604.50	111	1,753.54	64
J-F2	1,604.50	50	1,753.54	64
J-F3	1,597.50	50	1,753.51	67
J-F4	1,593.00	116	1,753.51	69
J-F5	1,590.78	16	1,753.60	70
J-FS	1,588.70	40	1,753.60	71

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Max Day Demand

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-05	12.0	Ductile Iron	EX J-10	EX FH-1 (FLOW B)	130.0	0	0.00
EX P-15	12.0	Ductile Iron	EX J-20	EX J-10	130.0	348	0.99
EX P-25	12.0	Ductile Iron	EX J-30	EX J-20	130.0	348	0.99
EX P-35	12.0	Ductile Iron	EX FH-2 (TEST)	EX J-30	130.0	348	0.99
EX P-45	12.0	Ductile Iron	EX J-50	EX FH-2 (TEST)	130.0	-421	1.19
EX P-55	12.0	Ductile Iron	EX FH-3 (FLOW A)	EX J-50	130.0	-202	0.57
EX P-65	12.0	Ductile Iron	FH-12	EX FH-3 (FLOW A)	130.0	-202	0.57
EX P-67	12.0	Ductile Iron	EX J-70	FH-12	130.0	-202	0.57
EX P-75	12.0	Ductile Iron	EX J-80	EX J-70	130.0	-83	0.24
EX P-85	12.0	Ductile Iron	EX J-90	EX J-80	130.0	-83	0.24
EX P-95	12.0	Ductile Iron	EX J-100	EX J-90	130.0	-83	0.24
EX P-105	16.0	Ductile Iron	EX. J-105	EX J-100	130.0	-83	0.13
EX P-115	16.0	Ductile Iron	EX J-110	EX. J-105	130.0	-67	0.11
P-05	12.0	Ductile Iron	J-10	EX J-10	130.0	-348	0.99
P-15	12.0	Ductile Iron	FH-1	J-10	130.0	-348	0.99
P-17	12.0	Ductile Iron	J-20	FH-1	130.0	-348	0.99
P-25	12.0	Ductile Iron	J-30	J-20	130.0	-348	0.99
P-35	12.0	Ductile Iron	FH-2	J-30	130.0	-174	0.49
P-45	12.0	Ductile Iron	J-46	FH-2	130.0	-174	0.49
P-47	12.0	Ductile Iron	FH-3	J-46	130.0	-174	0.49
P-55	12.0	Ductile Iron	J-60	FH-3	130.0	-174	0.49
P-65	12.0	Ductile Iron	J-60	FH-4	130.0	174	0.49
P-75	12.0	Ductile Iron	FH-4	FH-5	130.0	174	0.49
P-85	12.0	Ductile Iron	FH-5	FH-6	130.0	174	0.49
P-95	12.0	Ductile Iron	J-100	FH-6	130.0	-174	0.49
P-105	12.0	Ductile Iron	J-110	J-100	130.0	-174	0.49
P-115	12.0	Ductile Iron	J-120	J-110	130.0	-174	0.49
P-125	12.0	Ductile Iron	FH-7	J-120	130.0	-159	0.45
P-129	12.0	Ductile Iron	J-A	FH-7	130.0	-159	0.45
P-130	12.0	Ductile Iron	J-130	J-A	130.0	227	0.64
P-140	12.0	Ductile Iron	J-145	FH-8	130.0	268	0.76
P-140(1)	12.0	Ductile Iron	FH-8	J-130	130.0	268	0.76
P-145	12.0	Ductile Iron	J-150	J-145	130.0	393	1.12
P-155	12.0	Ductile Iron	FH-9	J-150	130.0	219	0.62
P-165	12.0	Ductile Iron	J-170	FH-9	130.0	219	0.62
P-175	12.0	Ductile Iron	EX J-50	J-170	130.0	219	0.62
P-185	12.0	Ductile Iron	J-30	FH-10	130.0	174	0.49
P-195	12.0	Ductile Iron	FH-10	FH-11	130.0	174	0.49
P-205	12.0	Ductile Iron	FH-11	J-150	130.0	174	0.49
P-215	12.0	Ductile Iron	J-220	EX J-70	130.0	-119	0.34
P-225	12.0	Ductile Iron	J-230	J-220	130.0	-119	0.34

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Max Day Demand

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-235	12.0	Ductile Iron	J-235	J-230	130.0	-119	0.34
P-240	12.0	Ductile Iron	FH-13	J-235	130.0	-95	0.27
P-245	12.0	Ductile Iron	J-240	FH-13	130.0	-95	0.27
P-250	12.0	Ductile Iron	FH-14	J-240	130.0	51	0.15
P-254	12.0	Ductile Iron	J-F5	FH-14	130.0	51	0.15
P-255	12.0	Ductile Iron	FH-15	J-F5	130.0	67	0.19
P-265	12.0	Ductile Iron	EX J-110	FH-15	130.0	67	0.19
P-275	12.0	Ductile Iron	J-240	J-250	130.0	146	0.41
P-285	12.0	Ductile Iron	J-250	J-F1	130.0	88	0.25
P-295	12.0	Ductile Iron	J-F1	J-260	130.0	-24	0.07
P-305	12.0	Ductile Iron	J-F2	J-260	130.0	8	0.02
P-315	12.0	Ductile Iron	J-250	J-F2	130.0	59	0.17
P-325	8.0	Ductile Iron	J-FS	J-235	130.0	-24	0.15
P-325	12.0	Ductile Iron	J-260	J-120	130.0	-15	0.04
P-335	8.0	Ductile Iron	EX. J-105	J-FS	130.0	15	0.10
P-345	8.0	Ductile Iron	J-F3	J-130	130.0	-40	0.26
P-355	8.0	Ductile Iron	J-F4	J-F3	130.0	9	0.06
P-365	8.0	Ductile Iron	J-145	J-F4	130.0	125	0.80
P-PMP-1	48.0	Ductile Iron	PMP-1	EX FH-2 (TEST)	130.0	769	0.14
P-R-1	48.0	Ductile Iron	R-1	PMP-1	130.0	769	0.14

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Peak Hour Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX FH-1 (FLOW B)	1,595.30	0	1,747.54	66
EX FH-2 (TEST)	1,590.98	0	1,747.99	68
EX FH-3 (FLOW A)	1,586.00	0	1,747.11	70
EX J-10	1,595.30	0	1,747.54	66
EX J-20	1,595.10	0	1,747.65	66
EX J-30	1,592.18	0	1,747.87	67
EX J-50	1,586.00	0	1,747.12	70
EX J-70	1,584.45	0	1,746.96	70
EX J-80	1,581.95	0	1,746.90	71
EX J-90	1,583.61	0	1,746.90	71
EX J-100	1,584.83	0	1,746.89	70
EX J-110	1,591.24	0	1,746.88	67
EX. J-105	1,588.42	0	1,746.89	69
FH-1	1,596.50	0	1,747.32	65
FH-2	1,601.60	0	1,747.16	63
FH-3	1,602.00	0	1,747.06	63
FH-4	1,605.00	0	1,746.96	61
FH-5	1,605.50	0	1,746.88	61
FH-6	1,604.50	0	1,746.79	62
FH-7	1,599.70	0	1,746.63	64
FH-8	1,594.00	0	1,746.86	66
FH-9	1,586.50	0	1,747.05	69
FH-10	1,594.53	0	1,747.05	66
FH-11	1,592.38	0	1,746.97	67
FH-12	1,584.48	0	1,746.97	70
FH-13	1,588.09	0	1,746.89	69
FH-14	1,591.62	0	1,746.86	67
FH-15	1,589.30	0	1,746.88	68
J-10	1,596.00	0	1,747.48	66
J-20	1,596.50	0	1,747.31	65
J-30	1,601.60	0	1,747.16	63
J-46	1,601.90	0	1,747.11	63
J-60	1,605.30	0	1,747.03	61
J-100	1,605.50	0	1,746.74	61
J-110	1,605.00	0	1,746.72	61
J-120	1,600.64	0	1,746.71	63
J-130	1,599.26	0	1,746.63	64
J-145	1,593.58	0	1,746.88	66
J-150	1,593.00	0	1,746.92	67
J-170	1,588.19	0	1,747.09	69
J-220	1,584.87	0	1,746.96	70
J-230	1,586.00	0	1,746.92	70
J-235	1,587.50	0	1,746.90	69
J-240	1,591.06	0	1,746.86	67

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Peak Hour Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-250	1,604.50	0	1,746.74	62
J-260	1,605.80	0	1,746.71	61
J-A	1,599.49	675	1,746.63	64
J-F1	1,604.50	195	1,746.70	62
J-F2	1,604.50	88	1,746.71	62
J-F3	1,597.50	87	1,746.61	65
J-F4	1,593.00	203	1,746.62	66
J-F5	1,590.78	28	1,746.87	68
J-FS	1,588.70	69	1,746.88	68

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Peak Hour Demand

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-05	12.0	Ductile Iron	EX J-10	EX FH-1 (FLOW B)	130.0	0	0.00
EX P-15	12.0	Ductile Iron	EX J-20	EX J-10	130.0	609	1.73
EX P-25	12.0	Ductile Iron	EX J-30	EX J-20	130.0	609	1.73
EX P-35	12.0	Ductile Iron	EX FH-2 (TEST)	EX J-30	130.0	609	1.73
EX P-45	12.0	Ductile Iron	EX J-50	EX FH-2 (TEST)	130.0	-737	2.09
EX P-55	12.0	Ductile Iron	EX FH-3 (FLOW A)	EX J-50	130.0	-354	1.00
EX P-65	12.0	Ductile Iron	FH-12	EX FH-3 (FLOW A)	130.0	-354	1.00
EX P-67	12.0	Ductile Iron	EX J-70	FH-12	130.0	-354	1.00
EX P-75	12.0	Ductile Iron	EX J-80	EX J-70	130.0	-145	0.41
EX P-85	12.0	Ductile Iron	EX J-90	EX J-80	130.0	-145	0.41
EX P-95	12.0	Ductile Iron	EX J-100	EX J-90	130.0	-145	0.41
EX P-105	16.0	Ductile Iron	EX. J-105	EX J-100	130.0	-145	0.23
EX P-115	16.0	Ductile Iron	EX J-110	EX. J-105	130.0	-118	0.19
P-05	12.0	Ductile Iron	J-10	EX J-10	130.0	-609	1.73
P-15	12.0	Ductile Iron	FH-1	J-10	130.0	-609	1.73
P-17	12.0	Ductile Iron	J-20	FH-1	130.0	-609	1.73
P-25	12.0	Ductile Iron	J-30	J-20	130.0	-609	1.73
P-35	12.0	Ductile Iron	FH-2	J-30	130.0	-304	0.86
P-45	12.0	Ductile Iron	J-46	FH-2	130.0	-304	0.86
P-47	12.0	Ductile Iron	FH-3	J-46	130.0	-304	0.86
P-55	12.0	Ductile Iron	J-60	FH-3	130.0	-304	0.86
P-65	12.0	Ductile Iron	J-60	FH-4	130.0	304	0.86
P-75	12.0	Ductile Iron	FH-4	FH-5	130.0	304	0.86
P-85	12.0	Ductile Iron	FH-5	FH-6	130.0	304	0.86
P-95	12.0	Ductile Iron	J-100	FH-6	130.0	-304	0.86
P-105	12.0	Ductile Iron	J-110	J-100	130.0	-304	0.86
P-115	12.0	Ductile Iron	J-120	J-110	130.0	-304	0.86
P-125	12.0	Ductile Iron	FH-7	J-120	130.0	-277	0.79
P-129	12.0	Ductile Iron	J-A	FH-7	130.0	-277	0.79
P-130	12.0	Ductile Iron	J-130	J-A	130.0	398	1.13
P-140	12.0	Ductile Iron	J-145	FH-8	130.0	469	1.33
P-140(1)	12.0	Ductile Iron	FH-8	J-130	130.0	469	1.33
P-145	12.0	Ductile Iron	J-150	J-145	130.0	688	1.95
P-155	12.0	Ductile Iron	FH-9	J-150	130.0	383	1.09
P-165	12.0	Ductile Iron	J-170	FH-9	130.0	383	1.09
P-175	12.0	Ductile Iron	EX J-50	J-170	130.0	383	1.09
P-185	12.0	Ductile Iron	J-30	FH-10	130.0	305	0.86
P-195	12.0	Ductile Iron	FH-10	FH-11	130.0	305	0.86
P-205	12.0	Ductile Iron	FH-11	J-150	130.0	305	0.86
P-215	12.0	Ductile Iron	J-220	EX J-70	130.0	-209	0.59
P-225	12.0	Ductile Iron	J-230	J-220	130.0	-209	0.59

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Peak Hour Demand

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-235	12.0	Ductile Iron	J-235	J-230	130.0	-209	0.59
P-240	12.0	Ductile Iron	FH-13	J-235	130.0	-166	0.47
P-245	12.0	Ductile Iron	J-240	FH-13	130.0	-166	0.47
P-250	12.0	Ductile Iron	FH-14	J-240	130.0	90	0.25
P-254	12.0	Ductile Iron	J-F5	FH-14	130.0	90	0.25
P-255	12.0	Ductile Iron	FH-15	J-F5	130.0	118	0.33
P-265	12.0	Ductile Iron	EX J-110	FH-15	130.0	118	0.33
P-275	12.0	Ductile Iron	J-240	J-250	130.0	256	0.73
P-285	12.0	Ductile Iron	J-250	J-F1	130.0	153	0.44
P-295	12.0	Ductile Iron	J-F1	J-260	130.0	-41	0.12
P-305	12.0	Ductile Iron	J-F2	J-260	130.0	15	0.04
P-315	12.0	Ductile Iron	J-250	J-F2	130.0	102	0.29
P-325	8.0	Ductile Iron	J-FS	J-235	130.0	-42	0.27
P-325	12.0	Ductile Iron	J-260	J-120	130.0	-27	0.08
P-335	8.0	Ductile Iron	EX. J-105	J-FS	130.0	27	0.17
P-345	8.0	Ductile Iron	J-F3	J-130	130.0	-71	0.45
P-355	8.0	Ductile Iron	J-F4	J-F3	130.0	16	0.10
P-365	8.0	Ductile Iron	J-145	J-F4	130.0	219	1.40
P-PMP-1	48.0	Ductile Iron	PMP-1	EX FH-2 (TEST)	130.0	1,346	0.24
P-R-1	48.0	Ductile Iron	R-1	PMP-1	130.0	1,346	0.24

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Fire Flow + Max Day

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX FH-1 (FLOW B)	1,595.30	0	1,670.24	32
EX FH-2 (TEST)	1,590.98	0	1,674.84	36
EX FH-3 (FLOW A)	1,586.00	0	1,667.89	35
EX J-10	1,595.30	0	1,670.24	32
EX J-20	1,595.10	0	1,671.38	33
EX J-30	1,592.18	0	1,673.61	35
EX J-50	1,586.00	0	1,667.91	35
EX J-70	1,584.45	0	1,666.80	36
EX J-80	1,581.95	0	1,666.36	37
EX J-90	1,583.61	0	1,666.31	36
EX J-100	1,584.83	0	1,666.29	35
EX J-110	1,591.24	0	1,666.21	32
EX. J-105	1,588.42	0	1,666.25	34
FH-1	1,596.50	0	1,668.09	31
FH-2	1,601.60	0	1,666.36	28
FH-3	1,602.00	0	1,663.82	27
FH-4	1,605.00	0	1,661.16	24
FH-5	1,605.50	3,625	1,658.90	23
FH-6	1,604.50	0	1,661.28	25
FH-7	1,599.70	0	1,664.45	28
FH-8	1,594.00	0	1,665.94	31
FH-9	1,586.50	0	1,667.33	35
FH-10	1,594.53	0	1,666.37	31
FH-11	1,592.38	0	1,666.26	32
FH-12	1,584.48	0	1,666.82	36
FH-13	1,588.09	0	1,666.21	34
FH-14	1,591.62	0	1,665.96	32
FH-15	1,589.30	0	1,666.15	33
J-10	1,596.00	0	1,669.70	32
J-20	1,596.50	0	1,667.94	31
J-30	1,601.60	0	1,666.50	28
J-46	1,601.90	0	1,665.00	27
J-60	1,605.30	0	1,663.05	25
J-100	1,605.50	0	1,662.75	25
J-110	1,605.00	0	1,663.38	25
J-120	1,600.64	0	1,663.56	27
J-130	1,599.26	0	1,664.56	28
J-145	1,593.58	0	1,666.03	31
J-150	1,593.00	0	1,666.21	32
J-170	1,588.19	0	1,667.71	34
J-220	1,584.87	0	1,666.76	35
J-230	1,586.00	0	1,666.47	35
J-235	1,587.50	0	1,666.27	34
J-240	1,591.06	0	1,665.93	32

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Fire Flow + Max Day

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-250	1,604.50	0	1,664.37	26
J-260	1,605.80	0	1,663.72	25
J-A	1,599.49	386	1,664.49	28
J-F1	1,604.50	111	1,664.14	26
J-F2	1,604.50	50	1,663.80	26
J-F3	1,597.50	50	1,664.65	29
J-F4	1,593.00	116	1,665.52	31
J-F5	1,590.78	16	1,666.02	33
J-FS	1,588.70	19	1,666.25	34

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Fire Flow + Max Day

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-05	12.0	Ductile Iron	EX J-10	EX FH-1 (FLOW B)	130.0	0	0.00
EX P-15	12.0	Ductile Iron	EX J-20	EX J-10	130.0	2,120	6.01
EX P-25	12.0	Ductile Iron	EX J-30	EX J-20	130.0	2,120	6.01
EX P-35	12.0	Ductile Iron	EX FH-2 (TEST)	EX J-30	130.0	2,120	6.01
EX P-45	12.0	Ductile Iron	EX J-50	EX FH-2 (TEST)	130.0	-2,253	6.39
EX P-55	12.0	Ductile Iron	EX FH-3 (FLOW A)	EX J-50	130.0	-1,035	2.94
EX P-65	12.0	Ductile Iron	FH-12	EX FH-3 (FLOW A)	130.0	-1,035	2.94
EX P-67	12.0	Ductile Iron	EX J-70	FH-12	130.0	-1,035	2.94
EX P-75	12.0	Ductile Iron	EX J-80	EX J-70	130.0	-414	1.17
EX P-85	12.0	Ductile Iron	EX J-90	EX J-80	130.0	-414	1.17
EX P-95	12.0	Ductile Iron	EX J-100	EX J-90	130.0	-414	1.17
EX P-105	16.0	Ductile Iron	EX. J-105	EX J-100	130.0	-414	0.66
EX P-115	16.0	Ductile Iron	EX J-110	EX. J-105	130.0	-438	0.70
P-05	12.0	Ductile Iron	J-10	EX J-10	130.0	-2,120	6.01
P-15	12.0	Ductile Iron	FH-1	J-10	130.0	-2,120	6.01
P-17	12.0	Ductile Iron	J-20	FH-1	130.0	-2,120	6.01
P-25	12.0	Ductile Iron	J-30	J-20	130.0	-2,120	6.01
P-35	12.0	Ductile Iron	FH-2	J-30	130.0	-1,791	5.08
P-45	12.0	Ductile Iron	J-46	FH-2	130.0	-1,791	5.08
P-47	12.0	Ductile Iron	FH-3	J-46	130.0	-1,791	5.08
P-55	12.0	Ductile Iron	J-60	FH-3	130.0	-1,791	5.08
P-65	12.0	Ductile Iron	J-60	FH-4	130.0	1,791	5.08
P-75	12.0	Ductile Iron	FH-4	FH-5	130.0	1,791	5.08
P-85	12.0	Ductile Iron	FH-5	FH-6	130.0	-1,834	5.20
P-95	12.0	Ductile Iron	J-100	FH-6	130.0	1,834	5.20
P-105	12.0	Ductile Iron	J-110	J-100	130.0	1,834	5.20
P-115	12.0	Ductile Iron	J-120	J-110	130.0	1,834	5.20
P-125	12.0	Ductile Iron	FH-7	J-120	130.0	996	2.82
P-129	12.0	Ductile Iron	J-A	FH-7	130.0	996	2.82
P-130	12.0	Ductile Iron	J-130	J-A	130.0	1,382	3.92
P-140	12.0	Ductile Iron	J-145	FH-8	130.0	1,233	3.50
P-140(1)	12.0	Ductile Iron	FH-8	J-130	130.0	1,233	3.50
P-145	12.0	Ductile Iron	J-150	J-145	130.0	1,548	4.39
P-155	12.0	Ductile Iron	FH-9	J-150	130.0	1,218	3.46
P-165	12.0	Ductile Iron	J-170	FH-9	130.0	1,218	3.46
P-175	12.0	Ductile Iron	EX J-50	J-170	130.0	1,218	3.46
P-185	12.0	Ductile Iron	J-30	FH-10	130.0	330	0.94
P-195	12.0	Ductile Iron	FH-10	FH-11	130.0	330	0.94
P-205	12.0	Ductile Iron	FH-11	J-150	130.0	330	0.94
P-215	12.0	Ductile Iron	J-220	EX J-70	130.0	-621	1.76
P-225	12.0	Ductile Iron	J-230	J-220	130.0	-621	1.76

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Fire Flow + Max Day

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-235	12.0	Ductile Iron	J-235	J-230	130.0	-621	1.76
P-240	12.0	Ductile Iron	FH-13	J-235	130.0	-578	1.64
P-245	12.0	Ductile Iron	J-240	FH-13	130.0	-578	1.64
P-250	12.0	Ductile Iron	FH-14	J-240	130.0	422	1.20
P-254	12.0	Ductile Iron	J-F5	FH-14	130.0	422	1.20
P-255	12.0	Ductile Iron	FH-15	J-F5	130.0	438	1.24
P-265	12.0	Ductile Iron	EX J-110	FH-15	130.0	438	1.24
P-275	12.0	Ductile Iron	J-240	J-250	130.0	1,000	2.84
P-285	12.0	Ductile Iron	J-250	J-F1	130.0	432	1.22
P-295	12.0	Ductile Iron	J-F1	J-260	130.0	321	0.91
P-305	12.0	Ductile Iron	J-F2	J-260	130.0	518	1.47
P-315	12.0	Ductile Iron	J-250	J-F2	130.0	568	1.61
P-325	8.0	Ductile Iron	J-FS	J-235	130.0	-44	0.28
P-325	12.0	Ductile Iron	J-260	J-120	130.0	839	2.38
P-335	8.0	Ductile Iron	EX. J-105	J-FS	130.0	-24	0.16
P-345	8.0	Ductile Iron	J-F3	J-130	130.0	148	0.95
P-355	8.0	Ductile Iron	J-F4	J-F3	130.0	198	1.27
P-365	8.0	Ductile Iron	J-145	J-F4	130.0	314	2.01
P-PMP-1	48.0	Ductile Iron	PMP-1	EX FH-2 (TEST)	130.0	4,373	0.78
P-R-1	48.0	Ductile Iron	R-1	PMP-1	130.0	4,373	0.78

SEC Hayden-Loop 101 Project

FlexTable: Junction Table

Active Scenario: Fire Flow + Max Day (Raw Flow Test Results)

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX FH-1 (FLOW B)	1,595.30	0	1,697.96	44
EX FH-2 (TEST)	1,590.98	0	1,702.55	48
EX FH-3 (FLOW A)	1,586.00	0	1,695.60	47
EX J-10	1,595.30	0	1,697.96	44
EX J-20	1,595.10	0	1,699.09	45
EX J-30	1,592.18	0	1,701.32	47
EX J-50	1,586.00	0	1,695.62	47
EX J-70	1,584.45	0	1,694.51	48
EX J-80	1,581.95	0	1,694.07	49
EX J-90	1,583.61	0	1,694.03	48
EX J-100	1,584.83	0	1,694.00	47
EX J-110	1,591.24	0	1,693.93	44
EX. J-105	1,588.42	0	1,693.96	46
FH-1	1,596.50	0	1,695.81	43
FH-2	1,601.60	0	1,694.07	40
FH-3	1,602.00	0	1,691.54	39
FH-4	1,605.00	0	1,688.87	36
FH-5	1,605.50	3,625	1,686.61	35
FH-6	1,604.50	0	1,688.99	37
FH-7	1,599.70	0	1,692.16	40
FH-8	1,594.00	0	1,693.65	43
FH-9	1,586.50	0	1,695.04	47
FH-10	1,594.53	0	1,694.08	43
FH-11	1,592.38	0	1,693.98	44
FH-12	1,584.48	0	1,694.53	48
FH-13	1,588.09	0	1,693.92	46
FH-14	1,591.62	0	1,693.67	44
FH-15	1,589.30	0	1,693.86	45
J-10	1,596.00	0	1,697.41	44
J-20	1,596.50	0	1,695.65	43
J-30	1,601.60	0	1,694.21	40
J-46	1,601.90	0	1,692.71	39
J-60	1,605.30	0	1,690.76	37
J-100	1,605.50	0	1,690.46	37
J-110	1,605.00	0	1,691.09	37
J-120	1,600.64	0	1,691.27	39
J-130	1,599.26	0	1,692.27	40
J-145	1,593.58	0	1,693.74	43
J-150	1,593.00	0	1,693.92	44
J-170	1,588.19	0	1,695.42	46
J-220	1,584.87	0	1,694.47	47
J-230	1,586.00	0	1,694.18	47
J-235	1,587.50	0	1,693.99	46
J-240	1,591.06	0	1,693.64	44

SEC Hayden-Loop 101 Project

FlexTable: Junction Table

Active Scenario: Fire Flow + Max Day (Raw Flow Test Results)

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-250	1,604.50	0	1,692.08	38
J-260	1,605.80	0	1,691.43	37
J-A	1,599.49	386	1,692.20	40
J-F1	1,604.50	111	1,691.85	38
J-F2	1,604.50	50	1,691.51	38
J-F3	1,597.50	50	1,692.36	41
J-F4	1,593.00	116	1,693.23	43
J-F5	1,590.78	16	1,693.74	45
J-FS	1,588.70	19	1,693.97	46

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Fire Flow + Max Day (Raw Flow Test Results)

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-05	12.0	Ductile Iron	EX J-10	EX FH-1 (FLOW B)	130.0	0	0.00
EX P-15	12.0	Ductile Iron	EX J-20	EX J-10	130.0	2,120	6.01
EX P-25	12.0	Ductile Iron	EX J-30	EX J-20	130.0	2,120	6.01
EX P-35	12.0	Ductile Iron	EX FH-2 (TEST)	EX J-30	130.0	2,120	6.01
EX P-45	12.0	Ductile Iron	EX J-50	EX FH-2 (TEST)	130.0	-2,253	6.39
EX P-55	12.0	Ductile Iron	EX FH-3 (FLOW A)	EX J-50	130.0	-1,035	2.94
EX P-65	12.0	Ductile Iron	FH-12	EX FH-3 (FLOW A)	130.0	-1,035	2.94
EX P-67	12.0	Ductile Iron	EX J-70	FH-12	130.0	-1,035	2.94
EX P-75	12.0	Ductile Iron	EX J-80	EX J-70	130.0	-414	1.17
EX P-85	12.0	Ductile Iron	EX J-90	EX J-80	130.0	-414	1.17
EX P-95	12.0	Ductile Iron	EX J-100	EX J-90	130.0	-414	1.17
EX P-105	16.0	Ductile Iron	EX. J-105	EX J-100	130.0	-414	0.66
EX P-115	16.0	Ductile Iron	EX J-110	EX. J-105	130.0	-438	0.70
P-05	12.0	Ductile Iron	J-10	EX J-10	130.0	-2,120	6.01
P-15	12.0	Ductile Iron	FH-1	J-10	130.0	-2,120	6.01
P-17	12.0	Ductile Iron	J-20	FH-1	130.0	-2,120	6.01
P-25	12.0	Ductile Iron	J-30	J-20	130.0	-2,120	6.01
P-35	12.0	Ductile Iron	FH-2	J-30	130.0	-1,791	5.08
P-45	12.0	Ductile Iron	J-46	FH-2	130.0	-1,791	5.08
P-47	12.0	Ductile Iron	FH-3	J-46	130.0	-1,791	5.08
P-55	12.0	Ductile Iron	J-60	FH-3	130.0	-1,791	5.08
P-65	12.0	Ductile Iron	J-60	FH-4	130.0	1,791	5.08
P-75	12.0	Ductile Iron	FH-4	FH-5	130.0	1,791	5.08
P-85	12.0	Ductile Iron	FH-5	FH-6	130.0	-1,834	5.20
P-95	12.0	Ductile Iron	J-100	FH-6	130.0	1,834	5.20
P-105	12.0	Ductile Iron	J-110	J-100	130.0	1,834	5.20
P-115	12.0	Ductile Iron	J-120	J-110	130.0	1,834	5.20
P-125	12.0	Ductile Iron	FH-7	J-120	130.0	996	2.82
P-129	12.0	Ductile Iron	J-A	FH-7	130.0	996	2.82
P-130	12.0	Ductile Iron	J-130	J-A	130.0	1,382	3.92
P-140	12.0	Ductile Iron	J-145	FH-8	130.0	1,233	3.50
P-140(1)	12.0	Ductile Iron	FH-8	J-130	130.0	1,233	3.50
P-145	12.0	Ductile Iron	J-150	J-145	130.0	1,548	4.39
P-155	12.0	Ductile Iron	FH-9	J-150	130.0	1,218	3.46
P-165	12.0	Ductile Iron	J-170	FH-9	130.0	1,218	3.46
P-175	12.0	Ductile Iron	EX J-50	J-170	130.0	1,218	3.46
P-185	12.0	Ductile Iron	J-30	FH-10	130.0	330	0.94
P-195	12.0	Ductile Iron	FH-10	FH-11	130.0	330	0.94
P-205	12.0	Ductile Iron	FH-11	J-150	130.0	330	0.94
P-215	12.0	Ductile Iron	J-220	EX J-70	130.0	-621	1.76
P-225	12.0	Ductile Iron	J-230	J-220	130.0	-621	1.76

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Fire Flow + Max Day (Raw Flow Test Results)

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-235	12.0	Ductile Iron	J-235	J-230	130.0	-621	1.76
P-240	12.0	Ductile Iron	FH-13	J-235	130.0	-578	1.64
P-245	12.0	Ductile Iron	J-240	FH-13	130.0	-578	1.64
P-250	12.0	Ductile Iron	FH-14	J-240	130.0	422	1.20
P-254	12.0	Ductile Iron	J-F5	FH-14	130.0	422	1.20
P-255	12.0	Ductile Iron	FH-15	J-F5	130.0	438	1.24
P-265	12.0	Ductile Iron	EX J-110	FH-15	130.0	438	1.24
P-275	12.0	Ductile Iron	J-240	J-250	130.0	1,000	2.84
P-285	12.0	Ductile Iron	J-250	J-F1	130.0	432	1.22
P-295	12.0	Ductile Iron	J-F1	J-260	130.0	321	0.91
P-305	12.0	Ductile Iron	J-F2	J-260	130.0	518	1.47
P-315	12.0	Ductile Iron	J-250	J-F2	130.0	568	1.61
P-325	8.0	Ductile Iron	J-FS	J-235	130.0	-44	0.28
P-325	12.0	Ductile Iron	J-260	J-120	130.0	839	2.38
P-335	8.0	Ductile Iron	EX. J-105	J-FS	130.0	-24	0.16
P-345	8.0	Ductile Iron	J-F3	J-130	130.0	148	0.95
P-355	8.0	Ductile Iron	J-F4	J-F3	130.0	198	1.27
P-365	8.0	Ductile Iron	J-145	J-F4	130.0	314	2.01
P-PMP-1	48.0	Ductile Iron	PMP-1	EX FH-2 (TEST)	130.0	4,373	0.78
P-R-1	48.0	Ductile Iron	R-1	PMP-1	130.0	4,373	0.78

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Fire Flow + Max Day (Six Hydrants)

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EX FH-1 (FLOW B)	1,595.30	0	1,670.30	32
EX FH-2 (TEST)	1,590.98	0	1,674.84	36
EX FH-3 (FLOW A)	1,586.00	0	1,667.82	35
EX J-10	1,595.30	0	1,670.30	32
EX J-20	1,595.10	0	1,671.42	33
EX J-30	1,592.18	0	1,673.62	35
EX J-50	1,586.00	0	1,667.84	35
EX J-70	1,584.45	0	1,666.93	36
EX J-80	1,581.95	0	1,666.57	37
EX J-90	1,583.61	0	1,666.54	36
EX J-100	1,584.83	0	1,666.51	35
EX J-110	1,591.24	0	1,666.46	33
EX. J-105	1,588.42	0	1,666.48	34
FH-1	1,596.50	0	1,668.17	31
FH-2	1,601.60	0	1,666.49	28
FH-3	1,602.00	604	1,664.57	27
FH-4	1,605.00	604	1,663.77	25
FH-5	1,605.50	604	1,663.67	25
FH-6	1,604.50	604	1,663.74	26
FH-7	1,599.70	604	1,664.35	28
FH-8	1,594.00	604	1,665.39	31
FH-9	1,586.50	0	1,667.14	35
FH-10	1,594.53	0	1,666.24	31
FH-11	1,592.38	0	1,665.96	32
FH-12	1,584.48	0	1,666.95	36
FH-13	1,588.09	0	1,666.45	34
FH-14	1,591.62	0	1,666.25	32
FH-15	1,589.30	0	1,666.40	33
J-10	1,596.00	0	1,669.76	32
J-20	1,596.50	0	1,668.02	31
J-30	1,601.60	0	1,666.59	28
J-46	1,601.90	0	1,665.46	27
J-60	1,605.30	0	1,664.34	26
J-100	1,605.50	0	1,664.12	25
J-110	1,605.00	0	1,664.28	26
J-120	1,600.64	0	1,664.32	28
J-130	1,599.26	0	1,664.42	28
J-145	1,593.58	0	1,665.54	31
J-150	1,593.00	0	1,665.81	32
J-170	1,588.19	0	1,667.60	34
J-220	1,584.87	0	1,666.90	35
J-230	1,586.00	0	1,666.66	35
J-235	1,587.50	0	1,666.50	34
J-240	1,591.06	0	1,666.22	33

SEC Hayden-Loop 101 Project
FlexTable: Junction Table
Active Scenario: Fire Flow + Max Day (Six Hydrants)

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-250	1,604.50	0	1,664.96	26
J-260	1,605.80	0	1,664.45	25
J-A	1,599.49	386	1,664.37	28
J-F1	1,604.50	111	1,664.77	26
J-F2	1,604.50	50	1,664.51	26
J-F3	1,597.50	50	1,664.48	29
J-F4	1,593.00	116	1,665.12	31
J-F5	1,590.78	16	1,666.30	33
J-FS	1,588.70	19	1,666.49	34

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Fire Flow + Max Day (Six Hydrants)

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
EX P-05	12.0	Ductile Iron	EX J-10	EX FH-1 (FLOW B)	130.0	0	0.00
EX P-15	12.0	Ductile Iron	EX J-20	EX J-10	130.0	2,107	5.98
EX P-25	12.0	Ductile Iron	EX J-30	EX J-20	130.0	2,107	5.98
EX P-35	12.0	Ductile Iron	EX FH-2 (TEST)	EX J-30	130.0	2,107	5.98
EX P-45	12.0	Ductile Iron	EX J-50	EX FH-2 (TEST)	130.0	-2,266	6.43
EX P-55	12.0	Ductile Iron	EX FH-3 (FLOW A)	EX J-50	130.0	-927	2.63
EX P-65	12.0	Ductile Iron	FH-12	EX FH-3 (FLOW A)	130.0	-927	2.63
EX P-67	12.0	Ductile Iron	EX J-70	FH-12	130.0	-927	2.63
EX P-75	12.0	Ductile Iron	EX J-80	EX J-70	130.0	-370	1.05
EX P-85	12.0	Ductile Iron	EX J-90	EX J-80	130.0	-370	1.05
EX P-95	12.0	Ductile Iron	EX J-100	EX J-90	130.0	-370	1.05
EX P-105	16.0	Ductile Iron	EX. J-105	EX J-100	130.0	-370	0.59
EX P-115	16.0	Ductile Iron	EX J-110	EX. J-105	130.0	-391	0.62
P-05	12.0	Ductile Iron	J-10	EX J-10	130.0	-2,107	5.98
P-15	12.0	Ductile Iron	FH-1	J-10	130.0	-2,107	5.98
P-17	12.0	Ductile Iron	J-20	FH-1	130.0	-2,107	5.98
P-25	12.0	Ductile Iron	J-30	J-20	130.0	-2,107	5.98
P-35	12.0	Ductile Iron	FH-2	J-30	130.0	-1,539	4.37
P-45	12.0	Ductile Iron	J-46	FH-2	130.0	-1,539	4.37
P-47	12.0	Ductile Iron	FH-3	J-46	130.0	-1,539	4.37
P-55	12.0	Ductile Iron	J-60	FH-3	130.0	-935	2.65
P-65	12.0	Ductile Iron	J-60	FH-4	130.0	935	2.65
P-75	12.0	Ductile Iron	FH-4	FH-5	130.0	331	0.94
P-85	12.0	Ductile Iron	FH-5	FH-6	130.0	-273	0.77
P-95	12.0	Ductile Iron	J-100	FH-6	130.0	877	2.49
P-105	12.0	Ductile Iron	J-110	J-100	130.0	877	2.49
P-115	12.0	Ductile Iron	J-120	J-110	130.0	877	2.49
P-125	12.0	Ductile Iron	FH-7	J-120	130.0	147	0.42
P-129	12.0	Ductile Iron	J-A	FH-7	130.0	751	2.13
P-130	12.0	Ductile Iron	J-130	J-A	130.0	1,137	3.23
P-140	12.0	Ductile Iron	J-145	FH-8	130.0	1,624	4.61
P-140(1)	12.0	Ductile Iron	FH-8	J-130	130.0	1,019	2.89
P-145	12.0	Ductile Iron	J-150	J-145	130.0	1,907	5.41
P-155	12.0	Ductile Iron	FH-9	J-150	130.0	1,340	3.80
P-165	12.0	Ductile Iron	J-170	FH-9	130.0	1,340	3.80
P-175	12.0	Ductile Iron	EX J-50	J-170	130.0	1,340	3.80
P-185	12.0	Ductile Iron	J-30	FH-10	130.0	568	1.61
P-195	12.0	Ductile Iron	FH-10	FH-11	130.0	568	1.61
P-205	12.0	Ductile Iron	FH-11	J-150	130.0	568	1.61
P-215	12.0	Ductile Iron	J-220	EX J-70	130.0	-556	1.58
P-225	12.0	Ductile Iron	J-230	J-220	130.0	-556	1.58

SEC Hayden-Loop 101 Project

FlexTable: Pipe Table

Active Scenario: Fire Flow + Max Day (Six Hydrants)

Label	Diameter (in)	Material	Start Node	Stop Node	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-235	12.0	Ductile Iron	J-235	J-230	130.0	-556	1.58
P-240	12.0	Ductile Iron	FH-13	J-235	130.0	-516	1.46
P-245	12.0	Ductile Iron	J-240	FH-13	130.0	-516	1.46
P-250	12.0	Ductile Iron	FH-14	J-240	130.0	375	1.06
P-254	12.0	Ductile Iron	J-F5	FH-14	130.0	375	1.06
P-255	12.0	Ductile Iron	FH-15	J-F5	130.0	391	1.11
P-265	12.0	Ductile Iron	EX J-110	FH-15	130.0	391	1.11
P-275	12.0	Ductile Iron	J-240	J-250	130.0	891	2.53
P-285	12.0	Ductile Iron	J-250	J-F1	130.0	390	1.11
P-295	12.0	Ductile Iron	J-F1	J-260	130.0	279	0.79
P-305	12.0	Ductile Iron	J-F2	J-260	130.0	451	1.28
P-315	12.0	Ductile Iron	J-250	J-F2	130.0	501	1.42
P-325	8.0	Ductile Iron	J-FS	J-235	130.0	-40	0.26
P-325	12.0	Ductile Iron	J-260	J-120	130.0	730	2.07
P-335	8.0	Ductile Iron	EX. J-105	J-FS	130.0	-21	0.13
P-345	8.0	Ductile Iron	J-F3	J-130	130.0	118	0.75
P-355	8.0	Ductile Iron	J-F4	J-F3	130.0	168	1.07
P-365	8.0	Ductile Iron	J-145	J-F4	130.0	284	1.81
P-PMP-1	48.0	Ductile Iron	PMP-1	EX FH-2 (TEST)	130.0	4,373	0.78
P-R-1	48.0	Ductile Iron	R-1	PMP-1	130.0	4,373	0.78

APPENDIX B – FIRE HYDRANT FLOW TEST

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	Hayden/ Union Hills
Project Address:	Union Hills & 82nd Street, Scottsdale, Arizona, 85255
Client Project No.:	Not Provided
Arizona Flow Testing Project No.:	20095
Flow Test Permit No.:	C61530
Date and time flow test conducted:	March 12, 2020 at 8:30 AM
Data is current and reliable until:	September 12, 2020
Conducted by:	F. Vaughan & T. Atherton – Az. Flow Testing, LLC (480-250-8154)
Coordinated by:	Jared Berry – City of Scottsdale-Inspector (602-541-4942)

Raw Test Data

Static Pressure: **84.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **55.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **18.0 PSI Hyd A**
29.0 PSI Hyd B
(Measured in pounds per square inch)

Diffuser Orifice Diameter: One 4-inch Hose Monster (B)
(Measured in inches) One 4 inch Pollard Diffuser (A)

Coefficient of Diffuser: 0.7875/(B) and 0.9/(A)

Flowing GPM: **3,909 GPM**
(Measured in gallons per minute)
1,595 GPM + 2,314 GPM = 3,909 GPM

GPM @ 20 PSI: **5,994 GPM**

Data with 12 PSI Safety Factor

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Scottsdale requires a maximum Static Pressure of 72 PSI for AFES Design.

Residual Pressure: **43.0 PSI**
(Measured in pounds per square inch)

Distance between hydrants: See Below

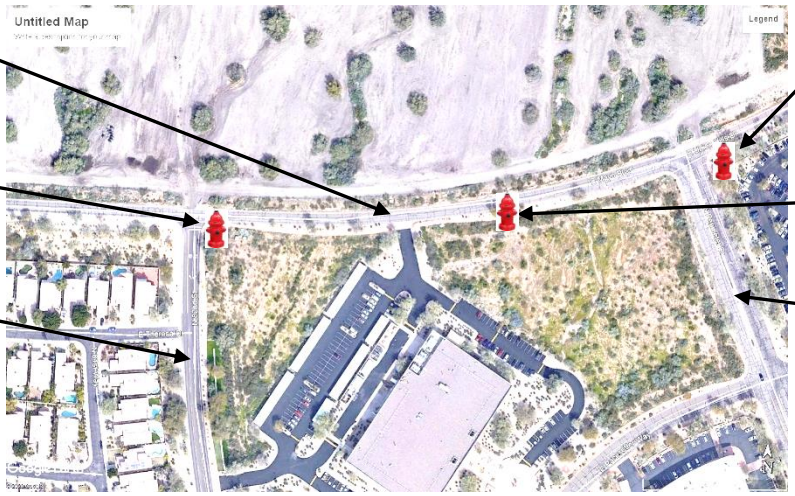
Main size: Not Provided

Flowing GPM: **3,909 GPM**

GPM @ 20 PSI: **5,359 GPM**

Flow Test Location

North



East Mayo Blvd.

Flow Fire Hydrant A
(630 Feet from Pressure Hydrant)

North 82nd Street

Flow Fire Hydrant B
(450 Feet from Pressure Hydrant)

Pressure Fire Hydrant

North Perimeter Drive

Project Site
Union Hills & 82nd Street

APPENDIX C – CRE WATER MASTER PLAN UPDATE
BY COE & VAN LOO CONSULTANTS INC., DATED FEBRUARY 22, 2012

COE & VAN LOO
CONSULTANTS, INC.

CROSSROADS EAST
SCOTTSDALE, ARIZONA

WATER MASTER PLAN UPDATE

Accepted For:
City of Scottsdale
Water Resources Department
9379 E. San Salvador
Scottsdale, Arizona

By: Doug Mann
Date: April 13 2012

February 22, 2012

Prepared for:

Arizona State Land Department
Planning & Engineering Section
1616 W. Adams Street
Phoenix Arizona 85007
602-542-4631 Phone
602-364-0406 Fax

Prepared by:

Coe & Van Loo Consultants Inc.
4550 North 12th Street
Phoenix, Arizona 85014
602-264-6831 Phone
602-264-0928 Fax

Registered Professional Engineer (Civil)
CERTIFICATE NO. 14478
ERIC LAURIN
Date Signed 8 March '12
ARIZONA, U.S.A.
Expires: 6/30/12

CVL Project No.: 1.07.0196501

TABLE OF CONTENTS

TABLES

FIGURES

Registered Professional Engineer (Civil)
CERTIFICATE NO. 14478
ERIC LAURIN
Date Signed: 8 March 12
ARIZONA, U.S.A.
Expires: 6/30/12

APPENDIX

1.0 INTRODUCTION

1.1 Scope

This Water Master Report Update (Report) has been prepared to address the water demand and determining infrastructure sizing requirements for the future development of Crossroads East. This Report has been prepared using information and findings contained in a previous report by CVL entitled, "Water Master Plan", dated September 15, 2011, and approved by the City of Scottsdale on November 3, 2011. It includes the increased residential dwelling unit count allowed by the City's recent approval of an amendment to the zoning for this project. See Section 1.4.

The Report for the Site will follow the guidelines presented in Chapter 6 "Water-Design Standards & Policies Manual" and the requirements set forth by the City of Scottsdale dated January 2010.

1.2 General Background

Crossroads East (site) is located north of the City of Scottsdale central area, on an ideal position on both sides of the dynamic Loop 101/Pima Freeway corridor, see Figure 1. The site represents a long-term opportunity for a significant commercial, office, and mixed-use development. It 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 833 gross acres and features excellent visibility and access.

1.3 Site Location

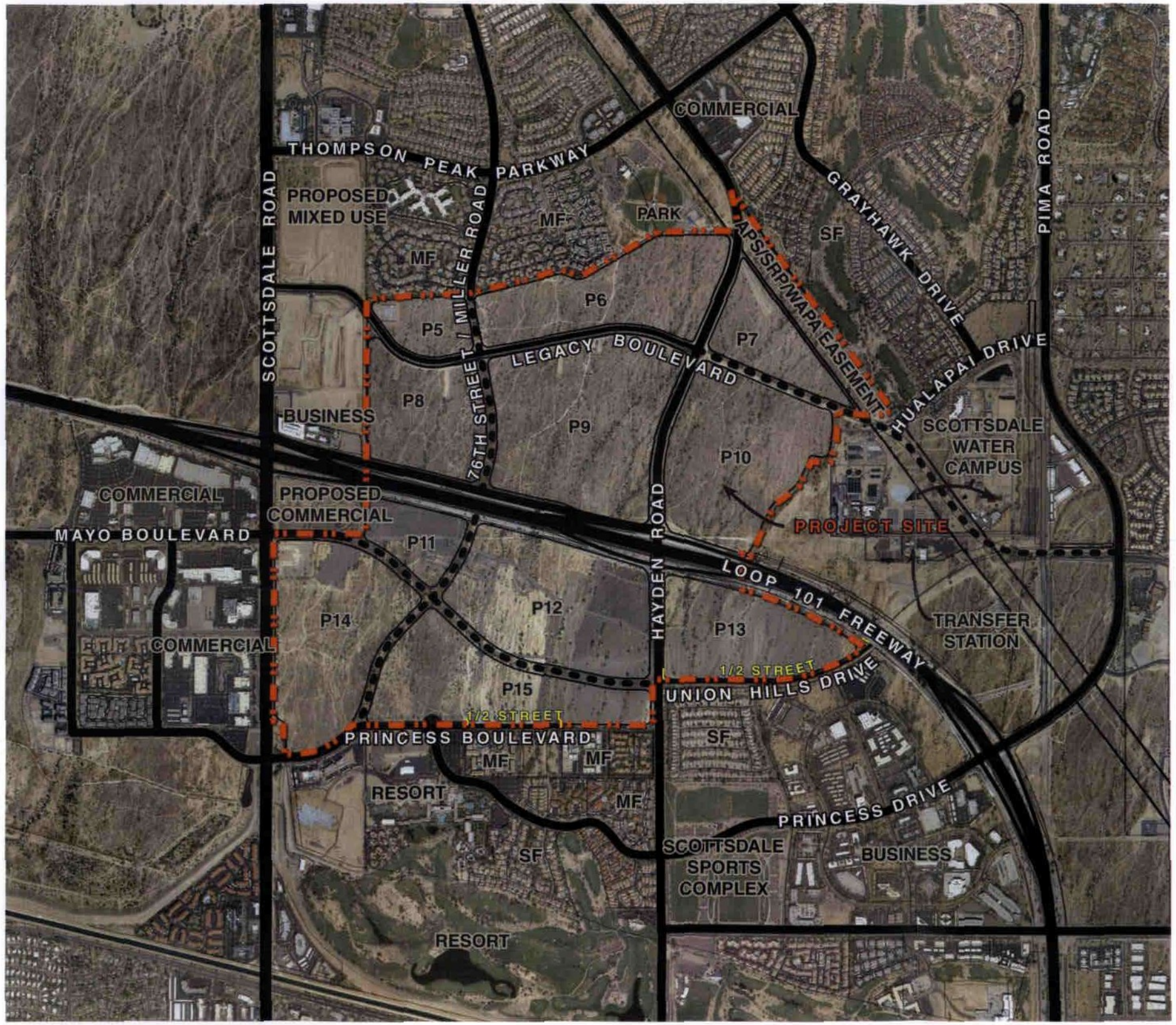
The Site is located within Section 25, 26, 35, and 36, Range 4 East, Township 4 North of the Gila and Salt River Base and Meridian, City of Scottsdale, Maricopa County, Arizona.

State Route Loop 101 (SR 101) bisects the Site and divides it into two parts, North and South. Scottsdale Road forms the boundary between the City of Scottsdale and the City of Phoenix.

North of SR 101, the Site is bounded by the Grayhawk community. An existing APS/SRP/WAPA power line easement forms the northeast boundary. Also, the City of Scottsdale Water Treatment Facility and a solid waste transfer station are located along the east boundary of the site.

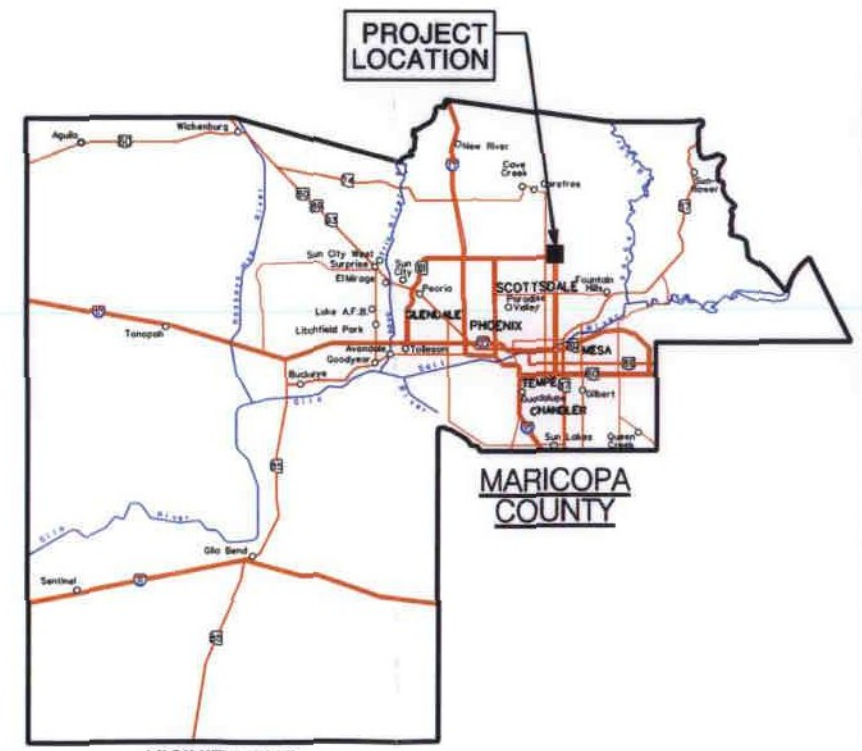
The Princess Resort, single family homes, and the Perimeter Center Business Park are on the south. On the west and north of SR101, the parcel is adjacent to "One Scottsdale", a mixed-use project to be developed by DMB. South of SR101, a retail Center and a series of auto dealerships are located along the site's west boundary.

CITY OF PHOENIX ← | → CITY OF SCOTTSDALE



LEGEND

- PROJECT BOUNDARY
- EXISTING ROADWAY ALIGNMENT
- ROADWAY ALIGNMENTS UNDER CONSTRUCTION
- PROPOSED ROADWAY ALIGNMENT
- P7 PARCEL NUMBERS (SEE FIGURE 2)



VICINITY MAP
SCALE: NONE

CVL

750' 0' 1500'

CROSSROADS EAST

COE & VAN LOO
PLANNING ENGINEERING LANDSCAPE ARCHITECTURE

VICINITY MAP

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

JOB NO
07-0196501

FIGURE
1

FILE:N:\01\0220001\GRAPHICS\PL\EXHIBIT\01-0220001 - CROSSROADS EAST.INDD 2 FEBRUARY 2012

The existing Hayden Road traffic interchange with SR101 is in the center of the site, which is located approximately one mile east of Scottsdale Road, see Figure 2 for a location of parcels adjacent to the project.

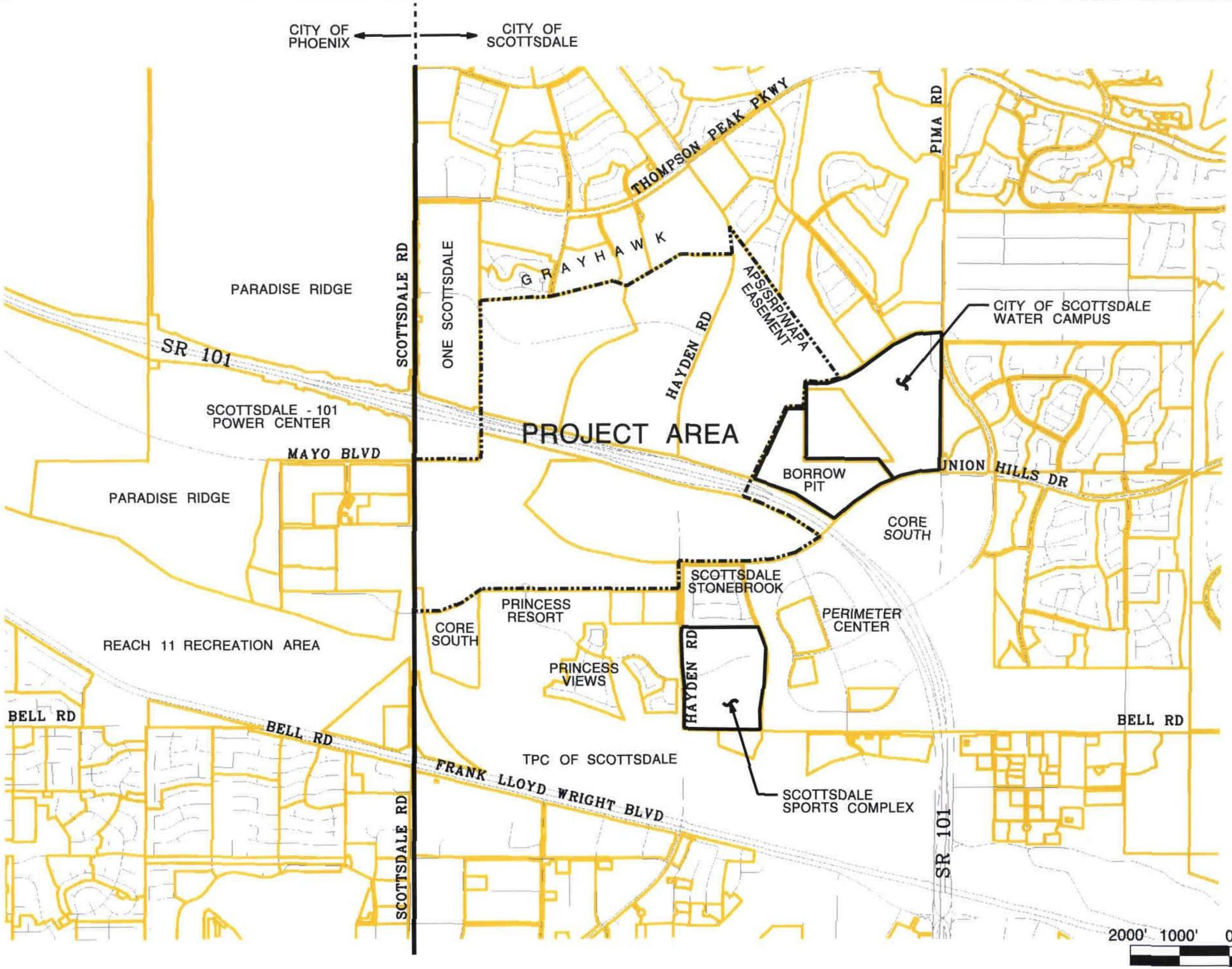
1.4 Zoning / Site History

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 and outlined the terms of reimbursement for City-installed roadway and infrastructure improvements by ASLD's future buyers and lessees.

An application for an amendment to the property's development plan was approved by the City of Scottsdale on October 18, 2011. The changes to the development plan are described in "Crossroads East Planned Community District Master Development Plan 19-ZN-2002 #2" and consist of the following:

- Development standards for C-3 are comparable to those for zoning district C-2 and may replace C-2 zoning.
- The maximum dwelling units per gross acre for R-5 is now 23, resulting in an increase in allowable DUs for R-5 to 2,806. The total allowable dwelling units within Crossroads East is now 4,378, an increase of 935 from the previously approved zoning.

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.



CROSSROADS EAST

COE & VAN LOO
PLANNING·ENGINEERING·LANDSCAPE ARCHITECTURE

PROJECT AREA & VICINITY PARCELS

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

JOB NO
1.07.0196501

FIGURE
2

...\Exhibits\Fig 2 - Parcels.dgn 2/22/2012 1:38:47 PM

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 and amended in October 2011. 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 change in maximum allowable densities to 23 DU/acre results in a net increase of 935 units for the project. The final concept places commercial uses (C-2 and C-3) at the Hayden/SR101 intersection to provide a node of commercial activity at this important junction.

The FAR ratios approved in the zoning development agreement and used in the Crossroads East Water Master Plan prepared by Coe & Van Loo Consultants, Inc., dated September 15, 2011, were kept for this study. Calculations were based on net parcel area, which is gross area less proposed street rights-of-way. Table 1 lists the proposed land use calculations.

Figure 3 is a site conditions map that identifies current planned and proposed uses and development for the project.

ASLD has received a sales application for approximately 29 gross acres located at the southeast corner of Scottsdale Road and Union Hills Drive. The demands for this 29-acre piece are included in the overall Parcel 14 (PRC) demands. See Table 1 for the Floor Area Ratio (FAR).

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]
North							
P5	C-O	25.5	22.7	593,287			25.5
P6	R-5	84.2	77.7		77.7	1,936	
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/C-3	34.2	32.4	423,403			130.5
P10	C-2/C-3	28.7	26.9	351,529			
P10	I-1	74.1	69.9	1,522,422			102.8
Subtotal	-	**477.6**	**439.9**	**7,217,456**	**77.7**	**2,479**	**477.6**
South							
P11	C-2/C-3	29.8	26.6	347,609			29.8
P12	I-1	70.4	66.2	1,441,836			
P12	C-2/C-3	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	870	
P15	C-O	38.2	35.0	914,760			88.0
Subtotal	-	**404.9**	**371.3**	**6,421,615**	**35.7**	**1,899**	**404.9**
Grand Total		**882.5**	**811.2**	**13,639,072**	**113.4**	**4,378**	**882.5**

		max allowed (based on net area, less ROW's)	
Notes:	I-1	0.5 FAR	
Yield per Development Agreement	C-0	0.6 FAR	
	C-2/C-3	0.3 FAR	
	PCC	0.3 FAR	
	PCoC	0.3 FAR	
	PRC	0.8 FAR	50% of FAR is for Non-Res
	R-5	23 DU/ac	

ZONING/LAND USE PLAN

- R-5 MULTIPLE FAMILY
- C-2/C-3 CENTRAL BUSINESS/HIGHWAY COMMERCIAL
- C-0 COMMERCIAL/OFFICE
- PCC PLANNED COMMUNITY CENTER
- PCoC PLANNED CONVENIENCE CENTER
- PRC PLANNED REGIONAL CENTER (MIXED USE)
- I-1 INDUSTRIAL PARK
- PROJECT BOUNDARY (GROSS)
- P8 PARCEL NUMBER

NOTES:

1.) SEC OF SCOTTSDALE ROAD AND UNION HILLS / MAYO (APPROXIMATELY 29 ACRES)

N

CVL

600' 0' 1200'

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
07-0196501

FIGURE
3

3.0 EXISTING CONDITIONS

3.1 Topographic Conditions

A two-foot contour interval topographic map was obtained from the Flood Control District of Maricopa County (FCDMC) for the project site. The existing topography indicates a general slope of 0.013 ft/ft from the north to the south-southwest. The maximum elevation of the site, 1,655 feet is noted at Hayden and Legacy Boulevard. The minimum elevation of 1,575 feet is located approximately one-quarter mile west of Hayden Road along the Union Hills proposed alignment.

3.2 Existing Water Infrastructure

Water service to the Crossroads East development will be provided by the City of Scottsdale, PWS #07-098. The area's existing infrastructure is identified in Figure 4. The water distribution system layout shown in the map is based on conversations and correspondence with the City of Scottsdale during the preparation of this report, review of currently available as-builts, and research of existing quarter-section maps. Information regarding additional extended area infrastructure may be found in the City's Integrated Water Master Plan maps included in Appendix A.

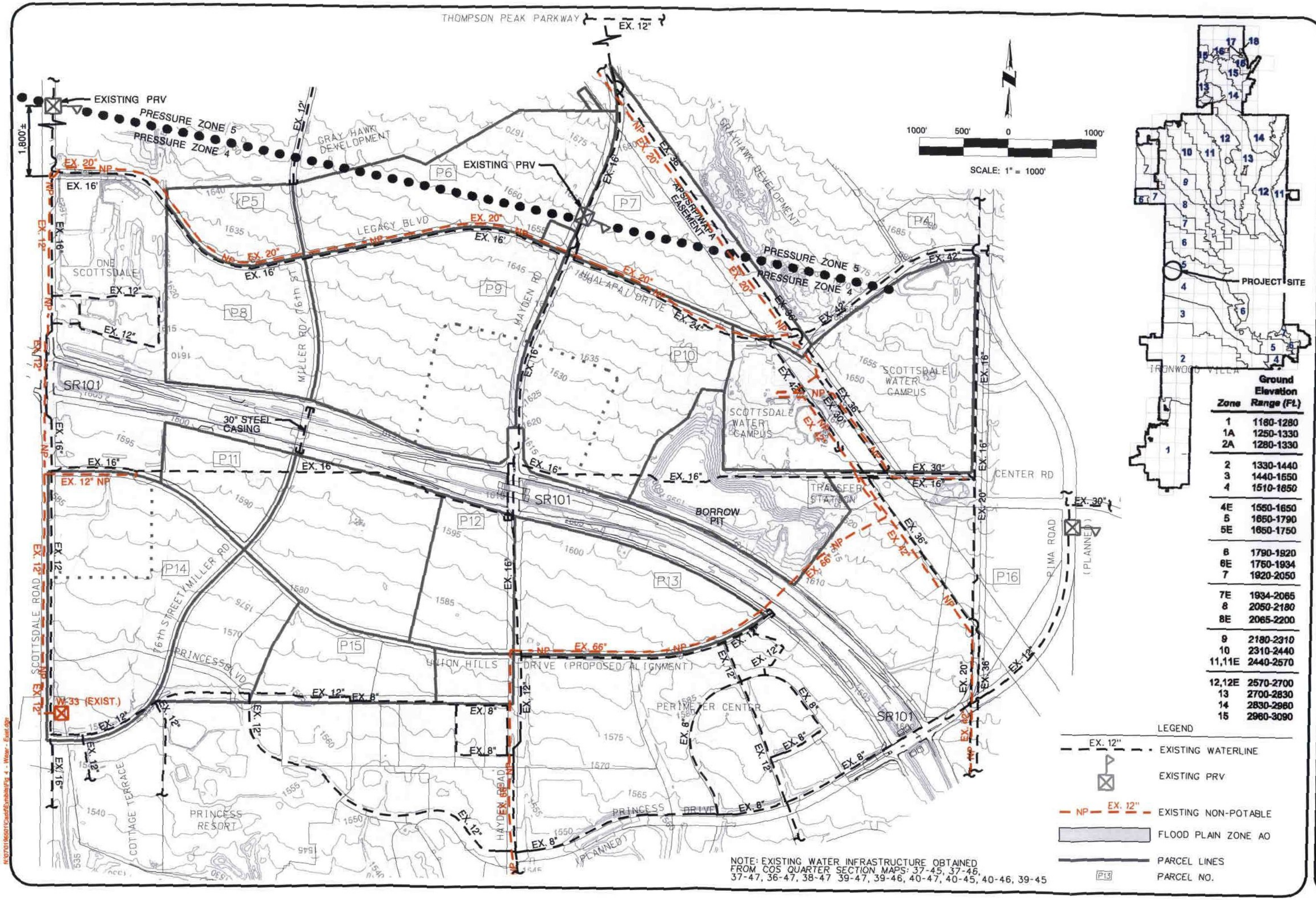
Crossroads East is planned to include four major internal collector roadways: Legacy Boulevard, Hayden Road, Miller Road, and Union Hills Drive. Hayden Road contains an existing 16-inch waterline that connects to an existing 12-inch transmission main at Thompson Peak Parkway and to existing mains south of the project. Legacy Boulevard contains an existing live 16-inch main from Scottsdale Road to Hayden Road; an existing 24-inch main extends east along Hualapai Drive to a 42-inch transmission main within the APS/SRP/WAPA corridor. An existing 16-inch main bisects the site from east to west along the Mayo Boulevard alignment. The portion east of Hayden Road has been reinstalled to a deeper sewer elevation to allow for the excavation of a borrow pit used in the construction of SR101.

Finally, an existing 12-inch line is found along the proposed Union Hills Drive alignment from Hayden Road, east, to SR101 where it connects with existing mains serving the Perimeter Center.

The existing City of Scottsdale Water Treatment Plant has a design capacity of 50 mgd with plans to increase its capacity to 70 mgd. Plans for further expansion forecast its capacity to rise to 80 mgd by 2015.

<u>Pressure Zones</u>

Crossroads East is located in the City's South Central water service region along the upper border of Pressure Zone 4. The zonal boundary between Zones 4 and 5 is shown in Figure 4.



Zone	Ground Elevation Range (FL)
1	1160-1280
1A	1250-1330
2A	1280-1330
2	1330-1440
3	1440-1550
4	1510-1650
4E	1550-1650
5	1650-1790
5E	1650-1750
6	1790-1920
6E	1750-1934
7	1920-2050
7E	1934-2065
8	2050-2180
8E	2065-2200
9	2180-2310
10	2310-2440
11,11E	2440-2570
12,12E	2570-2700
13	2700-2830
14	2830-2960
15	2960-3090

NOTE: EXISTING WATER INFRASTRUCTURE OBTAINED FROM COS QUARTER SECTION MAPS: 37-45, 37-46, 37-47, 36-47, 38-47 39-47, 39-46, 40-47, 40-45, 40-46, 39-45

CROSSROADS EAST

COE & VAN LOO
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EXISTING WATERLINES

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

JOB NO
1.07.0196501

FIGURE
4

Since the development is located at the top of Pressure Zone 4, the northern edge of the project would be provided service from the lowest zonal pressure resulting in unacceptably low service pressures. This would require portions of Parcels 6 and 7 to be served from Pressure Zone 5 as determined by CVL in its 2011 Water Master Plan. Previous correspondence with the City of Scottsdale estimates a Zone 4 hydraulic grade line (HGL) of 1,750 feet MSL and a Zone 5 HGL of 1,860 feet MSL. Pressure Reducing Valve Stations are noted in Hayden and Scottsdale Roads.

3.3 FEMA Map

Review of current FEMA maps reveals that most of the project is within zone AO, indicating that these areas are subjected to inundation by a 1 percent annual chance of shallow flooding. Sheet flows of between 1 and 3 feet are anticipated. A wedge of land extending north from Union Hills Drive to the northern boundary of the site is outside the 100-year floodplain, see Figure 4.

4.0 DEMAND CALCULATIONS

4.1 Unit Factors

The proposed development's water use estimates are based on information found within the City's Integrated Water Master Plan and presented in CVL's 2011 Water Master Plan report. See Appendix B. 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/C-3	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	5,935	6,530	9,141
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

[1] ADDMM = Average Day Demand of Maximum Month, MDD = Maximum Day Demand, PHD = Peak Hour Demand
[2] 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.

The water use factors for those parcels having an R-5 zoning designation were calculated as follows. The base unit demand estimates of 3,957 gpapd were multiplied by a factor of 1.5 to reflect the proportional increase in dwelling units of 935 units as calculated from the increased density from 15 to 23 DU/acre. The revised AADMM for R-5 parcels is now 5,935 gpapd.

4.2 Water Demand Estimates

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

4.3 Modeling and System Design Criteria

The Crossroads East water system was modeled using WaterCAD V8 XM by Bentley Systems. Modeling was performed under Steady State Condition. Modeling was performed under 4 demand scenarios: Average Daily Demand (ADD), Maximum Daily Demand (MDD), Peak Hour Demand (PHD), and MDD plus fire flow.

For ADD, MDD, and PHD, the City of Scottsdale requires all system pressures meet a minimum pressure of 50 psi. A 30 psi minimum pressure is required for MDD plus fire flow analysis. MDD plus a fire flow of 3,500 gpm was used for the fire flow analysis.

Table 3: Water Use Demands

Parcel	Land Use	Area [ac]	ADD [gpm]	MDD [gpm]	PHD [gpm]
Areas North of Loop 101					
P5	C-0	25.5	72.0	79.2	110.9
P6	R-5	84.2	347.0	381.8	534.5
P6	PCoC	2.0	1.79	2.0	2.8
P7	I-1	72.6	92.3	101.5	142.1
P8	PRC	60.0	144.0	158.4	221.8
P9	I-1	96.3	122.4	134.6	188.5
P9	C-2/C-3	34.2	49.9	54.8	76.8
P10	C-2/C-3	28.7	41.8	46.0	64.4
P10	I-1	74.1	94.2	103.6	145.0
Areas South of the Loop 101					
Parcel	Land Use	Area [ac]	ADD [gpm]	MDD [gpm]	PHD [gpm]
P11	C-2/C-3	29.8	43.4	47.8	66.9
P12	I-1	70.4	89.5	98.4	137.8
P12	C-2/C-3	38.8	56.6	62.2	87.1
P13	I-1	69.6	88.5	97.3	136.2
P14	PRC	108.3	259.9	285.9	400.3
P15	PCC	12.0	10.7	11.8	16.5
P15	R-5	37.8	155.8	171.4	240.0
P15	C-O	38.2	107.9	118.6	166.1

Table 4 summarizes the water demands for Crossroads East north or south of SR101.

Table 4: Water Demand Estimates

Crossroads East Area[1]	Adjusted Area[2] [ac]	ADMM [gpm]	MDD [gpm]	PHD [gpm]		ADMM [mgd]	MDD [mgd]	PHD [mgd]
North	901	965	1,062	1,486		1.39	1.53	2.14
South	853	812	894	1,251		1.17	1.29	1.80
Total	1,754	1,777	1,956	2,737		2.56[3]	2.82	3.94

[1] North or South of SR101.
[2] See Table 1 and Section 2.0: Adjust Area = Gross Parcel Area x Parcel FAR / 0.25.
[3] Calculated Storage = One Average Day Demand = 2.32 MG.

The water distribution system design was calculated on the City of Scottsdale criteria for Water System Design (see Design Standards Policies Manual dated January 2010, Chapter 6) and shown in Table 5.

Table 5: City of Scottsdale Design Criteria

Minimum Line Sizes	Quarter mile alignment	8-inch
	Half-mile alignment	12-inch
	Mile alignment	12-inch
Pipe Material	6-inch through 12-inch	DIP Class 350
	16-inch and larger	DIP, mortar lined steel, steel cylinder
	AWWA C-900 PVC	Unacceptable
Maximum Head Loss	Distribution lines	10 feet/1,000 feet
	Transmission lines	8 feet/1,000 feet
Line Pressures	120 psi static - maximum	
	50 psi residual - minimum	
	30 psi residual - fire flow	
Pipe Cover (Minimum)	For < 12-inch diameter	36-inch
	For 12-inch diameter	48-inch
	For >12-inch diameter	60-inch
	At wash crossings for 100-year flows o < 50 cfs + 1 foot o 50 to 99 cfs + 2 feet o 100 to 499 cfs + 3 feet o >499 cfs scour analysis	
Water Services	Connection to mains 14-inches and greater is prohibited.	

These criteria were used in developing the water distribution system for the project.

4.4 Modeling Results

In its previous water master plan, CVL established that Parcels 6 and 7 must be served by the extension of the City of Scottsdale's Pressure Zone 5 to ensure adequate pressures during fire events. The remaining areas to the south of these parcels would be within Pressure Zone 4. In summary:

- Parcels 6 and 7 are served by extending the Pressure Zone 5 mains in Miller and Hayden Roads southward to Legacy Boulevard.
- A 12-inch line parallels the existing 16-inch main in Legacy Boulevard between Miller and Hayden Roads for a looped Zone 5 connection.

Interconnections with the existing 16-inch Legacy Boulevard main would be made at Miller and Hayden Roads downgradient of a Pressure Reducing Station (PRV). The expected settings for both PRVs at static conditions will be as follows:

Upgradient Pressure	95 psi
Downgradient Pressure	50 psi

This model was calibrated from the results of a Flow Test performed on May 27, 2011, at 7:30 a.m. by E J Flow Tests at two fire hydrants located in the Grayhawk Development on Miller Road (76th Street) approximately one-quarter mile south of Thompson Peak Parkway. See Appendix C for a copy of the results and Figure 5 for location.

Table 6 summarizes the results of the water system modeling for Average Day, Maximum Day, Peak Hour, and Maximum Day plus fire flow. We note that a fire flow of 3,500 gpm was modeled for both pressure zones. See Appendix D for a copy of the WaterCAD results.

Table 6: Water Modeling Results

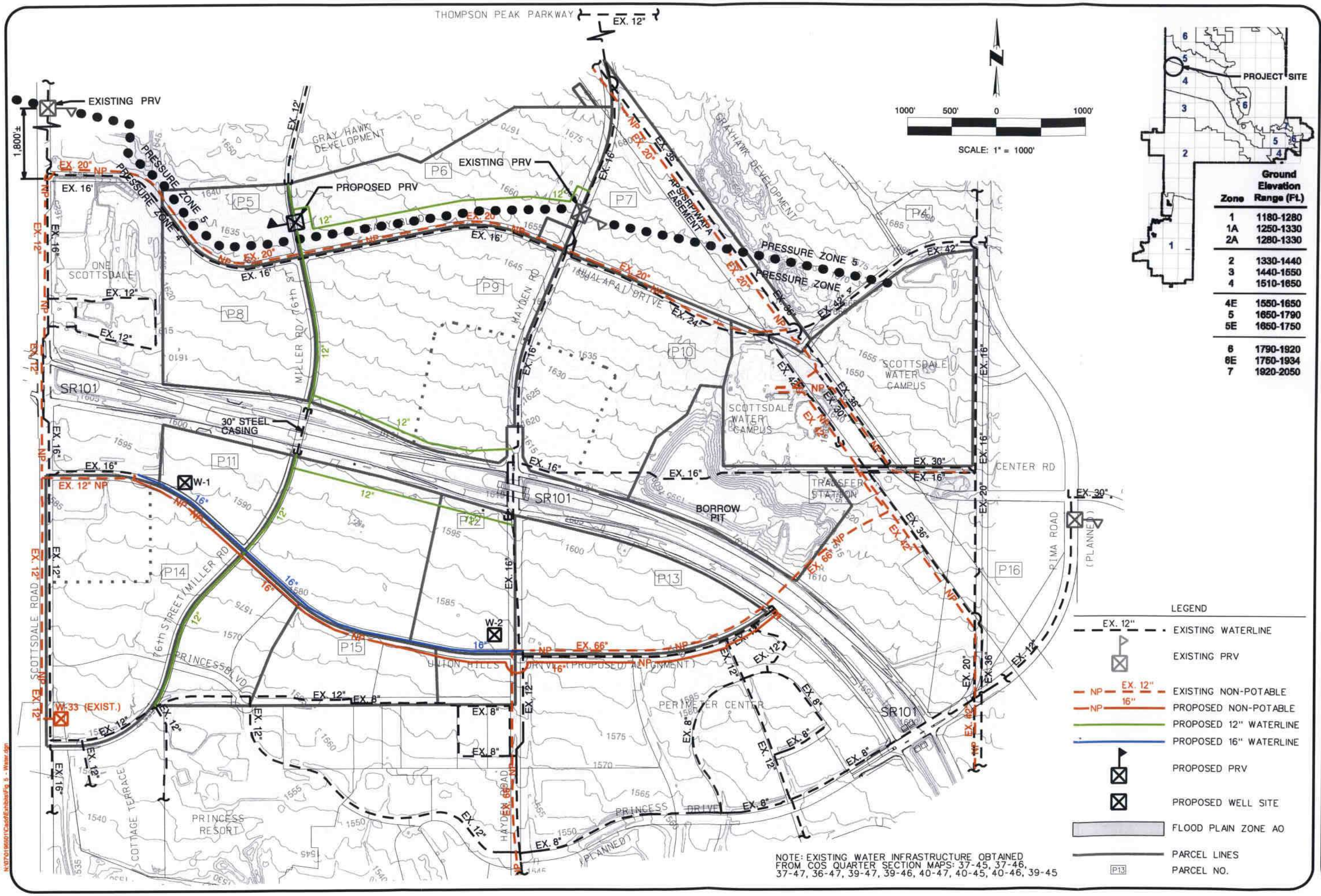
Demand	Water Demand (gpm)	Pressure				Maximum Velocity (fps)	Pipe ID
		Minimum	Node	Maximum	Node		
Pressure Zone 4 — HGL = 1,550 – 1,650 FT							
Average Day	1,356	52	J-1	86	J-2	0.82	P-33
Maximum Day	1,492	52	J-1	86	J-2	0.90	P-33
Peak Hour	2,089	51	J-1	86	J-2	1.26	P-33
Maximum Day + Fire Flow	4,992	30	J-43	67	12B 15A	N/A	N/A
Pressure Zone 5 — HGL = 1,650 – 1,790 FT							
Average Day	422	85	6-PCOC	93	PRL-5	1.20	P-95
Maximum Day	464	85	6-PCOC	93	PRL-5	1.32	P-95
Peak Hour	648	84	6-PCOC	93	PRL-5	1.84	P-95
Maximum Day + Fire Flow	3,964	30	6-PCOC J-47	71	PRL-5	N/A	N/A

As indicated by the water modeling results, the existing and planned infrastructure in the portions of Crossroads East in Pressure Zones 4 and 5 meet all City of Scottsdale requirements. Figure 5 depicts the proposed "backbone" water system improvements necessary to provide service to the ASLD parcel.

4.5 Well Sites and Non-Potable Waterlines

The City of Scottsdale has indicated that it will require two (2) sites to be reserved for the future development of potable wells in Parcels 11 and 12. Each site is to be one (1) acre in area and located as follows:

- Well #1 – approximately one-quarter mile east of Scottsdale Road along Union Hills Drive.
- Well #2 – immediately west of the intersection of Hayden Road and Union Hills Drive.



CROSSROADS EAST

COE & VAN LOO
PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

PROPOSED WATER DISTRIBUTION SYSTEM

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

JOB NO
1.07.0196501

FIGURE
5

Both wells will discharge to an extension to the existing 16-inch non-potable waterline in Union Hills Drive for eventual connection to the City Water Campus.

Figure 5 depicts the existing non-potable waterline within Crossroads East and their proposed extensions.

4.6 Cost Estimate

The proposed improvements and expansion of the City of Scottsdale water system are shown in Figure 5. An estimate of probable construction costs for these improvements was performed by CVL using recent bid information and pipe material costs and is shown in Table 7 below. All item costs include installation.

Table 7: Crossroads East Cost Estimate
Water System Installation

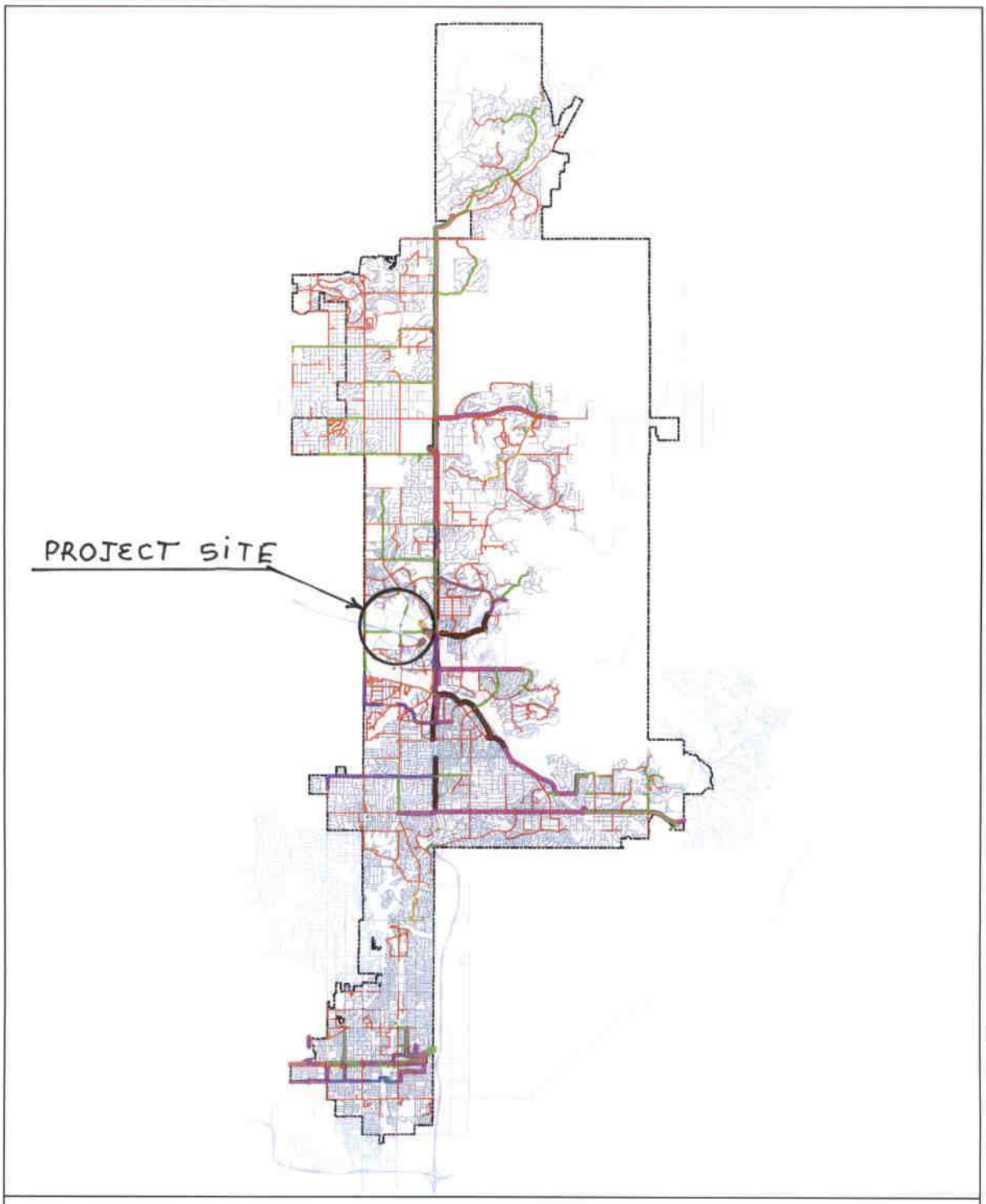
Description	Unit	Quantity	Unit Price	Amount	Remarks
12" Waterline	LF	9,200	$65	$598,000	DIP Class 350
16" Waterline	LF	14,900	$100	$1,490,000	DIP Class 250
12" Gate Valve	EA	21	$4,000	$84,000	Resilient Seat
16" BV Assembly	EA	5	$20,000	$100,000	COS Std. Detail 2361
12" x 12" TS&V	EA	1	$7,000	$7,000	
12" x 16" TS&V	EA	5	$7,000	$35,000	
16" x 16" TS&V	EA	2	$20,000	$40,000	
Fire Hydrant Assembly	EA	18	$5,000	$90,000	
PRV Hydrant Assembly	EA	1	$100,000	$100,000	Zone 5 to Zone 4 on Miller Road
Jacking & Boring	LF	250	$240	$60,000	Carrier Pipe Only, Casing Pipe
			Subtotal	**$2,604,000**	
			Contingency	$520,800	20% of Subtotal
			Engineering	$260,040	10% of Subtotal
			Administration	$130,200	5% of Subtotal
			TOTAL	**$3,515,400**	

5.0 RECOMMENDATIONS

The following observations and recommendations are made:

- The demands calculated in this report reflect the Zoning Case amendment (19-ZN-2002 #2") that increases residential units by 935 in R-5 parcels.
- Unit Factors: The water demand calculations performed in this study are based on unit factors obtained from the City's Integrated Water Master Plan and based on a 0.25 FAR.
- Water demands and water infrastructure improvements have been presented in this report as a template for the orderly expansion of the City of Scottsdale's water system. It will be the responsibility of the future developer(s) of each parcel within Crossroads East to install the required water system improvements in accordance with City of Scottsdale requirements and as presented herein.
- As each parcel is sold and developed, the City will ascertain specific water infrastructure requirements to be met by the developer. A Basis of Design Report is to be prepared by the developer's engineer to demonstrate adherence to this Water Master Plan.
- Parcels 6 and 7 will be served by the extension of Zone 5 water mains. All other parcels in Crossroads East will be served through interconnections to Zone 4 water infrastructure.
- Parcels 4, 5, 6, 7, 10, 11, and 13 will require that additional infrastructure be installed as necessary to meet parcel demands. We note that the increased system demands resulting from the additional 935 residential units did not result in line size increases from those shown in the 2011 Water Master Plan.
- It is also noted that various mechanisms exist for the City of Scottsdale's reimbursement of the cost of installing water system improvements provided certain conditions are met. Eligibility will be determined by the City of Scottsdale and payback agreements administered through the applicable sections of the City Code or amendments to the Development Agreement. Examples of creditable infrastructure improvements are as follows:
    - Oversizing of infrastructure as directed by the City of Scottsdale.
    - Union Hills 16-inch waterline and the Union Hills non-potable waterlines if constructed by private development.
    - Regional infrastructure improvements benefiting the City System outside of Crossroads East.
- As properties are leased within the Crossroads East development, the duration of the term of the water/sewer easements for the water/sewer infrastructure need to be no less than the term of the lease of the leased properties.

Appendix A
Existing Water Distribution System



Pipes Diameter

< 12"
12"
14"
16"
18"
20"
24"
30"
36"
42"
60"

City Boundary
Streets

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.

Miles
0 2.5 5

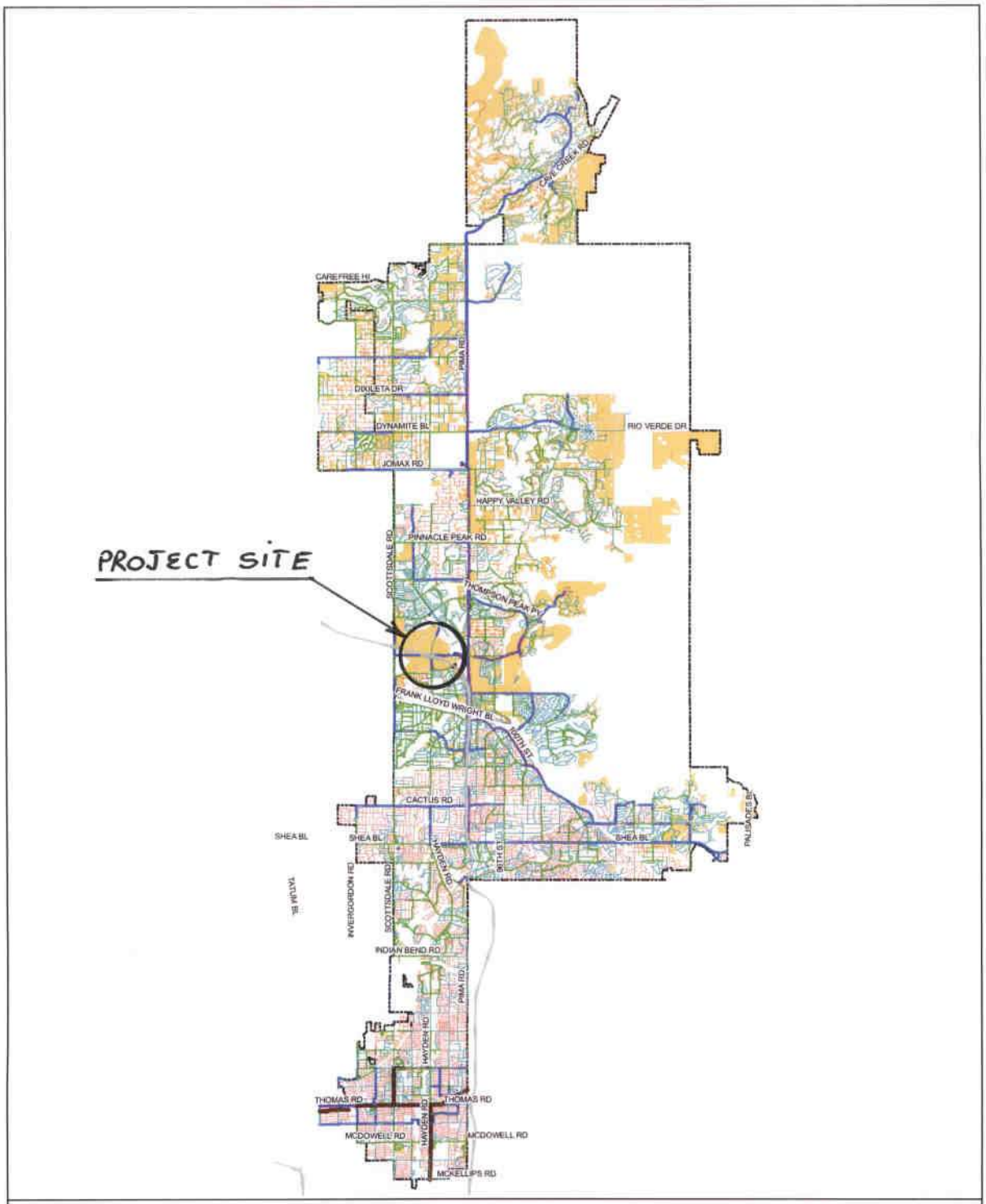
carollo

WATER DISTRIBUTION SYSTEM

2008 Scottsdale Integrated Water Master Plan

Figure 4.1

M:\Client\Scottsdale\72058\05 Scottsdale Asset Management Project\Analysis\GIS\Maps\Water Chapter 4\Figure 4_1 Water Distribution System.mxd



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.

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CITY OF SCOTTSDALE

carollo

Page 4-30

Figure 4.5

EXISTING WATER DISTRIBUTION SYSTEM AND UNDEVELOPED PARCELS

2008 Scottsdale Integrated Water Master Plan

M:\Client\Scottsdale\72650\00 Scottsdale Asset Management Project\Analysis\GIS\Maps\Water Chapter 4\Figure 4_5 Existing Water Distribution System and Undeveloped Parcels

Appendix B
Integrated Water Master Plan
Water Use Factors

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[1] (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
TOTAL		**34,220**			

(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

Appendix C
Flow Test

E•J Flow Tests

FLOW TESTING SERVICES

FLOW TEST SUMMARY

EJ Flow Tests Project Name: Crossroads East
EJ Flow Tests Project No.: 11047
Project Address: 76th Street south of Thompson Peak Parkway, Scottsdale, Arizona

Raw Test Data:
Date of Flow Test: May 27, 2011
Time: 7:30AM
Data is current and reliable until: November 27, 2011

Static Pressure: 100 psi
(measured in pounds per square inch)

Residual Pressure: 70 psi
(measured in pounds per square inch)

Pitot Pressure: 46 psi each
(measured in pounds per square inch)

Fire Hydrant Orifice Diameter: 2-1/2 inch (2 orifices)
(measured in inches)

Coefficient of Discharge: .90 = smooth outlet

Flowing GPM (measured in gallons per minute): 2,276
1,138 gpm X 2 orifices = 2,276 gpm
GPM @ 20 PSI: 3,866

Data with 28 % Safety Factor (minimum):

Static Pressure: 72 psi
(measured in pounds per square inch)

Residual Pressure: 42 psi
(measured in pounds per square inch)

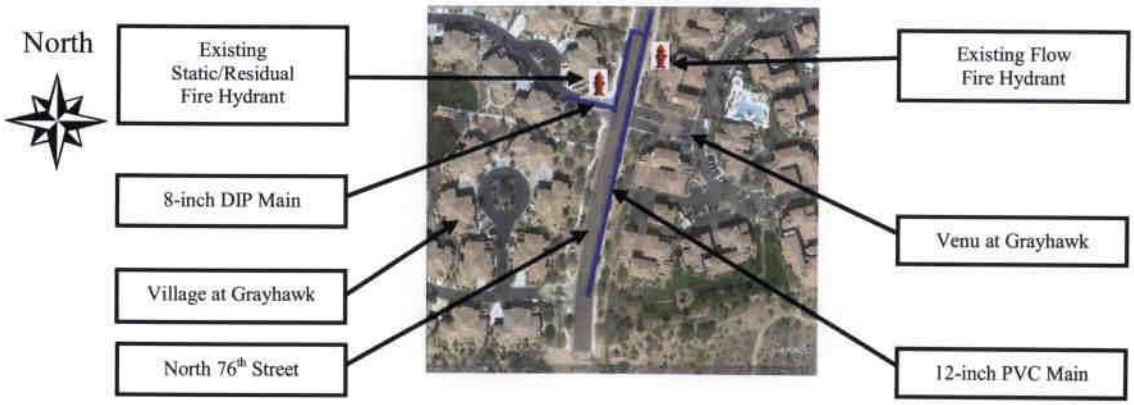
Distance between hydrants: See Routing (below)

Main size: 12-inch east side of 76th Street &
8-inch on West side of 76th Street

Flowing GPM: 2,276
GPM @ 20 PSI: 3,063

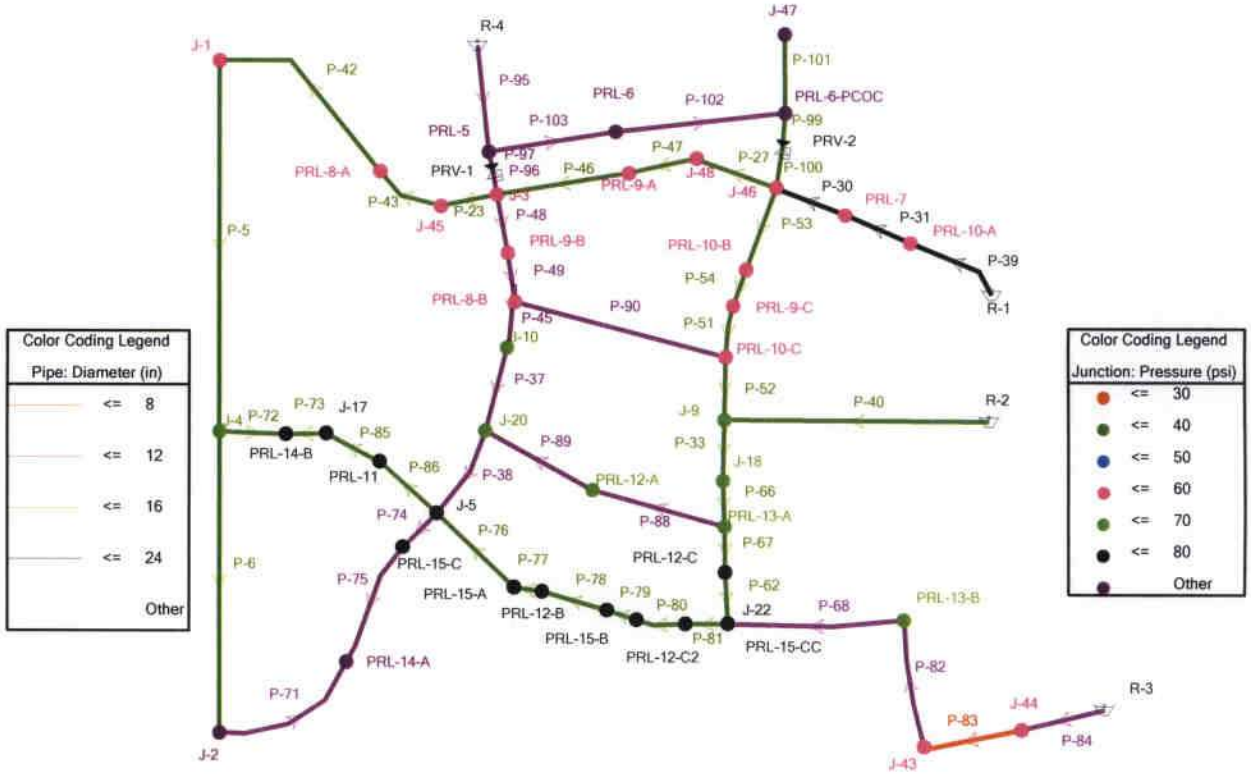
Conducted by/Witnessed by/City Forces Contacted:
Conducted by: Floyd Vaughan and John Echeverri – EJ Flow Tests (602.999.7637)
Witnessed by: Mike Young, Inspector II, Scottsdale Public Works, (602.541.0586)

Flow Test Vicinity Map (no scale)



Appendix D
Water Modeling Results

Crossroads East
Steady State Analysis
Active Scenario: ADD
Scenario: ADD



Crossroads East
Steady State Analysis
Active Scenario: ADD
FlexTable: Junction Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	1,630	Zone 4	0	1,749	52
J-2	1,550	Zone 4	0	1,749	86
J-3	1,630	Zone 4	0	1,749	52
J-4	1,590	Zone 4	0	1,749	69
J-5	1,585	Zone 4	0	1,749	71
J-22	1,580	Zone 4	0	1,749	73
J-46	1,630	Zone 4	0	1,750	52
PRL-10-A	1,630	Zone 4	47	1,750	52
J-9	1,610	Zone 4	0	1,750	60
J-10	1,610	Zone 4	0	1,749	60
J-45	1,628	Zone 4	0	1,749	53
J-48	1,630	Zone 4	0	1,750	52
PRL-7	1,630	Zone 4	92	1,750	52
J-17	1,580	Zone 4	0	1,749	73
J-18	1,600	Zone 4	0	1,750	65
J-20	1,600	Zone 4	0	1,749	65
PRL-8-A	1,630	Zone 4	72	1,749	52
PRL-8-B	1,615	Zone 4	72	1,749	58
PRL-9-A	1,630	Zone 4	61	1,750	52
PRL-9-B	1,625	Zone 4	61	1,749	54
PRL-9-C	1,630	Zone 4	50	1,750	52
PRL-10-C	1,620	Zone 4	42	1,750	56
PRL-10-B	1,630	Zone 4	47	1,750	52
PRL-12-A	1,600	Zone 4	30	1,749	65
PRL-12-B	1,570	Zone 4	30	1,749	78
PRL-12-C	1,585	Zone 4	30	1,750	71
PRL-12-C2	1,580	Zone 4	57	1,749	73
PRL-13-A	1,590	Zone 4	44	1,750	69
PRL-13-B	1,590	Zone 4	44	1,750	69
PRL-14-A	1,560	Zone 4	130	1,749	82
PRL-14-B	1,580	Zone 4	130	1,749	73
PRL-15-C	1,585	Zone 4	108	1,749	71
PRL-15-A	1,570	Zone 4	78	1,749	78
PRL-15-B	1,580	Zone 4	78	1,749	73
PRL-15-CC	1,580	Zone 4	11	1,749	73
J-43	1,620	Zone 4	0	1,750	56
J-44	1,620	Zone 4	0	1,750	56
PRL-11	1,585	Zone 4	43	1,749	71
PRL-5	1,630	Zone 5	72	1,846	93
PRL-6-PCOC	1,650	Zone 5	2	1,845	85
J-47	1,650	Zone 5	0	1,845	85
PRL-6	1,650	Zone 5	348	1,845	85

Crossroads East
Steady State Analysis
Active Scenario: ADD
FlexTable: Pipe Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Start Node	Stop Node	Dia (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Length (ft)
P-5	J-1	J-4	16	DIP	130	149	0.24	0.018	3,887
P-6	J-4	J-2	16	DIP	130	76	0.12	0.005	3,162
P-23	J-45	J-3	16	DIP	130	-221	0.35	0.038	606
P-27	J-48	J-46	16	DIP	130	-449	0.72	0.141	897
P-30	J-46	PRL-7	24	DIP	130	-739	0.52	0.049	777
P-31	PRL-7	PRL-10-A	24	DIP	130	-831	0.59	0.062	741
P-33	J-9	J-18	16	DIP	130	511	0.82	0.180	639
P-37	J-10	J-20	12	DIP	130	33	0.09	0.004	896
P-38	J-20	J-5	12	DIP	130	147	0.42	0.073	1,020
P-39	R-1	PRL-10-A	24	DIP	130	878	0.62	0.068	1,063
P-40	J-9	R-2	16	DIP	130	-359	0.57	0.094	2,784
P-42	J-1	PRL-8-A	16	DIP	130	-149	0.24	0.018	2,252
P-43	PRL-8-A	J-45	16	DIP	130	-221	0.35	0.038	772
P-45	PRL-8-B	J-10	12	DIP	130	33	0.09	0.005	850
P-46	J-3	PRL-9-A	16	DIP	130	-387	0.62	0.108	1,413
P-47	PRL-9-A	J-48	16	DIP	130	-449	0.72	0.141	731
P-48	J-3	PRL-9-B	12	DIP	130	166	0.47	0.091	621
P-49	PRL-9-B	PRL-8-B	12	DIP	130	105	0.30	0.039	516
P-51	PRL-9-C	PRL-10-C	16	DIP	130	194	0.31	0.030	543
P-52	PRL-10-C	J-9	16	DIP	130	152	0.24	0.019	656
P-53	J-46	PRL-10-B	16	DIP	130	290	0.46	0.063	911
P-54	PRL-10-B	PRL-9-C	16	DIP	130	243	0.39	0.045	403
P-62	PRL-12-C	J-22	16	DIP	130	293	0.47	0.064	539
P-66	J-18	PRL-13-A	16	DIP	130	511	0.82	0.180	481
P-67	PRL-13-A	PRL-12-C	16	DIP	130	323	0.51	0.077	485
P-68	J-22	PRL-13-B	12	DIP	130	-75	0.21	0.021	1,852
P-71	PRL-14-A	J-2	12	DIP	130	-76	0.22	0.021	1,661
P-72	J-4	PRL-14-B	16	DIP	130	73	0.12	0.005	704
P-73	PRL-14-B	J-17	16	DIP	130	-57	0.09	0.003	425
P-74	J-5	PRL-15-C	12	DIP	130	162	0.46	0.087	508
P-75	PRL-15-C	PRL-14-A	12	DIP	130	54	0.15	0.011	1,357
P-76	J-5	PRL-15-A	16	DIP	130	-115	0.18	0.011	1,132
P-77	PRL-15-A	PRL-12-B	16	DIP	130	-192	0.31	0.029	298
P-78	PRL-12-B	PRL-15-B	16	DIP	130	-222	0.35	0.039	715
P-79	PRL-15-B	PRL-12-C2	16	DIP	130	-300	0.48	0.067	329
P-80	PRL-12-C2	PRL-15-CC	16	DIP	130	-357	0.57	0.092	525
P-81	PRL-15-CC	J-22	16	DIP	130	-367	0.59	0.098	446
P-82	PRL-13-B	J-43	12	DIP	130	-119	0.34	0.049	1,341
P-83	J-43	J-44	8	DIP	130	-119	0.76	0.353	1,093
P-84	J-44	R-3	12	DIP	130	-119	0.34	0.049	901
P-85	J-17	PRL-11	16	DIP	130	-57	0.09	0.003	637
P-86	PRL-11	J-5	16	DIP	130	-100	0.16	0.009	814

Crossroads East

Steady State Analysis

Active Scenario: ADD

FlexTable: Pipe Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Start Node	Stop Node	Dia (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Length (ft)
P-88	PRL-12-A	PRL-13-A	12	DIP	130	-144	0.41	0.070	1,445
P-89	J-20	PRL-12-A	12	DIP	130	-114	0.32	0.046	1,297
P-90	PRL-8-B	PRL-10-C	12	DIP	130	0	0.00	0.000	2,297
P-95	R-4	PRL-5	12	DIP	130	422	1.20	0.512	900
P-96	J-3	PRV-1	12	DIP	130	0	0.00	0.000	10
P-97	PRV-1	PRL-5	12	DIP	130	0	0.00	0.000	10
P-101	J-47	PRL-6-PCOC	16	DIP	130	0	0.00	0.000	500
P-102	PRL-6-PCOC	PRL-6	12	DIP	130	-2	0.01	0.000	1,795
P-103	PRL-6	PRL-5	12	DIP	130	-350	0.99	0.362	1,359
P-100	J-46	PRV-2	16	DIP	130	0	0.00	0.000	10
P-99	PRV-2	PRL-6-PCOC	16	DIP	130	0	0.00	0.000	10

Crossroads East

Steady State Analysis

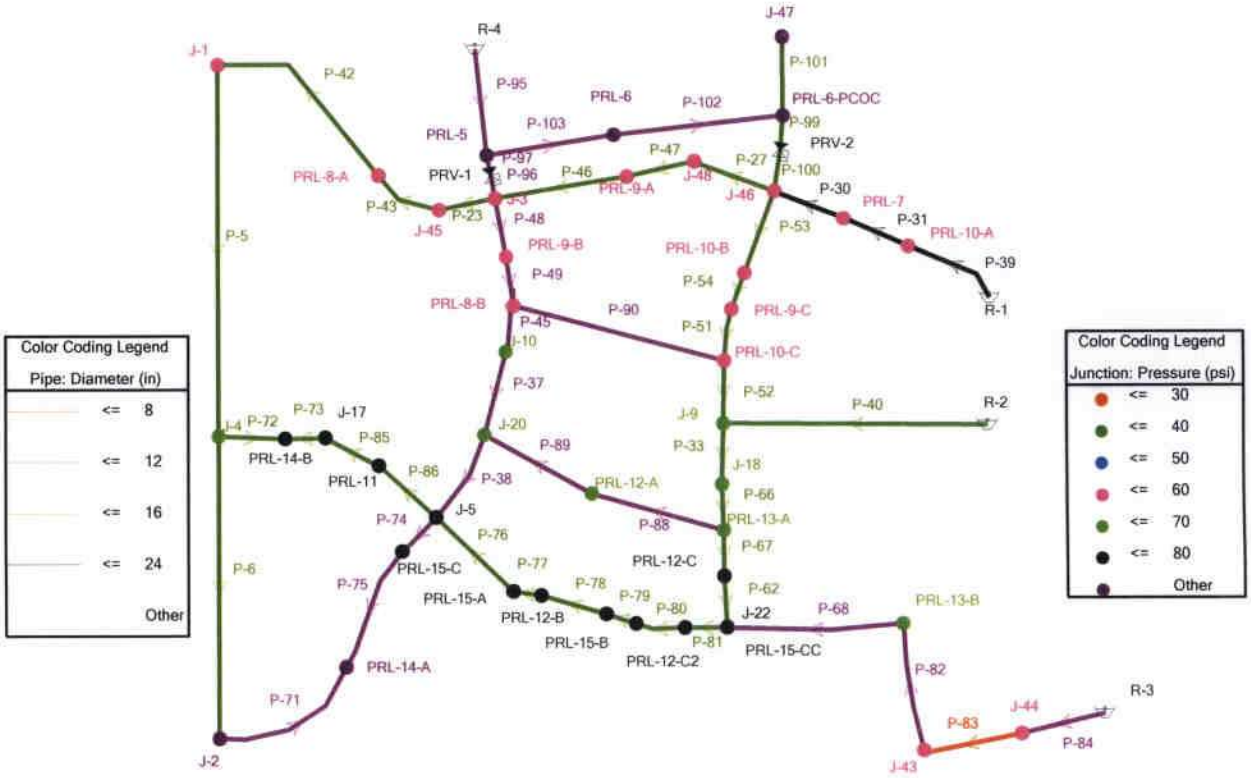
Active Scenario: ADD

FlexTable: Reservoir Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	1,750	Zone 4	878	1,750
R-2	1,750	Zone 4	359	1,750
R-3	1,750	Zone 4	119	1,750
R-4	1,846	Zone 5	422	1,846

Crossroads East
Steady State Analysis
Active Scenario: MDD
Scenario: MDD



Crossroads East
Steady State Analysis
Active Scenario: MDD
FlexTable: Junction Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	1,630	Zone 4	0	1,749	52
J-2	1,550	Zone 4	0	1,749	86
J-3	1,630	Zone 4	0	1,749	52
J-4	1,590	Zone 4	0	1,749	69
J-5	1,585	Zone 4	0	1,749	71
J-22	1,580	Zone 4	0	1,749	73
J-46	1,630	Zone 4	0	1,750	52
PRL-10-A	1,630	Zone 4	52	1,750	52
J-9	1,610	Zone 4	0	1,750	60
J-10	1,610	Zone 4	0	1,749	60
J-45	1,628	Zone 4	0	1,749	52
J-48	1,630	Zone 4	0	1,750	52
PRL-7	1,630	Zone 4	101	1,750	52
J-17	1,580	Zone 4	0	1,749	73
J-18	1,600	Zone 4	0	1,750	65
J-20	1,600	Zone 4	0	1,749	65
PRL-8-A	1,630	Zone 4	79	1,749	52
PRL-8-B	1,615	Zone 4	79	1,749	58
PRL-9-A	1,630	Zone 4	67	1,750	52
PRL-9-B	1,625	Zone 4	67	1,749	54
PRL-9-C	1,630	Zone 4	55	1,750	52
PRL-10-C	1,620	Zone 4	46	1,750	56
PRL-10-B	1,630	Zone 4	52	1,750	52
PRL-12-A	1,600	Zone 4	33	1,749	65
PRL-12-B	1,570	Zone 4	33	1,749	78
PRL-12-C	1,585	Zone 4	33	1,749	71
PRL-12-C2	1,580	Zone 4	62	1,749	73
PRL-13-A	1,590	Zone 4	49	1,749	69
PRL-13-B	1,590	Zone 4	49	1,749	69
PRL-14-A	1,560	Zone 4	143	1,749	82
PRL-14-B	1,580	Zone 4	143	1,749	73
PRL-15-C	1,585	Zone 4	119	1,749	71
PRL-15-A	1,570	Zone 4	88	1,749	78
PRL-15-B	1,580	Zone 4	88	1,749	73
PRL-15-CC	1,580	Zone 4	12	1,749	73
J-43	1,620	Zone 4	0	1,749	56
J-44	1,620	Zone 4	0	1,750	56
PRL-11	1,585	Zone 4	48	1,749	71
PRL-5	1,630	Zone 5	79	1,846	93
PRL-6-PCOC	1,650	Zone 5	2	1,845	84
J-47	1,650	Zone 5	0	1,845	84
PRL-6	1,650	Zone 5	383	1,845	84

Crossroads East
Steady State Analysis
Active Scenario: MDD
FlexTable: Pipe Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Start Node	Stop Node	Dia (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Length (ft)
P-5	J-1	J-4	16	DIP	130	165	0.26	0.022	3,887
P-6	J-4	J-2	16	DIP	130	84	0.13	0.006	3,162
P-23	J-45	J-3	16	DIP	130	-244	0.39	0.046	606
P-27	J-48	J-46	16	DIP	130	-495	0.79	0.170	897
P-30	J-46	PRL-7	24	DIP	130	-815	0.58	0.059	777
P-31	PRL-7	PRL-10-A	24	DIP	130	-917	0.65	0.074	741
P-33	J-9	J-18	16	DIP	130	564	0.90	0.216	639
P-37	J-10	J-20	12	DIP	130	37	0.10	0.006	896
P-38	J-20	J-5	12	DIP	130	163	0.46	0.088	1,020
P-39	R-1	PRL-10-A	24	DIP	130	969	0.69	0.082	1,063
P-40	J-9	R-2	16	DIP	130	-396	0.63	0.113	2,784
P-42	J-1	PRL-8-A	16	DIP	130	-165	0.26	0.022	2,252
P-43	PRL-8-A	J-45	16	DIP	130	-244	0.39	0.046	772
P-45	PRL-8-B	J-10	12	DIP	130	37	0.10	0.005	850
P-46	J-3	PRL-9-A	16	DIP	130	-428	0.68	0.129	1,413
P-47	PRL-9-A	J-48	16	DIP	130	-495	0.79	0.170	731
P-48	J-3	PRL-9-B	12	DIP	130	183	0.52	0.109	621
P-49	PRL-9-B	PRL-8-B	12	DIP	130	116	0.33	0.047	516
P-51	PRL-9-C	PRL-10-C	16	DIP	130	214	0.34	0.036	543
P-52	PRL-10-C	J-9	16	DIP	130	168	0.27	0.023	656
P-53	J-46	PRL-10-B	16	DIP	130	320	0.51	0.076	911
P-54	PRL-10-B	PRL-9-C	16	DIP	130	269	0.43	0.055	403
P-62	PRL-12-C	J-22	16	DIP	130	324	0.52	0.077	539
P-66	J-18	PRL-13-A	16	DIP	130	564	0.90	0.216	481
P-67	PRL-13-A	PRL-12-C	16	DIP	130	357	0.57	0.093	485
P-68	J-22	PRL-13-B	12	DIP	130	-82	0.23	0.025	1,852
P-71	PRL-14-A	J-2	12	DIP	130	-84	0.24	0.026	1,661
P-72	J-4	PRL-14-B	16	DIP	130	81	0.13	0.006	704
P-73	PRL-14-B	J-17	16	DIP	130	-62	0.10	0.003	425
P-74	J-5	PRL-15-C	12	DIP	130	178	0.50	0.103	508
P-75	PRL-15-C	PRL-14-A	12	DIP	130	59	0.17	0.013	1,357
P-76	J-5	PRL-15-A	16	DIP	130	-124	0.20	0.013	1,132
P-77	PRL-15-A	PRL-12-B	16	DIP	130	-212	0.34	0.035	298
P-78	PRL-12-B	PRL-15-B	16	DIP	130	-245	0.39	0.046	715
P-79	PRL-15-B	PRL-12-C2	16	DIP	130	-332	0.53	0.081	329
P-80	PRL-12-C2	PRL-15-CC	16	DIP	130	-395	0.63	0.112	525
P-81	PRL-15-CC	J-22	16	DIP	130	-406	0.65	0.118	446
P-82	PRL-13-B	J-43	12	DIP	130	-131	0.37	0.059	1,341
P-83	J-43	J-44	8	DIP	130	-131	0.84	0.424	1,093
P-84	J-44	R-3	12	DIP	130	-131	0.37	0.059	901
P-85	J-17	PRL-11	16	DIP	130	-62	0.10	0.004	637
P-86	PRL-11	J-5	16	DIP	130	-109	0.17	0.010	814

Crossroads East

Steady State Analysis

Active Scenario: MDD

FlexTable: Pipe Table (Crossroads East.wtg)

Current Time: 0.000 hours

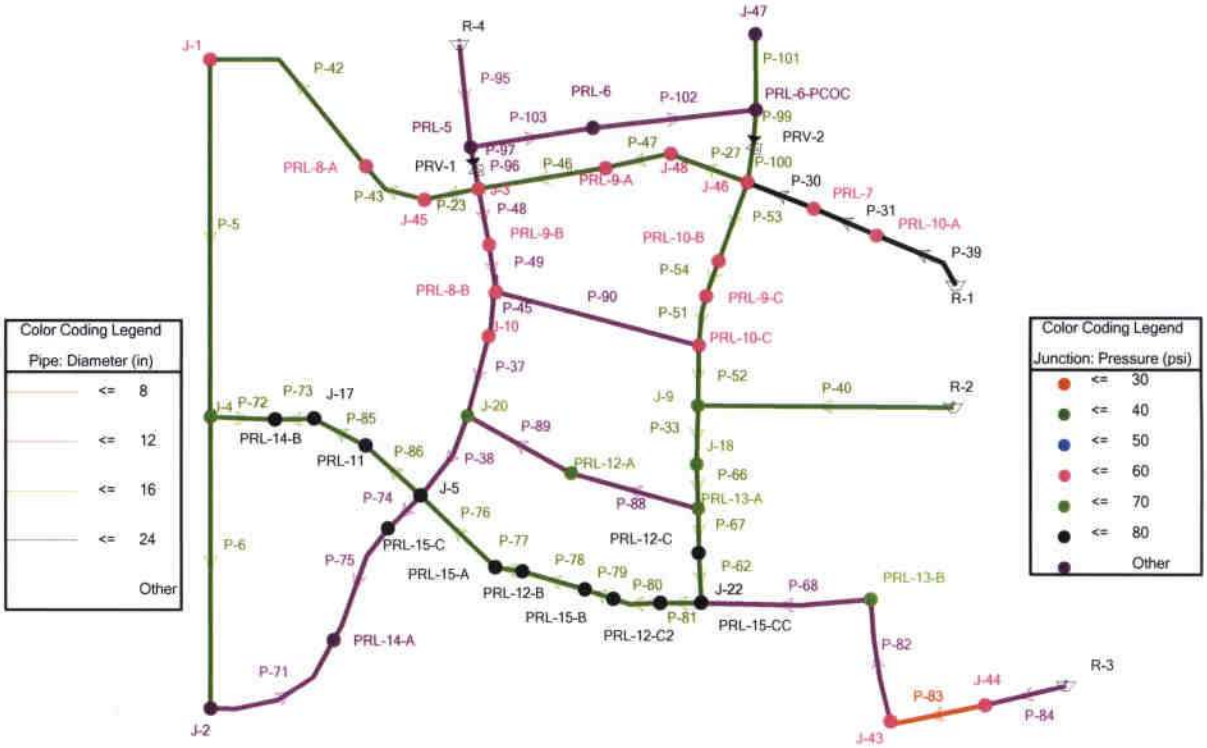
Label	Start Node	Stop Node	Dia (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Length (ft)
P-88	PRL-12-A	PRL-13-A	12	DIP	130	-159	0.45	0.084	1,445
P-89	J-20	PRL-12-A	12	DIP	130	-126	0.36	0.055	1,297
P-90	PRL-8-B	PRL-10-C	12	DIP	130	0	0.00	0.000	2,297
P-95	R-4	PRL-5	12	DIP	130	464	1.32	0.611	900
P-96	J-3	PRV-1	12	DIP	130	0	0.00	0.000	10
P-97	PRV-1	PRL-5	12	DIP	130	0	0.00	0.000	10
P-101	J-47	PRL-6-PCOC	16	DIP	130	0	0.00	0.000	500
P-102	PRL-6-PCOC	PRL-6	12	DIP	130	-2	0.01	0.000	1,795
P-103	PRL-6	PRL-5	12	DIP	130	-385	1.09	0.432	1,359
P-100	J-46	PRV-2	16	DIP	130	0	0.00	0.000	10
P-99	PRV-2	PRL-6-PCOC	16	DIP	130	0	0.00	0.000	10

Crossroads East
Steady State Analysis
Active Scenario: MDD
FlexTable: Reservoir Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	1,750	Zone 4	969	1,750
R-2	1,750	Zone 4	396	1,750
R-3	1,750	Zone 4	131	1,750
R-4	1,846	Zone 5	464	1,846

Crossroads East
Steady State Analysis
Active Scenario: PHD
Scenario: PHD



Crossroads East
Steady State Analysis
Active Scenario: PHD
FlexTable: Junction Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	1,630	Zone 4	0	1,749	51
J-2	1,550	Zone 4	0	1,748	86
J-3	1,630	Zone 4	0	1,749	51
J-4	1,590	Zone 4	0	1,748	69
J-5	1,585	Zone 4	0	1,748	71
J-22	1,580	Zone 4	0	1,749	73
J-46	1,630	Zone 4	0	1,750	52
PRL-10-A	1,630	Zone 4	73	1,750	52
J-9	1,610	Zone 4	0	1,749	60
J-10	1,610	Zone 4	0	1,749	60
J-45	1,628	Zone 4	0	1,749	52
J-48	1,630	Zone 4	0	1,749	52
PRL-7	1,630	Zone 4	142	1,750	52
J-17	1,580	Zone 4	0	1,748	73
J-18	1,600	Zone 4	0	1,749	65
J-20	1,600	Zone 4	0	1,749	64
PRL-8-A	1,630	Zone 4	111	1,749	51
PRL-8-B	1,615	Zone 4	111	1,749	58
PRL-9-A	1,630	Zone 4	94	1,749	52
PRL-9-B	1,625	Zone 4	94	1,749	54
PRL-9-C	1,630	Zone 4	77	1,749	52
PRL-10-C	1,620	Zone 4	64	1,749	56
PRL-10-B	1,630	Zone 4	73	1,750	52
PRL-12-A	1,600	Zone 4	46	1,749	64
PRL-12-B	1,570	Zone 4	46	1,748	77
PRL-12-C	1,585	Zone 4	46	1,749	71
PRL-12-C2	1,580	Zone 4	87	1,749	73
PRL-13-A	1,590	Zone 4	68	1,749	69
PRL-13-B	1,590	Zone 4	68	1,749	69
PRL-14-A	1,560	Zone 4	200	1,748	81
PRL-14-B	1,580	Zone 4	200	1,748	73
PRL-15-C	1,585	Zone 4	166	1,748	71
PRL-15-A	1,570	Zone 4	123	1,748	77
PRL-15-B	1,580	Zone 4	123	1,749	73
PRL-15-CC	1,580	Zone 4	16	1,749	73
J-43	1,620	Zone 4	0	1,749	56
J-44	1,620	Zone 4	0	1,750	56
PRL-11	1,585	Zone 4	67	1,748	71
PRL-5	1,630	Zone 5	111	1,845	93
PRL-6-PCOC	1,650	Zone 5	3	1,844	84
J-47	1,650	Zone 5	0	1,844	84
PRL-6	1,650	Zone 5	534	1,844	84

Crossroads East
Steady State Analysis
Active Scenario: PHD
FlexTable: Pipe Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Start Node	Stop Node	Dia (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Length (ft)
P-5	J-1	J-4	16	DIP	130	231	0.37	0.041	3,887
P-6	J-4	J-2	16	DIP	130	117	0.19	0.012	3,162
P-23	J-45	J-3	16	DIP	130	-342	0.55	0.086	606
P-27	J-48	J-46	16	DIP	130	-693	1.11	0.316	897
P-30	J-46	PRL-7	24	DIP	130	-1,141	0.81	0.111	777
P-31	PRL-7	PRL-10-A	24	DIP	130	-1,283	0.91	0.137	741
P-33	J-9	J-18	16	DIP	130	790	1.26	0.403	639
P-37	J-10	J-20	12	DIP	130	51	0.15	0.010	896
P-38	J-20	J-5	12	DIP	130	228	0.65	0.164	1,020
P-39	R-1	PRL-10-A	24	DIP	130	1,356	0.96	0.152	1,063
P-40	J-9	R-2	16	DIP	130	-555	0.89	0.210	2,784
P-42	J-1	PRL-8-A	16	DIP	130	-231	0.37	0.041	2,252
P-43	PRL-8-A	J-45	16	DIP	130	-342	0.55	0.086	772
P-45	PRL-8-B	J-10	12	DIP	130	51	0.15	0.010	850
P-46	J-3	PRL-9-A	16	DIP	130	-599	0.96	0.241	1,413
P-47	PRL-9-A	J-48	16	DIP	130	-693	1.11	0.316	731
P-48	J-3	PRL-9-B	12	DIP	130	256	0.73	0.204	621
P-49	PRL-9-B	PRL-8-B	12	DIP	130	162	0.46	0.087	516
P-51	PRL-9-C	PRL-10-C	16	DIP	130	299	0.48	0.067	543
P-52	PRL-10-C	J-9	16	DIP	130	235	0.37	0.043	656
P-53	J-46	PRL-10-B	16	DIP	130	449	0.72	0.141	911
P-54	PRL-10-B	PRL-9-C	16	DIP	130	376	0.60	0.102	403
P-62	PRL-12-C	J-22	16	DIP	130	453	0.72	0.144	539
P-66	J-18	PRL-13-A	16	DIP	130	790	1.26	0.404	481
P-67	PRL-13-A	PRL-12-C	16	DIP	130	499	0.80	0.172	485
P-68	J-22	PRL-13-B	12	DIP	130	-115	0.33	0.047	1,852
P-71	PRL-14-A	J-2	12	DIP	130	-117	0.33	0.048	1,661
P-72	J-4	PRL-14-B	16	DIP	130	114	0.18	0.011	704
P-73	PRL-14-B	J-17	16	DIP	130	-86	0.14	0.007	425
P-74	J-5	PRL-15-C	12	DIP	130	249	0.71	0.193	508
P-75	PRL-15-C	PRL-14-A	12	DIP	130	83	0.23	0.025	1,357
P-76	J-5	PRL-15-A	16	DIP	130	-174	0.28	0.024	1,132
P-77	PRL-15-A	PRL-12-B	16	DIP	130	-297	0.47	0.066	298
P-78	PRL-12-B	PRL-15-B	16	DIP	130	-343	0.55	0.086	715
P-79	PRL-15-B	PRL-12-C2	16	DIP	130	-465	0.74	0.151	329
P-80	PRL-12-C2	PRL-15-CC	16	DIP	130	-552	0.88	0.208	525
P-81	PRL-15-CC	J-22	16	DIP	130	-569	0.91	0.220	446
P-82	PRL-13-B	J-43	12	DIP	130	-184	0.52	0.110	1,341
P-83	J-43	J-44	8	DIP	130	-184	1.17	0.791	1,093
P-84	J-44	R-3	12	DIP	130	-184	0.52	0.110	901
P-85	J-17	PRL-11	16	DIP	130	-86	0.14	0.007	637
P-86	PRL-11	J-5	16	DIP	130	-153	0.24	0.019	814

Crossroads East

Steady State Analysis

Active Scenario: PHD

FlexTable: Pipe Table (Crossroads East.wtg)

Current Time: 0.000 hours

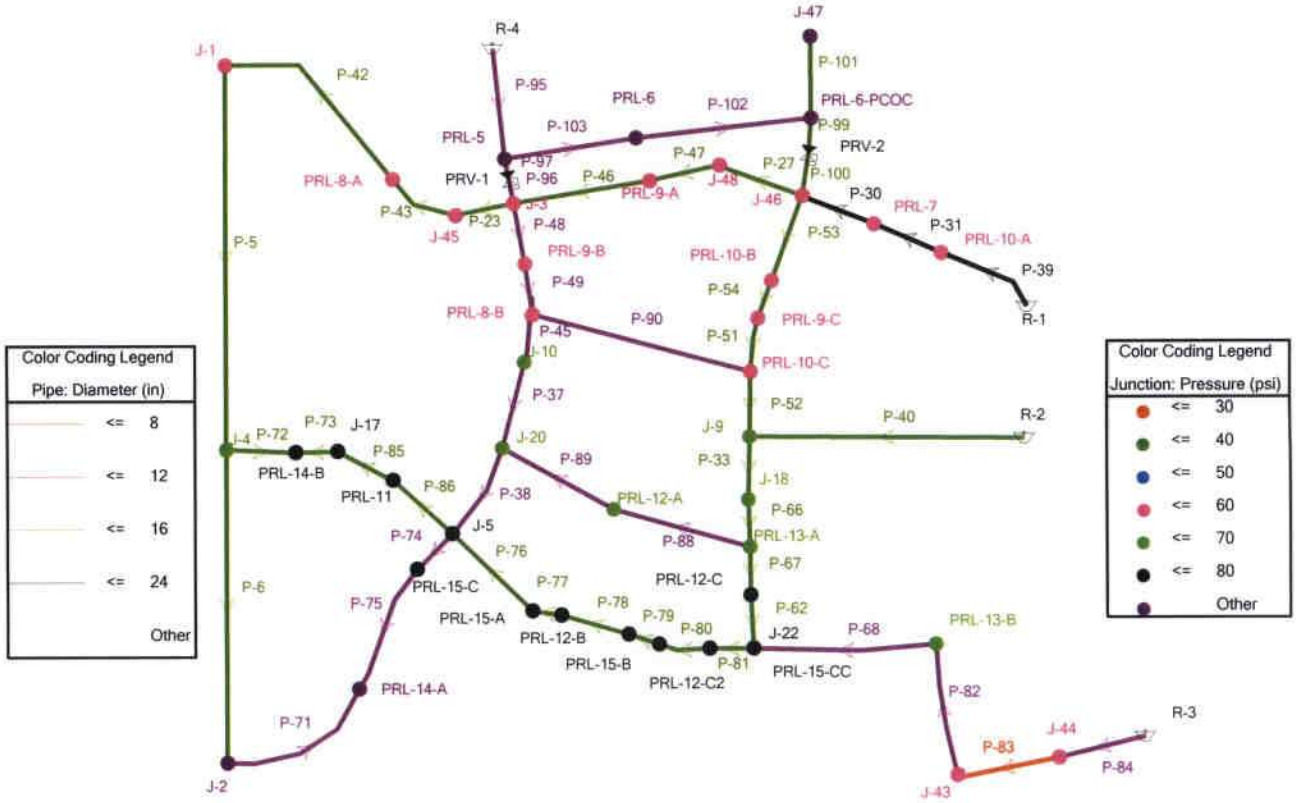
Label	Start Node	Stop Node	Dia (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Length (ft)
P-88	PRL-12-A	PRL-13-A	12	DIP	130	-223	0.63	0.157	1,445
P-89	J-20	PRL-12-A	12	DIP	130	-177	0.50	0.102	1,297
P-90	PRL-8-B	PRL-10-C	12	DIP	130	0	0.00	0.000	2,297
P-95	R-4	PRL-5	12	DIP	130	648	1.84	1.136	900
P-96	J-3	PRV-1	12	DIP	130	0	0.00	0.000	10
P-97	PRV-1	PRL-5	12	DIP	130	0	0.00	0.000	10
P-101	J-47	PRL-6-PCOC	16	DIP	130	0	0.00	0.000	500
P-102	PRL-6-PCOC	PRL-6	12	DIP	130	-3	0.01	0.000	1,795
P-103	PRL-6	PRL-5	12	DIP	130	-537	1.52	0.802	1,359
P-100	J-46	PRV-2	16	DIP	130	0	0.00	0.000	10
P-99	PRV-2	PRL-6-PCOC	16	DIP	130	0	0.00	0.000	10

Crossroads East
Steady State Analysis
Active Scenario: PHD
FlexTable: Reservoir Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	1,750	Zone 4	1,356	1,750
R-2	1,750	Zone 4	555	1,750
R-3	1,750	Zone 4	184	1,750
R-4	1,846	Zone 5	648	1,846

Crossroads East
Steady State Analysis
Active Scenario: MD+FF
Scenario: MD+FF



Crossroads East

Steady State Analysis

Active Scenario: MD+FF

Fire Flow Node FlexTable: Fire Flow Report (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)
J-1	Zone 4	True	3,500	5,000	3,500	5,000	30	38
J-2	Zone 4	True	3,500	5,000	3,500	5,000	30	66
J-3	Zone 4	True	3,500	5,000	3,500	5,000	30	43
J-4	Zone 4	True	3,500	5,000	3,500	5,000	30	56
J-5	Zone 4	True	3,500	5,000	3,500	5,000	30	61
J-22	Zone 4	True	3,500	5,000	3,500	5,000	30	66
J-46	Zone 4	True	3,500	5,000	3,500	5,000	30	50
PRL-10-A	Zone 4	True	3,500	5,000	3,552	5,052	30	51
J-9	Zone 4	True	3,500	5,000	3,500	5,000	30	57
J-10	Zone 4	True	3,500	5,000	3,500	5,000	30	44
J-45	Zone 4	True	3,500	5,000	3,500	5,000	30	42
J-48	Zone 4	True	3,500	5,000	3,500	5,000	30	47
PRL-7	Zone 4	True	3,500	5,000	3,601	5,101	30	51
J-17	Zone 4	True	3,500	5,000	3,500	5,000	30	61
J-18	Zone 4	True	3,500	5,000	3,500	5,000	30	60
J-20	Zone 4	True	3,500	5,000	3,500	5,000	30	53
PRL-8-A	Zone 4	True	3,500	5,000	3,579	5,079	30	40
PRL-8-B	Zone 4	True	3,500	5,000	3,579	5,079	30	42
PRL-9-A	Zone 4	True	3,500	5,000	3,567	5,067	30	45
PRL-9-B	Zone 4	True	3,500	5,000	3,567	5,067	30	40
PRL-9-C	Zone 4	True	3,500	5,000	3,555	5,055	30	48
PRL-10-C	Zone 4	True	3,500	5,000	3,546	5,046	30	52
PRL-10-B	Zone 4	True	3,500	5,000	3,552	5,052	30	48
PRL-12-A	Zone 4	True	3,500	5,000	3,533	5,033	30	50
PRL-12-B	Zone 4	True	3,500	5,000	3,533	5,033	30	67
PRL-12-C	Zone 4	True	3,500	5,000	3,533	5,033	30	64
PRL-12-C2	Zone 4	True	3,500	5,000	3,562	5,062	30	64
PRL-13-A	Zone 4	True	3,500	5,000	3,549	5,049	30	63
PRL-13-B	Zone 4	True	3,500	5,000	3,549	5,049	30	43
PRL-14-A	Zone 4	True	3,500	5,000	3,643	5,143	30	58
PRL-14-B	Zone 4	True	3,500	5,000	3,643	5,143	30	61
PRL-15-C	Zone 4	True	3,500	5,000	3,619	5,119	30	54
PRL-15-A	Zone 4	True	3,500	5,000	3,588	5,088	30	67
PRL-15-B	Zone 4	True	3,500	5,000	3,588	5,088	30	64
PRL-15-CC	Zone 4	True	3,500	5,000	3,512	5,012	30	65
J-43	Zone 4	True	3,500	4,399	3,500	4,399	30	30
J-44	Zone 4	True	3,500	5,000	3,500	5,000	30	43
PRL-11	Zone 4	True	3,500	5,000	3,548	5,048	30	59
PRL-5	Zone 5	True	3,500	5,000	3,579	5,079	30	71
PRL-6-PCOC	Zone 5	True	3,500	3,651	3,502	3,653	30	30
J-47	Zone 5	True	3,500	3,595	3,500	3,595	30	30
PRL-6	Zone 5	True	3,500	4,916	3,883	5,298	30	30

Crossroads East

Steady State Analysis

Active Scenario: MD+FF

FlexTable: Reservoir Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	1,750	Zone 4	969	1,750
R-2	1,750	Zone 4	396	1,750
R-3	1,750	Zone 4	131	1,750
R-4	1,846	Zone 5	464	1,846

Crossroads East

Steady State Analysis

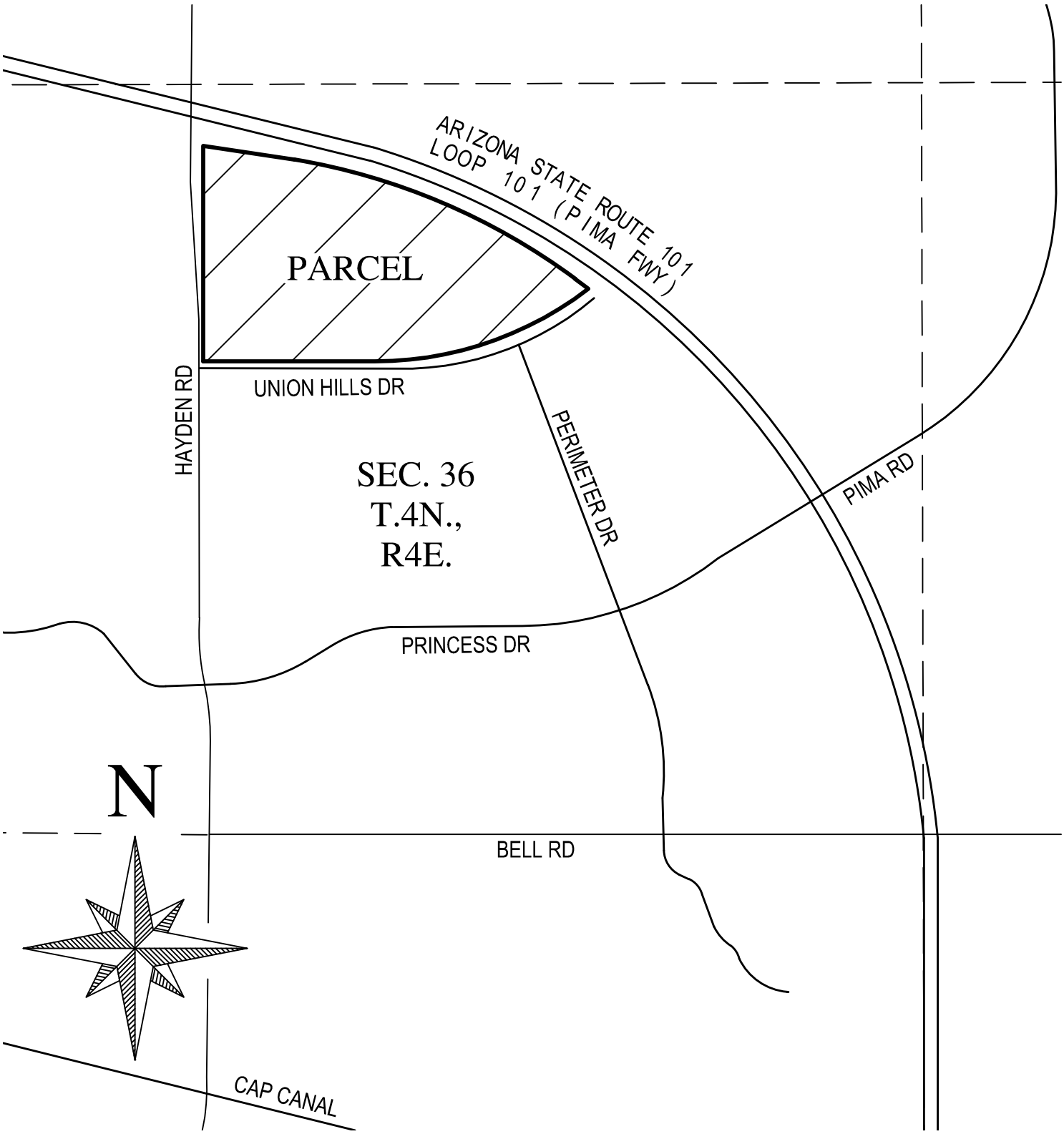
Active Scenario: MD+FF

FlexTable: PRV Table (Crossroads East.wtg)

Current Time: 0.000 hours

Label	Elevation (ft)	Diameter (Valve) (in)	Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
PRV-1	1,630	12	0	1,846	1,749	0.00
PRV-2	1,630	16	0	1,845	1,750	0.00

EXHIBIT 1 – VICINITY MAP



WOOD PATEL

CRE - PLANNING UNIT X & XI

VICINITY MAP

DATE	10/02/2020	SCALE	1" = 1000'	SHEET	1 OF 1
JOB NO.	205133	DESIGN	BJ	CHECK	NEB
		DRAWN	ACH		

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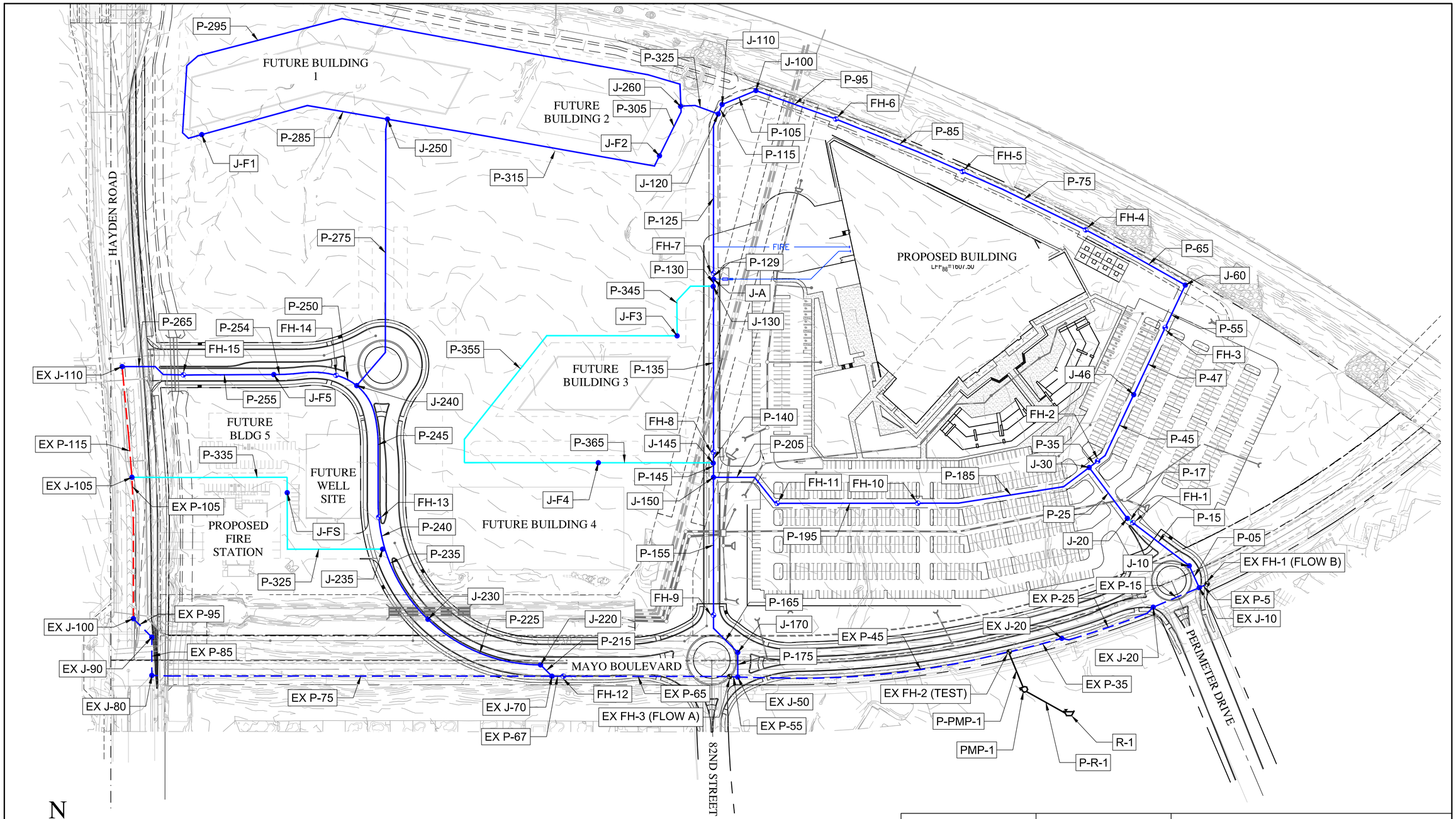
EXHIBIT 2 – WATER EXHIBIT



N

0 50 100

Horz. 1 in. = 100 ft.

LEGEND

- PROPOSED FIRE HYDRANT
- EXISTING FIRE HYDRANT
- EXISTING 16" WATER PIPE
- EXISTING 12" WATER PIPE
- PROPOSED 12" WATER PIPE
- PROPOSED 8" WATER PIPE
- PROPERTY BOUNDARY
- HYDRAULIC MODEL JUNCTION NODE AND LABEL (J-10)
- HYDRAULIC MODEL PIPE LABEL (P-10)
- HYDRAULIC MODEL BACKFLOW AND LABEL (B-1)

NOT FOR CONSTRUCTION OR RECORDING

WOOD PATEL

CRE - PLANNING UNIT X & XI

MASTER WATER SYSTEM MAP

DATE	10-02-2020	SCALE	1" = 100'	SHEET	1 OF 1
JOB NO.	205133	DESIGN	JB	DRAWN	AF

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