



Water Study

FINAL BASIS OF DESIGN REPORT for WATER AND SEWER SERVICE

TSG FOUNDATION

SWC OF STAGECOACH PASS ROAD AND PIMA ROAD

Scottsdale, AZ

Prepared For:

FINAL Basis of Design Report

☐ APPROVED

☒ APPROVED AS NOTED

☐ REVISE AND RESUBMIT



Disclaimer: If approved; the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance. For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY irahman

DATE 3/3/2020

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Project Number: 180333

Date Submitted: 05-09-2019

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Plan Check No.: TBD

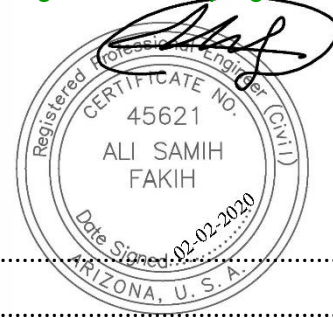


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1. EXECUTIVE SUMMARY

The proposed development consists of 13 acres of residential land located at the Southwest corner of Stagecoach Pass Road and Pima Road. The Site is bounded by:

- Adjoining neighboring property owners at the west and south boundaries
- North Pima Road to the east
- East Stagecoach Pass Road to the north

Refer to **EXHIBIT 1 – Vicinity Map**.

The property is presently zoned R1-35 ESL.

Located within the City of Scottsdale corporate boundary, this site will receive domestic water and fire service from the City of Scottsdale by connecting to a 12" PVC water line in East Stagecoach Pass, west of an existing PRV near the intersection with Pima Road.

Sanitary sewer service will be provided by a connection to the 21" PVC sewer line in Pima Road with a new manhole.

An existing well in the property will be utilized for supplemental irrigation water service. Water quality testing is presently being completed. The irrigation system will utilize purple pipe and will not connect to the public water system at any location.

All water and sewer improvements will be designed and constructed to the most recent City of Scottsdale and MCESD design standards and policies.

2. INTRODUCTION

2.1 PLAN OBJECTIVE:

The purpose of this report is to provide information and calculations defining the water and sewer system design. Preparation of this report has been done in accordance with Chapters 6 and Chapter 7 of the City's Design Standards & Policies Manual.

2.2 SITE LOCATION

The 13.04 acres of the subject property consists of a public R.O.W and thirteen separate but contiguous parcels whose APN's are:

- | | |
|------------------------|-----------------------|
| • 216-34-316 (Lot 1) | • 216-34-321 (Lot 6) |
| • 216-34-317 (Lot 2) | • 216-34-322 (Lot 7) |
| • 216-34-318 (Lot 3) | • 216-34-323 (Lot 8) |
| • 216-34-319 (Lot 4) | • 216-34-324 (Lot 9) |
| • 216-34-320 (Lot 5) | • 216-34-325 (Lot 10) |
| • 216-34-326 (Lot 11) | |
| • 216-34-327 (Tract A) | |
| • 216-34-328 (Lot B) | |

2.3 PROPOSED DEVELOPMENT

2.3.1 Existing Site Description:

This site is open desert land with one single structure and generally slopes from the northeast (elevation 2,564 +/-) to the southwest (elevation 2,531 +/-) at approximately 3.5% with a change in elevation of 33 feet.

The City of Scottsdale Water & Sewer Quarter Section Map (60-48) shows water mains and Sewer lines in East Stagecoach Pass and North Pima Rd as follows:

- A 12" PVC water main exists in East Stagecoach Pass, 32' South of the road center line.
- An 8" ACP in East Stagecoach Pass 4' north of the road centerline, owned by Carefree Water Company.
- A 10" TYP UNK in East Stagecoach Pass 12' south of the road centerline, owned by Carefree Water Company.
- An 8" TYP UNK RWDS, Non-portable water line exists in East Stagecoach Pass, 25' south to the road centerline.
- A 16" TYP UNK potable water main exists to the east in North Pima Road, 20' west of the road centerline.
- A 24" SCP potable water line exists to the east in North Pima Road, 81' east of the road centerline.
- 12" DIP Non-portable water line, 12" TYP UNK Non-portable water line, and 16" TYP UNK Non-portable water line exist to the east in North Pima Road, 50', 32', and 15' east to the road centerline.
- A 21" PVC gravity sewer main exists to the east in North Pima Road, 48' east of the road centerline.

Non-potable

Refer to **EXHIBIT 2** for the COS Water Quarter Section Map (60-48).

2.3.2 Proposed Site Development:

The existing site will be re-platted and developed with a new building for office use and a parking lot. An existing structure will be retained as a casita. Refer to **EXHIBIT 3** for the site plan and water/sewer improvement plans. An existing onsite well will remain in service to provide irrigation water for the site. No cross-connections will be made to the potable water system.

The irrigation mainlines have been shown on the civil improvement plans (**EXHIBIT 3**). Refer to **EXHIBIT 7** for the proposed irrigation plans.

3. DESIGN CRITERIA

3.1 DEVELOPMENT CRITERIA

Proposed zoning: R1-35 ESL

Acreage: 13.04

Demands, system layout, system pressures, velocities, head losses for fire flow will all be in accordance with the City's DS&PM (References 2 and 3 in Sec. 11).

A 1,500 gpm system fire flow demand will be utilized in hydraulic calculations.

4. DEMANDS

4.1 PROPOSED DEMANDS

Refer to the tables below for the proposed (R1-35 ESL PRD) water and sewer demand calculations in gallons per minute based on design criteria in the City's DS&PM.

Table 1: WATER DEMAND CALCULATIONS

	Area (sf)	Avg. Day Demand (gpm/sf or unit)	Max Day Peaking Factor	Peak Hour Peaking Factor	Avg. Day Demand (gpm)	Max. Day Demand (gpm)	Peak Hour Demand (gpm)
Office	14,588	8.34E-04	2	3.5	12.2	24.3	42.6
Casita	n/a	6.90E-01	2	3.5	0.7	1.4	2.4

Table 2 - SEWER DEMAND CALCULATIONS

	Area (sf)	Avg. Day Demand (gpd/sf or unit)	Avg. Day Demand (gpd)	Peaking Factor	Peak Flow (gpm)
Office	14,588	0.4	5,835	3	12.2
Casita	n/a	250	250	4	0.7

4.2 WATER ZONE

According to the City of Scottsdale DS&PM Sec. 6-1, the site is within Zone 11N.

4.3 PHASING OF PROJECT

The project is anticipated to be constructed in a single phase. This Final Basis of Design Report must be accepted by the Water Resources Department prior to the submittal of improvement plans to the City's 1-Stop Shop.

4.4 SUMMARY NARRATIVE OF DEMANDS

- The max day + fire flow scenario will govern the water system design.
- No offsite sewer flow impacts this site.

5. PROPOSED INFRASTRUCTURE

5.1 WATER DISTRIBUTION SYSTEM

This project proposes to construct approximately 375 LF of 8" DIP connecting to the 12" line in East Stagecoach Pass. Refer to **EXHIBIT 3** for the proposed site and utility plan. A fire hydrant will terminate the extension. Metered service and the main building fire line will be tapped off the new 8" water line. Metered service for the casita will be separately tapped off the 8" water line. All service lines will install a reduced pressure principle backflow preventer and pressure regulator per COS DS+PM Sec. 6-1.417 and 6-1.407.

This is not what is shown on Exhibit 3. Service line is shown to tapped into 4" fire line, not acceptable. Fire line connection shall be per COS Detail 2362-2, See DSPM 6-1.504.

Plans show 4" DIP for Casita. Revise to conform COS Service connection details.

5.2 SEWER COLLECTION SYSTEM

The 21" PVC sewer pipe in Pima Road is approximately 20' deep per COS as-built #25366. The proposed private 8" DIP Sewer connection to this existing pipe will cross three 16" water lines (one potable and two non-potable). Per as-builts the non-potable lines appear to be approximately 10' deep. The potable line appears to be 6 to 8 feet deep. The proposed 8" DIP Sewer line should have sufficient vertical separation from the existing water lines. A plan's note requires the contractor to verify all utility locations and elevations prior to construction.

The private sanitary sewer service will connect the proposed and existing building to the 21" PVC public sewer main in Pima Road. A new manhole will need to be constructed over the existing sewer. The first reach of pipe will be 8" ductile iron with a cured-in-place PVC liner between the two manholes. 6" service lines serving the casita and main building respectively will be located under or near drives with cleanouts at 100' on-center.

Pipe (CIPP)

Falling topography does not support extension of public sewer along the site's Stagecoach Pass frontage. A public sewer to 8603 E. Stagecoach Pass has been extended to the southwest corner of that parcel which can provide future service.

5.3 MAINTENANCE AND OWNERSHIP

The water line is proposed as public to be owned and maintained by the City and is located within a 20-foot wide water easement.

property

All proposed sanitary sewer lines and related appurtenances will be private, owned and maintained by the owner. The new manhole constructed over the 21" public sewer will be public, owned and maintained by the City.

6. WATER COMPUTATIONS

6.1 DESCRIPTION OF MODEL

The new water system will be designed to meet the criteria of COS Water, the Arizona Department of Environmental Quality ("ADEQ"), and Maricopa County Environmental Services Department ("MCESD").

Bentley WaterCAD® Version 8i was used to model the water extension and demand scenarios. A current fire hydrant flow test is included in **EXHIBIT 4**. The results of water modeling are included in **EXHIBIT 5**.

7. SEWER COMPUTATIONS

DIP per plan

7.1 DESCRIPTION

An 8" PVC sewer service at 1.5% grade will convey the peak 12 gpm flow to Pima Road at 1.6 fps with a normal depth of 0.7". The hydraulic radius is 0.47". At $d/D = 0.65$ the 8" service pipe has a capacity of 502.4 gpm at 4.7 fps. The full flow capacity is 664 gpm at 4.2 fps.

A 6" PVC sewer service at 2% grade will convey the peak 12 gpm flow to Pima Road at 1.9 fps with a normal depth of 0.8". The hydraulic radius is 0.47". At $d/D = 0.65$ the 6" service pipe has a capacity of 269 gpm at 4.4 fps. The full flow capacity is 356 gpm at 4.0 fps.

Reference **EXHIBIT 6** .

8. SUMMARY / CONCLUSIONS

- Sufficient city water supply is available to support the project's domestic and fire flow demand.
- Sufficient city sewer capacity is available to support the project.
- An existing onsite well will be utilized for irrigation service.

9. REFERENCES

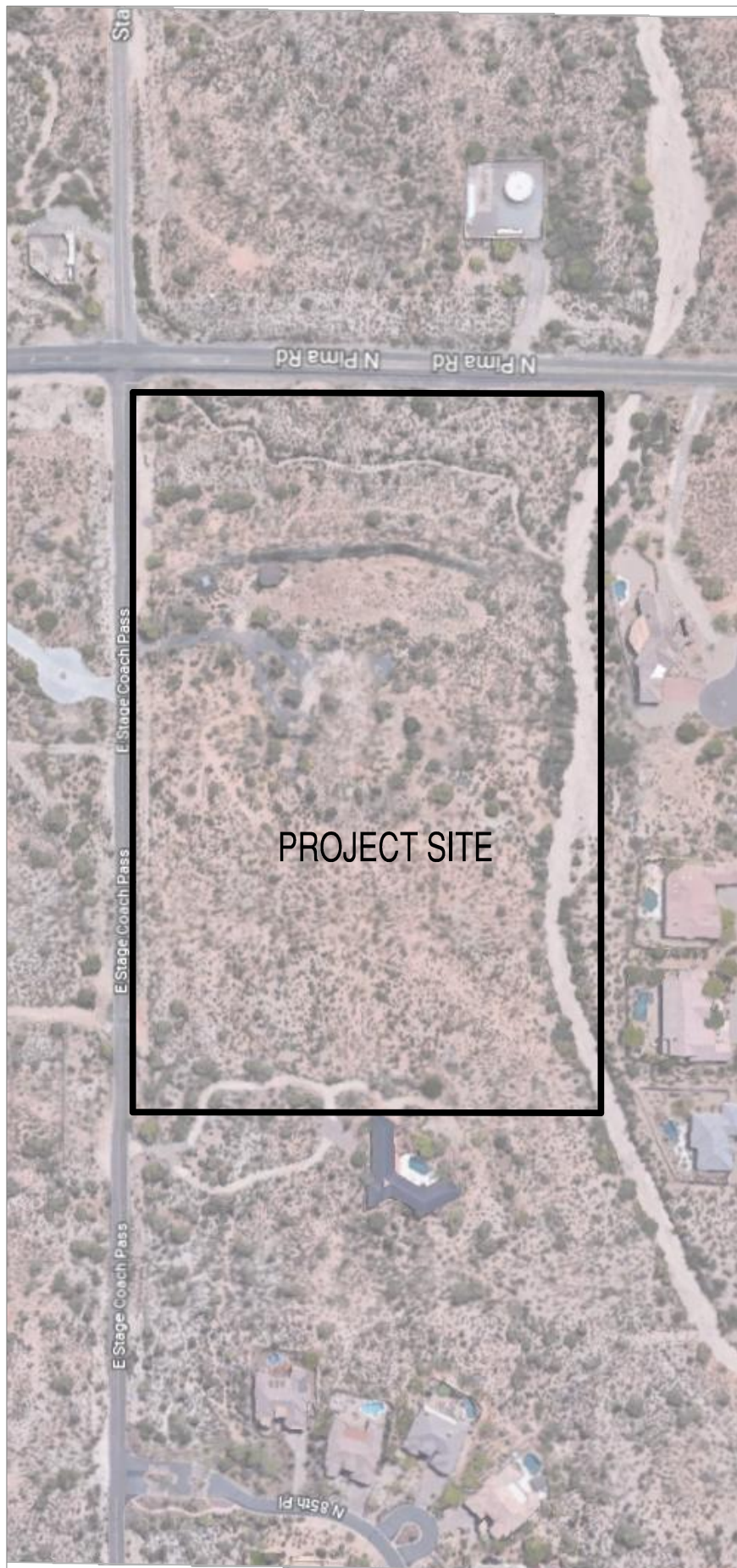
1. COS QS numbers 60-48, 61-49
2. City of Scottsdale Design Standards & Policies Manual, 2018 (Chapter 6 – Water).
3. City of Scottsdale Design Standards & Policies Manual, 2018 (Chapter 7 – Wastewater)

10. EXHIBITS:

- EXHIBIT 1 - VICINITY MAP – CONTEXT AERIAL
- EXHIBIT 2 - Q-S MAPS 60-48, 61-49
- EXHIBIT 3 - Utility Plan/Water Sewer Improvement Plans
- EXHIBIT 4 - Fire Hydrant Flow Test
- EXHIBIT 5 - Water Modeling
- EXHIBIT 6 - Sewer Service Calculation
- EXHIBIT 7 - Irrigation Plans

EXHIBIT 1

Vicinity Map



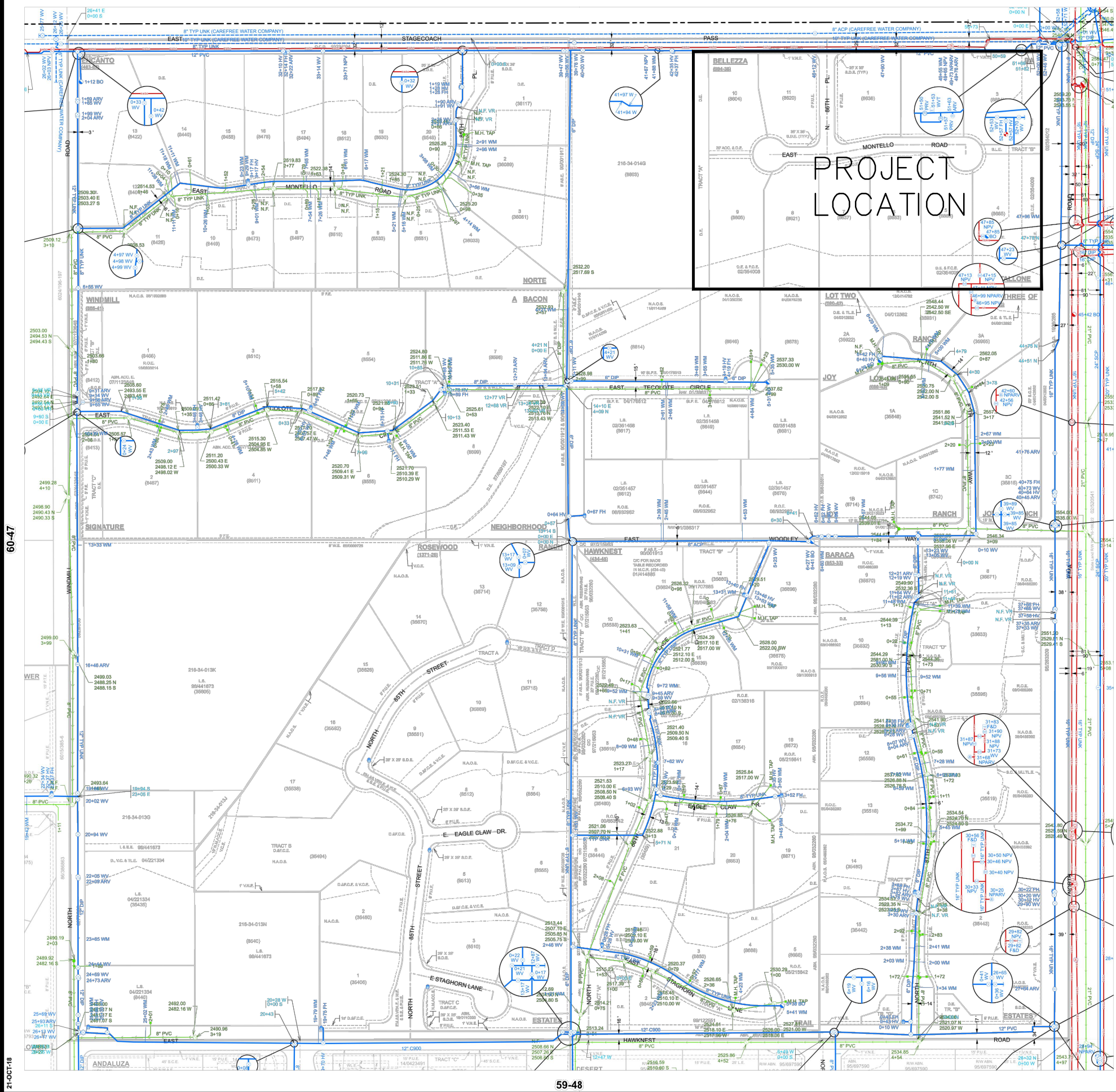
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EXHIBIT 1
VICINITY MAP

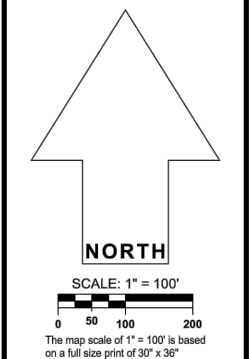
EXHIBIT 2

Q-S Map



GENERAL NOTES:
THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE, GIS DEPARTMENT AT (480) 312-7192.
THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE PLATTED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS CALCULATED ON THE MAP.

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



WATER & SEWER
QUARTER SECTION MAP
60-48
NE 1/4 SEC. 1 T5N R4E

CITY OF SCOTTSDALE
SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS
3628 North Drinkwater Boulevard
Scottsdale, Arizona 85251

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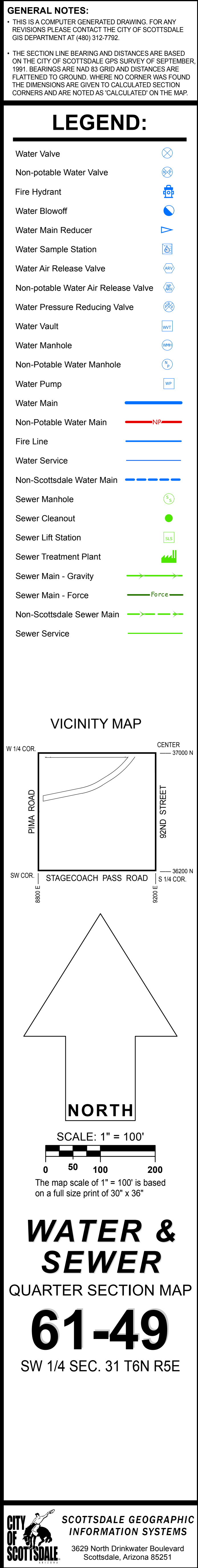
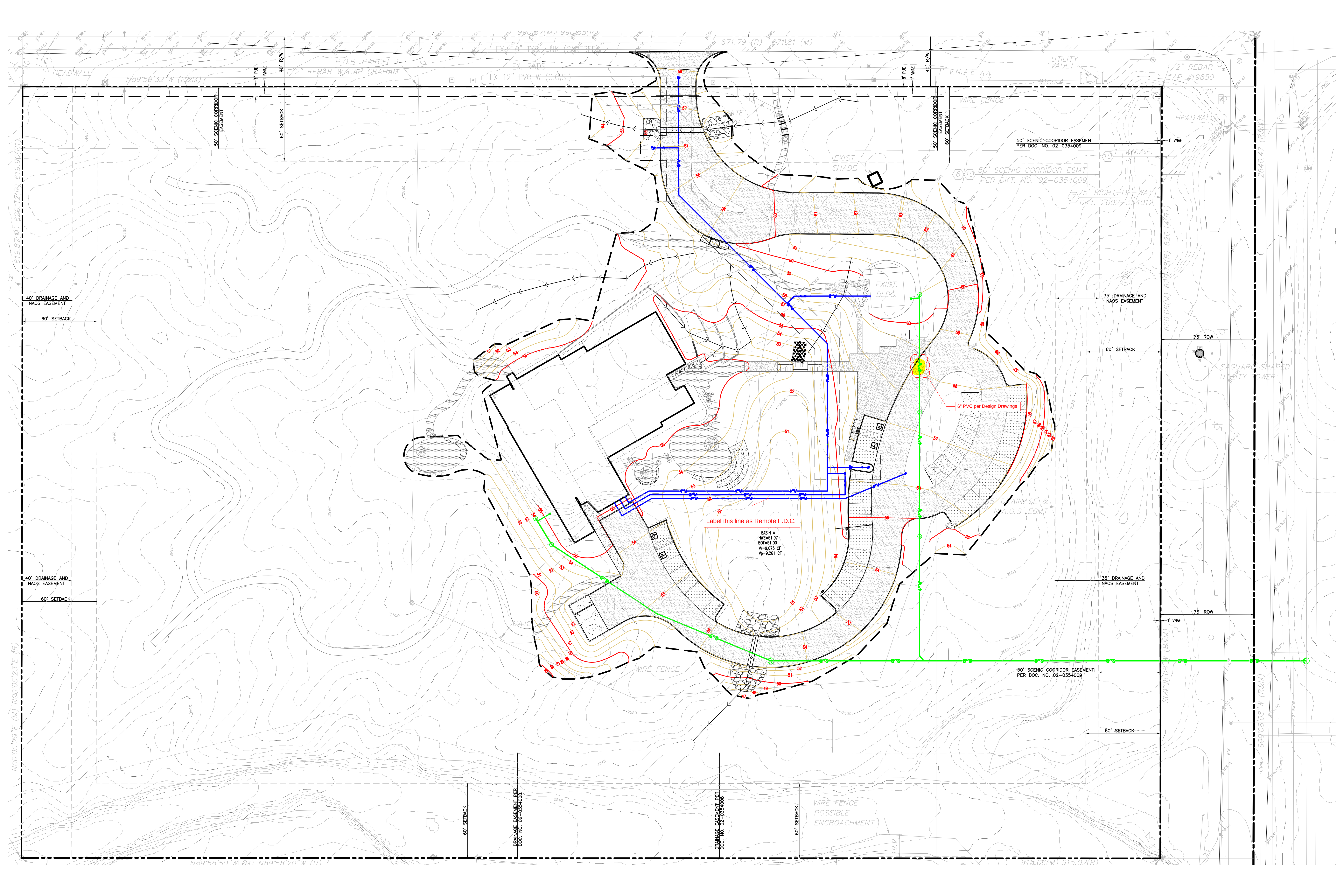
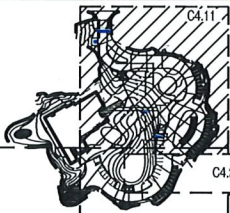
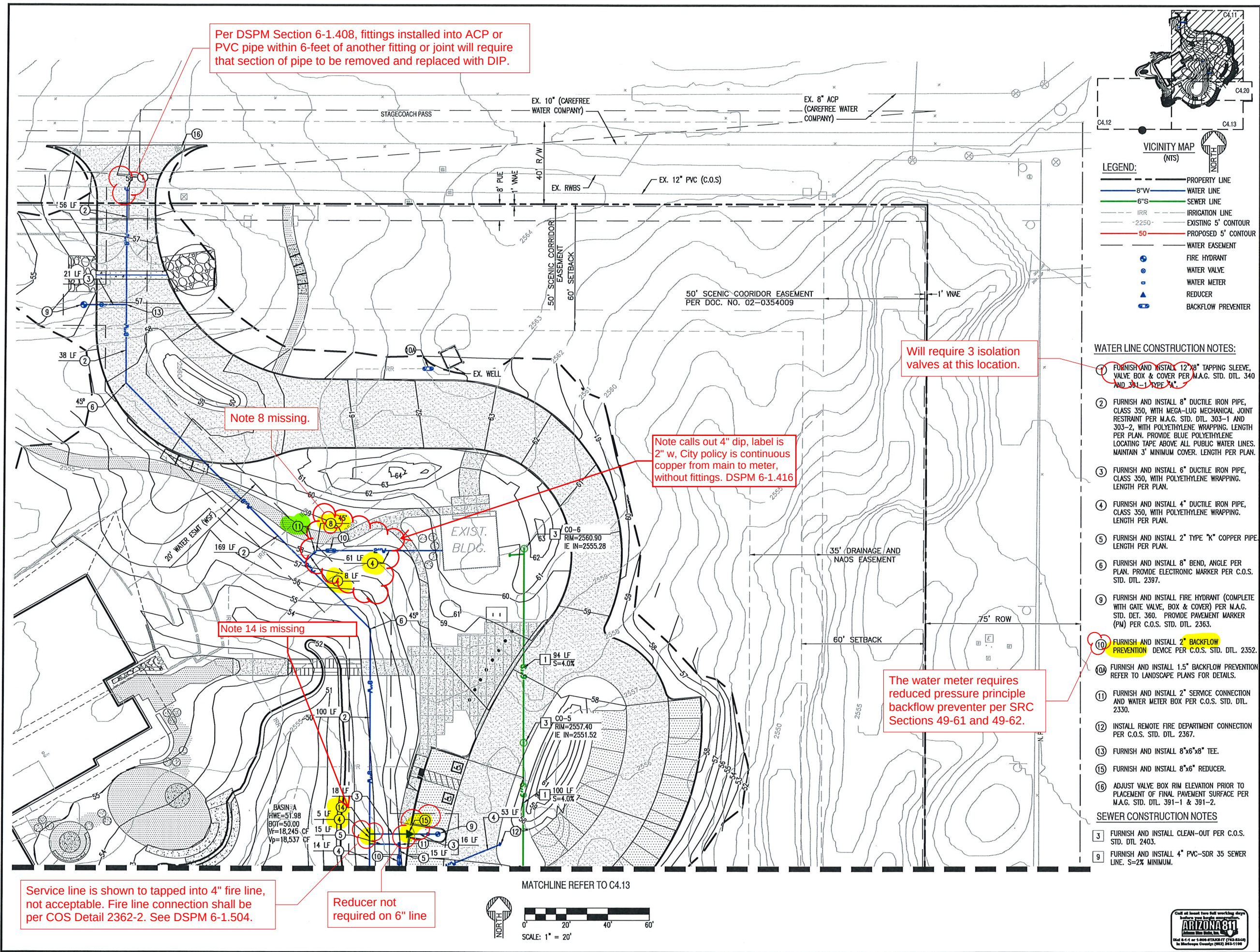


EXHIBIT 3

Preliminary Utility Plans



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VICINITY MAP (NTS)

- LEGEND:
- PROPERTY LINE
 - 8" W WATER LINE
 - 6" S SEWER LINE
 - IRRIGATION LINE
 - EXISTING 5' CONTOUR
 - PROPOSED 5' CONTOUR
 - WATER EASEMENT
 - FIRE HYDRANT
 - WATER VALVE
 - WATER METER
 - REDUCER
 - BACKFLOW PREVENTER

WATER LINE CONSTRUCTION NOTES:

- FURNISH AND INSTALL 12" X 8" TAPPING SLEEVE, VALVE BOX & COVER PER M.A.G. STD. DTL. 340 AND 381-1 TYPE "A".
- FURNISH AND INSTALL 8" DUCTILE IRON PIPE, CLASS 350, WITH MEGA-LUG MECHANICAL JOINT RESTRAINT PER M.A.G. STD. DTL. 303-1 AND 303-2, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN. PROVIDE BLUE POLYETHYLENE LOCATING TAPE ABOVE ALL PUBLIC WATER LINES. MAINTAIN 3' MINIMUM COVER. LENGTH PER PLAN.
- FURNISH AND INSTALL 6" DUCTILE IRON PIPE, CLASS 350, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN.
- FURNISH AND INSTALL 4" DUCTILE IRON PIPE, CLASS 350, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN.
- FURNISH AND INSTALL 2" TYPE "K" COPPER PIPE. LENGTH PER PLAN.
- FURNISH AND INSTALL 8" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DTL. 2397.
- FURNISH AND INSTALL FIRE HYDRANT (COMPLETE WITH GATE VALVE, BOX & COVER) PER M.A.G. STD. DET. 360. PROVIDE PAVEMENT MARKER (PM) PER C.O.S. STD. DTL. 2363.
- FURNISH AND INSTALL 2" BACKFLOW PREVENTION DEVICE PER C.O.S. STD. DTL. 2352.
- FURNISH AND INSTALL 1.5" BACKFLOW PREVENTION REFER TO LANDSCAPE PLANS FOR DETAILS.
- FURNISH AND INSTALL 2" SERVICE CONNECTION AND WATER METER BOX PER C.O.S. STD. DTL. 2330.
- INSTALL REMOTE FIRE DEPARTMENT CONNECTION PER C.O.S. STD. DTL. 2367.
- FURNISH AND INSTALL 8"x6"x8" TEE.
- FURNISH AND INSTALL 8"x6" REDUCER.
- ADJUST VALVE BOX RIM ELEVATION PRIOR TO PLACEMENT OF FINAL PAVEMENT SURFACE PER M.A.G. STD. DTL. 391-1 & 391-2.

SEWER CONSTRUCTION NOTES

- FURNISH AND INSTALL CLEAN-OUT PER C.O.S. STD. DTL. 2403.
- FURNISH AND INSTALL 4" PVC-SDR 35 SEWER LINE. S=2% MINIMUM.

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Center for Spiritual Development

PIMA RD & STAGECOACH DR, SCOTTSDALE, AZ #Site

Postcode

CLIENT CONTACT

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PO Box 7068 gita@tsgfoundation.org
Cave Creek, AZ 85327

PROJECT NO. 18_077-01
REVISION NO. 01/14/2020

PROJECT TEAM SEG
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SHEET CONTENTS

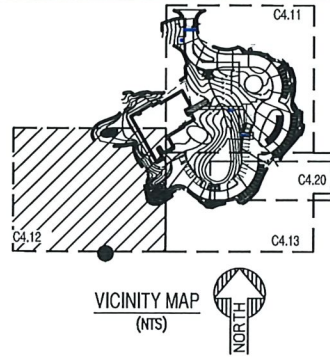
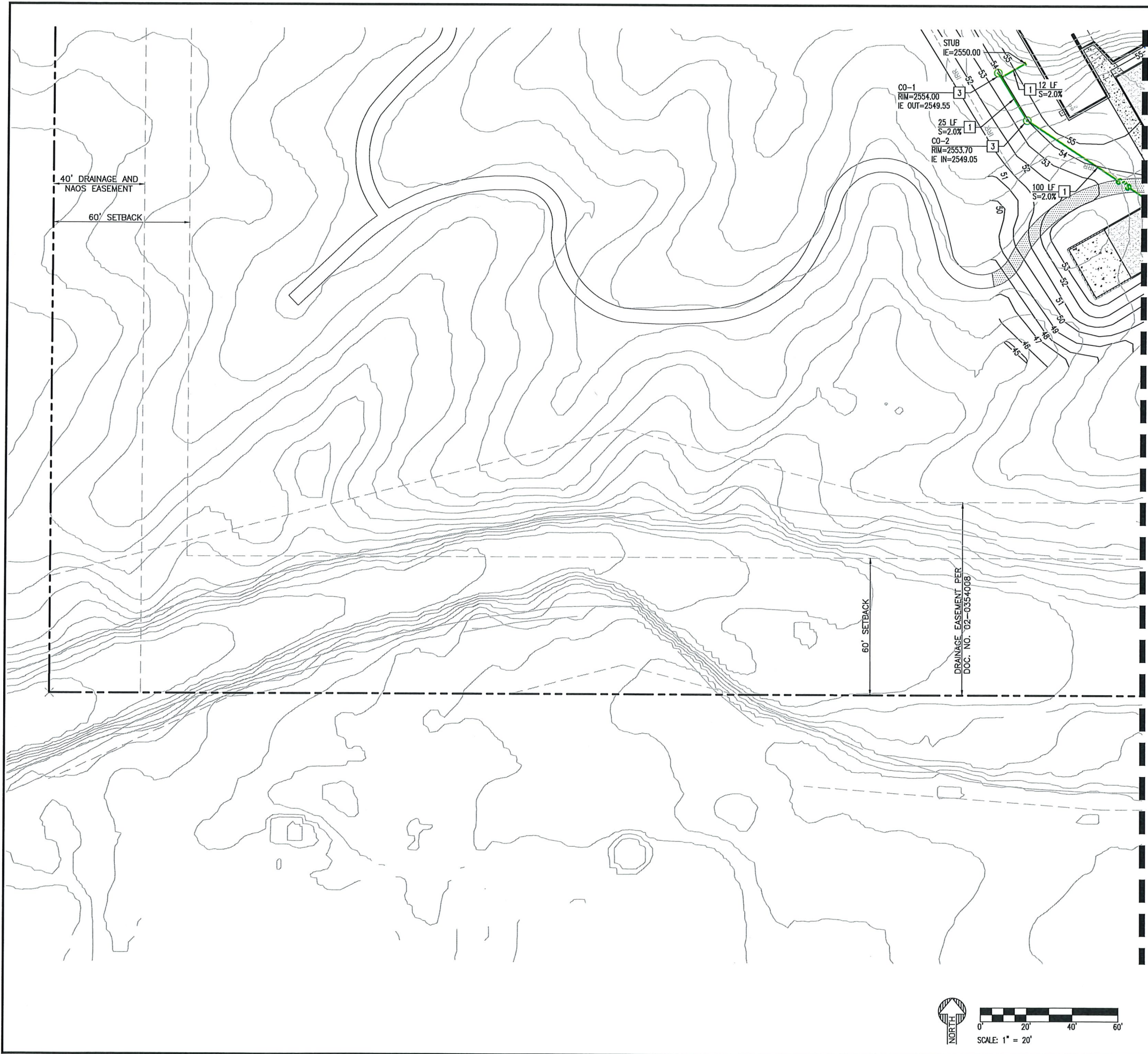
UTILITY PLAN 1

SHEET NO. C4.11



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LEGEND:

- | | |
|--------|---------------------|
| 8"W | PROPERTY LINE |
| 6"S | WATER LINE |
| IRR | SEWER LINE |
| -2250- | IRRIGATION LINE |
| 50 | EXISTING 5' CONTOUR |
| | PROPOSED 5' CONTOUR |
| | WATER EASEMENT |
| | FIRE HYDRANT |
| | WATER VALVE |
| | WATER METER |
| | REDUCER |
| | BACKFLOW PREVENTER |

SEWER CONSTRUCTION NOTES

- FURNISH AND INSTALL 6" PVC-SDR 35 SEWER LINE CONNECTION PER M.A.G. STD. DET. 440-3. S=2% MINIMUM.
- FURNISH AND INSTALL CLEAN-OUT PER C.O.S. STD. DTL 2403.

TSG FOUNDATION

Center for Spiritual Development

PIMA RD & STAGECOACH DR, SCOTTSDALE, AZ #Site

Postcode

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Cave Creek, AZ 85327

PROJECT NO.	DATE OF ISSUE
18_077-01	01/14/2020
REVISION NO.	DATE

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SEG	DB

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UTILITY PLAN 2

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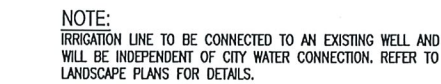
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- ④ FURNISH AND INSTALL 4" DUCTILE IRON PIPE, CLASS 350, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN.
- ⑤ FURNISH AND INSTALL 2" TYPE "K" COPPER PIPE. LENGTH PER PLAN.
- ⑦ FURNISH AND INSTALL 4" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DTL. 2397.
- ⑧ FURNISH AND INSTALL 2" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DTL. 2397.

- Call at least two full working days
before you begin excavation.
- ARIZONA 811**
Arizona One Stop, Inc.
- Dial 8-1-1 or 1-800-STAKE-IT (783-8344)
in Maricopa County: (602) 263-1100

	PROPERTY LINE
	WATER LINE
	SEWER LINE
	IRRIGATION LINE
	EXISTING 5' CONTOUR
	PROPOSED 5' CONTOUR
	WATER EASEMENT
	FIRE HYDRANT
	WATER VALVE
	WATER METER
	REDUCER
	BACKFLOW PREVENTER

- 1 FURNISH AND INSTALL 6" PVC-SOR 35 SEWER LINE CONNECTION PER M.A.G. STD. DET. 440-3. S=2% MINIMUM.
- 2 FURNISH AND INSTALL 8" D.I.P. SEWER LINE. LENGTH PER PLAN. S=0.52% MINIMUM.
- 3 FURNISH AND INSTALL CLEAN-OUT PER C.O.S. STD. DET. 2403.
- 4 CONTRACTOR SHALL VERIFY THE LOCATION OF THE EXISTING SANITARY SEWER LINE BEFORE PROCEEDING WITH TRENCHING. CONTRACTOR SHALL CONTACT ENGINEER IF EXISTING SEWER ELEVATION IS HIGHER THAN PROPOSED TIE-IN INVERT PRIOR TO ANY CONSTRUCTION ACTIVITY.
- 5 CONTRACTOR SHALL VERIFY ALL INVERTS AND CLEARANCE OF CROSSING UTILITIES PRIOR TO COMMENCING CONSTRUCTION.
- 6 SAWCUT, REMOVE AND REPLACE EXISTING ASPHALT FOR TRENCHING PER C.O.S. STD. DET. 2200 & 2201 (T-TOP).
- 7 FURNISH AND INSTALL 5' DIAMETER PRECAST CONCRETE SEWER MANHOLE PER M.A.G. STD. DET. 420-1 (NO STEPS) WITH 12 CONCRETE COLLAR PER C.O.S. STD. DET. 2270. 30" WATERTIGHT COVER PER M.A.G. STD. DET. 424-2 AND C.O.S. STD. DET. 2421. CAST-IN-PLACE BASE.
- 8 FURNISH AND INSTALL SEWER CONNECTION PER M.A.G. STD. DET. 440-1.

Center for Spiritual Development

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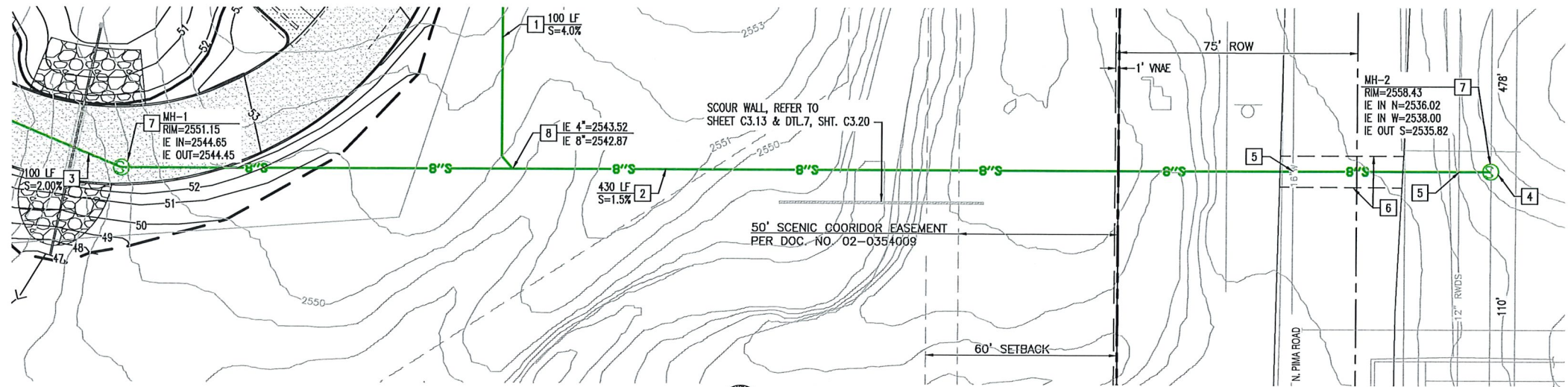
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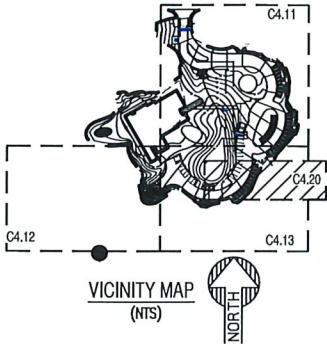
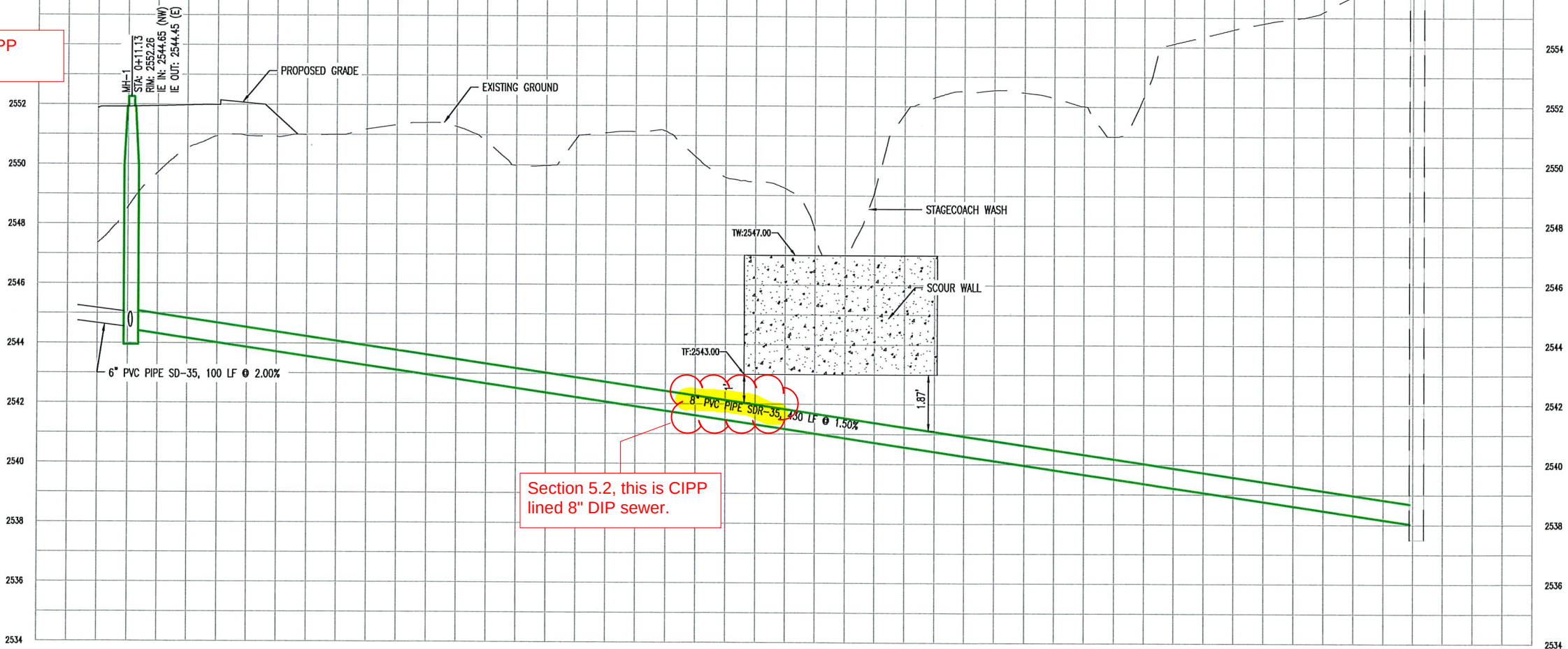
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SEWER CONSTRUCTION NOTES

- 1 FURNISH AND INSTALL 6" PVC-SDR 35 SEWER LINE CONNECTION PER M.A.G. STD. DET. 440-3. S=2% MINIMUM.
- 2 FURNISH AND INSTALL 8" D.I.P. SEWER LINE. LENGTH PER PLAN. S=0.52% MINIMUM.
- 3 FURNISH AND INSTALL CLEAN-OUT PER C.O.S. STD. DET. 2403.
- 4 CONTRACTOR SHALL VERIFY THE LOCATION OF THE EXISTING SANITARY SEWER LINE BEFORE PROCEEDING WITH TRENCHING. CONTRACTOR SHALL CONTACT ENGINEER IF EXISTING SEWER ELEVATION IS HIGHER THAN PROPOSED TIE-IN INVERT PRIOR TO ANY CONSTRUCTION ACTIVITY.
- 5 CONTRACTOR SHALL VERIFY ALL INVERTS AND CLEARANCE OF CROSSING UTILITIES PRIOR TO COMMENCING CONSTRUCTION.
- 6 SAWCUT, REMOVE AND REPLACE EXISTING ASPHALT FOR TRENCHING PER C.O.S. STD. DET. 2200 & 2201 (T-TOP).
- 7 FURNISH AND INSTALL 5' DIAMETER PRECAST CONCRETE SEWER MANHOLE PER M.A.G. STD. DET. 420-1 (NO STEPS) WITH 12 CONCRETE COLLAR PER C.O.S. STD. DET. 2270. 30" WATERTIGHT COVER PER M.A.G. STD. DET. 424-2 AND C.O.S. STD. DET. 2421. CAST-IN-PLACE BASE.
- 8 FURNISH AND INSTALL SEWER CONNECTION PER M.A.G. STD. DET. 440-1.
- 9 FURNISH AND INSTALL 4" PVC-SDR 35 SEWER LINE. S=2% MINIMUM.



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TSG FOUNDATION

**Center for Spiritual
Development**

PIMA RD & STAGECOACH DR, SCOTTSDALE, AZ #Site

Postcode

CLIENT CONTACT

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Cave Creek, AZ 85327

PROJECT NO. 18_077-01
DATE OF ISSUE 01/14/2020

REVISION NO. **DATE**

PROJECT TEAM SEG
DRAWN BY DB

PROJECT PHASE BID SET

SHEET CONTENTS SANITARY PROFILE

SHEET NO. C4.20



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EXHIBIT 4

Fire Hydrant Flow Test

EXHIBIT 5

Model Output

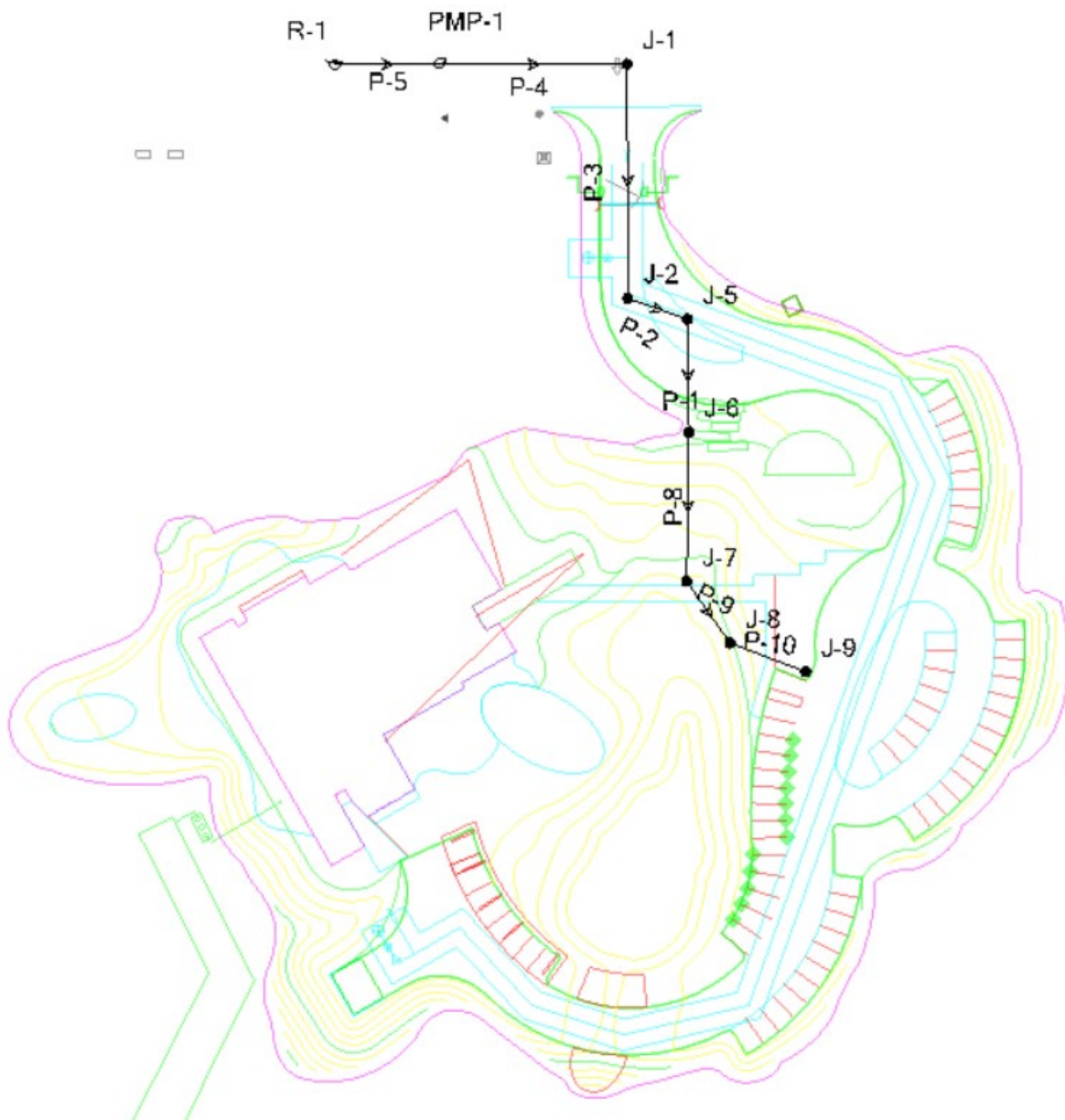


EXHIBIT 5 – MODEL MAP

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	2,560.28	0	2,698.00	60
J-2	2,553.00	0	2,698.00	63
J-5	2,552.00	0	2,698.00	63
J-6	2,556.55	1	2,698.00	61
J-7	2,554.00	0	2,698.00	62
J-8	2,555.00	12	2,698.00	62
J-9	2,555.00	0	2,698.00	62

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Pipe Table

Label	Diameter (in)	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	8.0	59	Ductile Iron	130.0	13	0.08
P-2	8.0	33	Ductile Iron	130.0	13	0.08
P-3	8.0	123	Ductile Iron	130.0	13	0.08
P-4	12.0	1,120	PVC	150.0	13	0.04
P-5	16.0	25	Ductile Iron	130.0	13	0.02
P-8	8.0	78	Ductile Iron	130.0	12	0.08
P-9	8.0	39	Ductile Iron	130.0	12	0.08
P-10	8.0	42	Ductile Iron	130.0	0	0.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Pump Table

Label	Elevation (ft)	Pump Status	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	2,530.00	On	2,532.00	2,698.00	13	166.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	2,532.00	13	2,532.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	2,560.28	0	2,697.99	60
J-2	2,553.00	0	2,697.99	63
J-5	2,552.00	0	2,697.99	63
J-6	2,556.55	1	2,697.98	61
J-7	2,554.00	0	2,697.98	62
J-8	2,555.00	24	2,697.98	62
J-9	2,555.00	0	2,697.98	62

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Pipe Table

Label	Diameter (in)	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	8.0	59	Ductile Iron	130.0	26	0.16
P-2	8.0	33	Ductile Iron	130.0	26	0.16
P-3	8.0	123	Ductile Iron	130.0	26	0.16
P-4	12.0	1,120	PVC	150.0	26	0.07
P-5	16.0	25	Ductile Iron	130.0	26	0.04
P-8	8.0	78	Ductile Iron	130.0	24	0.16
P-9	8.0	39	Ductile Iron	130.0	24	0.16
P-10	8.0	42	Ductile Iron	130.0	0	0.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Pump Table

Label	Elevation (ft)	Pump Status	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	2,530.00	On	2,532.00	2,697.99	26	165.99

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	2,532.00	26	2,532.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	2,560.28	0	2,697.97	60
J-2	2,553.00	0	2,697.96	63
J-5	2,552.00	0	2,697.96	63
J-6	2,556.55	2	2,697.96	61
J-7	2,554.00	0	2,697.95	62
J-8	2,555.00	43	2,697.95	62
J-9	2,555.00	0	2,697.95	62

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Pipe Table

Label	Diameter (in)	Length (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	8.0	59	Ductile Iron	130.0	45	0.29
P-2	8.0	33	Ductile Iron	130.0	45	0.29
P-3	8.0	123	Ductile Iron	130.0	45	0.29
P-4	12.0	1,120	PVC	150.0	45	0.13
P-5	16.0	25	Ductile Iron	130.0	45	0.07
P-8	8.0	78	Ductile Iron	130.0	43	0.27
P-9	8.0	39	Ductile Iron	130.0	43	0.27
P-10	8.0	42	Ductile Iron	130.0	0	0.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Pump Table

Label	Elevation (ft)	Pump Status	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	2,530.00	On	2,532.00	2,697.98	45	165.98

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	2,532.00	45	2,532.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD+Fire

Fire Flow Node FlexTable: Fire Flow Report

Label	Needed Fire Flow (gpm)	MD + Needed Flow (gpm)	Calculated Pressure at Junction (psi)	Total Available Flow at 20 psi (gpm)	Junction w/ Minimum Pressure	Junction Pressure) (psi)	Pipe w/ Maximum Velocity	Pipe Velocity (ft/s)
J-1	1,500	1,500	51	1,501	J-6	53	P-4	4.33
J-2	1,500	1,500	52	1,501	J-6	51	P-3	9.74
J-5	1,500	1,500	52	1,501	J-6	50	P-3	9.74
J-6	1,500	1,501	49	1,502	J-9	50	P-3	9.74
J-7	1,500	1,500	49	1,501	J-9	49	P-3	9.74
J-8	1,500	1,524	48	1,525	J-9	48	P-3	9.74
J-9	1,500	1,500	47	1,501	J-8	48	P-3	9.74

EXHIBIT 6

Sewer Service Calculation

8" Pipe - Peak Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.01500 ft/ft
Diameter	8 in
Discharge	12.0 gal/min

Results

Normal Depth	0.74 in
Flow Area	0.02 ft²
Wetted Perimeter	0.41 ft
Hydraulic Radius	0.47 in
Top Width	0.39 ft
Critical Depth	0.07 ft
Percent Full	9.3 %
Critical Slope	0.00743 ft/ft
Velocity	1.64 ft/s
Velocity Head	0.04 ft
Specific Energy	0.10 ft
Froude Number	1.40
Maximum Discharge	714.52 gal/min
Discharge Full	664.2 gal/min
Slope Full	0.00000 ft/ft
Flow Type	SuperCritical

8" Pipe - d/D = 0.65

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Normal Depth	5.20	in
Diameter	8	in

Results

Discharge	502.4	gal/min
Flow Area	0.24	ft²
Wetted Perimeter	1.25	ft
Hydraulic Radius	2.31	in
Top Width	0.64	ft
Critical Depth	0.50	ft
Percent Full	65.0	%
Critical Slope	0.01023	ft/ft
Velocity	4.66	ft/s
Velocity Head	0.34	ft
Specific Energy	0.77	ft
Froude Number	1.34	
Maximum Discharge	714.52	gal/min
Discharge Full	664.2	gal/min
Slope Full	0.00858	ft/ft
Flow Type	SuperCritical	

8" Pipe - Full Flow Capacity

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Normal Depth	8.00	in
Diameter	8	in
Discharge	664.2	gal/min

Results

Discharge	664.2	gal/min
Normal Depth	8.00	in
Flow Area	0.35	ft²
Wetted Perimeter	2.09	ft
Hydraulic Radius	2.00	in
Top Width	0.00	ft
Critical Depth	0.57	ft
Percent Full	100.0	%
Critical Slope	0.01402	ft/ft
Velocity	4.24	ft/s
Velocity Head	0.28	ft
Specific Energy	0.95	ft
Froude Number	0.00	
Maximum Discharge	714.52	gal/min
Discharge Full	664.2	gal/min
Slope Full	0.01500	ft/ft
Flow Type	SubCritical	

6" Pipe - Peak Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.02000 ft/ft
Diameter	6 in
Discharge	12.0 gal/min

Results

Normal Depth	0.75 in
Flow Area	0.01 ft²
Wetted Perimeter	0.36 ft
Hydraulic Radius	0.47 in
Top Width	0.33 ft
Critical Depth	0.08 ft
Percent Full	12.6 %
Critical Slope	0.00760 ft/ft
Velocity	1.87 ft/s
Velocity Head	0.05 ft
Specific Energy	0.12 ft
Froude Number	1.59
Maximum Discharge	383.10 gal/min
Discharge Full	356.1 gal/min
Slope Full	0.00002 ft/ft
Flow Type	SuperCritical

6" Pipe - d/D = 0.65

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Normal Depth	3.90	in
Diameter	6	in

Results

Discharge	269.4	gal/min
Flow Area	0.14	ft²
Wetted Perimeter	0.94	ft
Hydraulic Radius	1.73	in
Top Width	0.48	ft
Critical Depth	0.39	ft
Percent Full	65.0	%
Critical Slope	0.01234	ft/ft
Velocity	4.44	ft/s
Velocity Head	0.31	ft
Specific Energy	0.63	ft
Froude Number	1.47	
Maximum Discharge	383.10	gal/min
Discharge Full	356.1	gal/min
Slope Full	0.01144	ft/ft
Flow Type	SuperCritical	

6" Pipe - Full Flow Capacity

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

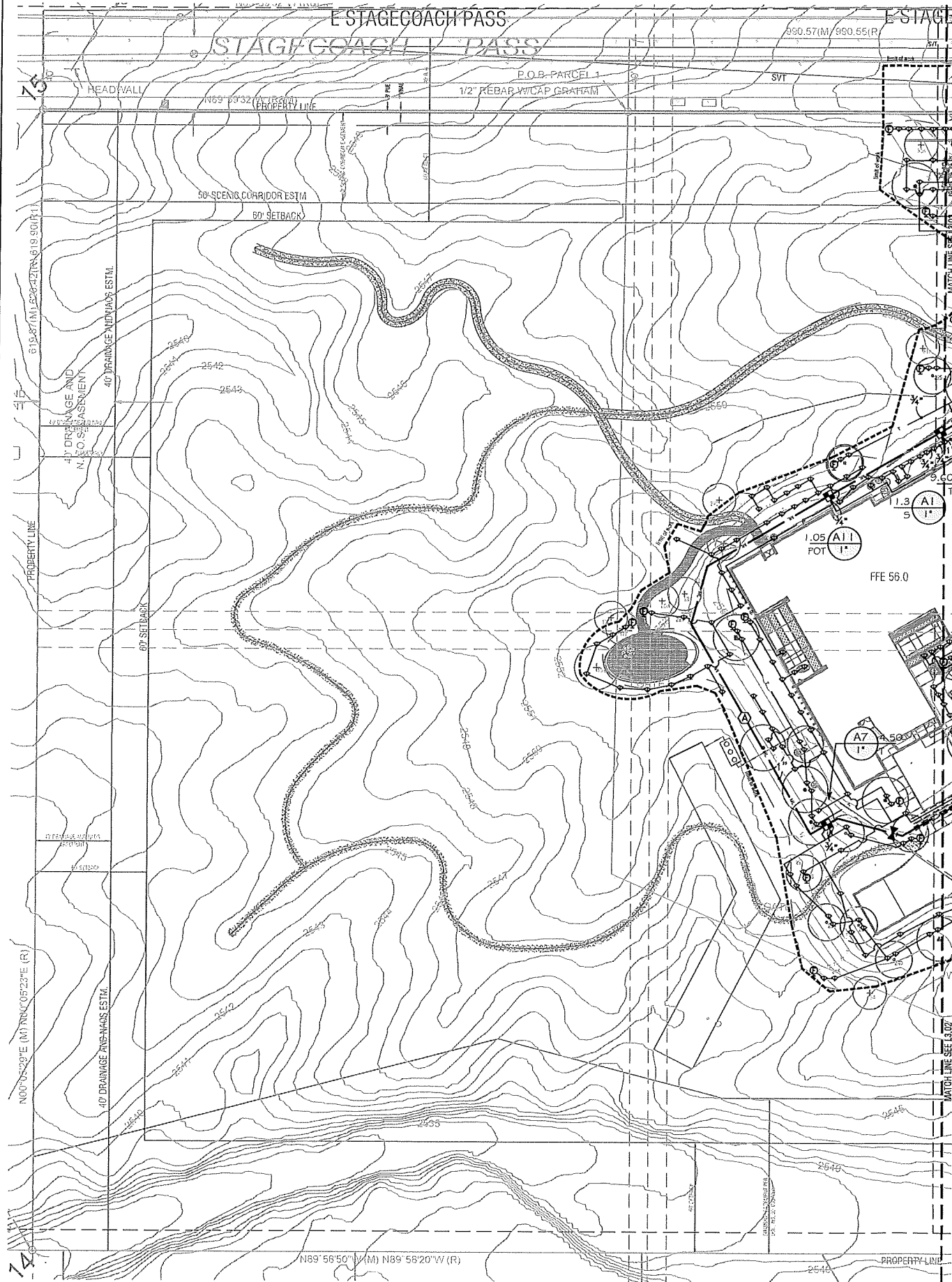
Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Normal Depth	6.00	in
Diameter	6	in
Discharge	356.1	gal/min

Results

Discharge	356.1	gal/min
Normal Depth	6.00	in
Flow Area	0.20	ft²
Wetted Perimeter	1.57	ft
Hydraulic Radius	1.50	in
Top Width	0.00	ft
Critical Depth	0.44	ft
Percent Full	100.0	%
Critical Slope	0.01788	ft/ft
Velocity	4.04	ft/s
Velocity Head	0.25	ft
Specific Energy	0.75	ft
Froude Number	0.00	
Maximum Discharge	383.10	gal/min
Discharge Full	356.1	gal/min
Slope Full	0.02000	ft/ft
Flow Type	SubCritical	

EXHIBIT 7

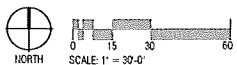
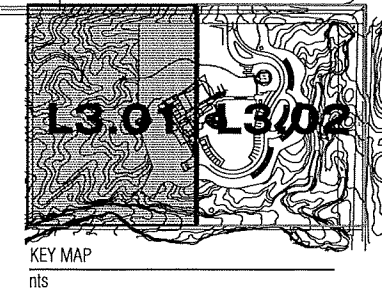
Irrigation Plans



IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION
	Rain Bird XCZ-100-PRB-COM Wide Flow Drip Control Kit for Commercial Applications. 1" Ball Valve with 1" PESB Valve and 1" Pressure Regulating 40psi Quick-Check Basket Filter. 0.3gpm to 20gpm.
	Drip Flush Valve AG Products. 3/4"-B
	Bowsmith ML200 Series Multi-Outlet Emitter Multi Outlet Emitter, six open outlets, 1/2" FPT inlet, 0.6-2.0 gph flows, Green=0.6gph, Blue=1.0gph, Red=2.0gph.
SYMBOL	MANUFACTURER/MODEL/DESCRIPTION
	Nibco T-113-K Class 125 bronze gate shut off valve with cross handle, same size as mainline pipe diameter at valve location. Size Range - 1/4" - 3"
	Air Release Valve 2" Crispin Combination Air and Vacuum Release Valve
	Febco 825Y 1-1/2" Reduced Pressure Backflow Preventer
	Rain Bird ESP12LXMEF-LXMMSS 12 Station Commercial Controller. Stainless Steel Metal Cabinet. Flow Sensing. Mount inside pump station cabinet or on wall of well house.
	Existing Well
	Irrigation Lateral Line: PVC Schedule 40 See Pipe Sizing Detail for Size.
	Irrigation Lateral Line: PVC Schedule 40 See Pipe Sizing Detail for Size.
	Irrigation Mainline: PVC Schedule 40 1" - 3" Diameter
	Pipe Sleeve: PVC Schedule 40 Twice the nominal diameter of the pipe being sleeved.
	Valve Callout Valve Number Valve Flow Valve Type Valve Size
	VALVE TYPE: T=TREE, S=SHRUB, SP=SPRINKLER, TT=TREES IN TURF, P=PALM, A=ANNUALS, ABD=ABANDON

- NOTE:
- Irrigation layout is diagrammatic only. Install all irrigation components in landscape areas. Irrigation is not to be installed in R.O.W.s, P.U.E.s, roadways, hardscape, or home site lots. Adjust irrigation lines to avoid any and all utilities.
 - Contractor to mount controller on interior wall of pump station cabinet or pump building and provide power per manufacturer's specifications.
 - Contractor to verify existing pump and storage equipment is functional prior to irrigation installation.



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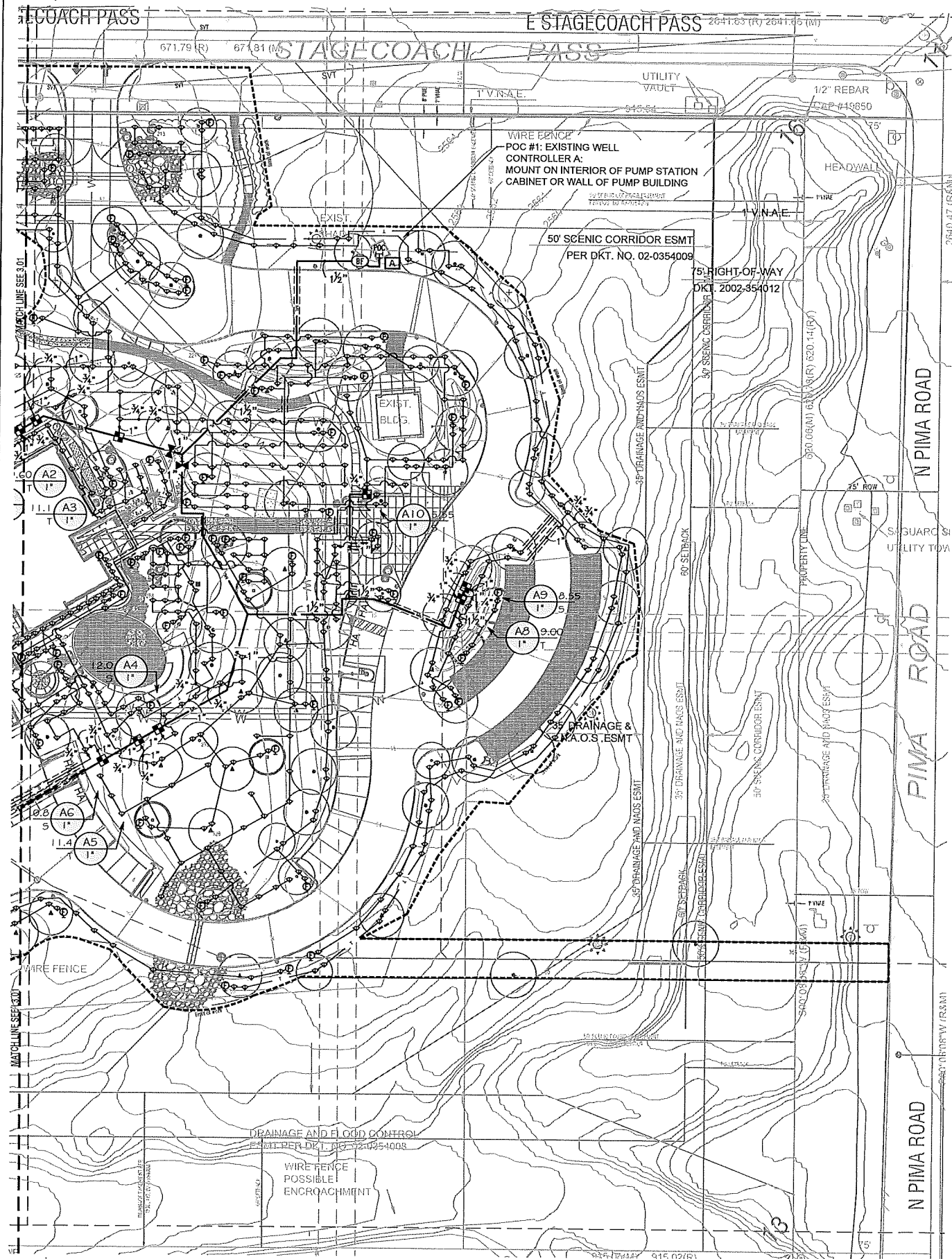
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DATE OF ISSUE 11.08.2019
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PROJECT TEAM **DRAWN BY**
Trueform Team

PROJECT PHASE
cd progress

SHEET CONTENTS
irrigation plan

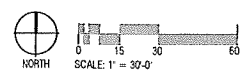
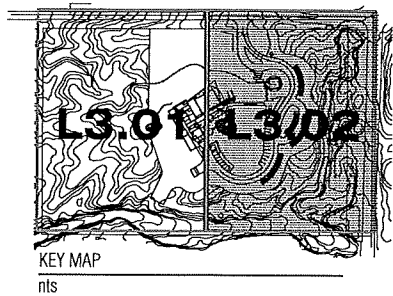
SHEET NO.
L3.01



IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION
	Rain Bird XCZ-100-PRB-COM Wide Flow Drip Control Kit for Commercial Applications. 1" Ball Valve with 1" PESB Valve and 1" Pressure Regulating 40psi Quick-Check Basket Filter. 0.3gpm to 20gpm.
	Drip Flush Valve AG Products. 3/4"-B
	Bowsmith ML200 Series Multi-Outlet Emitter Multi Outlet Emitter, six open outlets, 1/2" FPT inlet, 0.6-2.0 gph flows, Green=0.6gph, Blue=1.0gph, Red=2.0gph.
SYMBOL	MANUFACTURER/MODEL/DESCRIPTION
	Nibco T-113-K Class 125 bronze gate shut off valve with cross handle, same size as mainline pipe diameter at valve location. Size Range - 1/4" - 3"
	Air Release Valve 2" Crispin Combination Air and Vacuum Release Valve
	Febco 825Y 1-1/2" Reduced Pressure Backflow Preventer
	Rain Bird ESP12LXMEF-LXMMSS 12 Station Commercial Controller. Stainless Steel Metal Cabinet. Flow Sensing. Mount inside pump station cabinet or on wall of well house.
	Existing Well
	Irrigation Lateral Line: PVC Schedule 40 See Pipe Sizing Detail for Size.
	Irrigation Lateral Line: PVC Schedule 40 See Pipe Sizing Detail for Size.
	Irrigation Mainline: PVC Schedule 40 1" - 3" Diameter
	Pipe Sleeve: PVC Schedule 40 Twice the nominal diameter of the pipe being sleeved.
	Valve Callout Valve Number Valve Flow Valve Type Valve Size
	VALVE TYPE: T=FREE, S=SHRUB, SP=SPRINKLER, TT=TREES IN TURF, P=PALM, A=ANNUALS, ABD=ABANDON

- NOTE:
- Irrigation layout is diagrammatic only. Install all irrigation components in landscape areas. Irrigation is not to be installed in R.O.W.s, P.U.E.s, roadways, hardscape, or home site lots. Adjust irrigation lines to avoid any and all utilities.
 - Contractor to mount controller on interior wall of pump station cabinet or pump building and provide power per manufacturer's specifications.
 - Contractor to verify existing pump and storage equipment is functional prior to irrigation installation.



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PROJECT NO. 18_077-01 DATE OF ISSUE 11.08.2019
REVISION NO. DATE

PROJECT TEAM DRAWN BY
Trueform Team

PROJECT PHASE
cd progress

SHEET CONTENTS
irrigation plan

SHEET NO.

L3.02

PRELIMINARY MASTER/BASIS OF DESIGN REPORT WATER & SEWER

TSG FOUNDATION

SWC OF STAGECOACH PASS ROAD AND PIMA ROAD

Scottsdale, AZ

Prepared For:

PRELIMINARY Basis of Design Report

- ☐ ACCEPTED
☐ ACCEPTED AS NOTED
☒ REVISE AND RESUBMIT



Disclaimer: If accepted; the preliminary approval is granted under the condition that a final basis of design report will also be submitted for city review and approval (typically during the DR or PP case). The final report shall incorporate further water or sewer design and analysis requirements as defined in the city design standards and policy manual and address those items noted in the preliminary review comments (both separate and included herein). The final report shall be submitted and approved prior to the plan review submission.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY rrahman

DATE 11/20/2018

Orcutt Winslow
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Phoenix, AZ 85012
602.257.1764

Prepared by:



EXPIRES 12-31-18



Sustainability Engineering Group

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480.588.7226 www.azSEG.com

Project Number: 180333

Date: 11-02-2018

Pre-App No.: 513-PA-2017

Plan Check No.: TB

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4.4 SUMMARY NARRATIVE OF DEMANDS	3
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5.1 PREVIOUS MASTER PLANS	4
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EXPIRES 12-31-18

Per DSPM Section 7-1.400, needs to extend sewer if within 660-ft of active sewer system. Based on the location of the building, it appears that a gravity sewer can be constructed and discharged to Pima Rd Sewer through an existing sewer easement.

1. EXECUTIVE SUMMARY

The proposed development consists of 13 acres of residential land located at the Southwest corner of Stagecoach Pass Road and Pima Road. The Site is bounded by:

- Adjoining neighboring property owners at the west and south boundaries
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Refer to **EXHIBIT 1 – Vicinity Map**.

The property is presently zoned R1-35 ESL.

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Wastewater service will be provided by an onsite wastewater treatment system. The effluent will be used as subsurface irrigation for onsite landscaping.

All water and sewer improvements will be designed and constructed to the most recent City of Scottsdale and MCESD design standards and policies.

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The purpose of this report is to provide information and calculations defining the water and sewer system design. Preparation of this report has been done in accordance with Chapters 6 and Chapter 7 of the City's Design Standards & Policies Manual.

2.2 SITE LOCATION

The 13.04 acres of the subject property consists of a public R.O.W and thirteen separate but contiguous parcels whose APN's are:

- 216-34-316 (Lot 1)
- 216-34-317 (Lot 2)
- 216-34-318 (Lot 3)
- 216-34-319 (Lot 4)
- 216-34-320 (Lot 5)
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- 216-34-325 (Lot 10)
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- 216-34-327 (Tract A)
- 216-34-328 (Lot B)

2.3 PROPOSED DEVELOPMENT

2.3.1 Existing Site Description:

This site is open desert land with one single structure and generally slopes from the northeast (elevation 2,564 +/-) to the southwest (elevation 2,531 +/-) at approximately 3.5% with a change in elevation of 33 feet.

The City of Scottsdale Water & Sewer Quarter Section Map (60-48) shows water mains and Sewer lines in East Stagecoach Pass and North Pima Rd as follows:

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- An 8" TYP UNK RWDS Non-portable water line exists in East Stagecoach Pass, 25' south to the road centerline.
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- A 24" SCP potable water line exists to the east in North Pima Road, 81' east of the road centerline.
- 12" DIP Non-portable water line, 12" TYP UNK Non-portable water line, and 16" TYP UNK Non-portable water line exist to the east in North Pima Road, 50', 32', and 15' east to the road centerline.
- A 21" PVC gravity sewer main exists to the east in North Pima Road, 48' east of the road centerline.

Refer to **EXHIBIT 2** for the COS Water **Quarter Section Map (60-48)**.

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The existing site will be re-platted and developed with a new building for office use and a parking lot. Refer to **EXHIBIT 3** for the Preliminary Utility Plans and site plan. Domestic water and fire service will be provided by connecting to a 12" water located in East Stagecoach Pass and extending a public line onto the site.

An existing onsite well is to be retained for additional landscape irrigation use.

To achieve LEED® points, this project will incorporate an advanced on-site wastewater treatment system as preliminarily approved by Mr. Scott Anderson, a City of Scottsdale Water Resources Engineer, for this site.

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3. DESIGN CRITERIA

3.1 DEVELOPMENT CRITERIA

Proposed zoning: R1-35 ESL

Acreage: 13.04

Demands, system layout, system pressures, velocities, head losses and fire flow will all be in accordance with the City's DS&PM (References 2 and 3 in Sec. 11).

A 1,500 gpm system fire flow demand will be utilized in hydraulic calculations submitted with the Final Basis of Design Report.

4. DEMANDS

4.1 PROPOSED DEMANDS

Refer to the tables below for the proposed (R1-35 ESL PRD) water and sewer demand calculations in gallons per minute based on design criteria in the City's DS&PM.

Table 1: WATER DEMAND CALCULATIONS

	Area (sf)	Avg. Day Demand (GPM/SF)	Max Day Peaking Factor	Peak Hour Peaking Factor	Avg. Day Demand (GPM)	Max. Day Demand (GPM)	Peak Hour Demand (GPM)
Office	14,588	8.34E-04	2	3.5	12	24	43

Table 2 - SEWER DEMAND CALCULATIONS

	Area (sf)	Avg. Day Demand (gal/day/sf)	Avg. Day Demand (GPD)	Peaking Factor	Peak Flow (GPM)
Office	14,588	0.4	5,835	3	12

Per DSPM Section 6-1.201, a fire hydrant flow test is required.

4.2 WATER ZONE

According to the City of Scottsdale DS&PM Sec. 6-1, the site is within Zone 11N. The hydraulic grade will be established by a PRV located at the intersection of East Stagecoach Pass and North Pima Road. A fire hydrant flow test will be provided in the final report.

4.3 PHASING OF PROJECT

Currently, the project is anticipated to be constructed in a single phase. Should this change, later reports will be updated and submitted for review. Final Basis of Design Reports must be accepted by the Water Resources Department prior to the submittal of improvement plans to the City's 1-Stop Shop.

4.4 SUMMARY NARRATIVE OF DEMANDS

- The max day + fire flow scenario will govern the water system design.
- No offsite sewer flow impacts this site.

5. EXISTING INFRASTRUCTURE / CONDITIONS

5.1 PREVIOUS DESIGN REPORTS

A basis of design report may have been prepared for the Bellezza da Stallone plat.

5.2 EXISTING INFRASTRUCTURE

Water is available for connection at East Stagecoach Pass.

Per DSPM Section 6-1.201, a fire hydrant flow test is required. Show preliminary hydraulic analysis based on the fire hydrant flow test.

6. PROPOSED INFRASTRUCTURE

6.1 WATER DISTRIBUTION SYSTEM

This project proposes an 8" DIP line connecting to the 12" line in East Stagecoach Pass. City mapping shows this PRV at elevation 2561.51 with a pressure setting of 50 psi. Refer to **EXHIBIT 3** for the proposed site and utility plan. For onsite water distribution system, the site will be sole sourced off the East Stagecoach Pass line and will have a static pressure around 56 psi.

A fire hydrant flow test has been ordered for the Zone 11 system to confirm the available flow and pressures. **EXHIBIT 4** illustrates preliminary pressure with a fire flow.

6.2 SEWER COLLECTION SYSTEM

An onsite wastewater treatment system will be placed to collect and treat the onsite sewer, and ultimately reuse the water for subsurface irrigation. The selection and installation of an onsite wastewater treatment system will follow the ADEQ regulation TITLE 18. Environmental Quality, Chapter 9. Water Pollution Control, Article 3. Aquifer Protection Permits – General Permits, Part A. General Provisions. Three types of treatment system are now in consideration: 1. *ES6* from *MicroSepTic®*, *AdvanTex AX20* from *Orenco Systems®*, and *ATS-8-AC/BC* from *Quanics Engineering Water Solution®*. Further detail will be provided in final water and sewer report.

6.3 MAINTENANCE AND OWNERSHIP

The water line is proposed as public, owned and maintained by the City, located within a 20-foot wide water easement .

7. WATER COMPUTATIONS

7.1 DESCRIPTION OF MODEL

The new water system will be designed to meet the criteria of COS Water, the Arizona Department of Environmental Quality ("ADEQ"), and Maricopa County Environmental Services Department ("MCESD").

Bentley WaterCAD® Version 8i will be used in the final Design Report to model the water extension and demand scenarios.

Per DSPM Section 7-1.400, needs to extend sewer if within 660-ft of active sewer system. Based on the location of the building, it appears that a gravity sewer can be constructed and discharged to Pima Rd Sewer through an existing sewer easement.

8. SEWER COMPUTATIONS

8.1 DESCRIPTION

The onsite wastewater system will be designed and detailed compliant with MCESD and the manufacturer's guidelines and requirements.

9. SUMMARY / CONCLUSIONS

- Sufficient city water supply is available to support domestic and fire flow demand of this project.
- Wastewater will be processed through an onsite wastewater treatment system with subsurface effluent disposal.

10. REFERENCES

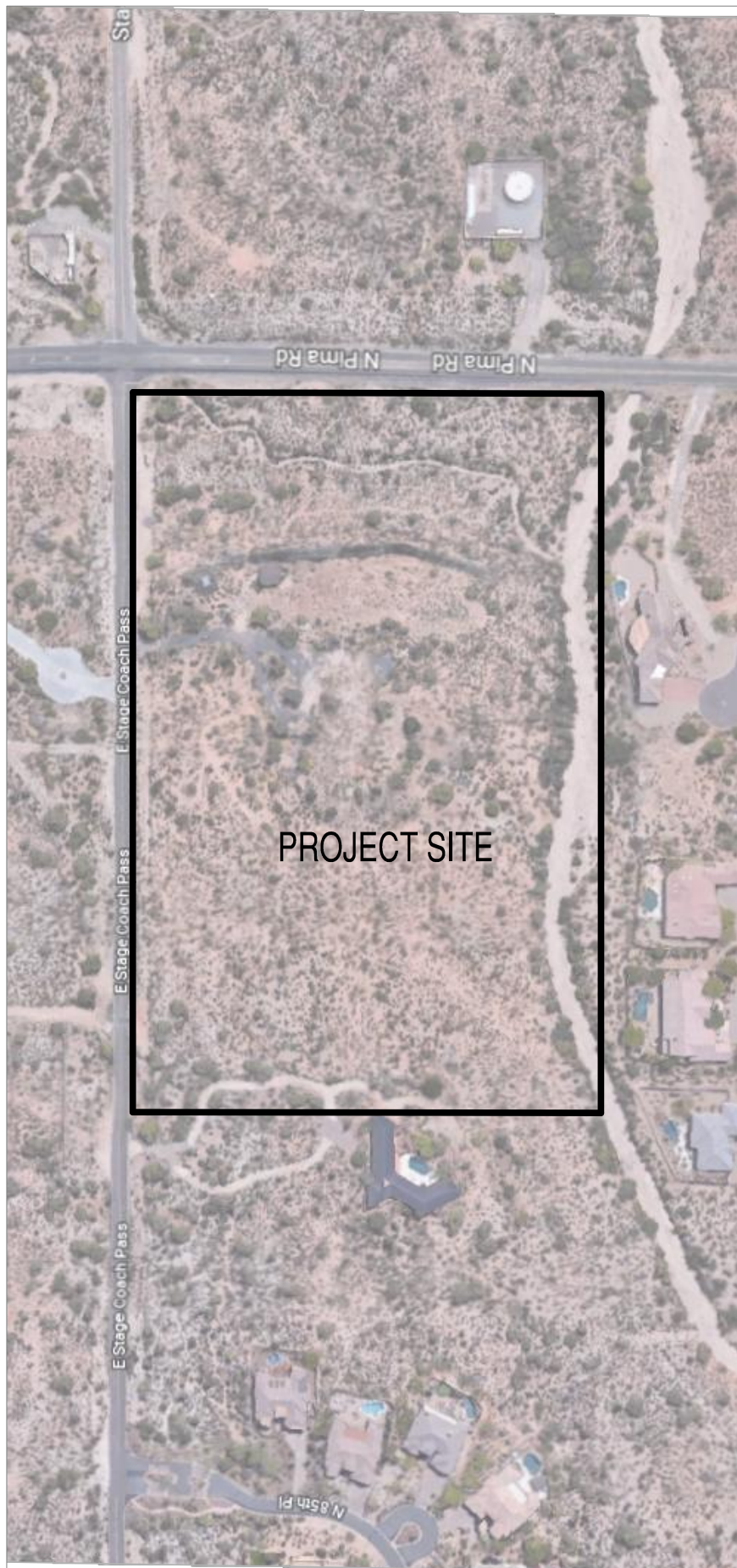
1. COS QS numbers 60-48, 61-49
2. City of Scottsdale Design Standards & Policies Manual, 2018 (Chapter 6 – Water).
3. City of Scottsdale Design Standards & Policies Manual, 2018 (Chapter 7 – Wastewater)

11. EXHIBITS:

- EXHIBIT 1 - VICINITY MAP – CONTEXT AERIAL
- EXHIBIT 2 - Q-S MAPS 60-48, 61-49
- EXHIBIT 3 - Utility Plan
- EXHIBIT 4 - Fire Flow Calculation

EXHIBIT 1

Vicinity Map



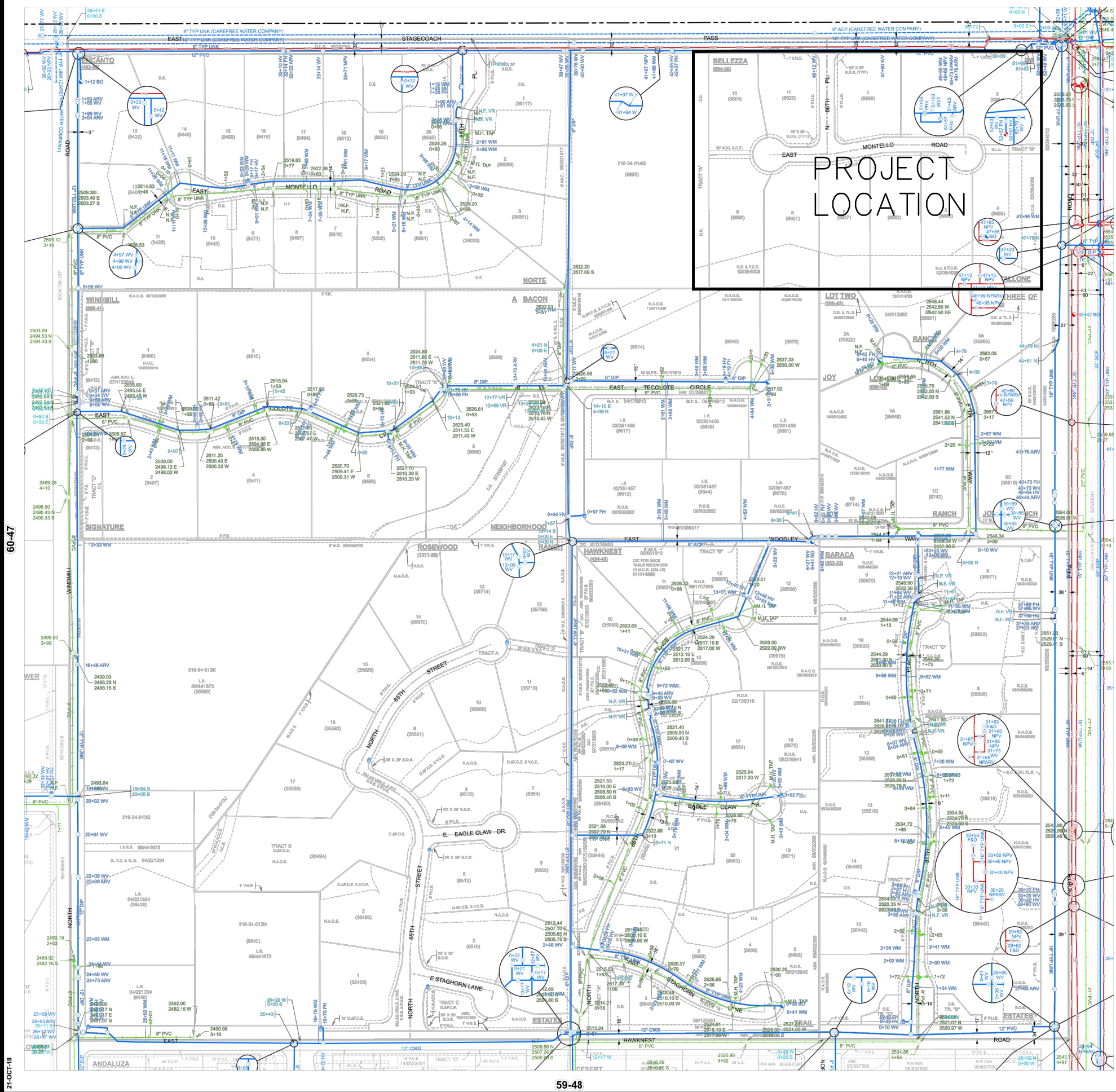
N.T.S



EXHIBIT 1
VICINITY MAP

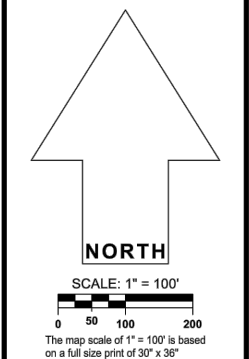
EXHIBIT 2

Q-S Map



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

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



WATER & SEWER
QUARTER SECTION MAP
60-48
NE 1/4 SEC. 1 T5N R4E

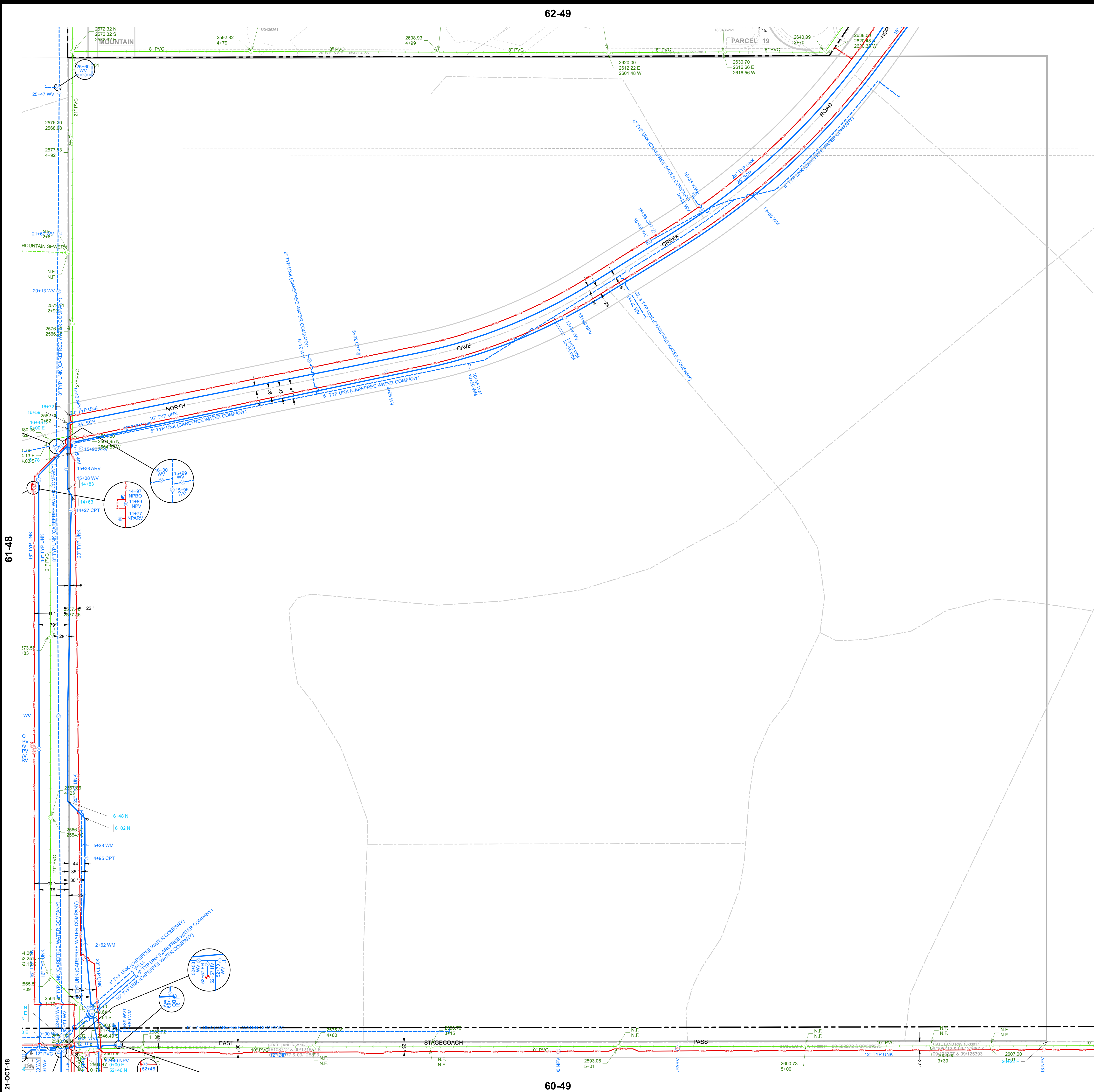
CITY OF SCOTTSDALE
SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS
3628 North Drinkwater Boulevard
Scottsdale, Arizona 85251

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THE CITY OF SCOTTSDALE

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Sewer Cleanout	
Sewer Lift Station	
Sewer Treatment Plant	
Sewer Main - Gravity	
Sewer Main - Force	
Non-Scottsdale Sewer Main	
Sewer Service	

VICINITY MAP

NORTH

SCALE: 1" = 100'

0 50 100 200

The map scale of 1" = 100' is based on a full size print of 30" x 36"

WATER & SEWER

QUARTER SECTION MAP

61-49

SW 1/4 SEC. 31 T6N R5E

EXHIBIT 3

Preliminary Utility Plan

Per DSPM Section 7-1.400 and SRC, Section 49-224, requires sewer improvements along all frontages. However, sewer line construction along Stage Coach Pass Rd is waived as the existing topo does not allow gravity flow to Pima Rd Sewer.

COS Std Dtl 2345-1 & 2345-2 is for 3"-6" meter connections. Std Dtl 2330 is for up to 2" meter connection.

LEGEND:

- PROPERTY LINE
--- 8"W WATER LINE
--- WATER EASEMENT
● FIRE HYDRANT
□ WATER METER
▲ REDUCER

WATER LINE CONSTRUCTION NOTES:

- FURNISH AND INSTALL 1" WATER SERVICE/METER BOX PER C.O.S. STD. DET. 2345-1 & 2345-2.
- FURNISH AND INSTALL 1" BACKFLOW PREVENTION DEVICE PER C.O.S. STD. DET. 2351 & 2356.
- FURNISH AND INSTALL 12"x8" TAPPING SLEEVE, VALVE BOX & COVER PER M.A.G. STD. DET. 340 AND 391-1 TYPE "A"
- FURNISH AND INSTALL 8" DUCTILE IRON PIPE, CLASS 350, WITH MEGA-LUG MECHANICAL JOINT RESTRAINT PER M.A.G. STD. DET. 303-1 AND 303-2, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN. PROVIDE BLUE POLYETHYLENE LOCATING TAPE ABOVE ALL PUBLIC WATER LINES. MAINTAIN 3' MINIMUM COVER.
- FURNISH AND INSTALL 8" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DET. 2397
- FURNISH AND INSTALL FIRE HYDRANT (COMPLETE WITH GATE VALVE, BOX & COVER) PER M.A.G. STD. DET. 360. PROVIDE PAVEMENT MARKER (PM) PER C.O.S. STD. DET. 2363.
- FURNISH AND INSTALL 6" DUCTILE IRON PIPE, CLASS 350, WITH MEGA-LUG MECHANICAL JOINT RESTRAINT PER M.A.G. STD. DET. 303-1 AND 303-2, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN. PROVIDE BLUE POLYETHYLENE LOCATING TAPE ABOVE ALL PUBLIC WATER LINES. MAINTAIN 3' MINIMUM COVER.
- 8"x6" TEE.
- 8"x6" REDUCER.

SEWER CONSTRUCTION NOTES

- FURNISH AND INSTALL 2,500 GAL SEPTIC TANK.
- PROVIDE 4,000 SF LEACH FIELD AREA

NOTE: ULTIMATE SIZING AND LOCATION TO BE PROVIDED IN FINAL B.O.D REPORT.

Per DSPM Section 7-1.400, needs to extend sewer if within 660-ft of active sewer system. Based on the location of the building, it appears that a gravity sewer can be constructed and discharged to Pima Rd Sewer through an existing sewer easement.

Per DSPM Section 6-1.408 fittings installed into ACP or PVC pipe within 6-feet of another fitting or joint will require that section of pipe to be removed and replaced with DIP.

COS Std Dtl 2351 for 3"-10" BFPs.

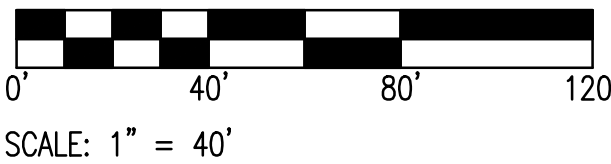
Show fire line per DSPM Section 6-1.201. Coordinate with fire department on fire line size and location.

DRAINAGE EASEMENT PER DOC. NO. 02-0354008

50' SCENIC COORIDOR EASEMENT PER DOC. NO. 02-0354009

35' DRAINAGE AND NAOS EASEMENT

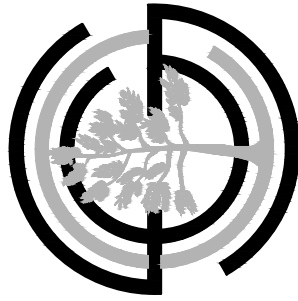
40' DRAINAGE AND NAOS EASEMENT



NOTE TO CONTRACTORS:
THIS SET OF DRAWINGS AND DOCUMENTS IS INTENDED AS A SET OF GUIDELINES FOR THE PROJECT AND ARE INTENDED TO BE USED IN CONJUNCTION WITH A SET OF CONSTRUCTION SPECIFICATIONS TO BE SUPPLIED BY OWNER. THEY MUST BE READ TO INCORPORATE ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES INCLUDING FEDERAL, A.I.A. REQUIREMENTS. THIS SET ASSUMES THAT THERE ARE NO UNUSUAL SOIL CONDITIONS OR WIND LOADS. THE FAILURE OF THIS CONSTRUCTION MAY REQUIRE SIGNING ANY CHANGES TO THESE DOCUMENTS. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO COMPLY WITH ALL APPLICABLE CODES AND TO INFORM THE OWNER/ARCHITECTS OF ANY QUESTIONS OR CLARIFICATIONS WHICH ARE DESIRED. CONTRACTORS SHALL ALSO VISIT THE SITE BEFORE BIDDING. CONTRACTORS ARE REQUIRED TO KNOW ALL OBSERVABLE CONDITIONS AND APPLICABLE CODES.

PRELIMINARY
NOT FOR
CONSTRUCTION

SUSTAINABILITY
ENGINEERING
GROUP



orcutt|winslow

PROJECT
TSC FOUNDATION
PIMA

DRAWN
DESIGNED
CHECKED
PROJ. MGR
CULVER
CULVER
COUNSELL
FAKIH

DATE: 11-02-2018

ISSUED FOR:
PRELIM DESIGN

REVISION NO.:	DATE:
△	
△	
△	

JOB NO.: 180333

SHEET TITLE:

PRELIMINARY UTILITY PLAN

SHEET NO.:
C4.00

THIS DRAWING IS AN INSTRUMENT OF SERVICE AND THE PROPERTY OF SUSTAINABILITY ENGINEERING GROUP, AND SHALL REMAIN THEIR PROPERTY. THE USE OF THIS DRAWING SHALL BE RESTRICTED TO THE ORIGINAL SITE FOR WHICH IT IS PREPARED AND PUBLICATION THEREOF IS EXPRESSLY LIMITED TO SUCH USE.

EXHIBIT 4

Fire Flow Calculation

TSG Fire FLOW

Project Description

Friction Method Hazen-Williams Formula
Solve For Pressure at 2

Input Data

Pressure 1	50.00	psi
Elevation 1	2561.00	ft
Elevation 2	2545.00	ft
Length	750.00	ft
Roughness Coefficient	130.000	
Diameter	8	in
Discharge	1500.00	gpm

Results

Pressure 2	44.35	psi
Headloss	29.04	ft
Energy Grade 1	2677.75	ft
Energy Grade 2	2648.71	ft
Hydraulic Grade 1	2676.33	ft
Hydraulic Grade 2	2647.29	ft
Flow Area	0.35	ft ²
Wetted Perimeter	2.09	ft
Velocity	9.57	ft/s
Velocity Head	1.42	ft
Friction Slope	0.03872	ft/ft

PRELIMINARY MASTER/BASIS OF DESIGN REPORT WATER & SEWER

TSG FOUNDATION

SWC OF STAGECOACH PASS ROAD AND PIMA ROAD

Scottsdale, AZ

Prepared For:

Orcutt Winslow

2929 N Central Ave,
Phoenix, AZ 85012
602.257.1764

Prepared by:



EXPIRES 12-31-18



Sustainability Engineering Group

8280 E. Gelding Drive, Suite 101

Scottsdale, AZ 85260

480.588.7226 www.azSEG.com

Project Number: 180333

Date: 11-02-2018

Pre-Ap No.: 513-PA-2017

Plan Check No.: TB

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EXPIRES 12-31-18

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- Adjoining neighboring property owners at the west and south boundaries
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- East Stagecoach Pass Road to the north

Refer to **EXHIBIT 1 – Vicinity Map**.

The property is presently zoned R1-35 ESL.

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2.3.1 Existing Site Description:

This site is open desert land with one single structure and generally slopes from the northeast (elevation 2,564 +/-) to the southwest (elevation 2,531 +/-) at approximately 3.5% with a change in elevation of 33 feet.

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- An 8" TYP UNK RWDS Non-portable water line exists in East Stagecoach Pass, 25' south to the road centerline.
- A 16" TYP UNK potable water main exists to the east in North Pima Road, 20' west of the road centerline.
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- 12" DIP Non-portable water line, 12" TYP UNK Non-portable water line, and 16" TYP UNK Non-portable water line exist to the east in North Pima Road, 50', 32', and 15' east to the road centerline.
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3.1 DEVELOPMENT CRITERIA

Proposed zoning: R1-35 ESL

Acreage: 13.04

Demands, system layout, system pressures, velocities, head losses and fire flow will all be in accordance with the City's DS&PM (References 2 and 3 in Sec. 11).

A 1,500 gpm system fire flow demand will be utilized in hydraulic calculations submitted with the Final Basis of Design Report.

4. DEMANDS

4.1 PROPOSED DEMANDS

Refer to the tables below for the proposed (R1-35 ESL PRD) water and sewer demand calculations in gallons per minute based on design criteria in the City's DS&PM.

Table 1: WATER DEMAND CALCULATIONS

	Area (sf)	Avg. Day Demand (GPM/SF)	Max Day Peaking Factor	Peak Hour Peaking Factor	Avg. Day Demand (GPM)	Max. Day Demand (GPM)	Peak Hour Demand (GPM)
Office	14,588	8.34E-04	2	3.5	12	24	43

Table 2 - SEWER DEMAND CALCULATIONS

	Area (sf)	Avg. Day Demand (gal/day/sf)	Avg. Day Demand (GPD)	Peaking Factor	Peak Flow (GPM)
Office	14,588	0.4	5,835	3	12

4.2 WATER ZONE

According to the City of Scottsdale DS&PM Sec. 6-1, the site is within Zone 11N. The hydraulic grade will be established by a PRV located at the intersection of East Stagecoach Pass and North Pima Road. A fire hydrant flow test will be provided in the final report.

4.3 PHASING OF PROJECT

Currently, the project is anticipated to be constructed in a single phase. Should this change, later reports will be updated and submitted for review. Final Basis of Design Reports must be accepted by the Water Resources Department prior to the submittal of improvement plans to the City's 1-Stop Shop.

4.4 SUMMARY NARRATIVE OF DEMANDS

- The max day + fire flow scenario will govern the water system design.
- No offsite sewer flow impacts this site.

5. EXISTING INFRASTRUCTURE / CONDITIONS

5.1 PREVIOUS DESIGN REPORTS

A basis of design report may have been prepared for the Bellezza da Stallone plat.

5.2 EXISTING INFRASTRUCTURE

Water is available for connection at East Stagecoach Pass.

6. PROPOSED INFRASTRUCTURE

6.1 WATER DISTRIBUTION SYSTEM

This project proposes an 8" DIP line connecting to the 12" line in East Stagecoach Pass. City mapping shows this PRV at elevation 2561.51 with a pressure setting of 50 psi. Refer to **EXHIBIT 3** for the proposed site and utility plan. For onsite water distribution system, the site will be sole sourced off the East Stagecoach Pass line and will have a static pressure around 56 psi.

A fire hydrant flow test has been ordered for the Zone 11 system to confirm the available flow and pressures. **EXHIBIT 4** illustrates preliminary pressure with a fire flow.

6.2 SEWER COLLECTION SYSTEM

An onsite wastewater treatment system will be placed to collect and treat the onsite sewer, and ultimately reuse the water for subsurface irrigation. The selection and installation of an onsite wastewater treatment system will follow the ADEQ regulation TITLE 18. Environmental Quality, Chapter 9. Water Pollution Control, Article 3. Aquifer Protection Permits – General Permits, Part A. General Provisions. Three types of treatment system are now in consideration: 1. *ES6* from *MicroSepTic®*, *AdvanTex AX20* from *Orenco Systems®*, and *ATS-8-AC/BC* from *Quanics Engineering Water Solution®*. Further detail will be provided in final water and sewer report.

6.3 MAINTENANCE AND OWNERSHIP

The water line is proposed as public, owned and maintained by the City, located within a 20-foot wide water easement .

7. WATER COMPUTATIONS

7.1 DESCRIPTION OF MODEL

The new water system will be designed to meet the criteria of COS Water, the Arizona Department of Environmental Quality ("ADEQ"), and Maricopa County Environmental Services Department ("MCESD").

Bentley WaterCAD® Version 8i will be used in the final Design Report to model the water extension and demand scenarios.

8. SEWER COMPUTATIONS

8.1 DESCRIPTION

The onsite wastewater system will be designed and detailed compliant with MCESD and the manufacturer's guidelines and requirements.

9. SUMMARY / CONCLUSIONS

- Sufficient city water supply is available to support domestic and fire flow demand of this project.
- Wastewater will be processed through an onsite wastewater treatment system with subsurface effluent disposal.

10. REFERENCES

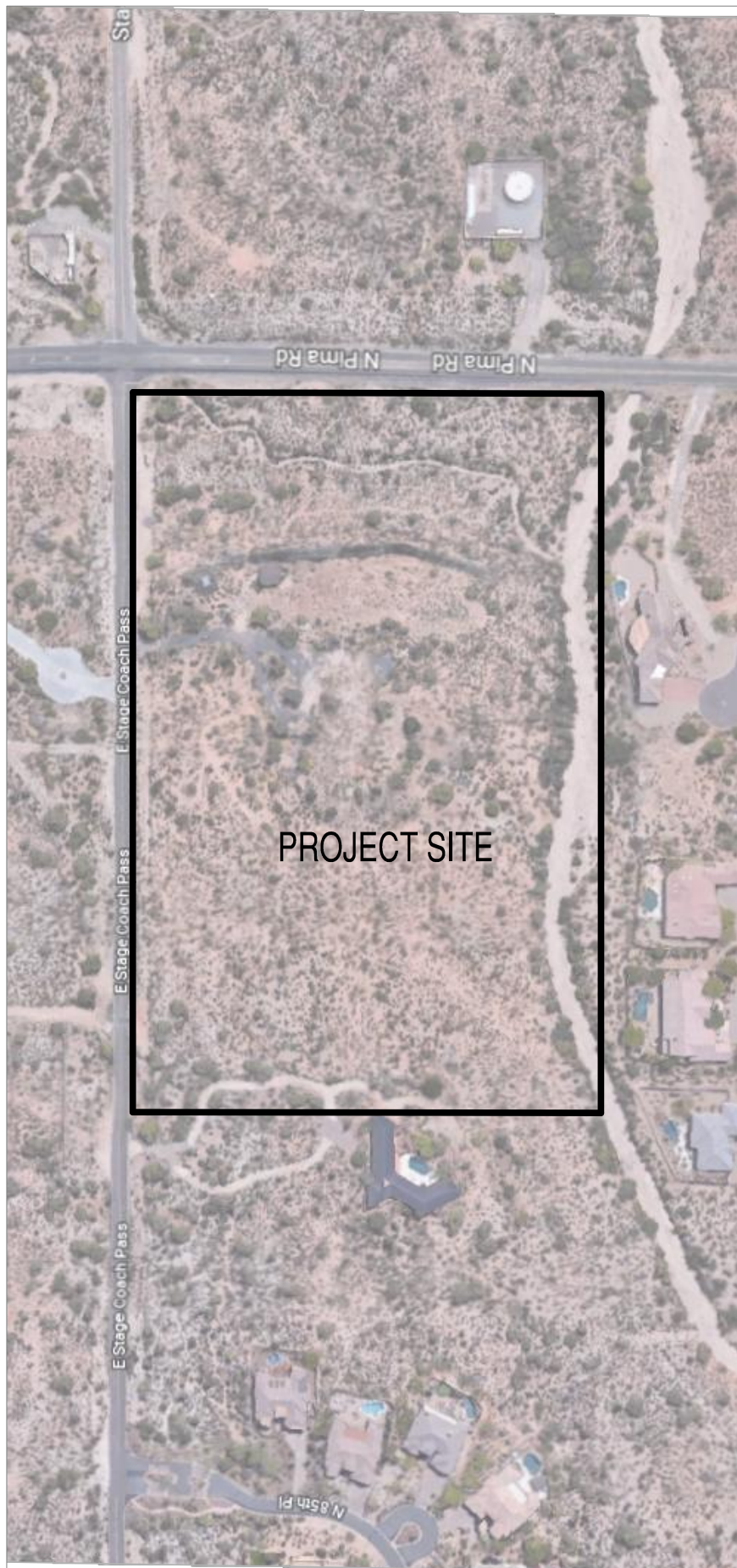
1. COS QS numbers 60-48, 61-49
2. City of Scottsdale Design Standards & Policies Manual, 2018 (Chapter 6 – Water).
3. City of Scottsdale Design Standards & Policies Manual, 2018 (Chapter 7 – Wastewater)

11. EXHIBITS:

- EXHIBIT 1 - VICINITY MAP – CONTEXT AERIAL
- EXHIBIT 2 - Q-S MAPS 60-48, 61-49
- EXHIBIT 3 - Utility Plan
- EXHIBIT 4 - Fire Flow Calculation

EXHIBIT 1

Vicinity Map



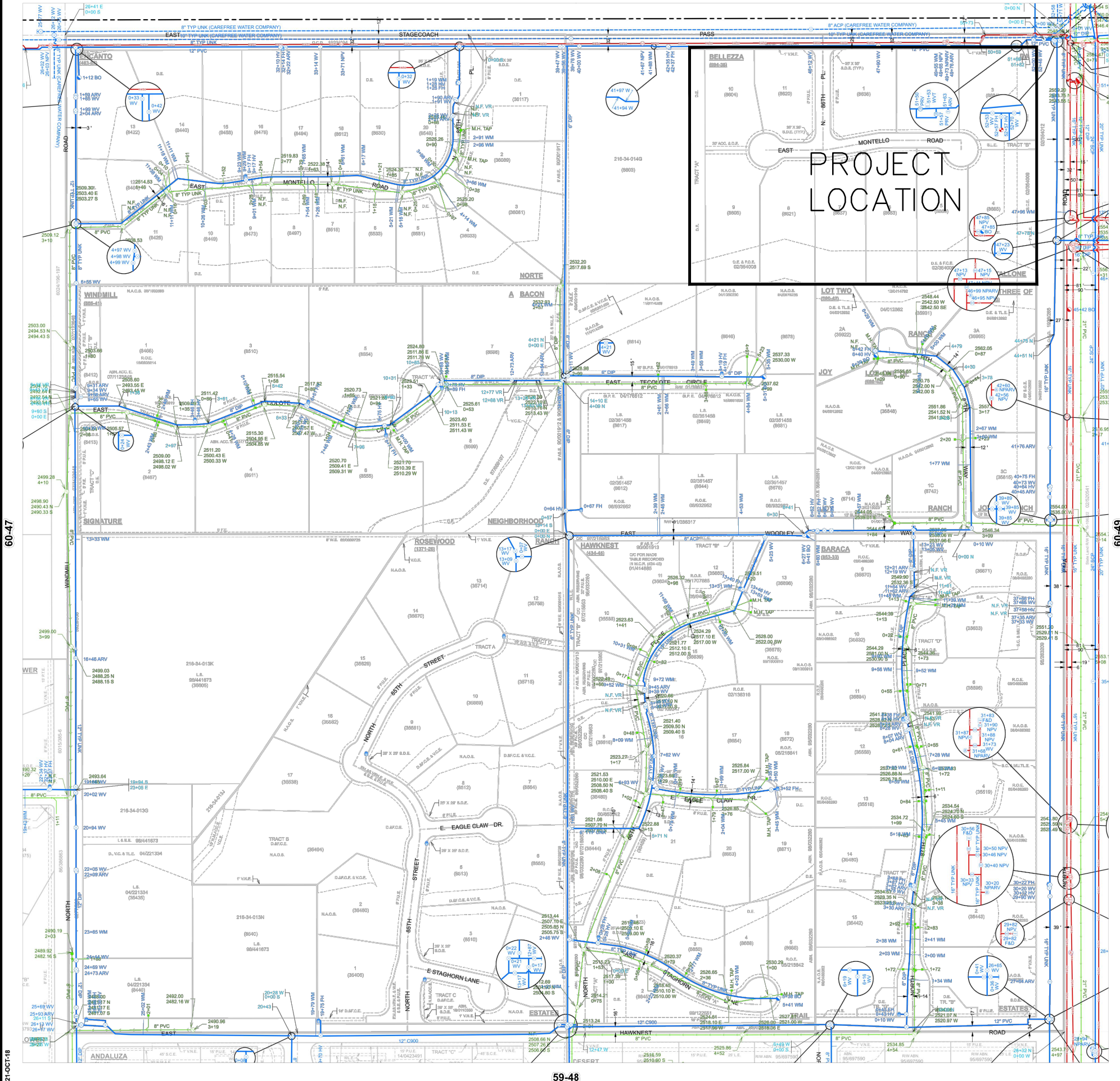
N.T.S



EXHIBIT 1
VICINITY MAP

EXHIBIT 2

Q-S Map

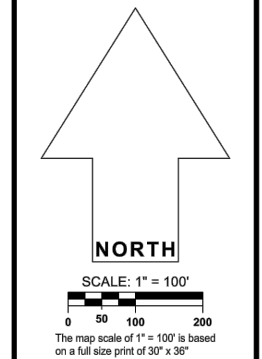
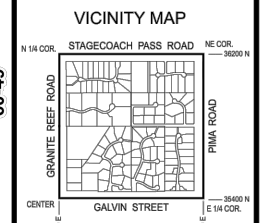


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LEGEND:

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



WATER & SEWER

QUARTER SECTION MAP

60-48

NE 1/4 SEC. 1 T5N R4E

CITY OF SCOTTSDALE

SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS

3628 North Drinkwater Boulevard
Scottsdale, Arizona 85251

NOTICE

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THE CITY OF SCOTTSDALE

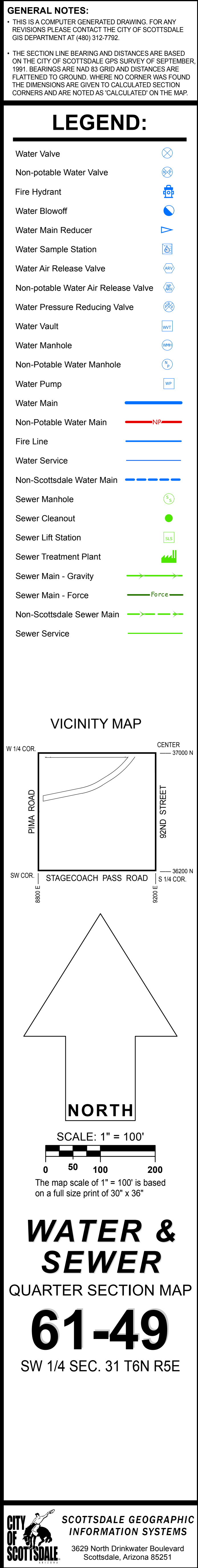
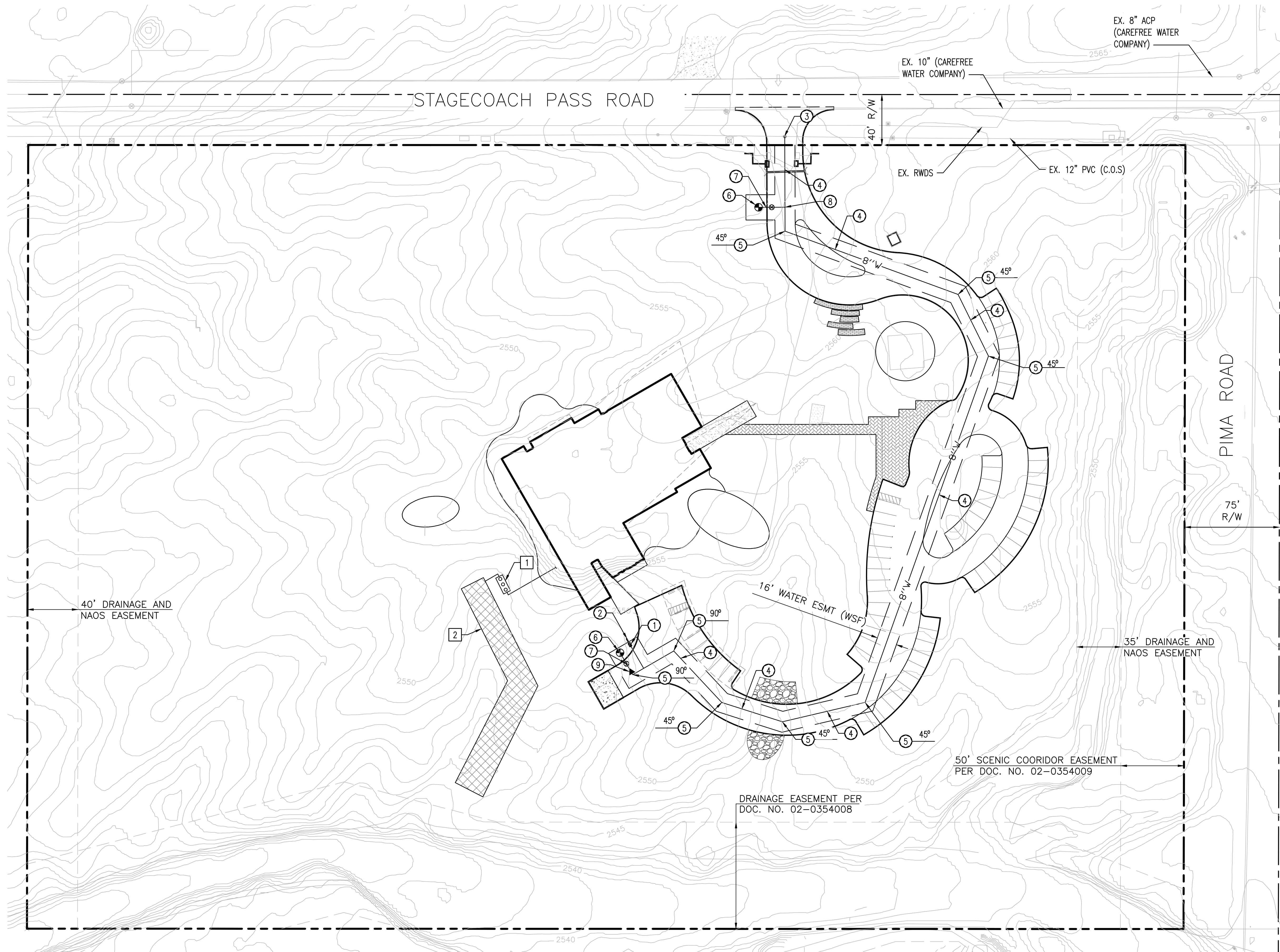


EXHIBIT 3

Preliminary Utility Plan



- LEGEND:**
- PROPERTY LINE
 - 8"W WATER LINE
 - WATER EASEMENT
 - FIRE HYDRANT
 - WATER METER
 - REDUCER

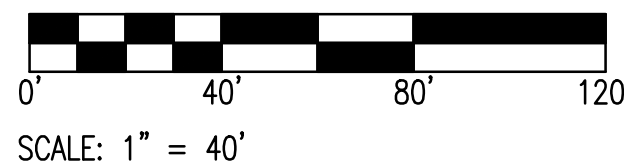
WATER LINE CONSTRUCTION NOTES:

- FURNISH AND INSTALL 1" WATER SERVICE/METER BOX PER C.O.S. STD. DET. 2345-1 & 2345-2.
- FURNISH AND INSTALL 1" BACKFLOW PREVENTION DEVICE PER C.O.S. STD. DET. 2351 & 2356.
- FURNISH AND INSTALL 12"x8" TAPPING SLEEVE, VALVE BOX & COVER PER M.A.G. STD. DET. 340 AND 391-1 TYPE "A"
- FURNISH AND INSTALL 8" DUCTILE IRON PIPE, CLASS 350, WITH MEGA-LUG MECHANICAL JOINT RESTRAINT PER M.A.G. STD. DET. 303-1 AND 303-2, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN. PROVIDE BLUE POLYETHYLENE LOCATING TAPE ABOVE ALL PUBLIC WATER LINES. MAINTAIN 3' MINIMUM COVER.
- FURNISH AND INSTALL 8" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DET. 2397
- FURNISH AND INSTALL FIRE HYDRANT (COMPLETE WITH GATE VALVE, BOX & COVER) PER M.A.G. STD. DET. 360. PROVIDE PAVEMENT MARKER (PM) PER C.O.S. STD. DET. 2363.
- FURNISH AND INSTALL 6" DUCTILE IRON PIPE, CLASS 350, WITH MEGA-LUG MECHANICAL JOINT RESTRAINT PER M.A.G. STD. DET. 303-1 AND 303-2, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN. PROVIDE BLUE POLYETHYLENE LOCATING TAPE ABOVE ALL PUBLIC WATER LINES. MAINTAIN 3' MINIMUM COVER.
- 8"x6" TEE.
- 8"x6" REDUCER.

SEWER CONSTRUCTION NOTES

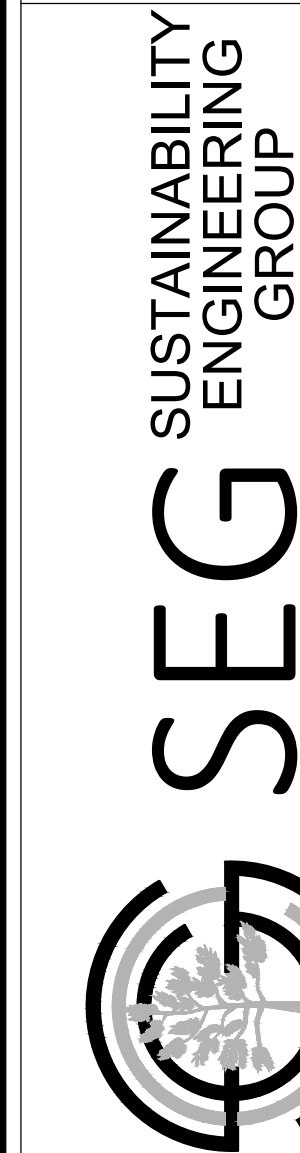
- FURNISH AND INSTALL 2,500 GAL SEPTIC TANK.
- PROVIDE 4,000 SF LEACH FIELD AREA

NOTE: ULTIMATE SIZING AND LOCATION TO BE PROVIDED IN FINAL B.O.D REPORT.



NOTE TO CONTRACTORS:
THIS SET OF DRAWINGS AND DOCUMENTS IS INTENDED AS A SET OF GUIDELINES FOR THE PROJECT AND ARE INTENDED TO BE USED IN CONJUNCTION WITH A SET OF CONSTRUCTION SPECIFICATIONS TO BE SUPPLIED BY OWNER. THEY MUST BE READ TO INCORPORATE ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES INCLUDING FEDERAL, A.I.A. REQUIREMENTS. THIS SET ASSUMES THAT THERE ARE NO UNUSUAL SOIL CONDITIONS OR WIND LOADS. THE FAILURE OF THIS CONDITION MAY REQUIRE ISSUING ANY CHANGES TO THESE DOCUMENTS. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO COMPLY WITH ALL APPLICABLE CODES AND TO INFORM THE OWNERS/ARCHITECTS OF ANY QUESTIONS OR CLARIFICATIONS WHICH ARE DESIRED. CONTRACTORS SHALL ALSO VISIT THE SITE BEFORE BIDDING. CONTRACTORS ARE REQUIRED TO KNOW ALL OBSERVABLE CONDITIONS AND APPLICABLE CODES.

PRELIMINARY
NOT FOR
CONSTRUCTION



orcutt|winslow

PROJECT
TSG FOUNDATION
PIMA

DRAWN
DESIGNED
CHECKED
PROJ. MGR
CULVER
CULVER
COUNSELL
FAKIH

DATE: 11-02-2018

ISSUED FOR:
PRELIM DESIGN

REVISION NO.:	DATE:
1	
2	
3	

JOB NO.: 180333

SHEET TITLE:

PRELIMINARY UTILITY PLAN

SHEET NO.:
C4.00

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EXHIBIT 4

Fire Flow Calculation

TSG Fire FLOW

Project Description

Friction Method Hazen-Williams Formula
Solve For Pressure at 2

Input Data

Pressure 1	50.00	psi
Elevation 1	2561.00	ft
Elevation 2	2545.00	ft
Length	750.00	ft
Roughness Coefficient	130.000	
Diameter	8	in
Discharge	1500.00	gpm

Results

Pressure 2	44.35	psi
Headloss	29.04	ft
Energy Grade 1	2677.75	ft
Energy Grade 2	2648.71	ft
Hydraulic Grade 1	2676.33	ft
Hydraulic Grade 2	2647.29	ft
Flow Area	0.35	ft ²
Wetted Perimeter	2.09	ft
Velocity	9.57	ft/s
Velocity Head	1.42	ft
Friction Slope	0.03872	ft/ft

**FINAL BASIS OF DESIGN REPORT
for
WATER AND SEWER SERVICE**

TSG FOUNDATION

SWC OF STAGECOACH PASS ROAD AND PIMA ROAD

Scottsdale, AZ

Prepared For:

**Orcutt Winslow
2929 N Central Ave,
Phoenix, AZ 85012
602.257.1764**

Prepared by:



Sustainability Engineering Group

8280 E. Gelding Drive, Suite 101

Scottsdale, AZ 85260

480.588.7226 www.azSEG.com

Project Number: 180333

Date Submitted: 04-08-2019

Pre-App No.: 513-PA-2017; 50-DR-2018

Plan Check No.: TBD

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1. EXECUTIVE SUMMARY

The proposed development consists of 13 acres of residential land located at the Southwest corner of Stagecoach Pass Road and Pima Road. The Site is bounded by:

- Adjoining neighboring property owners at the west and south boundaries
- North Pima Road to the east
- East Stagecoach Pass Road to the north

Refer to **EXHIBIT 1 – Vicinity Map**.

The property is presently zoned R1-35 ESL.

Located within the City of Scottsdale corporate boundary, this site will receive domestic water and fire service from the City of Scottsdale by connecting to a 12" PVC water line in East Stagecoach Pass, west of an existing PRV near the intersection with Pima Road.

Sanitary sewer service will be provided by a connection to the 21" PVC sewer line in Pima Road with a new manhole.

An existing well in the property will be utilized for domestic and supplemental irrigation water service. Water quality testing is presently being completed.

All water and sewer improvements will be designed and constructed to the most recent City of Scottsdale and MCESD design standards and policies.

2. INTRODUCTION

2.1 PLAN OBJECTIVE:

The purpose of this report is to provide information and calculations defining the water and sewer system design. Preparation of this report has been done in accordance with Chapters 6 and Chapter 7 of the City's Design Standards & Policies Manual.

2.2 SITE LOCATION

The 13.04 acres of the subject property consists of a public R.O.W and thirteen separate but contiguous parcels whose APN's are:

- 216-34-316 (Lot 1)
- 216-34-317 (Lot 2)
- 216-34-318 (Lot 3)
- 216-34-319 (Lot 4)
- 216-34-320 (Lot 5)
- 216-34-326 (Lot 11)
- 216-34-327 (Tract A)
- 216-34-328 (Lot B)
- 216-34-321 (Lot 6)
- 216-34-322 (Lot 7)
- 216-34-323 (Lot 8)
- 216-34-324 (Lot 9)
- 216-34-325 (Lot 10)

2.3 PROPOSED DEVELOPMENT

2.3.1 Existing Site Description:

This site is open desert land with one single structure and generally slopes from the northeast (elevation 2,564 +/-) to the southwest (elevation 2,531 +/-) at approximately 3.5% with a change in elevation of 33 feet.

The City of Scottsdale Water & Sewer Quarter Section Map (60-48) shows water mains and Sewer lines in East Stagecoach Pass and North Pima Rd as follows:

- A 12" PVC water main exists in East Stagecoach Pass, 32' South of the road center line.
- An 8" ACP in East Stagecoach Pass 4' north of the road centerline, owned by Carefree Water Company.
- A 10" TYP UNK in East Stagecoach Pass 12' south of the road centerline, owned by Carefree Water Company.
- An 8" TYP UNK RWDS Non-portable water line exists in East Stagecoach Pass, 25' south to the road centerline.
- A 16" TYP UNK potable water main exists to the east in North Pima Road, 20' west of the road centerline.
- A 24" SCP potable water line exists to the east in North Pima Road, 81' east of the road centerline.
- 12" DIP Non-portable water line, 12" TYP UNK Non-portable water line, and 16" TYP UNK Non-portable water line exist to the east in North Pima Road, 50', 32', and 15' east to the road centerline.
- A 21" PVC gravity sewer main exists to the east in North Pima Road, 48' east of the road centerline.

Refer to **EXHIBIT 2** for the COS Water **Quarter Section Map (60-48)**.

2.3.2 Proposed Site Development:

The existing site will be re-platted and developed with a new building for office use and a parking lot. Refer to **EXHIBIT 3** for the Site Plan.

3. DESIGN CRITERIA

3.1 DEVELOPMENT CRITERIA

Proposed zoning: R1-35 ESL

Acreage: 13.04

Demands, system layout, system pressures, velocities, head losses for fire flow will all be in accordance with the City's DS&PM (References 2 and 3 in Sec. 11).

A 1,500 gpm system fire flow demand will be utilized in hydraulic calculations.

4.1 PROPOSED DEMANDS

Refer to the tables below for the proposed (R1-35 ESL PRD) water and sewer demand calculations in gallons per minute based on design criteria in the City's DS&PM.

Table 1: WATER DEMAND CALCULATIONS

	Area (sf)	Avg. Day Demand (GPM/SF)	Max Day Peaking Factor	Peak Hour Peaking Factor	Avg. Day Demand (GPM)	Max. Day Demand (GPM)	Peak Hour Demand (GPM)
Office	14,588	8.34E-04	2	3.5	12	24	43

Table 2 - SEWER DEMAND CALCULATIONS

	Area (sf)	Avg. Day Demand (gal/day/sf)	Avg. Day Demand (GPD)	Peaking Factor	Peak Flow (GPM)
Office	14,588	0.4	5,835	3	12

4.2 WATER ZONE

According to the City of Scottsdale DS&PM Sec. 6-1, the site is within Zone 11N.

4.3 PHASING OF PROJECT

Currently, the project is anticipated to be constructed in a single phase. Should this change, later reports will be updated and submitted for review. Final Basis of Design Reports must be accepted by the Water Resources Department prior to the submittal of improvement plans to the City's 1-Stop Shop.

4.4 SUMMARY NARRATIVE OF DEMANDS

- The max day + fire flow scenario will govern the water system design.
- No offsite sewer flow impacts this site.

5. PROPOSED INFRASTRUCTURE

5.1 WATER DISTRIBUTION SYSTEM

This project proposes to construct approximately 375 LF of 8" DIP connecting to the 12" line in East Stagecoach Pass. Refer to **EXHIBIT 3** for the proposed site and utility plan. A fire hydrant will terminate the extension. Metered service and the building fire line will be tapped off the new 8" water line.

5.2 SEWER COLLECTION SYSTEM

A 8"/6" sanitary sewer service will connect the building to the 21" PVC sewer main in Pima Road. A new manhole will need to be constructed over the existing sewer. The first reach of pipe will be 8" between two manholes to minimize any future impact to the desert floor. The service will be 6" under the drive with cleanouts at 100' on-center.

Falling topography does not support extension of public sewer along the site's Stagecoach Pass frontage. A public sewer to 8603 E. Stagecoach Pass has been extended to the southwest corner of that parcel which can provide future service.

5.3 MAINTENANCE AND OWNERSHIP

The water line is proposed as public to be owned and maintained by the City and is located within a 20-foot wide water easement. The sanitary sewer service is private and will be maintained by the owner. The new manhole will be public, owned and maintained by the City.

6. WATER COMPUTATIONS

6.1 DESCRIPTION OF MODEL

The new water system will be designed to meet the criteria of COS Water, the Arizona Department of Environmental Quality ("ADEQ"), and Maricopa County Environmental Services Department ("MCESD").

Bentley WaterCAD® Version 8i was used to model the water extension and demand scenarios. A current fire hydrant flow test is included in **EXHIBIT 4**. The results of water modeling are included in **EXHIBIT 5**.

7. SEWER COMPUTATIONS

7.1 DESCRIPTION

A 8" PVC sewer service at 1.5% grade will convey the peak 12 gpm flow to Pima Road at 1.6 fps with a normal depth of 0.7". The hydraulic radius is 0.47". At $d/D = 0.65$ the 8" service pipe has a capacity of 502.4 gpm at 4.7 fps. The full flow capacity is 664 gpm at 4.2 fps.

A 6" PVC sewer service at 2% grade will convey the peak 12 gpm flow to Pima Road at 1.9 fps with a normal depth of 0.8". The hydraulic radius is 0.47". At $d/D = 0.65$ the 6" service pipe has a capacity of 269 gpm at 4.4 fps. The full flow capacity is 356 gpm at 4.0 fps.

Reference **EXHIBIT 6**.

8. SUMMARY / CONCLUSIONS

- Sufficient city water supply is available to support the project's domestic and fire flow demand.
- Sufficient city sewer capacity is available to support the project.
- An existing onsite well will be utilized for irrigation service.

9. REFERENCES

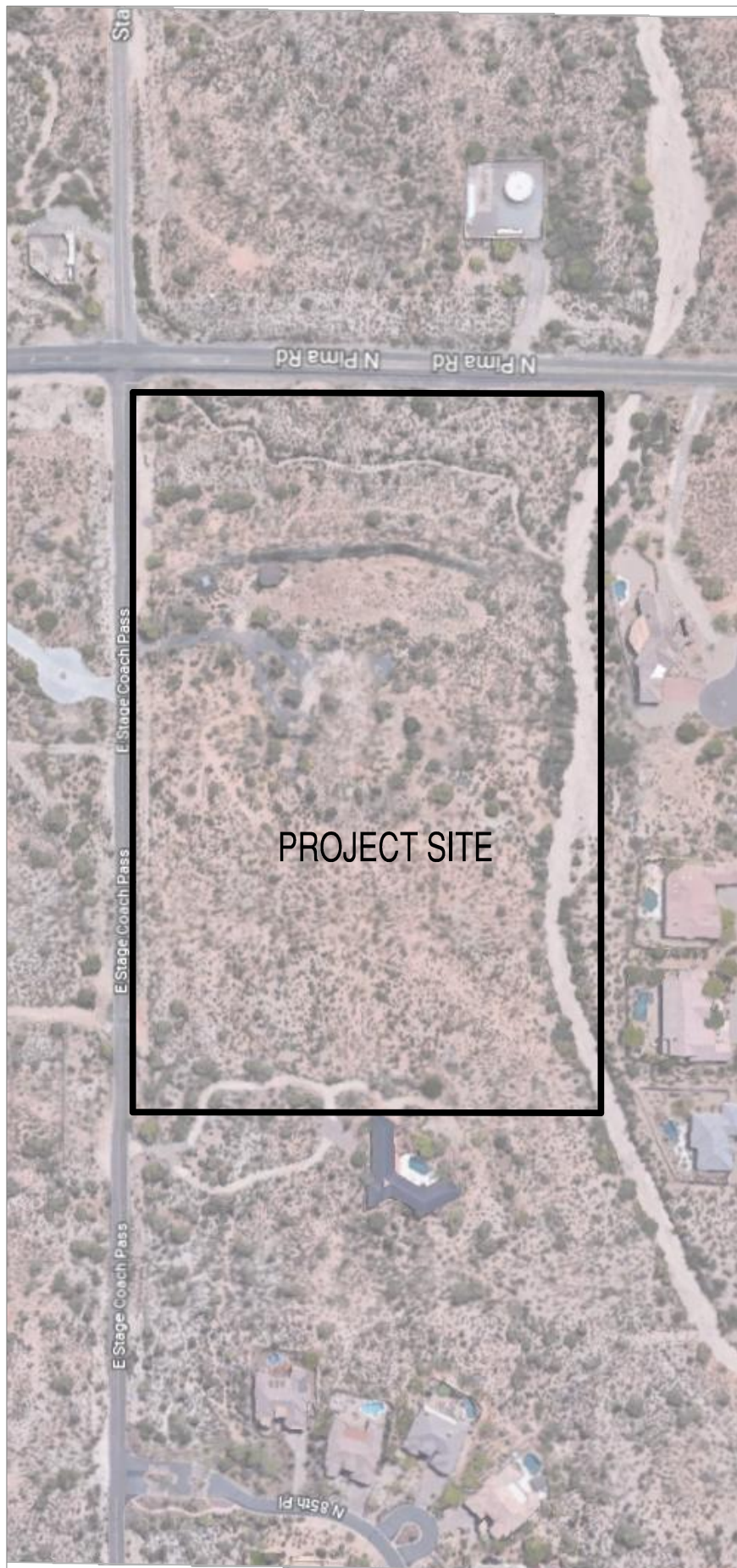
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10. EXHIBITS:

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- EXHIBIT 2 - Q-S MAPS 60-48, 61-49
- EXHIBIT 3 - Utility Plan
- EXHIBIT 4 - Fire Hydrant Flow Test
- EXHIBIT 5 - Water Modeling
- EXHIBIT 6 - Sewer Service Calculation

EXHIBIT 1

Vicinity Map



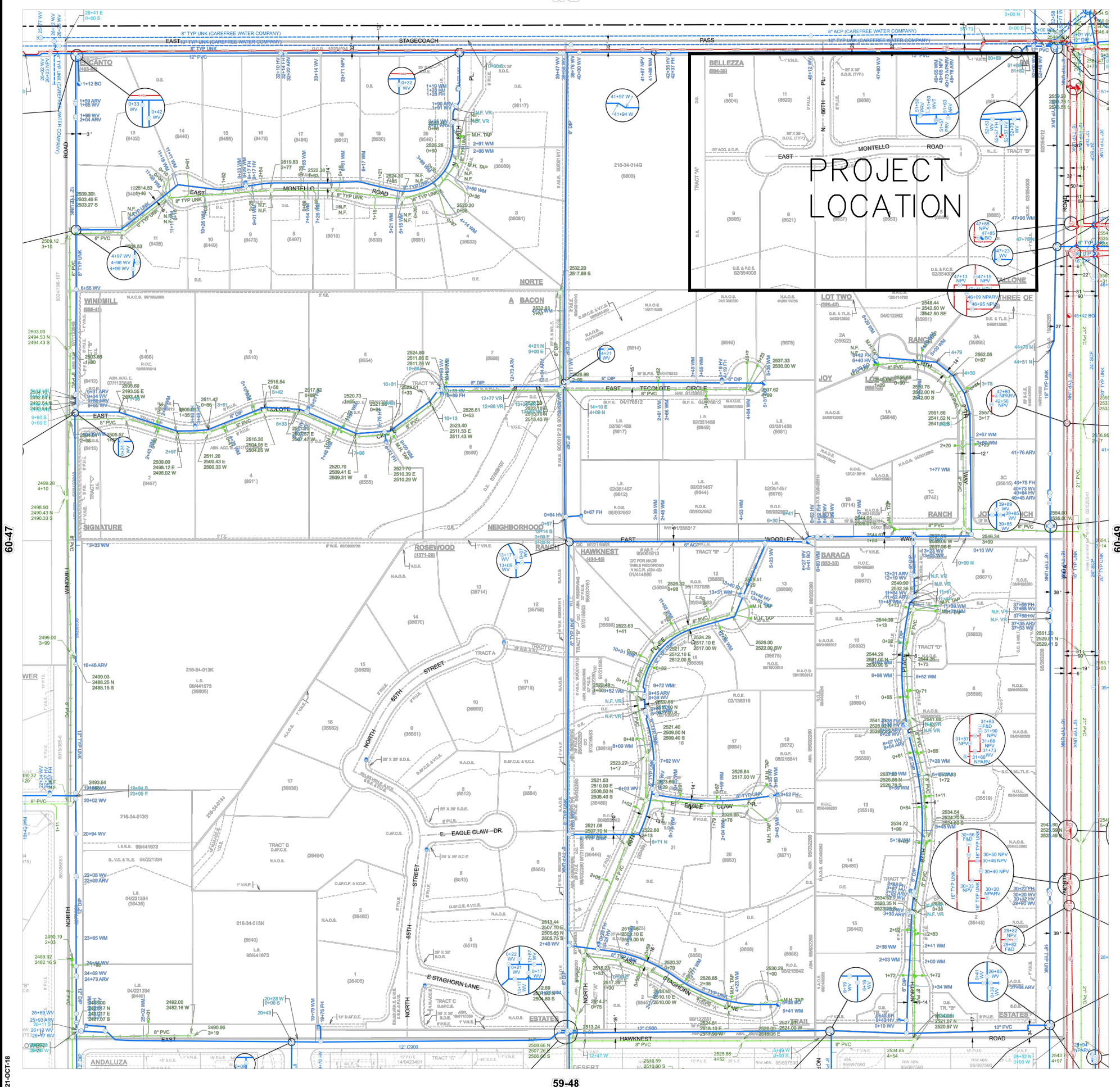
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EXHIBIT 1
VICINITY MAP

EXHIBIT 2

Q-S Map

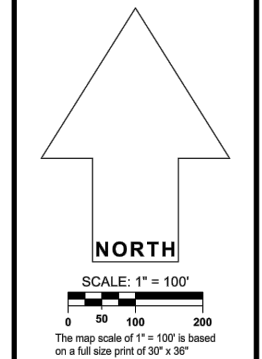
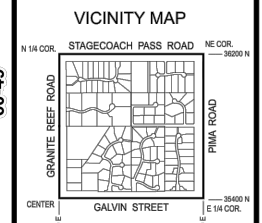


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LEGEND:

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



WATER & SEWER

QUARTER SECTION MAP

60-48

NE 1/4 SEC. 1 T5N R4E

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THE CITY OF SCOTTSDALE

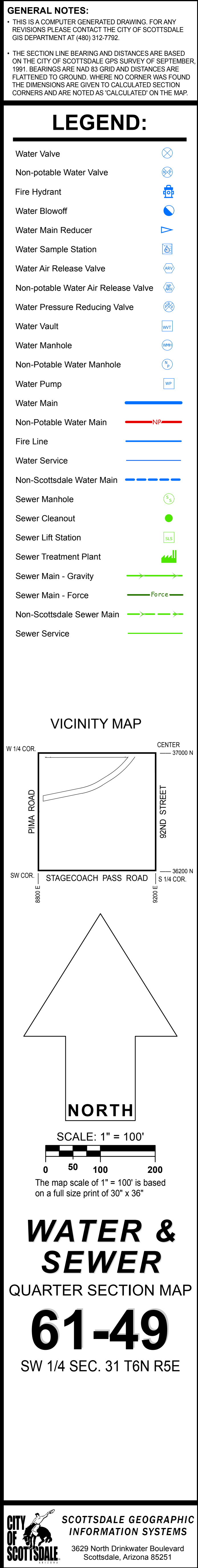
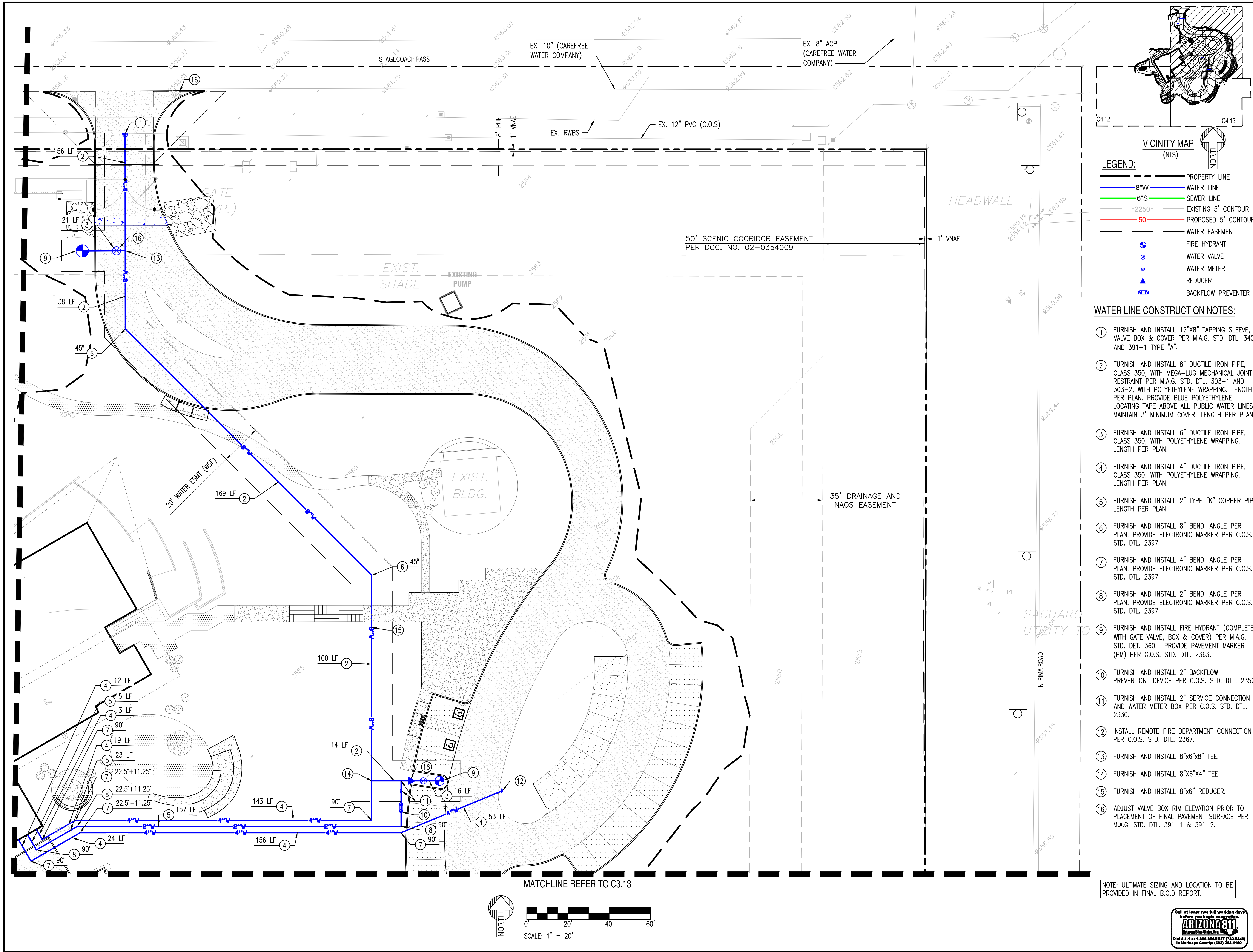


EXHIBIT 3

Preliminary Utility Plans

X:\PROJECTS\Orcutt Winslow\TSG Foundation Pima Scottsdale 180333\11 CAD (SEC)\11.3 CD\180333_C4.10 - C4.4.dwg



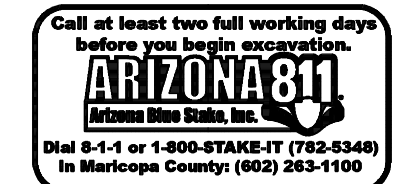
LEGEND:

- PROPERTY LINE
- 8"W WATER LINE
- 6"S SEWER LINE
- EXISTING 5' CONTOUR
- PROPOSED 5' CONTOUR
- WATER EASEMENT
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- REDUCER
- BACKFLOW PREVENTER

WATER LINE CONSTRUCTION NOTES:

- FURNISH AND INSTALL 12"x8" TAPPING SLEEVE, VALVE BOX & COVER PER M.A.G. STD. DTL. 340 AND 391-1 TYPE "A".
- FURNISH AND INSTALL 8" DUCTILE IRON PIPE, CLASS 350, WITH MEGA-LUG MECHANICAL JOINT RESTRAINT PER M.A.G. STD. DTL. 303-1 AND 303-2, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN. PROVIDE BLUE POLYETHYLENE LOCATING TAPE ABOVE ALL PUBLIC WATER LINES. MAINTAIN 3' MINIMUM COVER. LENGTH PER PLAN.
- FURNISH AND INSTALL 6" DUCTILE IRON PIPE, CLASS 350, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN.
- FURNISH AND INSTALL 4" DUCTILE IRON PIPE, CLASS 350, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN.
- FURNISH AND INSTALL 2" TYPE "K" COPPER PIPE. LENGTH PER PLAN.
- FURNISH AND INSTALL 8" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DTL. 2397.
- FURNISH AND INSTALL 4" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DTL. 2397.
- FURNISH AND INSTALL 2" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DTL. 2397.
- FURNISH AND INSTALL FIRE HYDRANT (COMPLETE WITH GATE VALVE, BOX & COVER) PER M.A.G. STD. DET. 360. PROVIDE PAVEMENT MARKER (PM) PER C.O.S. STD. DTL. 2363.
- FURNISH AND INSTALL 2" BACKFLOW PREVENTION DEVICE PER C.O.S. STD. DTL. 2352.
- FURNISH AND INSTALL 2" SERVICE CONNECTION AND WATER METER BOX PER C.O.S. STD. DTL. 2330.
- INSTALL REMOTE FIRE DEPARTMENT CONNECTION PER C.O.S. STD. DTL. 2367.
- FURNISH AND INSTALL 8"x6"x8" TEE.
- FURNISH AND INSTALL 8"x6"x4" TEE.
- FURNISH AND INSTALL 8"x6" REDUCER.
- ADJUST VALVE BOX RIM ELEVATION PRIOR TO PLACEMENT OF FINAL PAVEMENT SURFACE PER M.A.G. STD. DTL. 391-1 & 391-2.

NOTE: ULTIMATE SIZING AND LOCATION TO BE PROVIDED IN FINAL B.O.D. REPORT.



SEG SUSTAINABILITY ENGINEERING GROUP

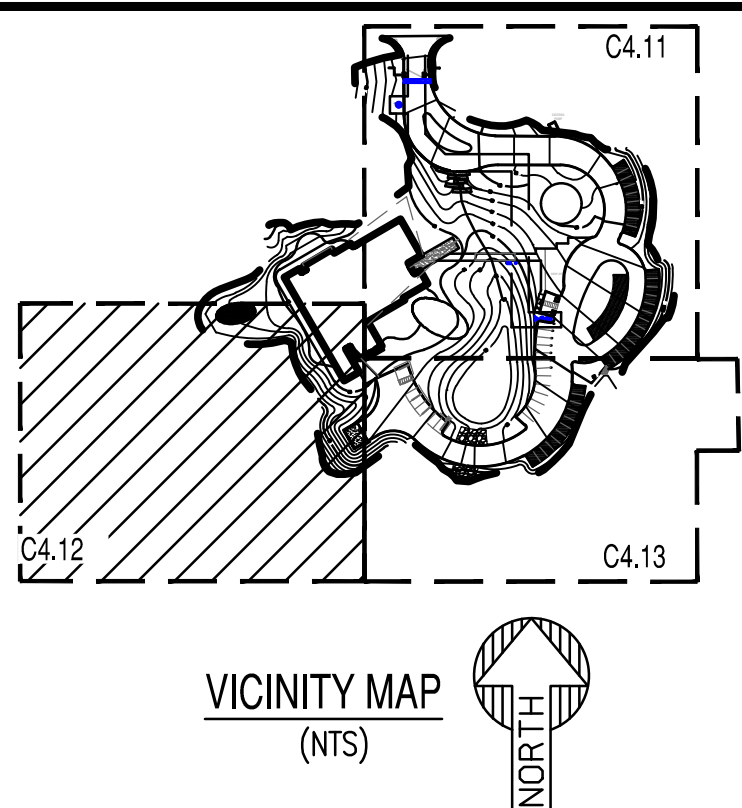
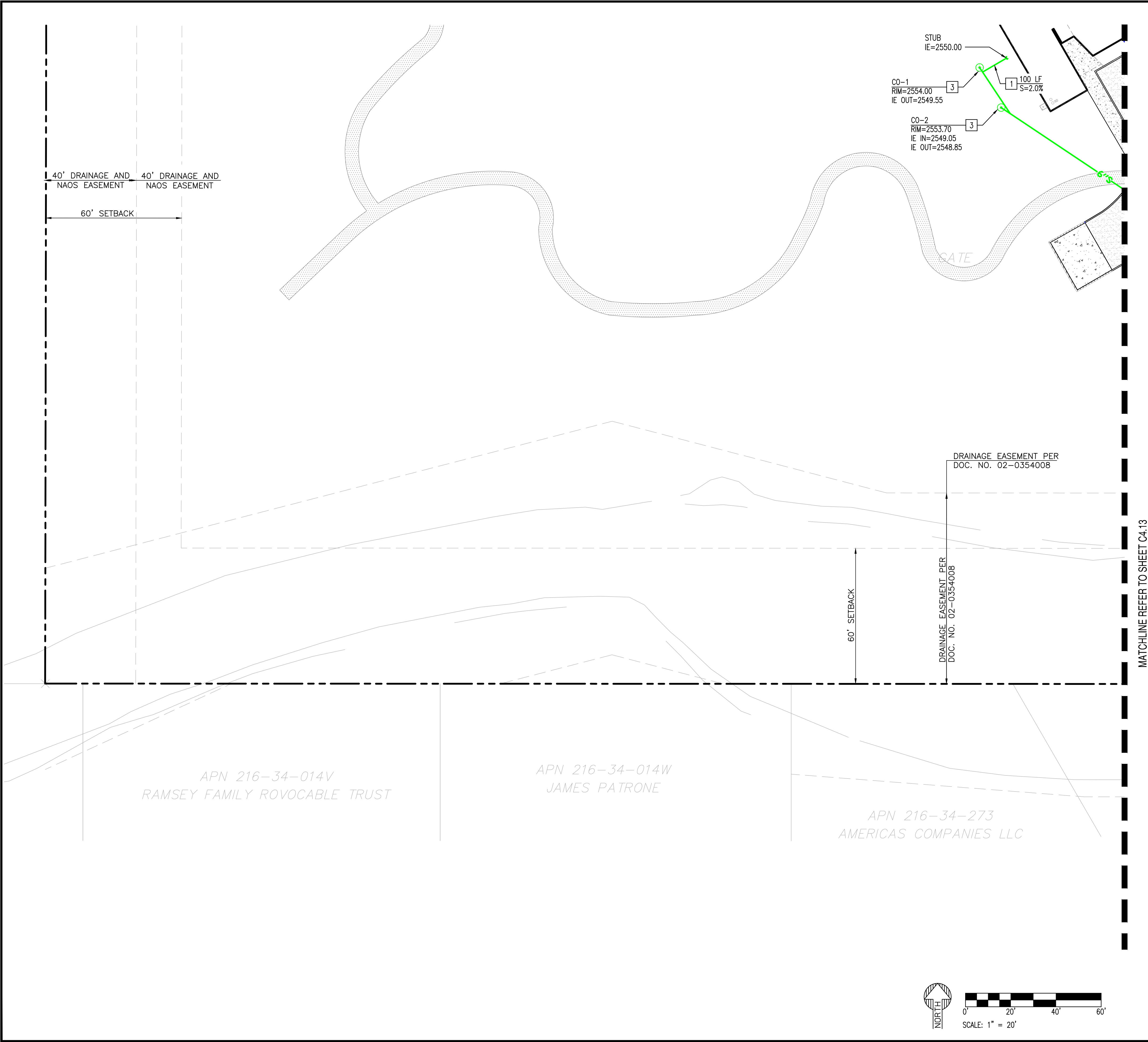
8280 E. GELDING DRIVE SUITE 101, SCOTTSDALE, ARIZONA 85260
WWW.AZSEG.COM TEL: 480.588.7226 FAX: 480.259.3534

PROJECT: TSG FOUNDATION CENTER FOR SPIRITUAL DEVELOPMENT
LOCATION: SWC OF E. STAGECOACH PASS AND N. PIMA RD.
DRAWN: BECELL
DESIGNED: BECELL
CHECKED: COUNSELL
PROJ. MGR: FAKHRI
DATE: 04/02/2019
ISSUED FOR: DRB
REVISION NO.:
DATE:
JOB NO.: 180333
SHEET TITLE:
SHEET NO.: C4.11

UTILITY PLAN 1

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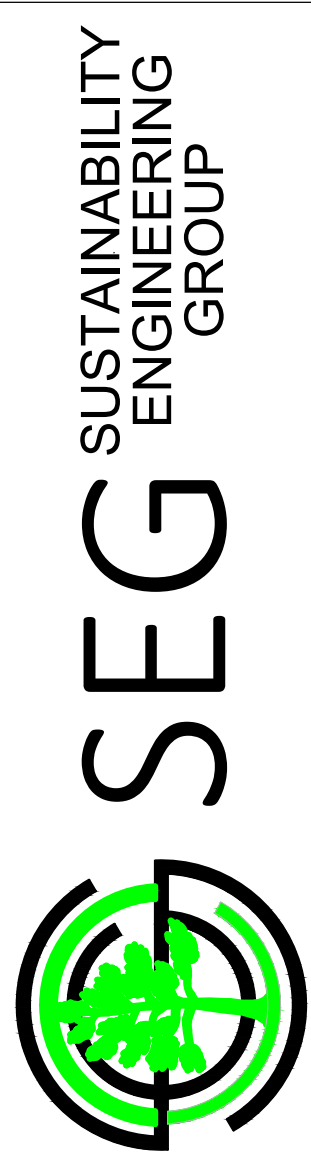
- LEGEND:**
- PROPERTY LINE
 - 8" W WATER LINE
 - 6" S SEWER LINE
 - EXISTING 5' CONTOUR
 - PROPOSED 5' CONTOUR
 - WATER EASEMENT
 - FIRE HYDRANT
 - WATER VALVE
 - WATER METER
 - REDUCER
 - BACKFLOW PREVENTER

- SEWER CONSTRUCTION NOTES**
- FURNISH AND INSTALL 6" PVC-SDR 35 SEWER LINE CONNECTION PER M.A.G. STD. DET. 440-3. S=2% MINIMUM.
 - FURNISH AND INSTALL CLEAN-OUT PER C.O.S. STD. DTL 2403.

MATCHLINE REFER TO SHEET C4.13



NOTE: ULTIMATE SIZING AND LOCATION TO BE PROVIDED IN FINAL B.O.D. REPORT.



8280 E. GELDING DRIVE SUITE 101, SCOTTSDALE, ARIZONA 85260
WWW.AZSEG.COM TEL 480.588.7226 FAX 480.259.3534

orcutt|winslow

PROJECT
TSG FOUNDATION
CENTER FOR SPIRITUAL DEVELOPMENT

LOCATION
SWC OF E. STAGECOACH PASS
AND N. PIMA RD.

DRAWN
DESIGNED
CHECKED
PROJ. MGR
BEGELL
BEGELL
COUNSELL
FAKIH

DATE:
ISSUED FOR:
04/02/2019
DRB

REVISION NO.:	DATE:
1	
2	
3	

JOB NO.: 180333

SHEET TITLE:

UTILITY PLAN 2

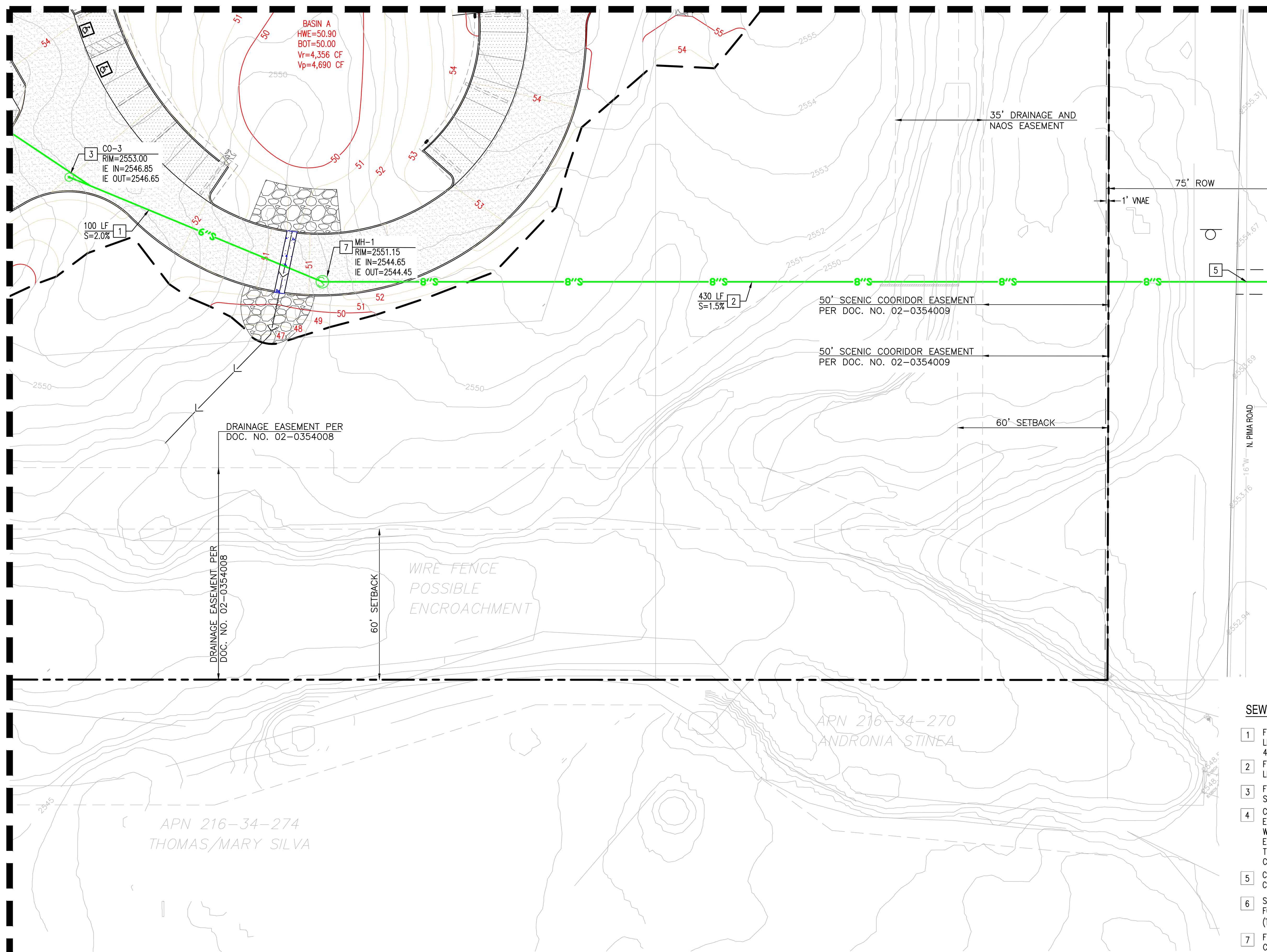
SHEET NO.: C4.12

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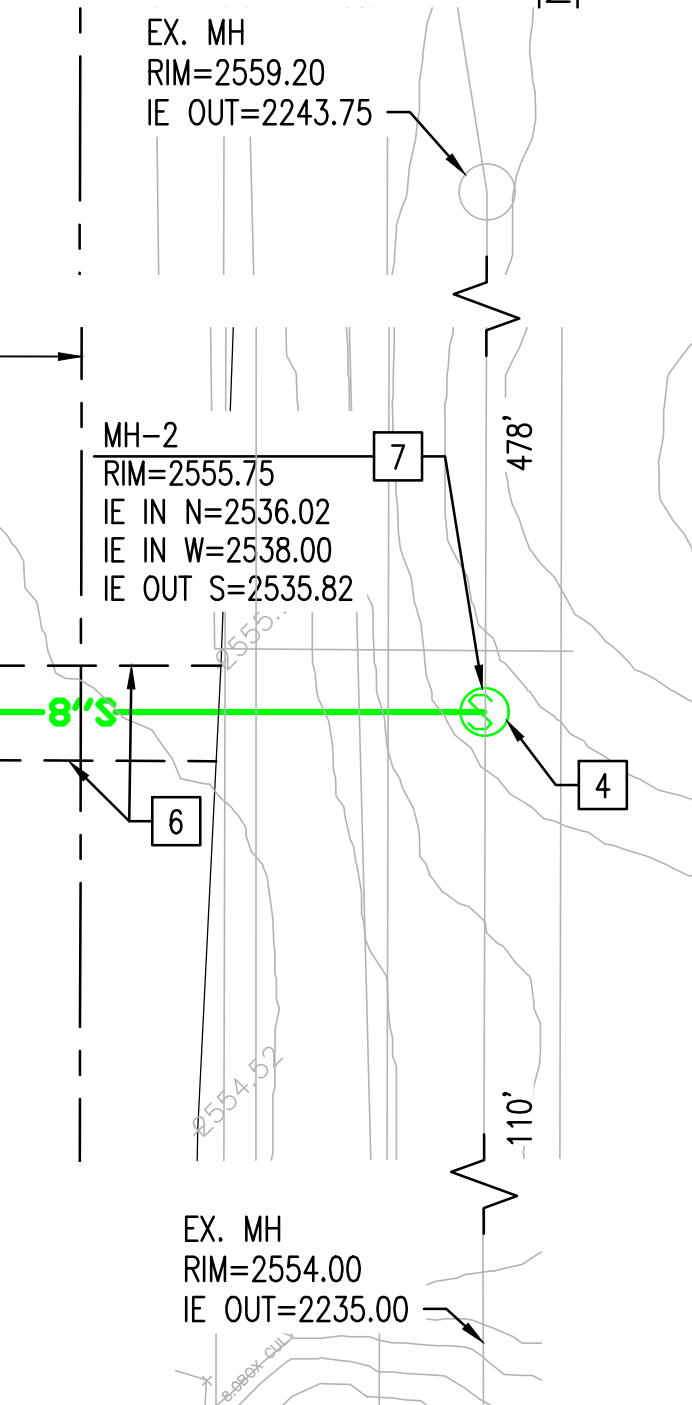
MATCHLINE REFER TO C4.11 SHEET 9

MATCHLINE REFER TO C4.12 SHEET #

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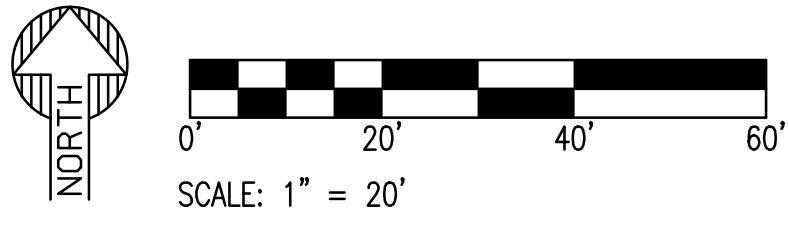
VICINITY MAP
(NTS)



- LEGEND:
- PROPERTY LINE
 - SAW-CUT LINE
 - 8" W WATER LINE
 - 6" S SEWER LINE
 - EXISTING 10' CONTOUR
 - PROPOSED 10' CONTOUR
 - WATER EASEMENT
 - FIRE HYDRANT
 - WATER VALVE
 - WATER METER
 - REDUCER
 - BACKFLOW PREVENTER

SEWER CONSTRUCTION NOTES

- FURNISH AND INSTALL 6" PVC-SDR 35 SEWER LINE CONNECTION PER M.A.G. STD. DET. 440-3. S=2% MINIMUM.
- FURNISH AND INSTALL 8" D.I.P. SEWER LINE. LENGTH PER PLAN. S=0.52% MINIMUM.
- FURNISH AND INSTALL CLEAN-OUT PER C.O.S. STD. DET. 2403.
- CONTRACTOR SHALL VERIFY THE LOCATION OF THE EXISTING SANITARY SEWER LINE BEFORE PROCEEDING WITH TRENCHING. CONTRACTOR SHALL CONTACT ENGINEER IF EXISTING SEWER ELEVATION IS HIGHER THAN PROPOSED TIE-IN INVERT PRIOR TO ANY CONSTRUCTION ACTIVITY.
- CONTRACTOR SHALL VERIFY ALL INVERTS AND CLEARANCE OF CROSSING UTILITIES PRIOR TO COMMENCING CONSTRUCTION.
- SAWCUT, REMOVE AND REPLACE EXISTING ASPHALT FOR TRENCHING PER C.O.S. STD. DET. 2200 & 2201 (T-TOP).
- FURNISH AND INSTALL 5' DIAMETER PRECAST CONCRETE SEWER MANHOLE PER M.A.G. STD. DET. 420-1 (NO STEPS) WITH 12 CONCRETE COLLAR PER C.O.S. STD. DET. 2270. 30" WATERTIGHT COVER PER M.A.G. STD. DET. 424-2 AND C.O.S. STD. DET. 2421. CAST-IN-PLACE BASE.



orcutt|winslow

PROJECT
TSG FOUNDATION
CENTER FOR SPIRITUAL DEVELOPMENT

LOCATION
SWC OF E. STAGECOACH PASS
AND N. PIMA RD.

DRAWN
DESIGNED
CHECKED
PROJ. MGR

BEGCELL
BEGCELL
COUNSELL
FAKIH

DATE: 04/02/2019

ISSUED FOR: DRB

REVISION NO.:	DATE:
1	
2	
3	

JOB NO.: 180333

SHEET TITLE:

UTILITY PLAN 3

SHEET NO.: C4.13

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EXHIBIT 4

Fire Hydrant Flow Test

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	TSG
Project Address:	Pima & Stagecoach Pass (SWC), Scottsdale, Arizona 85262
Arizona Flow Testing Project No.:	19051
Client Project No.:	Not Provided
Flow Test Permit No.:	C57398
Date and time flow test conducted:	February 21, 2019 at 8:30 AM
Data is current and reliable until:	August 21, 2019
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Phil Cipolla – City of Scottsdale-Inspector (602-828-0847)

Raw Test Data

Static Pressure: **80.0 PSI**
(Measured in pounds per square inch)

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

Pitot Pressure: **23.0 PSI**
(Measured in pounds per square inch)

Diffuser Orifice Diameter: 4 Inch Hose Monster
(Measured in inches)

Coefficient of Diffuser: 0.7875

Flowing GPM: **1,803 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **5,353 GPM**

Data with 10% Safety Factor

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

Residual Pressure: **64.0PSI**
(Measured in pounds per square inch)

Distance between hydrants: Approx. 1,060 feet

Main size: Not Provided

Flowing GPM: **1,803 GPM**

GPM @ 20 PSI: **4,955 GPM**

Flow Test Location

North ↑



EXHIBIT 5

Model Output

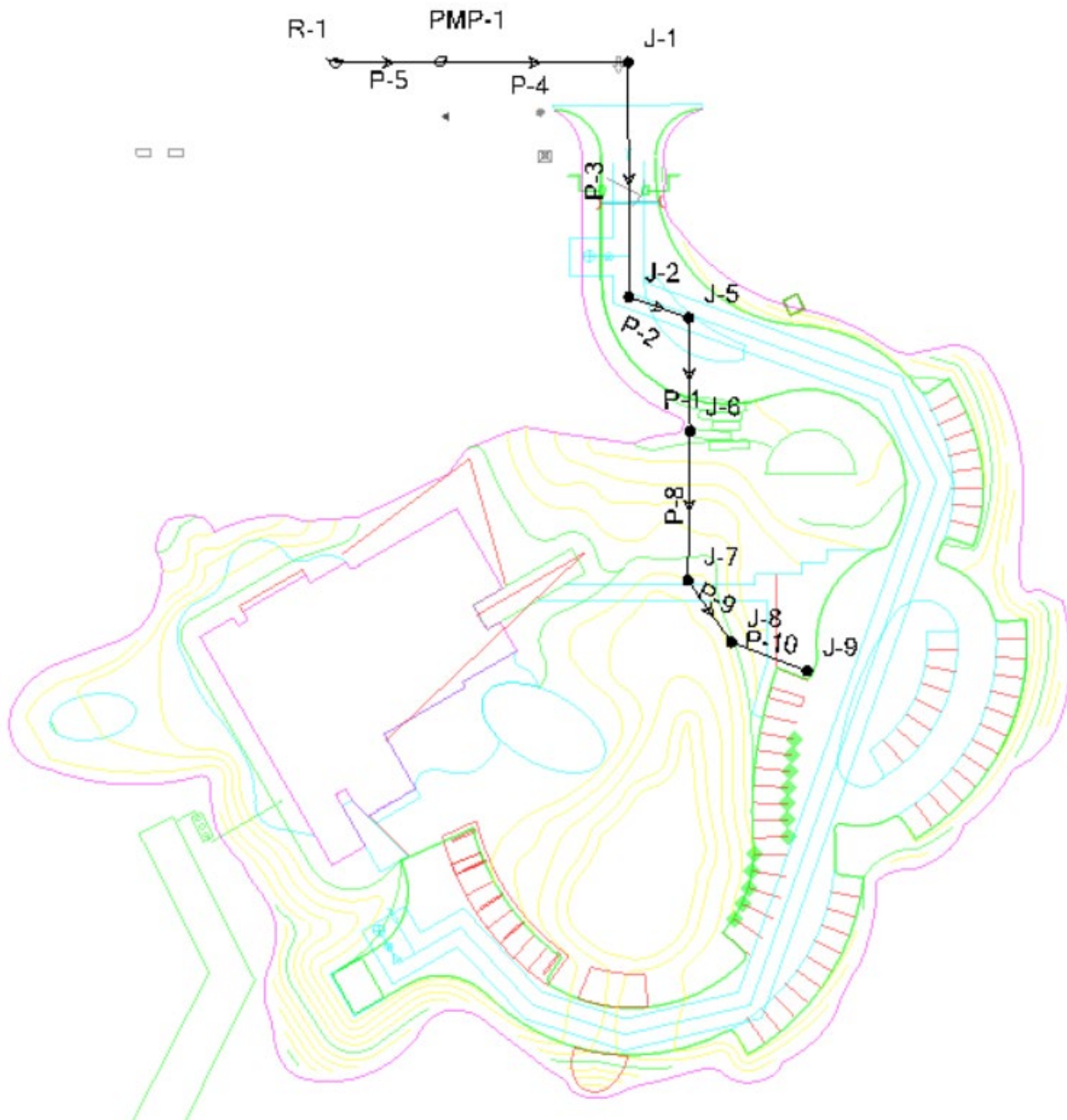


EXHIBIT 5 – MODEL MAP

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	2,560.28	0	2,698.00	60
J-2	2,553.00	0	2,698.00	63
J-5	2,552.00	0	2,698.00	63
J-6	2,556.55	0	2,698.00	61
J-7	2,554.00	0	2,698.00	62
J-8	2,555.00	12	2,698.00	62
J-9	2,555.00	0	2,698.00	62

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Pipe Table

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	8.0	59	130.0	12	0.08
P-2	8.0	33	130.0	12	0.08
P-3	8.0	123	130.0	12	0.08
P-4	12.0	1,120	150.0	12	0.03
P-5	16.0	25	130.0	12	0.02
P-8	8.0	78	130.0	12	0.08
P-9	8.0	39	130.0	12	0.08
P-10	8.0	42	130.0	0	0.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Pump Table

Label	Elevation (ft)	Pump Status	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	2,530.00	On	2,532.00	2,698.00	12	166.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	2,532.00	12	2,532.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	2,560.28	0	2,697.99	60
J-2	2,553.00	0	2,697.99	63
J-5	2,552.00	0	2,697.99	63
J-6	2,556.55	0	2,697.99	61
J-7	2,554.00	0	2,697.99	62
J-8	2,555.00	24	2,697.98	62
J-9	2,555.00	0	2,697.98	62

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Pipe Table

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	8.0	59	130.0	24	0.15
P-2	8.0	33	130.0	24	0.15
P-3	8.0	123	130.0	24	0.15
P-4	12.0	1,120	150.0	24	0.07
P-5	16.0	25	130.0	24	0.04
P-8	8.0	78	130.0	24	0.15
P-9	8.0	39	130.0	24	0.15
P-10	8.0	42	130.0	0	0.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Pump Table

Label	Elevation (ft)	Pump Status	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	2,530.00	On	2,532.00	2,697.99	24	165.99

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	2,532.00	24	2,532.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	2,560.28	0	2,697.97	60
J-2	2,553.00	0	2,697.97	63
J-5	2,552.00	0	2,697.96	63
J-6	2,556.55	0	2,697.96	61
J-7	2,554.00	0	2,697.96	62
J-8	2,555.00	43	2,697.95	62
J-9	2,555.00	0	2,697.95	62

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Pipe Table

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	8.0	59	130.0	43	0.27
P-2	8.0	33	130.0	43	0.27
P-3	8.0	123	130.0	43	0.27
P-4	12.0	1,120	150.0	43	0.12
P-5	16.0	25	130.0	43	0.07
P-8	8.0	78	130.0	43	0.27
P-9	8.0	39	130.0	43	0.27
P-10	8.0	42	130.0	0	0.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Pump Table

Label	Elevation (ft)	Pump Status	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	2,530.00	On	2,532.00	2,697.98	43	165.98

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	2,532.00	43	2,532.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD+Fire

Fire Flow Node FlexTable: Fire Flow Report

Label	Needed Fire Flow (gpm)	MD + Needed Flow (gpm)	Calculated Pressure at Junction (psi)	Total Available Flow at 20 psi (gpm)	Junction w/ Minimum Pressure	Junction Pressure) (psi)	Pipe w/ Maximum Velocity	Pipe Velocity (ft/s)
J-1	1,500	1,500	51	1,501	J-6	53	P-4	4.33
J-2	1,500	1,500	52	1,501	J-6	51	P-3	9.73
J-5	1,500	1,500	52	1,501	J-6	50	P-3	9.73
J-6	1,500	1,500	49	1,501	J-9	50	P-3	9.73
J-7	1,500	1,500	49	1,501	J-9	49	P-8	9.73
J-8	1,500	1,524	48	1,525	J-9	48	P-9	9.73
J-9	1,500	1,500	47	1,501	J-8	48	P-9	9.73

EXHIBIT 6

Sewer Service Calculation

8" Pipe - Peak Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.01500 ft/ft
Diameter	8 in
Discharge	12.0 gal/min

Results

Normal Depth	0.74 in
Flow Area	0.02 ft²
Wetted Perimeter	0.41 ft
Hydraulic Radius	0.47 in
Top Width	0.39 ft
Critical Depth	0.07 ft
Percent Full	9.3 %
Critical Slope	0.00743 ft/ft
Velocity	1.64 ft/s
Velocity Head	0.04 ft
Specific Energy	0.10 ft
Froude Number	1.40
Maximum Discharge	714.52 gal/min
Discharge Full	664.2 gal/min
Slope Full	0.00000 ft/ft
Flow Type	SuperCritical

8" Pipe - d/D = 0.65

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Normal Depth	5.20	in
Diameter	8	in

Results

Discharge	502.4	gal/min
Flow Area	0.24	ft²
Wetted Perimeter	1.25	ft
Hydraulic Radius	2.31	in
Top Width	0.64	ft
Critical Depth	0.50	ft
Percent Full	65.0	%
Critical Slope	0.01023	ft/ft
Velocity	4.66	ft/s
Velocity Head	0.34	ft
Specific Energy	0.77	ft
Froude Number	1.34	
Maximum Discharge	714.52	gal/min
Discharge Full	664.2	gal/min
Slope Full	0.00858	ft/ft
Flow Type	SuperCritical	

8" Pipe - Full Flow Capacity

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Normal Depth	8.00	in
Diameter	8	in
Discharge	664.2	gal/min

Results

Discharge	664.2	gal/min
Normal Depth	8.00	in
Flow Area	0.35	ft²
Wetted Perimeter	2.09	ft
Hydraulic Radius	2.00	in
Top Width	0.00	ft
Critical Depth	0.57	ft
Percent Full	100.0	%
Critical Slope	0.01402	ft/ft
Velocity	4.24	ft/s
Velocity Head	0.28	ft
Specific Energy	0.95	ft
Froude Number	0.00	
Maximum Discharge	714.52	gal/min
Discharge Full	664.2	gal/min
Slope Full	0.01500	ft/ft
Flow Type	SubCritical	

6" Pipe - Peak Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.02000 ft/ft
Diameter	6 in
Discharge	12.0 gal/min

Results

Normal Depth	0.75 in
Flow Area	0.01 ft²
Wetted Perimeter	0.36 ft
Hydraulic Radius	0.47 in
Top Width	0.33 ft
Critical Depth	0.08 ft
Percent Full	12.6 %
Critical Slope	0.00760 ft/ft
Velocity	1.87 ft/s
Velocity Head	0.05 ft
Specific Energy	0.12 ft
Froude Number	1.59
Maximum Discharge	383.10 gal/min
Discharge Full	356.1 gal/min
Slope Full	0.00002 ft/ft
Flow Type	SuperCritical

6" Pipe - d/D = 0.65

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Normal Depth	3.90	in
Diameter	6	in

Results

Discharge	269.4	gal/min
Flow Area	0.14	ft²
Wetted Perimeter	0.94	ft
Hydraulic Radius	1.73	in
Top Width	0.48	ft
Critical Depth	0.39	ft
Percent Full	65.0	%
Critical Slope	0.01234	ft/ft
Velocity	4.44	ft/s
Velocity Head	0.31	ft
Specific Energy	0.63	ft
Froude Number	1.47	
Maximum Discharge	383.10	gal/min
Discharge Full	356.1	gal/min
Slope Full	0.01144	ft/ft
Flow Type	SuperCritical	

6" Pipe - Full Flow Capacity

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Normal Depth	6.00	in
Diameter	6	in
Discharge	356.1	gal/min

Results

Discharge	356.1	gal/min
Normal Depth	6.00	in
Flow Area	0.20	ft²
Wetted Perimeter	1.57	ft
Hydraulic Radius	1.50	in
Top Width	0.00	ft
Critical Depth	0.44	ft
Percent Full	100.0	%
Critical Slope	0.01788	ft/ft
Velocity	4.04	ft/s
Velocity Head	0.25	ft
Specific Energy	0.75	ft
Froude Number	0.00	
Maximum Discharge	383.10	gal/min
Discharge Full	356.1	gal/min
Slope Full	0.02000	ft/ft
Flow Type	SubCritical	

FINAL BASIS OF DESIGN REPORT for WATER AND SEWER SERVICE

TSG FOUNDATION

SWC OF STAGECOACH PASS ROAD AND PIMA ROAD

Scottsdale, AZ

Prepared For:

Orcutt Winslow

2929 N Central Ave,

Phoenix, AZ 85012

602.257.1764

Prepared by:

FINAL Basis of Design Report

☐ APPROVED

☐ APPROVED AS NOTED

☒ REVISE AND RESUBMIT



Disclaimer: If approved, the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance. For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY rrahman

DATE 4/23/2019



Sustainability Engineering Group

8280 E. Gelding Drive, Suite 101

Scottsdale, AZ 85260

480.588.7226 www.azSEG.com

Project Number: 180333

Date Submitted: 04-08-2019

Report must be
signed and sealed by
PE. per DSPM
Section 6-1.202.B5

Pre-App No.: 513-PA-2017; 50-DR-2018

Plan Check No.: TBD

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Is this in addition to City service line? Utility plans do not show this. The plumbing for existing well must be separate from the COS service line plumbing per DSPM Section 6-1.416.

ing Smart Projects"

1. EXECUTIVE SUMMARY

The proposed development consists of 13 acres of residential land located at the Southwest corner of Stagecoach Pass Road and Pima Road. The Site is bounded by:

- Adjoining neighboring property owners at the west and south boundaries
- North Pima Road to the east
- East Stagecoach Pass Road to the north

Refer to **EXHIBIT 1 – Vicinity Map**.

The property is presently zoned R1-35 ESL.

Located within the City of Scottsdale corporate boundary, this site will receive domestic water and fire service from the City of Scottsdale by connecting to a 12" PVC water line in East Stagecoach Pass, west of an existing PRV near the intersection with Pima Road.

Sanitary sewer service will be provided by a connection to the 21" PVC sewer line in Pima Road with a new manhole.

An existing well in the property will be utilized for domestic and supplemental irrigation water service. Water quality testing is presently being completed.

All water and sewer improvements will be designed and constructed to the most recent City of Scottsdale and MCESD design standards and policies.

2. INTRODUCTION

2.1 PLAN OBJECTIVE:

The purpose of this report is to provide information and calculations defining the water and sewer system design. Preparation of this report has been done in accordance with Chapters 6 and Chapter 7 of the City's Design Standards & Policies Manual.

2.2 SITE LOCATION

The 13.04 acres of the subject property consists of a public R.O.W and thirteen separate but contiguous parcels whose APN's are:

- | | |
|------------------------|-----------------------|
| • 216-34-316 (Lot 1) | • 216-34-321 (Lot 6) |
| • 216-34-317 (Lot 2) | • 216-34-322 (Lot 7) |
| • 216-34-318 (Lot 3) | • 216-34-323 (Lot 8) |
| • 216-34-319 (Lot 4) | • 216-34-324 (Lot 9) |
| • 216-34-320 (Lot 5) | • 216-34-325 (Lot 10) |
| • 216-34-326 (Lot 11) | |
| • 216-34-327 (Tract A) | |
| • 216-34-328 (Lot B) | |

2.3 PROPOSED DEVELOPMENT

2.3.1 Existing Site Description:

This site is open desert land with one single structure and generally slopes from the northeast (elevation 2,564 +/-) to the southwest (elevation 2,531 +/-) at approximately 3.5% with a change in elevation of 33 feet.

The City of Scottsdale Water & Sewer Quarter Section Map (60-48) shows water mains and Sewer lines in East Stagecoach Pass and North Pima Rd as follows:

- A 12" PVC water main exists in East Stagecoach Pass, 32' South of the road center line.
- An 8" ACP in East Stagecoach Pass 4' north of the road centerline, owned by Carefree Water Company.
- A 10" TYP UNK in East Stagecoach Pass 12' south of the road centerline, owned by Carefree Water Company.
- An 8" TYP UNK RWDS Non-portable water line exists in East Stagecoach Pass, 25' south to the road centerline.
- A 16" TYP UNK potable water main exists to the east in North Pima Road, 20' west of the road centerline.
- A 24" SCP potable water line exists to the east in North Pima Road, 81' east of the road centerline.
- 12" DIP Non-portable water line, 12" TYP UNK Non-portable water line, and 16" TYP UNK Non-portable water line exist to the east in North Pima Road, 50', 32', and 15' east to the road centerline.
- A 21" PVC gravity sewer main exists to the east in North Pima Road, 48' east of the road centerline.

Refer to **EXHIBIT 2** for the COS Water Quarter Section Map (60-48).

2.3.2 Proposed Site Development:

The existing site will be re-platted and developed with a new building for office use and a parking lot. Refer to **EXHIBIT 3** for the Site Plan.

Shows partial site plan

3. DESIGN CRITERIA

3.1 DEVELOPMENT CRITERIA

Proposed zoning: R1-35 ESL

Acreage: 13.04

Demands, system layout, system pressures, velocities, head losses for fire flow will all be in accordance with the City's DS&PM (References 2 and 3 in Sec. 11).



A 1,500 gpm system fire flow demand will be utilized in hydraulic calculations.

4.1 PROPOSED DEMANDS

Refer to the tables below for the proposed (R1-35 ESL PRD) water and sewer demand calculations in gallons per minute based on design criteria in the City's DS&PM.

Table 1: WATER DEMAND CALCULATIONS

	Area (sf)	Avg. Day Demand (GPM/SF)	Max Day Peaking Factor	Peak Hour Peaking Factor	Avg. Day Demand (GPM)	Max. Day Demand (GPM)	Peak Hour Demand (GPM)
Office	14,588	8.34E-04	2	3.5	12	24	43

Table 2 - SEWER DEMAND CALCULATIONS

	Area (sf)	Avg. Day Demand (gal/day/sf)	Avg. Day Demand (GPD)	Peaking Factor	Peak Flow (GPM)
Office	14,588	0.4	5,835	3	12

4.2 WATER ZONE

According to the City of Scottsdale DS&PM Sec. 6-1, the site is within Zone 11N.

4.3 PHASING OF PROJECT

Currently, the project is anticipated to be constructed in a single phase. Should this change, later reports will be updated and submitted for review. Final Basis of Design Reports must be accepted by the Water Resources Department prior to the submittal of improvement plans to the City's 1-Stop Shop.

4.4 SUMMARY NARRATIVE OF DEMANDS

- The max day + fire flow scenario will govern the water system design.
- No offsite sewer flow impacts this site.

5. PROPOSED INFRASTRUCTURE

5.1 WATER DISTRIBUTION SYSTEM

This project proposes to construct approximately 375 LF of 8" DIP connecting to the 12" line in East Stagecoach Pass. Refer to **EXHIBIT 3** for the proposed site and utility plan. A fire hydrant will terminate the extension. Metered service and the building fire line will be tapped off the new 8" water line.

Requires reduced pressure principle backflow preventer per SRC Sections 49-61 and 49-62.

5.2 SEWER COLLECTION SYSTEM

A 8"/6" sanitary sewer service will connect the building to the 21" PVC sewer main in Pima Road. A new manhole will need to be constructed over the existing sewer. The first reach of pipe will be 8" between two manholes to minimize any future impact to the desert floor. The service will be 6" under the drive with cleanouts at 100' on-center.

Falling topography does not support extension of public sewer along the site's Stagecoach Pass frontage. A public sewer to 8603 E. Stagecoach Pass has been extended to the southwest corner of that parcel which can provide future service.

8" sewer line will cross potable water line. Provide adequate separation and extra protection if required per DSPM & COS Std Details.

MH1 and the 8" DIP sewer are not in a sewer easement and therefore, the owner shall be responsible for the maintenance of the 8" sewer line and MH1 per DSPM Section 7-1.400.

5.3 MAINTENANCE AND OWNERSHIP

The water line is proposed as public to be owned and maintained by the City and is located within a 20-foot wide water easement. The sanitary sewer service is private and will be maintained by the owner. The new manhole will be public, owned and maintained by the City.

6. WATER COMPUTATIONS

6.1 DESCRIPTION OF MODEL

The new water system will be designed to meet the criteria of COS Water, the Arizona Department of Environmental Quality ("ADEQ"), and Maricopa County Environmental Services Department ("MCESD").

Bentley WaterCAD® Version 8i was used to model the water extension and demand scenarios. A current fire hydrant flow test is included in **EXHIBIT 4**. The results of water modeling are included in **EXHIBIT 5**.

7. SEWER COMPUTATIONS

7.1 DESCRIPTION

Per utility plan, the 8" sewer is DIP.

A 8" PVC sewer service at 1.5% grade will convey the peak 12 gpm flow to Pima Road at 1.6 fps with a normal depth of 0.7". The hydraulic radius is 0.47". At $d/D = 0.65$ the 8" service pipe has a capacity of 502.4 gpm at 4.7 fps. The full flow capacity is 664 gpm at 4.2 fps.

A 6" PVC sewer service at 2% grade will convey the peak 12 gpm flow to Pima Road at 1.9 fps with a normal depth of 0.8". The hydraulic radius is 0.47". At $d/D = 0.65$ the 6" service pipe has a capacity of 269 gpm at 4.4 fps. The full flow capacity is 356 gpm at 4.0 fps.

Reference **EXHIBIT 6**.

8. SUMMARY / CONCLUSIONS

- Sufficient city water supply is available to support the project's domestic and fire flow demand.
- Sufficient city sewer capacity is available to support the project.
- An existing onsite well will be utilized for irrigation service.

9. REFERENCES

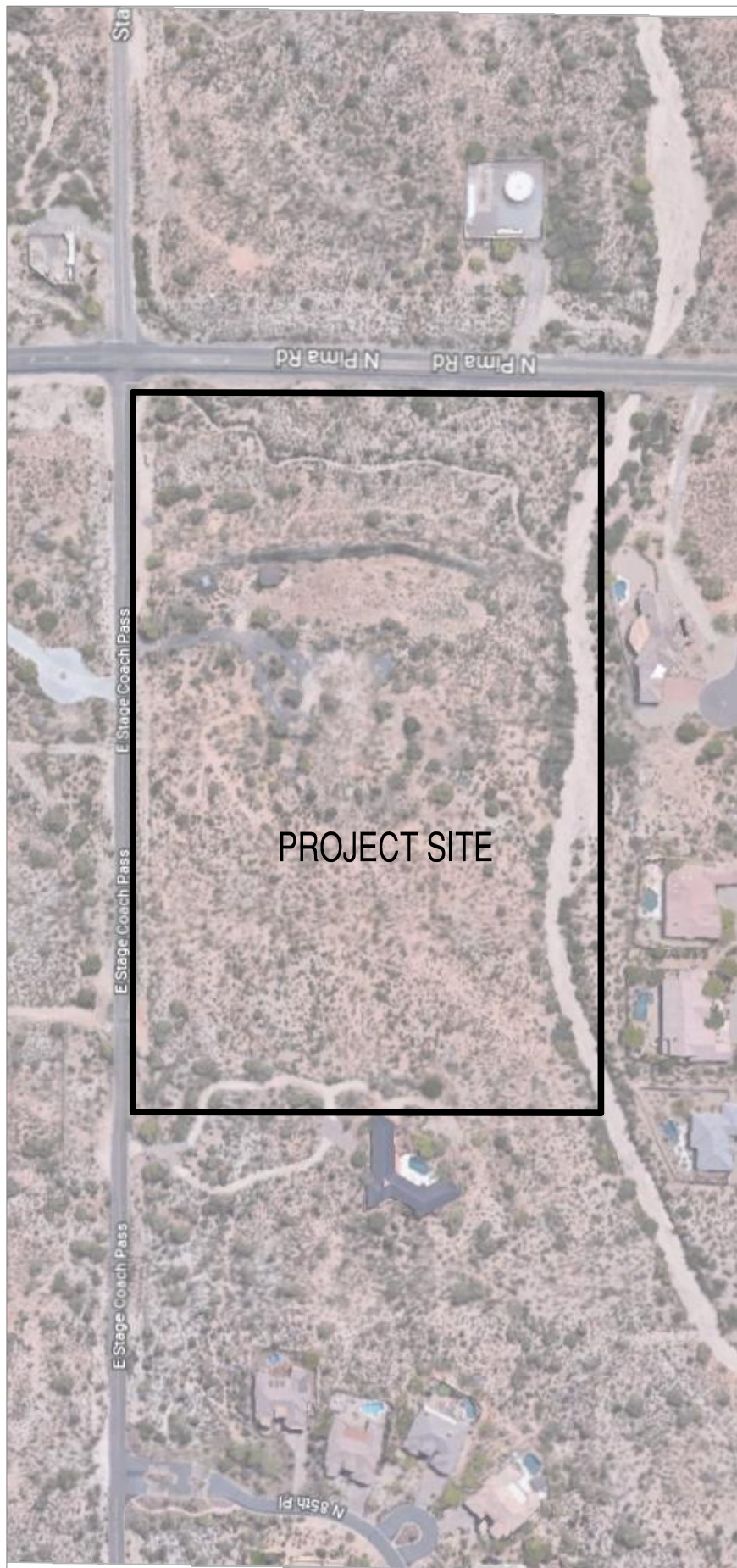
1. COS QS numbers 60-48, 61-49
2. City of Scottsdale Design Standards & Policies Manual, 2018 (Chapter 6 – Water).
3. City of Scottsdale Design Standards & Policies Manual, 2018 (Chapter 7 – Wastewater)

10. EXHIBITS:

- EXHIBIT 1 - VICINITY MAP – CONTEXT AERIAL
- EXHIBIT 2 - Q-S MAPS 60-48, 61-49
- EXHIBIT 3 - Utility Plan
- EXHIBIT 4 - Fire Hydrant Flow Test
- EXHIBIT 5 - Water Modeling
- EXHIBIT 6 - Sewer Service Calculation

EXHIBIT 1

Vicinity Map



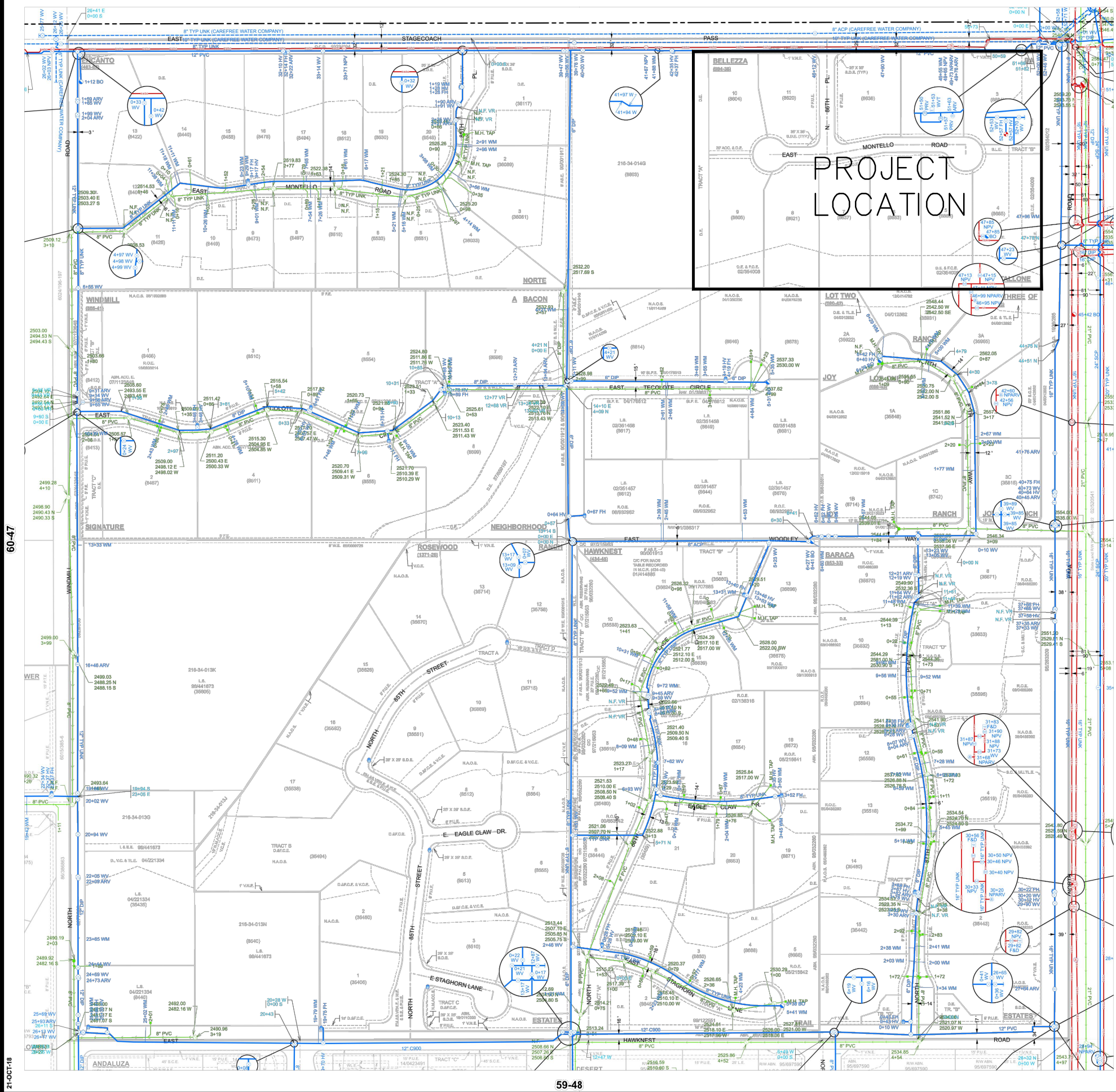
N.T.S



EXHIBIT 1
VICINITY MAP

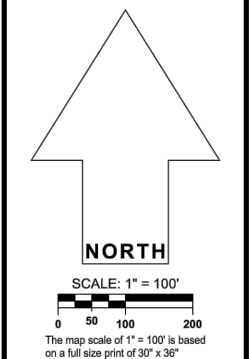
EXHIBIT 2

Q-S Map



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THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS CALCULATED ON THE MAP.

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



WATER & SEWER
QUARTER SECTION MAP
60-48
NE 1/4 SEC. 1 T5N R4E

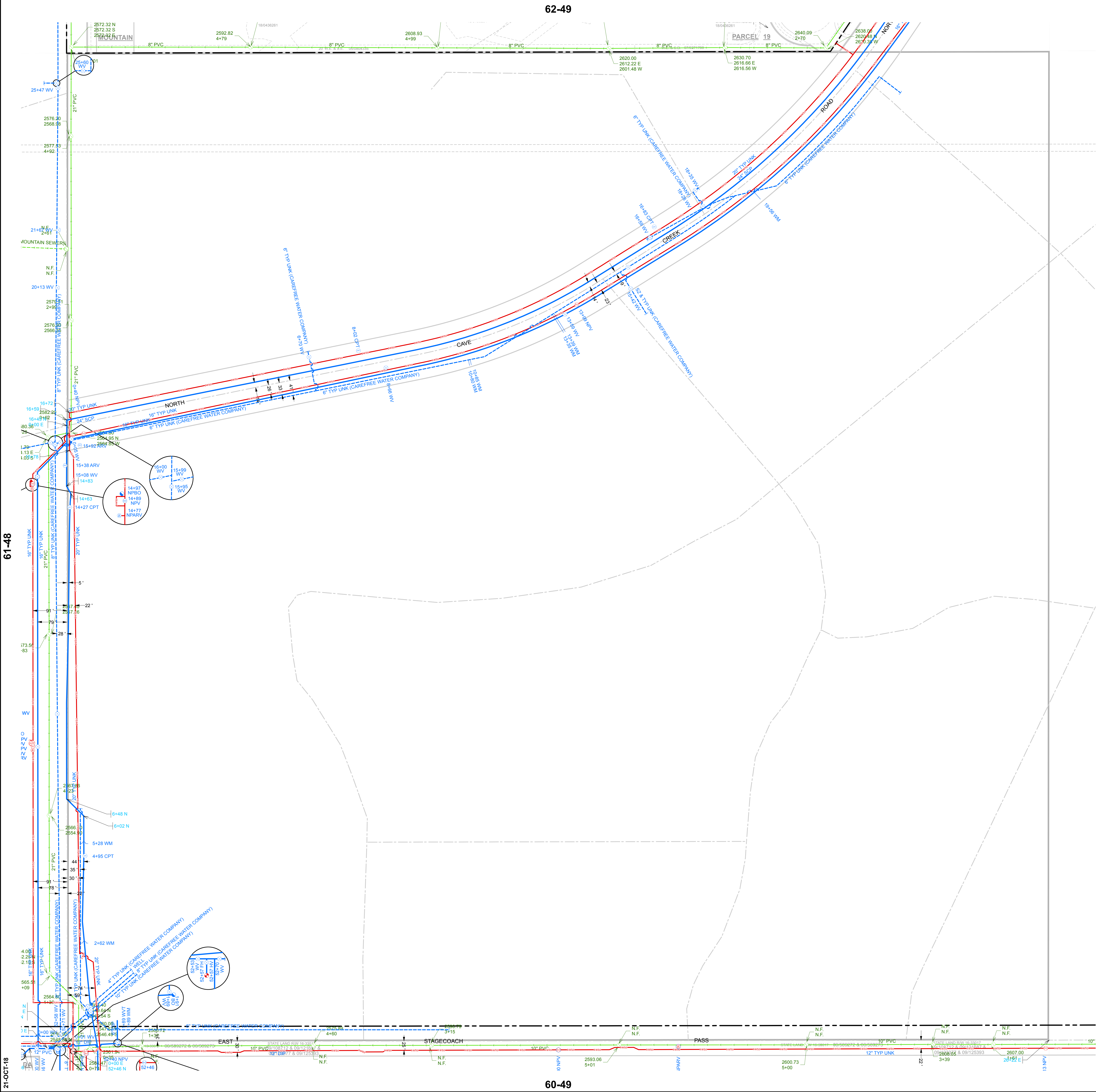
CITY OF SCOTTSDALE
SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS
3628 North Drinkwater Boulevard
Scottsdale, Arizona 85251

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LEGEND:

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

VICINITY MAP

W 1/4 COR. CENTER 37000 N
PIMA ROAD 92ND STREET
SW COR. STAGECOACH PASS ROAD S 1/4 COR.
8800 E 9200 E

NORTH

SCALE: 1" = 100'

0 50 100 200

The map scale of 1" = 100' is based on a full size print of 30" x 36"

WATER & SEWER

QUARTER SECTION MAP

61-49

SW 1/4 SEC. 31 T6N R5E

CITY OF SCOTTSDALE

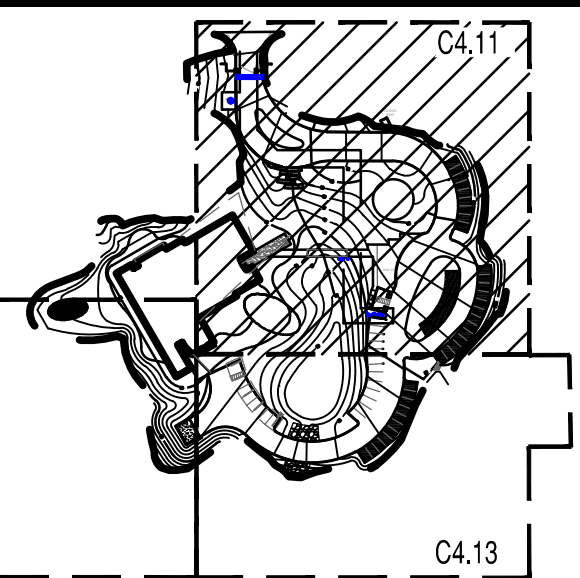
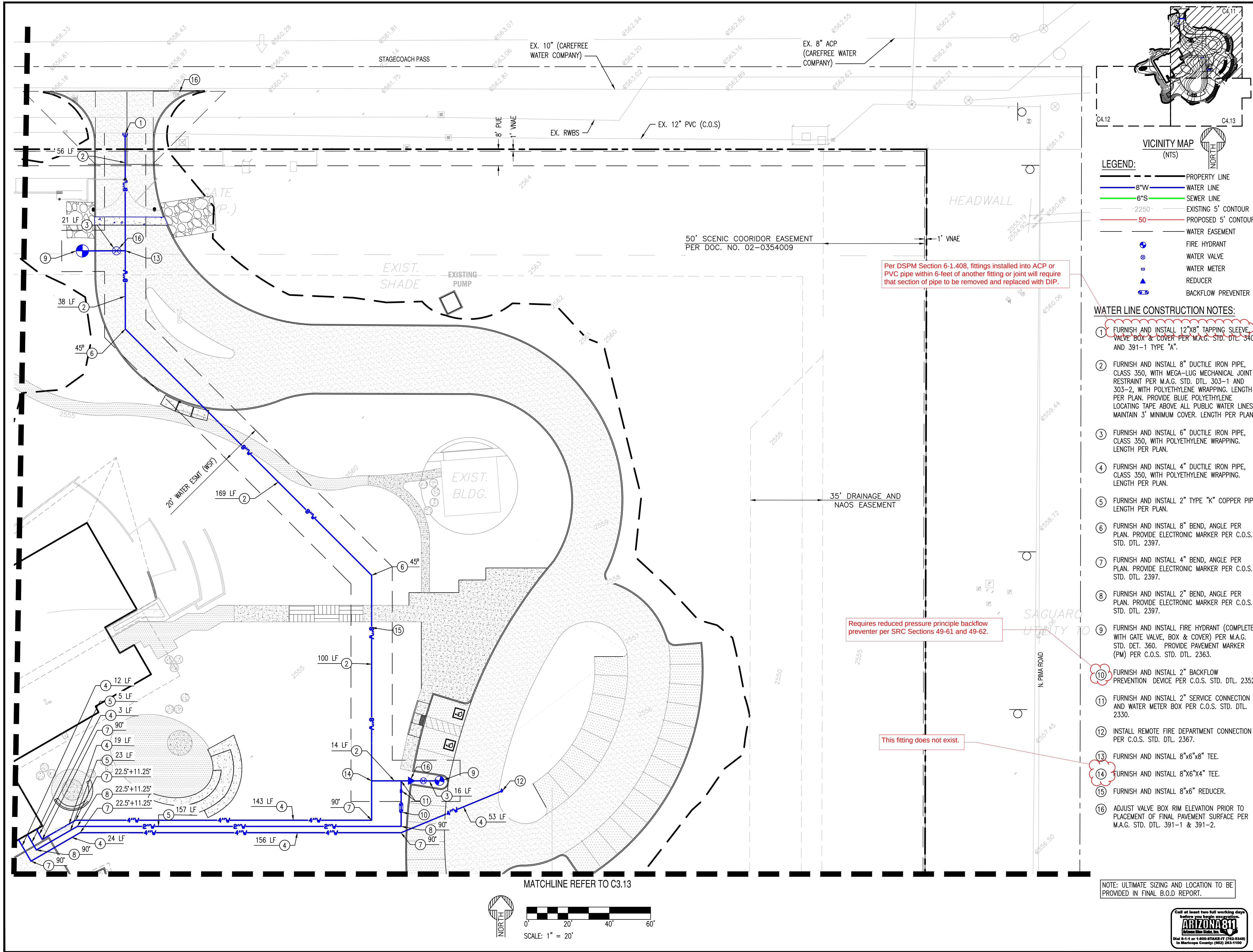
SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS

3629 North Drinkwater Boulevard
Scottsdale, Arizona 85251

EXHIBIT 3

Preliminary Utility Plans

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VICINITY MAP
(NTS)

- LEGEND:**
- PROPERTY LINE
 - 8"W WATER LINE
 - 6"S SEWER LINE
 - EXISTING 5' CONTOUR
 - PROPOSED 5' CONTOUR
 - WATER EASEMENT
 - FIRE HYDRANT
 - WATER VALVE
 - WATER METER
 - REDUCER
 - BACKFLOW PREVENTER

WATER LINE CONSTRUCTION NOTES:

- FURNISH AND INSTALL 12"x8" TAPPING SLEEVE, VALVE BOX & COVER PER M.A.G. STD. DTL. 340 AND 391-1 TYPE "A".
- FURNISH AND INSTALL 8" DUCTILE IRON PIPE, CLASS 350, WITH MEGA-LUG MECHANICAL JOINT RESTRAINT PER M.A.G. STD. DTL. 303-1 AND 303-2, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN. PROVIDE BLUE POLYETHYLENE LOCATING TAPE ABOVE ALL PUBLIC WATER LINES. MAINTAIN 3' MINIMUM COVER. LENGTH PER PLAN.
- FURNISH AND INSTALL 6" DUCTILE IRON PIPE, CLASS 350, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN.
- FURNISH AND INSTALL 4" DUCTILE IRON PIPE, CLASS 350, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN.
- FURNISH AND INSTALL 2" TYPE "K" COPPER PIPE. LENGTH PER PLAN.
- FURNISH AND INSTALL 8" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DTL. 2397.
- FURNISH AND INSTALL 4" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DTL. 2397.
- FURNISH AND INSTALL 2" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DTL. 2397.
- FURNISH AND INSTALL FIRE HYDRANT (COMPLETE WITH GATE VALVE, BOX & COVER) PER M.A.G. STD. DET. 360. PROVIDE PAVEMENT MARKER (PM) PER C.O.S. STD. DTL. 2363.
- FURNISH AND INSTALL 2" BACKFLOW PREVENTION DEVICE PER C.O.S. STD. DTL. 2352.
- FURNISH AND INSTALL 2" SERVICE CONNECTION AND WATER METER BOX PER C.O.S. STD. DTL. 2330.
- INSTALL REMOTE FIRE DEPARTMENT CONNECTION PER C.O.S. STD. DTL. 2367.
- FURNISH AND INSTALL 8"x6"x8" TEE.
- FURNISH AND INSTALL 8"x6"x4" TEE.
- FURNISH AND INSTALL 8"x6" REDUCER.
- ADJUST VALVE BOX RIM ELEVATION PRIOR TO PLACEMENT OF FINAL PAVEMENT SURFACE PER M.A.G. STD. DTL. 391-1 & 391-2.

NOTE: ULTIMATE SIZING AND LOCATION TO BE PROVIDED IN FINAL B.O.D. REPORT.



SUSTAINABILITY ENGINEERING GROUP

SEG

8280 E. GELDING DRIVE SUITE 101, SCOTTSDALE, ARIZONA 85260
WWW.AZSEG.COM TEL: 480.588.7226 FAX: 480.259.3534

orcutt|winslow

PROJECT
TSG FOUNDATION
CENTER FOR SPIRITUAL DEVELOPMENT

LOCATION
SNC OF E. STAGECOACH PASS
AND N. PIMA RD.

DRAWN
DESIGNED
CHECKED
PROJ. MGR

BECELL
BECELL
COUNSELL
FAKHRI

DATE:
04/02/2019

ISSUED FOR:
DRB

REVISION NO.:

1		
2		
3		
4		

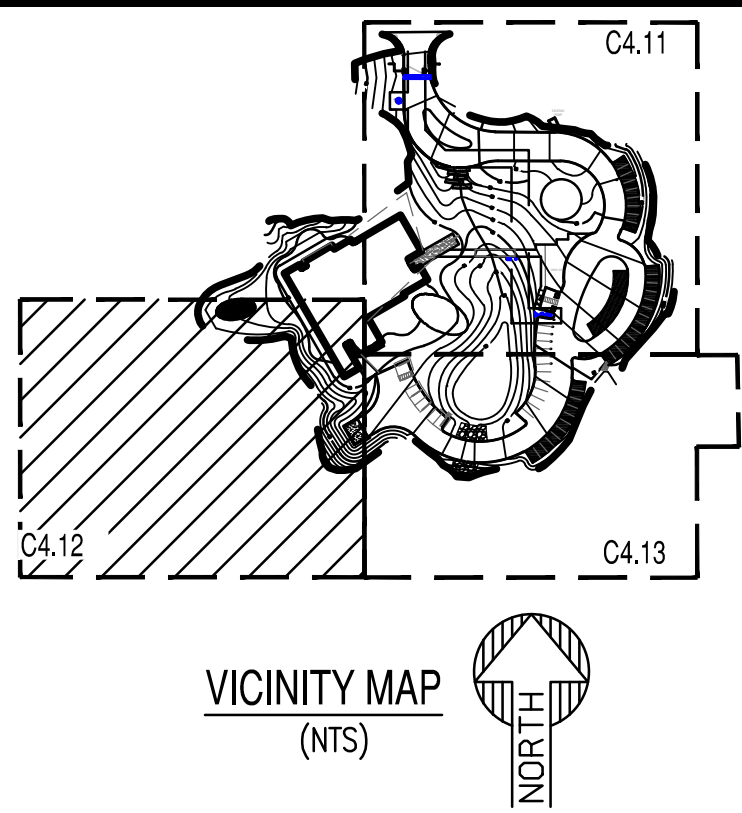
JOB NO.:
180333

SHEET TITLE:
UTILITY PLAN 1

SHEET NO.:
C4.11

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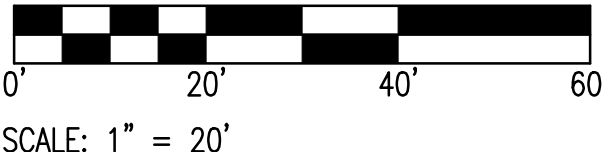
LEGEND:

- PROPERTY LINE
- 8" W WATER LINE
- 6" S SEWER LINE
- EXISTING 5' CONTOUR
- PROPOSED 5' CONTOUR
- WATER EASEMENT
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- REDUCER
- BACKFLOW PREVENTER

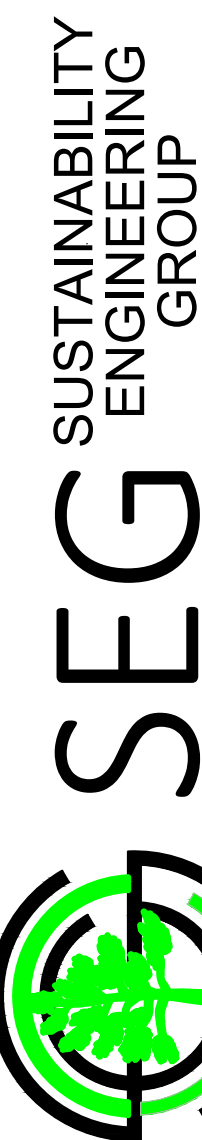
SEWER CONSTRUCTION NOTES

- FURNISH AND INSTALL 6" PVC-SDR 35 SEWER LINE CONNECTION PER M.A.G. STD. DET. 440-3. S=2% MINIMUM.
- FURNISH AND INSTALL CLEAN-OUT PER C.O.S. STD. DTL 2403.

MATCHLINE REFER TO SHEET C4.13



NOTE: ULTIMATE SIZING AND LOCATION TO BE PROVIDED IN FINAL B.O.D. REPORT.



8280 E. GELDING DRIVE SUITE 101, SCOTTSDALE, ARIZONA 85260
WWW.AZSEG.COM TEL 480.588.7226 FAX 480.259.3534



PROJECT
TSG FOUNDATION
CENTER FOR SPIRITUAL DEVELOPMENT

LOCATION
SWC OF E. STAGECOACH PASS
AND N. PIMA RD.

DRAWN
DESIGNED
CHECKED
PROJ. MGR
BEGELL
BEGELL
COUNSELL
FAKIH

DATE:
ISSUED FOR:
04/02/2019
DRB

REVISION NO.:	DATE:
1	
2	
3	

JOB NO.: 180333

SHEET TITLE:

UTILITY PLAN 2

SHEET NO.: C4.12

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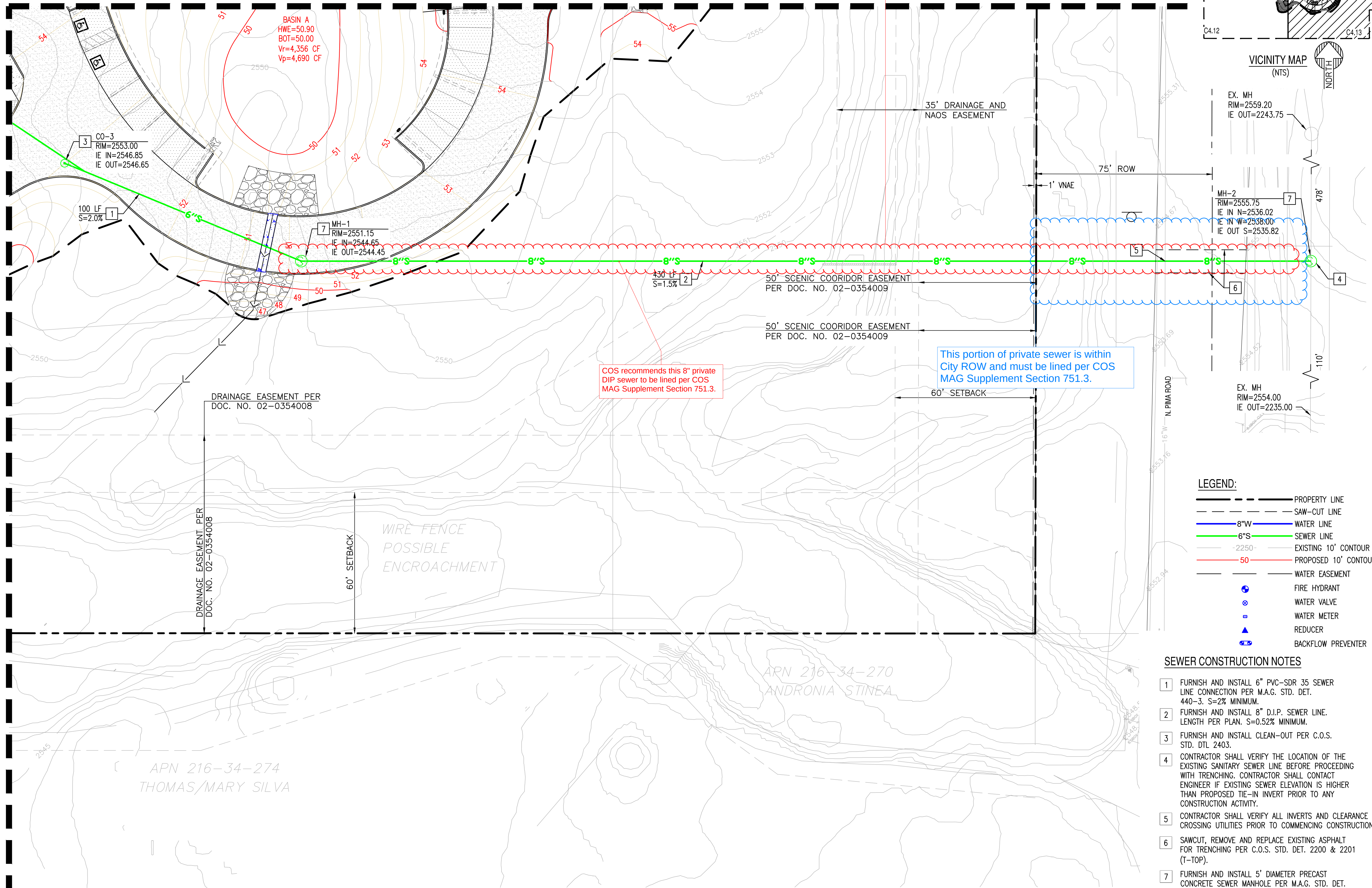
MATCHLINE REFER TO C4.12 SHEET #

MATCHLINE REFER TO C4.11 SHEET 9

MH1 and the 8" DIP sewer are not in a sewer easement and therefore, the owner shall be responsible for the maintenance of the 8" sewer and MH1.

COS recommends this 8" private DIP sewer to be lined per COS MAG Supplement Section 751.3.

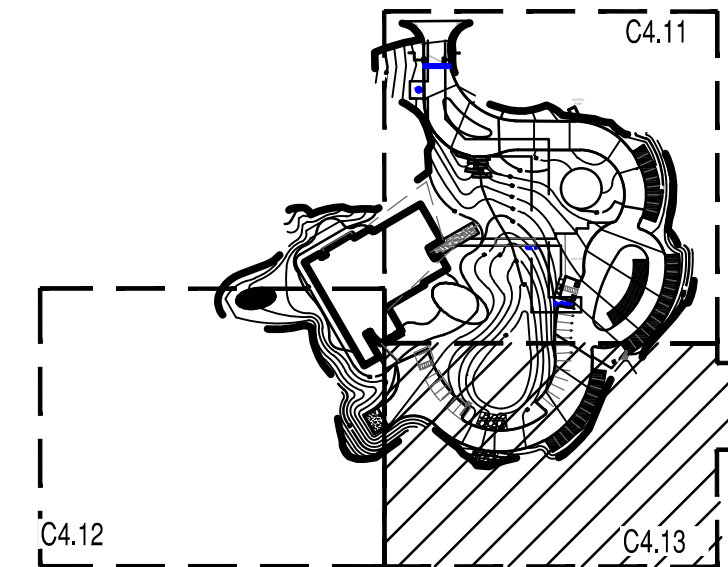
This portion of private sewer is within City ROW and must be lined per COS MAG Supplement Section 751.3.



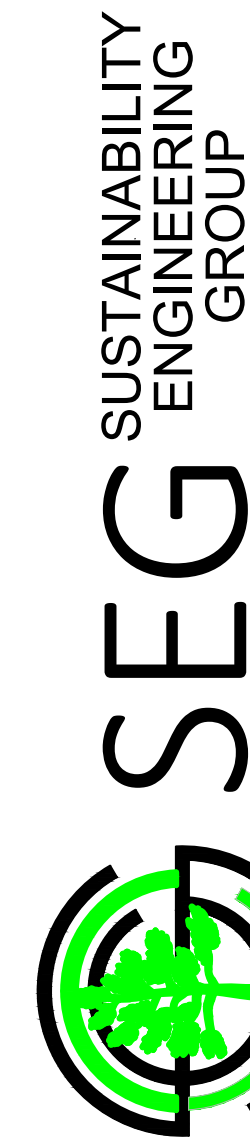
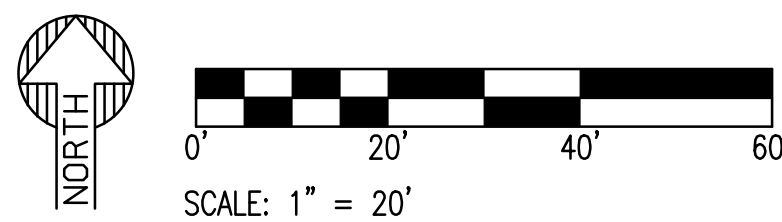
LEGEND:	
	PROPERTY LINE
	SAW-CUT LINE
	8"W WATER LINE
	6"S SEWER LINE
	EXISTING 10' CONTOUR
	PROPOSED 10' CONTOUR
	WATER EASEMENT
	FIRE HYDRANT
	WATER VALVE
	WATER METER
	REDUCER
	BACKFLOW PREVENTER

SEWER CONSTRUCTION NOTES

- FURNISH AND INSTALL 6" PVC-SDR 35 SEWER LINE CONNECTION PER M.A.G. STD. DET. 440-3. S=2% MINIMUM.
- FURNISH AND INSTALL 8" D.I.P. SEWER LINE. LENGTH PER PLAN. S=0.52% MINIMUM.
- FURNISH AND INSTALL CLEAN-OUT PER C.O.S. STD. DET. 2403.
- CONTRACTOR SHALL VERIFY THE LOCATION OF THE EXISTING SANITARY SEWER LINE BEFORE PROCEEDING WITH TRENCHING. CONTRACTOR SHALL CONTACT ENGINEER IF EXISTING SEWER ELEVATION IS HIGHER THAN PROPOSED TIE-IN INVERT PRIOR TO ANY CONSTRUCTION ACTIVITY.
- CONTRACTOR SHALL VERIFY ALL INVERTS AND CLEARANCE OF CROSSING UTILITIES PRIOR TO COMMENCING CONSTRUCTION.
- SAWCUT, REMOVE AND REPLACE EXISTING ASPHALT FOR TRENCHING PER C.O.S. STD. DET. 2200 & 2201 (T-TOP).
- FURNISH AND INSTALL 5' DIAMETER PRECAST CONCRETE SEWER MANHOLE PER M.A.G. STD. DET. 420-1 (NO STEPS) WITH 12 CONCRETE COLLAR PER C.O.S. STD. DET. 2270. 30" WATERTIGHT COVER PER M.A.G. STD. DET. 424-2 AND C.O.S. STD. DET. 2421. CAST-IN-PLACE BASE.



VICINITY MAP (NTS)



orcutt|winslow

PROJECT	
TSG FOUNDATION CENTER FOR SPIRITUAL DEVELOPMENT	
LOCATION	
SNC OF E. STAGECOACH PASS AND N. PIMA RD.	

DRAWN	BECELL
DESIGNED	BECELL
CHECKED	COUNSELL
PROJ. MGR	FAKIH

DATE: 04/02/2019

ISSUED FOR: DRB

REVISION NO.:	DATE:
1	
2	
3	

JOB NO.: 180333

SHEET TITLE:

UTILITY PLAN 3

SHEET NO.:

C4.13

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EXHIBIT 4

Fire Hydrant Flow Test

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	TSG
Project Address:	Pima & Stagecoach Pass (SWC), Scottsdale, Arizona 85262
Arizona Flow Testing Project No.:	19051
Client Project No.:	Not Provided
Flow Test Permit No.:	C57398
Date and time flow test conducted:	February 21, 2019 at 8:30 AM
Data is current and reliable until:	August 21, 2019
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Phil Cipolla – City of Scottsdale-Inspector (602-828-0847)

Raw Test Data

Static Pressure: **80.0 PSI**
(Measured in pounds per square inch)

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

Pitot Pressure: **23.0 PSI**
(Measured in pounds per square inch)

Diffuser Orifice Diameter: 4 Inch Hose Monster
(Measured in inches)

Coefficient of Diffuser: 0.7875

Flowing GPM: **1,803 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **5,353 GPM**

Data with 10% Safety Factor

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

Residual Pressure: **64.0PSI**
(Measured in pounds per square inch)

Distance between hydrants: Approx. 1,060 feet

Main size: Not Provided

Flowing GPM: **1,803 GPM**

GPM @ 20 PSI: **4,955 GPM**

Flow Test Location

North ↑



EXHIBIT 5

Model Output

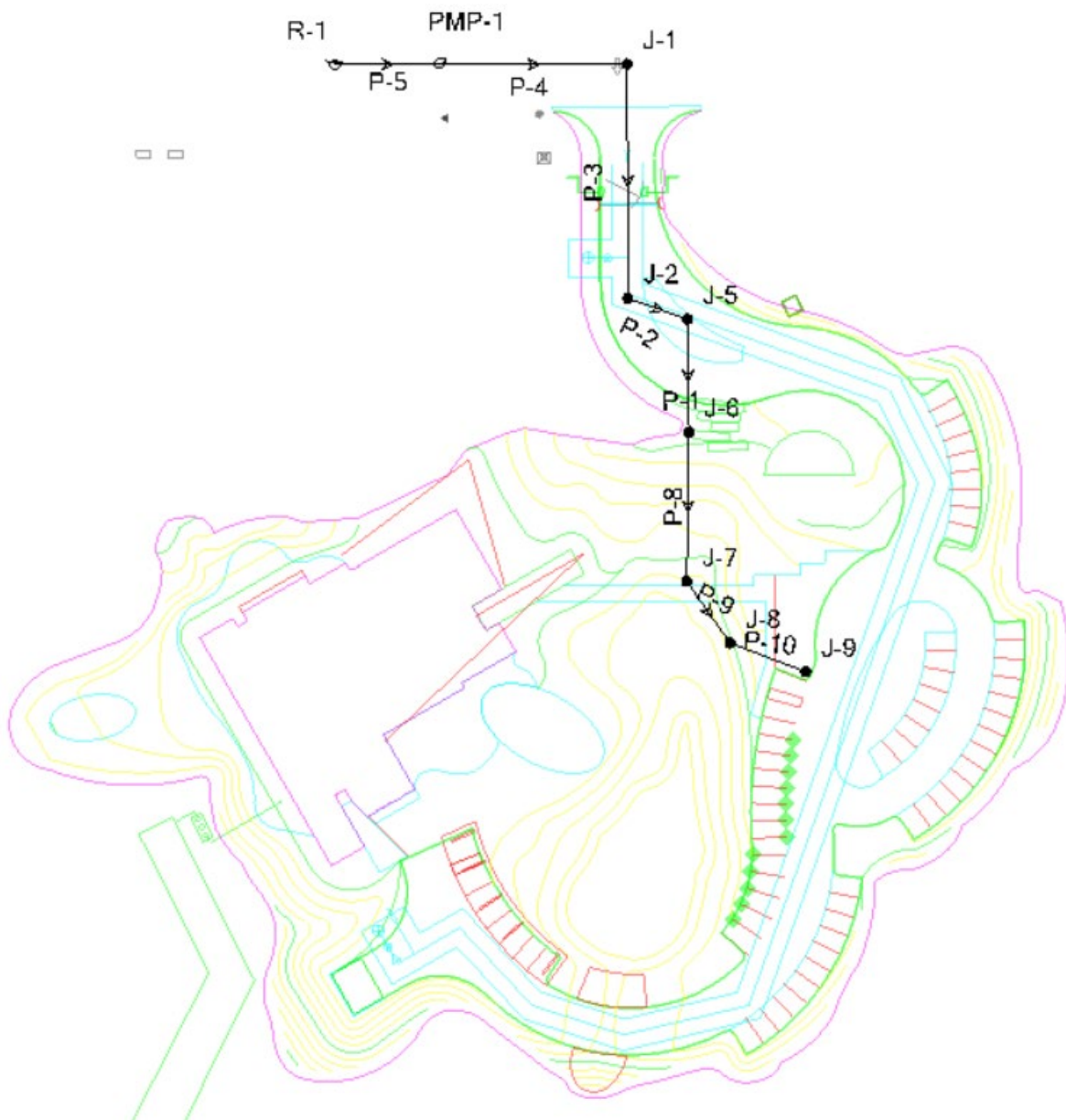


EXHIBIT 5 – MODEL MAP

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	2,560.28	0	2,698.00	60
J-2	2,553.00	0	2,698.00	63
J-5	2,552.00	0	2,698.00	63
J-6	2,556.55	0	2,698.00	61
J-7	2,554.00	0	2,698.00	62
J-8	2,555.00	12	2,698.00	62
J-9	2,555.00	0	2,698.00	62

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Pipe Table

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	8.0	59	130.0	12	0.08
P-2	8.0	33	130.0	12	0.08
P-3	8.0	123	130.0	12	0.08
P-4	12.0	1,120	150.0	12	0.03
P-5	16.0	25	130.0	12	0.02
P-8	8.0	78	130.0	12	0.08
P-9	8.0	39	130.0	12	0.08
P-10	8.0	42	130.0	0	0.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Pump Table

Label	Elevation (ft)	Pump Status	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	2,530.00	On	2,532.00	2,698.00	12	166.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: ADD

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	2,532.00	12	2,532.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	2,560.28	0	2,697.99	60
J-2	2,553.00	0	2,697.99	63
J-5	2,552.00	0	2,697.99	63
J-6	2,556.55	0	2,697.99	61
J-7	2,554.00	0	2,697.99	62
J-8	2,555.00	24	2,697.98	62
J-9	2,555.00	0	2,697.98	62

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Pipe Table

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	8.0	59	130.0	24	0.15
P-2	8.0	33	130.0	24	0.15
P-3	8.0	123	130.0	24	0.15
P-4	12.0	1,120	150.0	24	0.07
P-5	16.0	25	130.0	24	0.04
P-8	8.0	78	130.0	24	0.15
P-9	8.0	39	130.0	24	0.15
P-10	8.0	42	130.0	0	0.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Pump Table

Label	Elevation (ft)	Pump Status	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	2,530.00	On	2,532.00	2,697.99	24	165.99

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	2,532.00	24	2,532.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	2,560.28	0	2,697.97	60
J-2	2,553.00	0	2,697.97	63
J-5	2,552.00	0	2,697.96	63
J-6	2,556.55	0	2,697.96	61
J-7	2,554.00	0	2,697.96	62
J-8	2,555.00	43	2,697.95	62
J-9	2,555.00	0	2,697.95	62

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Pipe Table

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-1	8.0	59	130.0	43	0.27
P-2	8.0	33	130.0	43	0.27
P-3	8.0	123	130.0	43	0.27
P-4	12.0	1,120	150.0	43	0.12
P-5	16.0	25	130.0	43	0.07
P-8	8.0	78	130.0	43	0.27
P-9	8.0	39	130.0	43	0.27
P-10	8.0	42	130.0	0	0.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Pump Table

Label	Elevation (ft)	Pump Status	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
PMP-1	2,530.00	On	2,532.00	2,697.98	43	165.98

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: PHD

FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	2,532.00	43	2,532.00

2019-03-15 - TSG 1500 gpm FF with 8-in pipes.wtg

Active Scenario: MDD+Fire

Fire Flow Node FlexTable: Fire Flow Report

Label	Needed Fire Flow (gpm)	MD + Needed Flow (gpm)	Calculated Pressure at Junction (psi)	Total Available Flow at 20 psi (gpm)	Junction w/ Minimum Pressure	Junction Pressure) (psi)	Pipe w/ Maximum Velocity	Pipe Velocity (ft/s)
J-1	1,500	1,500	51	1,501	J-6	53	P-4	4.33
J-2	1,500	1,500	52	1,501	J-6	51	P-3	9.73
J-5	1,500	1,500	52	1,501	J-6	50	P-3	9.73
J-6	1,500	1,500	49	1,501	J-9	50	P-3	9.73
J-7	1,500	1,500	49	1,501	J-9	49	P-8	9.73
J-8	1,500	1,524	48	1,525	J-9	48	P-9	9.73
J-9	1,500	1,500	47	1,501	J-8	48	P-9	9.73

EXHIBIT 6

Sewer Service Calculation

8" Pipe - Peak Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.01500 ft/ft
Diameter	8 in
Discharge	12.0 gal/min

Results

Normal Depth	0.74 in
Flow Area	0.02 ft²
Wetted Perimeter	0.41 ft
Hydraulic Radius	0.47 in
Top Width	0.39 ft
Critical Depth	0.07 ft
Percent Full	9.3 %
Critical Slope	0.00743 ft/ft
Velocity	1.64 ft/s
Velocity Head	0.04 ft
Specific Energy	0.10 ft
Froude Number	1.40
Maximum Discharge	714.52 gal/min
Discharge Full	664.2 gal/min
Slope Full	0.00000 ft/ft
Flow Type	SuperCritical

8" Pipe - d/D = 0.65

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Normal Depth	5.20	in
Diameter	8	in

Results

Discharge	502.4	gal/min
Flow Area	0.24	ft²
Wetted Perimeter	1.25	ft
Hydraulic Radius	2.31	in
Top Width	0.64	ft
Critical Depth	0.50	ft
Percent Full	65.0	%
Critical Slope	0.01023	ft/ft
Velocity	4.66	ft/s
Velocity Head	0.34	ft
Specific Energy	0.77	ft
Froude Number	1.34	
Maximum Discharge	714.52	gal/min
Discharge Full	664.2	gal/min
Slope Full	0.00858	ft/ft
Flow Type	SuperCritical	

8" Pipe - Full Flow Capacity

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Normal Depth	8.00	in
Diameter	8	in
Discharge	664.2	gal/min

Results

Discharge	664.2	gal/min
Normal Depth	8.00	in
Flow Area	0.35	ft²
Wetted Perimeter	2.09	ft
Hydraulic Radius	2.00	in
Top Width	0.00	ft
Critical Depth	0.57	ft
Percent Full	100.0	%
Critical Slope	0.01402	ft/ft
Velocity	4.24	ft/s
Velocity Head	0.28	ft
Specific Energy	0.95	ft
Froude Number	0.00	
Maximum Discharge	714.52	gal/min
Discharge Full	664.2	gal/min
Slope Full	0.01500	ft/ft
Flow Type	SubCritical	

6" Pipe - Peak Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.02000 ft/ft
Diameter	6 in
Discharge	12.0 gal/min

Results

Normal Depth	0.75 in
Flow Area	0.01 ft²
Wetted Perimeter	0.36 ft
Hydraulic Radius	0.47 in
Top Width	0.33 ft
Critical Depth	0.08 ft
Percent Full	12.6 %
Critical Slope	0.00760 ft/ft
Velocity	1.87 ft/s
Velocity Head	0.05 ft
Specific Energy	0.12 ft
Froude Number	1.59
Maximum Discharge	383.10 gal/min
Discharge Full	356.1 gal/min
Slope Full	0.00002 ft/ft
Flow Type	SuperCritical

6" Pipe - d/D = 0.65

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Normal Depth	3.90	in
Diameter	6	in

Results

Discharge	269.4	gal/min
Flow Area	0.14	ft²
Wetted Perimeter	0.94	ft
Hydraulic Radius	1.73	in
Top Width	0.48	ft
Critical Depth	0.39	ft
Percent Full	65.0	%
Critical Slope	0.01234	ft/ft
Velocity	4.44	ft/s
Velocity Head	0.31	ft
Specific Energy	0.63	ft
Froude Number	1.47	
Maximum Discharge	383.10	gal/min
Discharge Full	356.1	gal/min
Slope Full	0.01144	ft/ft
Flow Type	SuperCritical	

6" Pipe - Full Flow Capacity

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Normal Depth	6.00	in
Diameter	6	in
Discharge	356.1	gal/min

Results

Discharge	356.1	gal/min
Normal Depth	6.00	in
Flow Area	0.20	ft²
Wetted Perimeter	1.57	ft
Hydraulic Radius	1.50	in
Top Width	0.00	ft
Critical Depth	0.44	ft
Percent Full	100.0	%
Critical Slope	0.01788	ft/ft
Velocity	4.04	ft/s
Velocity Head	0.25	ft
Specific Energy	0.75	ft
Froude Number	0.00	
Maximum Discharge	383.10	gal/min
Discharge Full	356.1	gal/min
Slope Full	0.02000	ft/ft
Flow Type	SubCritical	