Drainage Reports

Abbreveated Water & Sewer Need Reports

Water Study

Wastewater Study

Stormwater Waiver Application

FINAL BASIS OF DESIGN REPORT
for
WATER AND SEWER SERVICE

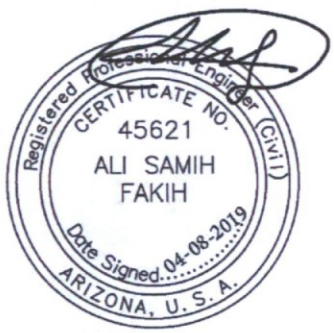
TSG FOUNDATION

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:

SEG

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-Ap No.: 513-PA-2017; 50-DR-2018 **Plan Check No.: TBD**

50-DR-2018
4/8/2019

Table of Contents

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. 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.

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

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

NORTH

FIGURE 1
VICINITY MAP

N.T.S

EXHIBIT 2

Q-S Map

61-48

PROJECT LOCATION

60-47

60-49

59-48

GENERAL NOTES:

- THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7780.
- THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER, 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS "CALCULATED" ON THE MAP.

LEGEND:

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

VICINITY MAP

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

60-48

NE 1/4 SEC. 1 T5N R4E

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

21-OCT-18

62-49

61-48

60-49

61-50

21-OCT-18

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
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- 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

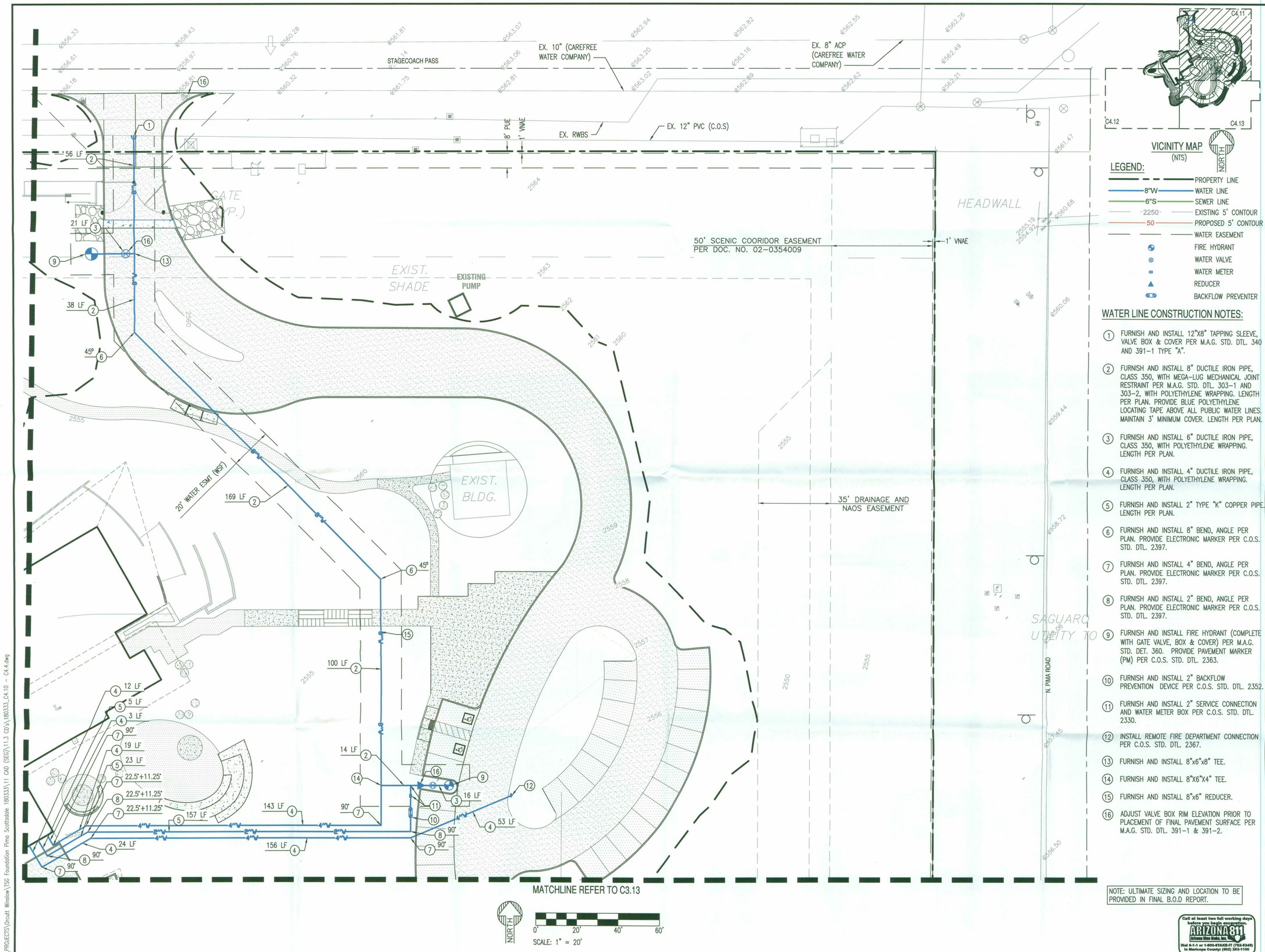
SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS

3629 North Drinkwater Boulevard
Scottsdale, Arizona 85251

EXHIBIT 3

Preliminary Utility Plans

8280 E. Gelding Dr., Suite 101
Scottsdale, AZ 85260
Sustainability Engineering Group *info@azSEG.com 480.588.7226 www.azSEG.com*



VICINITY MAP
(NTS)

NORTH

LEGEND:

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

WATER LINE CONSTRUCTION NOTES:

1. FURNISH AND INSTALL 12"X8" TAPPING SLEEVE, VALVE BOX & COVER PER M.A.G. STD. DTL. 340 AND 391-1 TYPE "A".
2. 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.
3. FURNISH AND INSTALL 6" DUCTILE IRON PIPE, CLASS 350, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN.
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.
6. FURNISH AND INSTALL 8" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DTL. 2397.
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.
9. 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.
10. FURNISH AND INSTALL 2" BACKFLOW PREVENTION DEVICE PER C.O.S. STD. DTL. 2352.
11. FURNISH AND INSTALL 2" SERVICE CONNECTION AND WATER METER BOX PER C.O.S. STD. DTL. 2330.
12. *INSTALL REMOTE FIRE DEPARTMENT* CONNECTION PER C.O.S. STD. DTL. 2367.
13. FURNISH AND INSTALL 8"x6"x8" TEE.
14. FURNISH AND INSTALL 8"X6"X4" TEE.
15. FURNISH AND INSTALL 8"x6" REDUCER.
16. 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.

Call at least two full working days before you begin excavation. ARIZONA811 Arizona Blue Stake, Inc. Dial 8-1-1 or 1-800-STAKE-IT (782-5348) In Maricopa County (602) 263-1100

Registered Professional Engineer CERTIFICATE NO. 45621 ALI SAMIH FAKIH Date Signed 04-05-2019 ARIZONA, U.S.A.

SEG SUSTAINABILITY ENGINEERING GROUP
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 BEGELL
DESIGNED BEGELL
CHECKED COUNSELL
PROJ. MGR. FAKIH

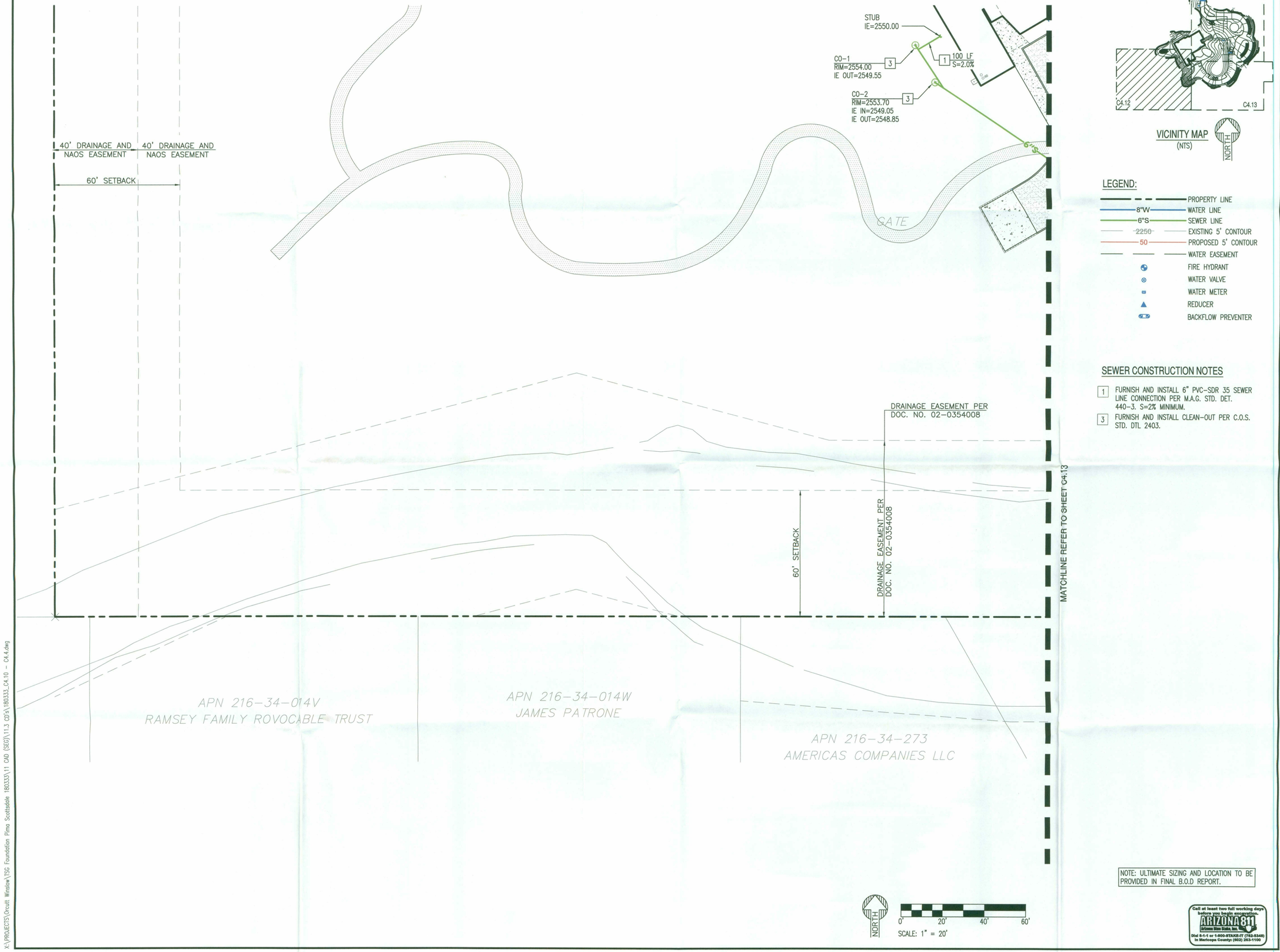
DATE: 04/02/2019
ISSUED FOR: DRB

REVISION NO.:	DATE:
1	
2	
3	
4	

JOB NO.: 180333

SHEET TITLE: UTILITY PLAN 1

SHEET NO.: C4.11



VICINITY MAP
(NTS)

NORTH

LEGEND:

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

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.
3. FURNISH AND INSTALL CLEAN-OUT PER C.O.S. STD. DTL 2403.

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

Call at least two full working days before you begin excavation.
ARIZONA 811 Arizona Blue Stake, Inc.
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In Maricopa County: (602) 263-1100

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orcutt|winslow

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

DRAWN	BEGELL
DESIGNED	BEGELL
CHECKED	COUNSELL
PROJ. MGR.	FAKIH

DATE: 04/02/2019
ISSUED FOR: DRB

REVISION NO.:	DATE:
1	
2	
3	
4	

JOB NO.: 180333

SHEET TITLE: UTILITY PLAN 2

SHEET NO.: C4.12

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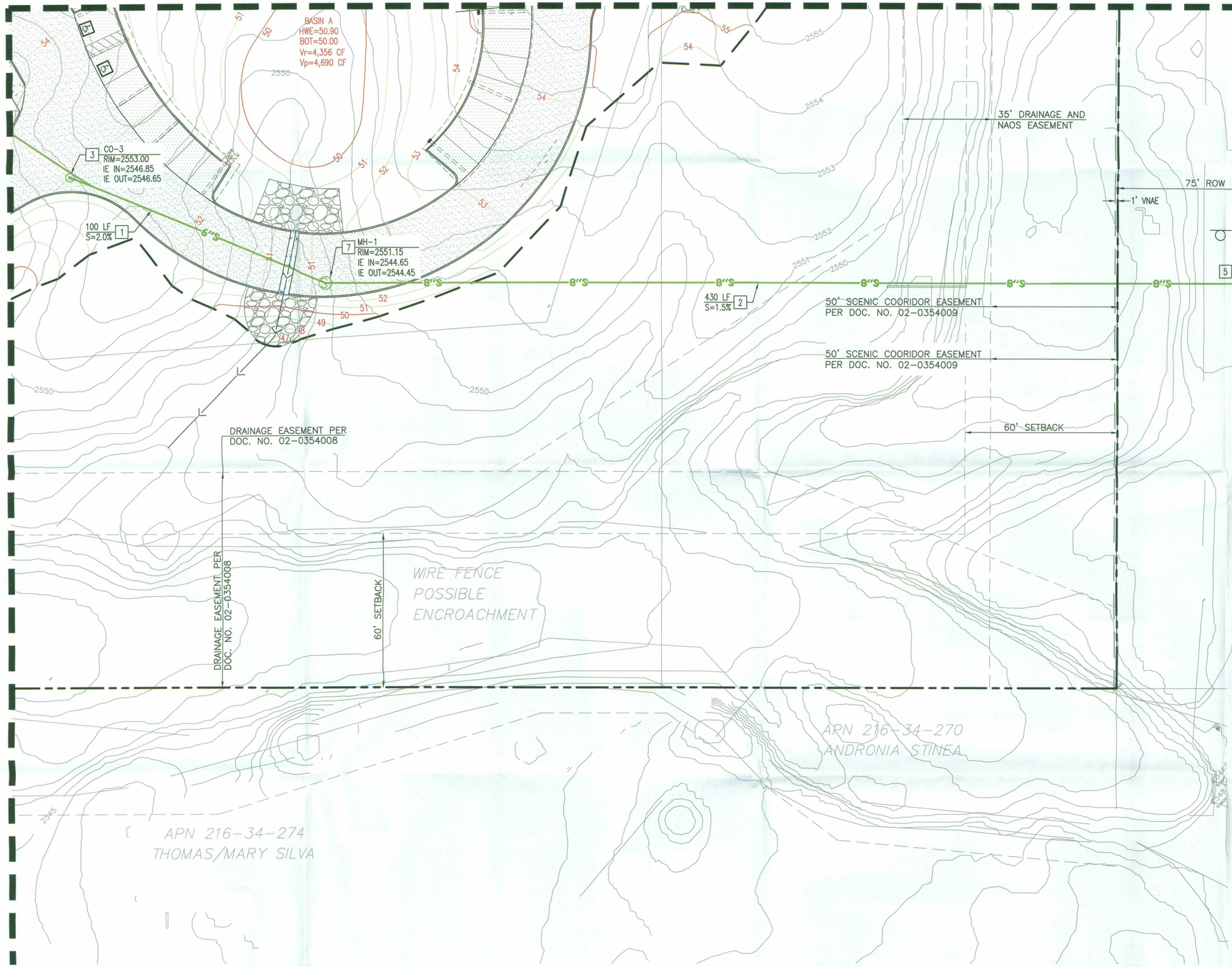
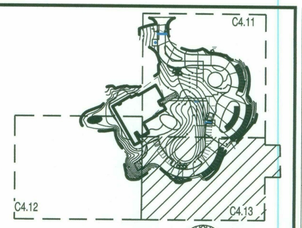
MATCHLINE REFER TO C4.12 SHEET #





VICINITY MAP
(NTS)

NORTH

LEGEND:

- PROPERTY LINE
- SAW-CUT LINE
- 8"W WATER LINE
- 6"S SEWER LINE
- 2250 EXISTING 10' CONTOUR
- 50 PROPOSED 10' CONTOUR
- WATER EASEMENT
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- REDUCER
- BACKFLOW PREVENTER

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. DTL 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.

Call at least two full working days before you begin excavation.
ARIZONA 811
Arizona Blue Stake, Inc.
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In Maricopa County: (602) 263-1100

45621
ALI SAMIH FAKIH
Date Signed 04-02-2019
ARIZONA, U.S.A.

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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
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PROJ. MGR.	FAKIH

DATE: 04/02/2019

ISSUED FOR: DRB

REVISION NO.:	DATE:
1	
2	
3	
4	

JOB NO.: 180333

SHEET TITLE: UTILITY PLAN 3

SHEET NO.: C4.13

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EXHIBIT 4

Fire Hydrant Flow Test

8280 E. Gelding Dr., Suite 101
Scottsdale, AZ 85260
Sustainability Engineering Group info@azSEG.com 480.588.7226 www.azSEG.com

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

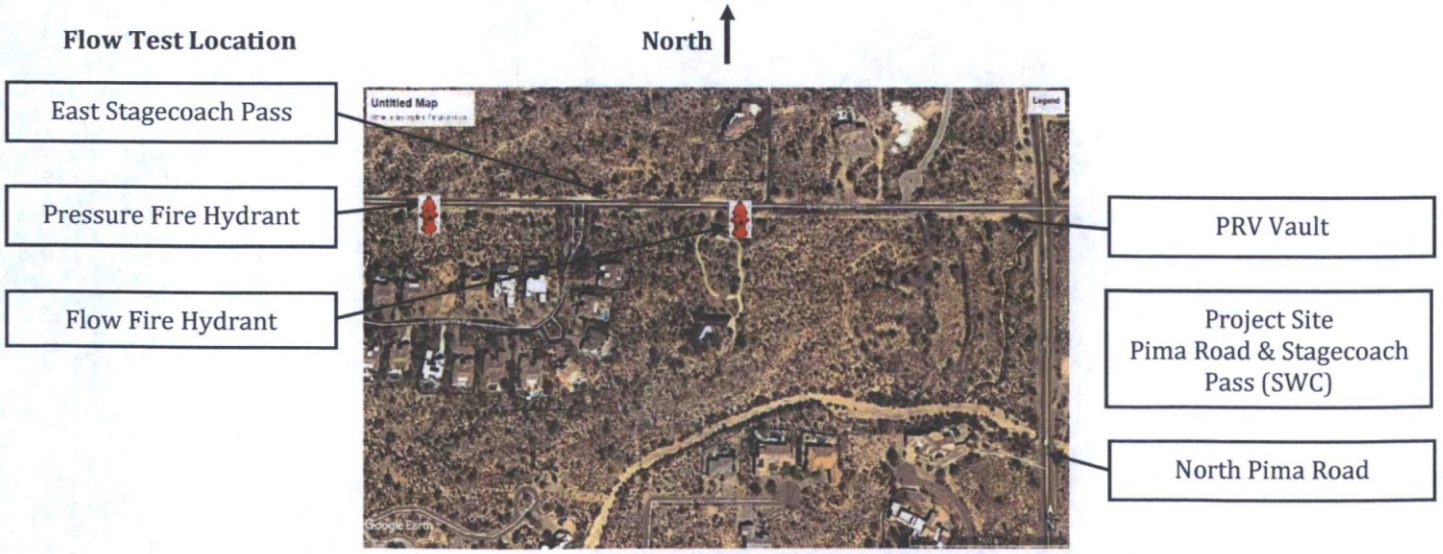


EXHIBIT 5

Model Output

8280 E. Gelding Dr., Suite 101
Scottsdale, AZ 85260
Sustainability Engineering Group *info@azSEG.com 480.588.7226 www.azSEG.com*

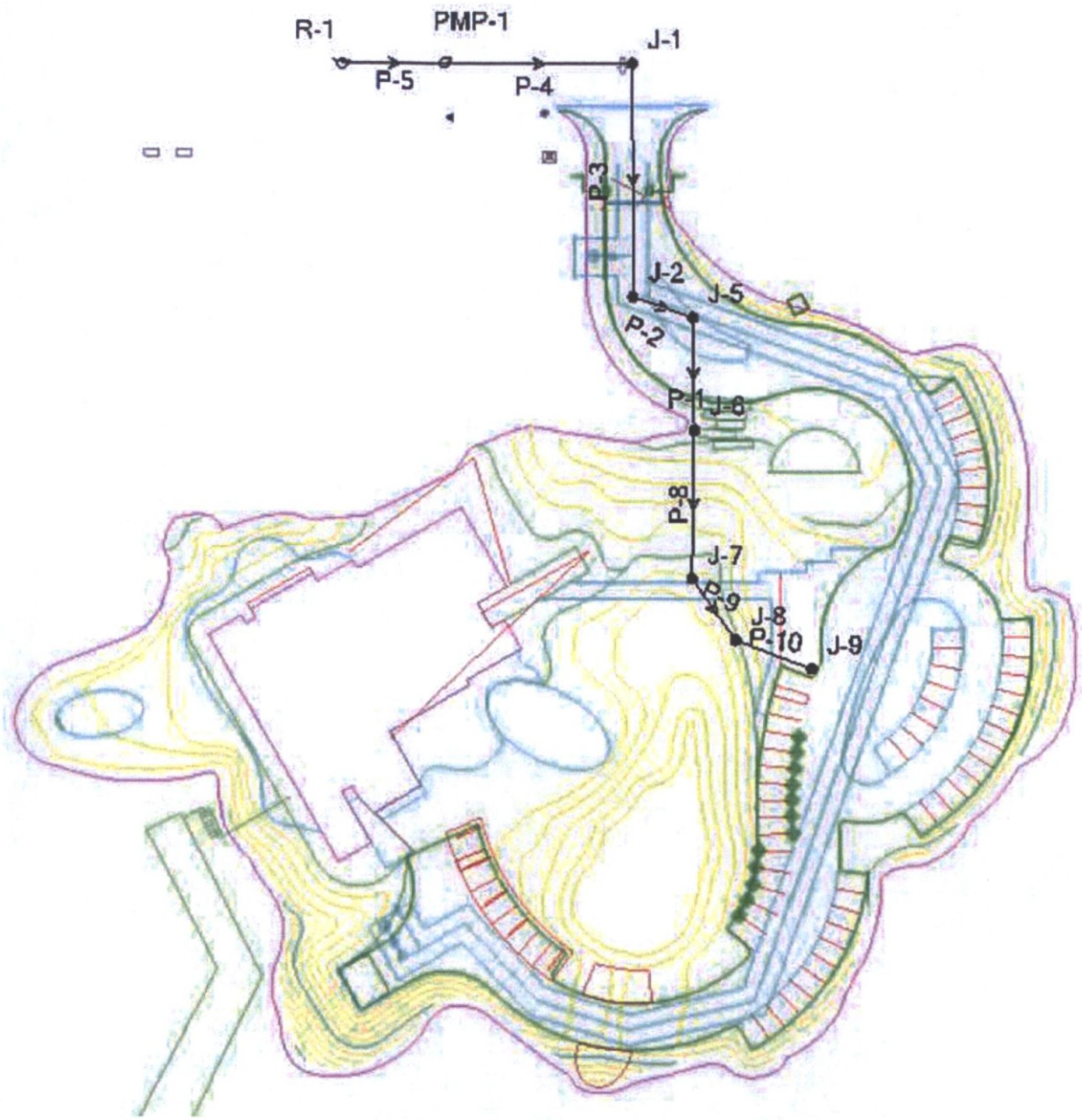


EXHIBIT 5 – MODEL MAP

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

8280 E. Gelding Dr., Suite 101
Scottsdale, AZ 85260
Sustainability Engineering Group info@azSEG.com 480.588.7226 www.azSEG.com

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

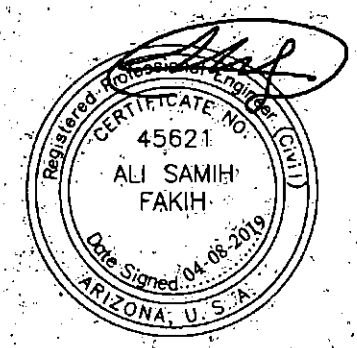
TSG FOUNDATION

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:

SEG

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-Ap No.: 513-PA-2017; 50-DR-2018 **Plan Check No.: TBD**

50-DR-2018
4/8/2019

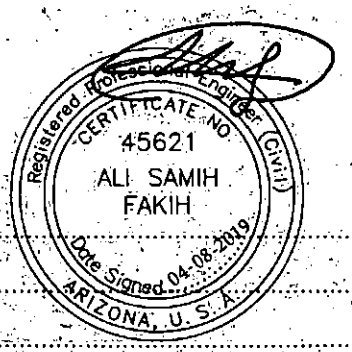


Table of Contents

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. 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.

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

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

Sustainability Engineering Group

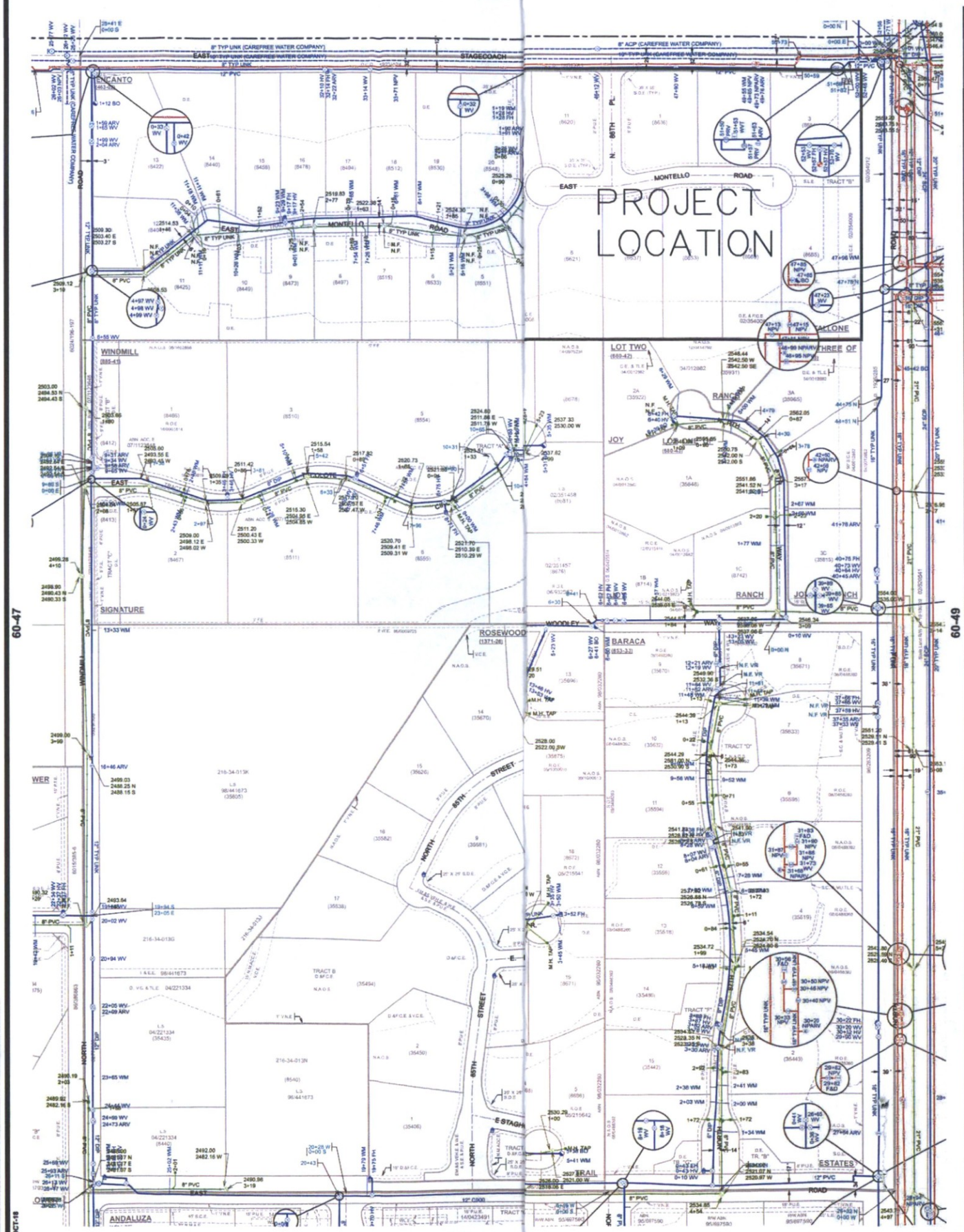
8280 E. Gelding Dr., Suite 101
Scottsdale, AZ 85260
info@azSEG.com 480.588.7226 www.azSEG.com

FIGURE 1
VICINITY MAP

N.T.S

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

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

60-48

NE 1/4 SEC. 1 T5N R4E

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

EXHIBIT 4

Fire Hydrant Flow Test

8280 E. Gelding Dr., Suite 101
Scottsdale, AZ 85260

Sustainability Engineering Group *info@azSEG.com 480.588.7226 www.azSEG.com*

62-49

60-49

61-48

61-50

21-OCT-18

MOUNTAIN

PARCEL 19

NORTH

CREEK

CAVE

ROAD

PASS

STAGECOACH

EAST

MOUNTAIN SEWER

6" TYP UNK (CAREFREE WATER COMPANY)

8" TYP UNK (CAREFREE WATER COMPANY)

10" TYP UNK (CAREFREE WATER COMPANY)

12" TYP UNK

16" TYP UNK

20" TYP UNK

21" PVC

8" PVC

12" PVC

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LEGEND:

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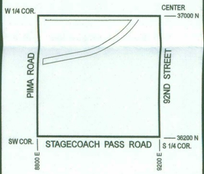
- Non-potable Water Valve
- Fire Hydrant
- Water Blowoff
- Water Main Reducer
- Water Sample Station
- Water Air Release Valve
- Non-potable Water Air Release Valve
- Water Pressure Reducing Valve
- Water Vault
- Water Manhole
- Non-Potable Water Manhole
- Water Pump
- Water Main
- Non-Potable Water 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



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

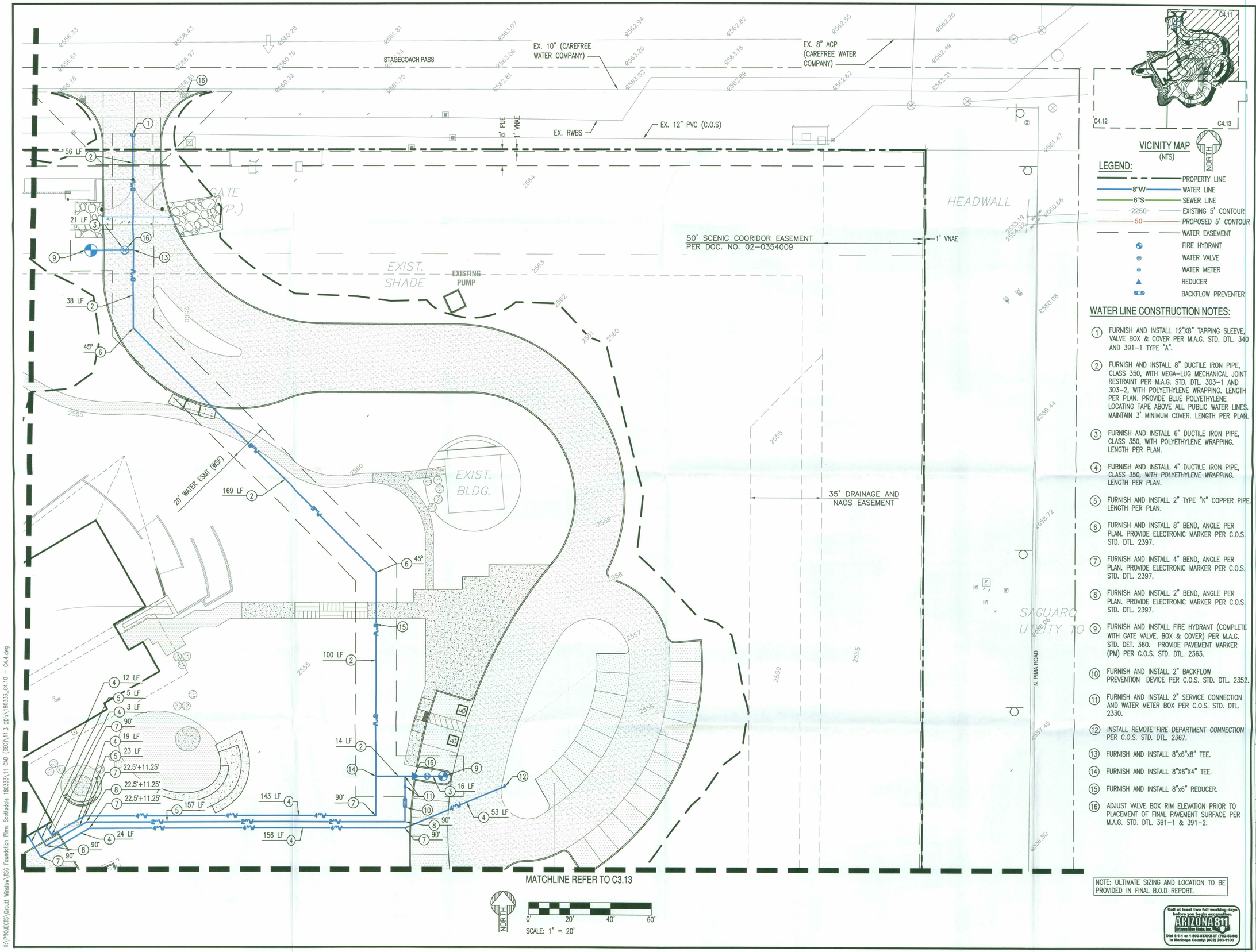
61-49

SW 1/4 SEC. 31 T6N R5E

CITY OF SCOTTSDALE

SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS

3629 North Drinkwater Boulevard
Scottsdale, Arizona 85251



VICINITY MAP
(NTS)

NORTH

LEGEND:

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

WATER LINE CONSTRUCTION NOTES:

1. FURNISH AND INSTALL 12"X8" TAPPING SLEEVE, VALVE BOX & COVER PER M.A.G. STD. DTL. 340 AND 391-1 TYPE "A".
2. 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.
3. FURNISH AND INSTALL 6" DUCTILE IRON PIPE, CLASS 350, WITH POLYETHYLENE WRAPPING. LENGTH PER PLAN.
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.
6. FURNISH AND INSTALL 8" BEND, ANGLE PER PLAN. PROVIDE ELECTRONIC MARKER PER C.O.S. STD. DTL. 2397.
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.
9. 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.
10. FURNISH AND INSTALL 2" BACKFLOW PREVENTION DEVICE PER C.O.S. STD. DTL. 2352.
11. FURNISH AND INSTALL 2" SERVICE CONNECTION AND WATER METER BOX PER C.O.S. STD. DTL. 2330.
12. INSTALL REMOTE FIRE DEPARTMENT CONNECTION PER C.O.S. STD. DTL. 2367.
13. FURNISH AND INSTALL 8"x6"x8" TEE.
14. FURNISH AND INSTALL 8"X6"X4" TEE.
15. FURNISH AND INSTALL 8"x6" REDUCER.
16. 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.

Call at least two full working days before you begin excavation. ARIZONA 811 Arizona Blue Stake, Inc. Dial 8-1-1 or 1-800-STAKE-IT (782-5348) In Maricopa County: (602) 263-1100

Registered Professional Engineer — CERTIFICATE NO. 45621 — ALI SAMIH FAKIH — Date Signed 04-02-2019 — ARIZONA, U.S.A.

SEG SUSTAINABILITY ENGINEERING GROUP
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	BEGELL
DESIGNED	BEGELL
CHECKED	COUNSELL
PROJ. MGR.	FAKIH

DATE: 04/02/2019
ISSUED FOR: DRB

REVISION NO.:	DATE:
1	
2	
3	
4	

JOB NO.: 180333

SHEET TITLE: UTILITY PLAN 1

SHEET NO.: C4.11

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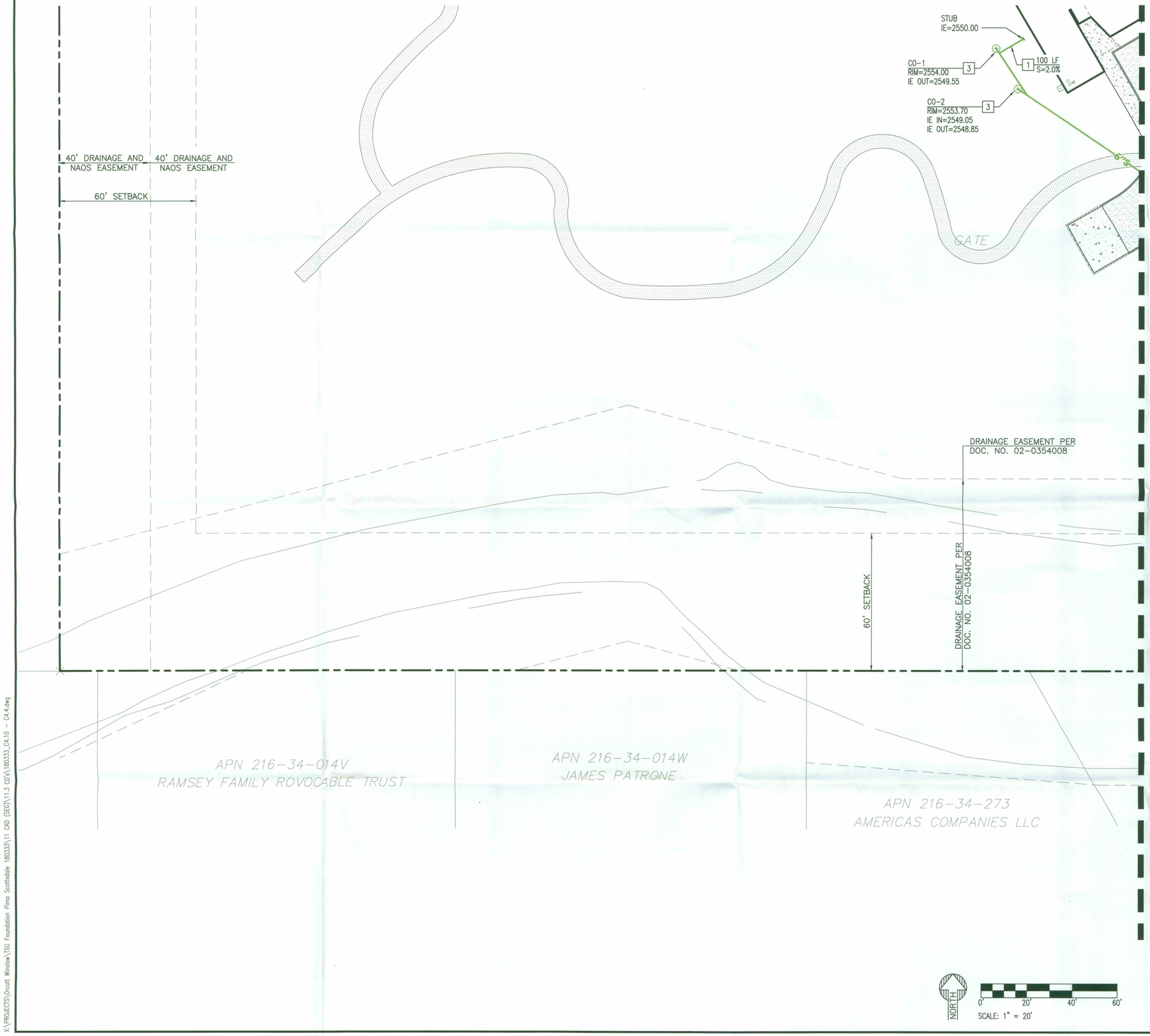
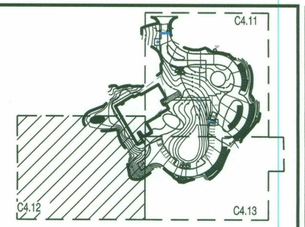




VICINITY MAP
(NTS)

NORTH

LEGEND:

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

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.
3. FURNISH AND INSTALL CLEAN-OUT PER C.O.S. STD. DTL 2403.

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

Call at least two full working days before you begin excavation.
ARIZONA 811
Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)
In Maricopa County: (602) 263-1100

Registered Professional Engineer
CERTIFICATE NO.
45621
ALI SAMIH FAKIH
Date Signed 04-02-2019
ARIZONA, U.S.A.

SEG SUSTAINABILITY ENGINEERING GROUP
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	BEGELL
DESIGNED	BEGELL
CHECKED	COUNSELL
PROJ. MGR.	FAKIH

DATE: 04/02/2019
ISSUED FOR: DRB

REVISION NO.:	DATE:
1	
2	
3	
4	

JOB NO.: 180333

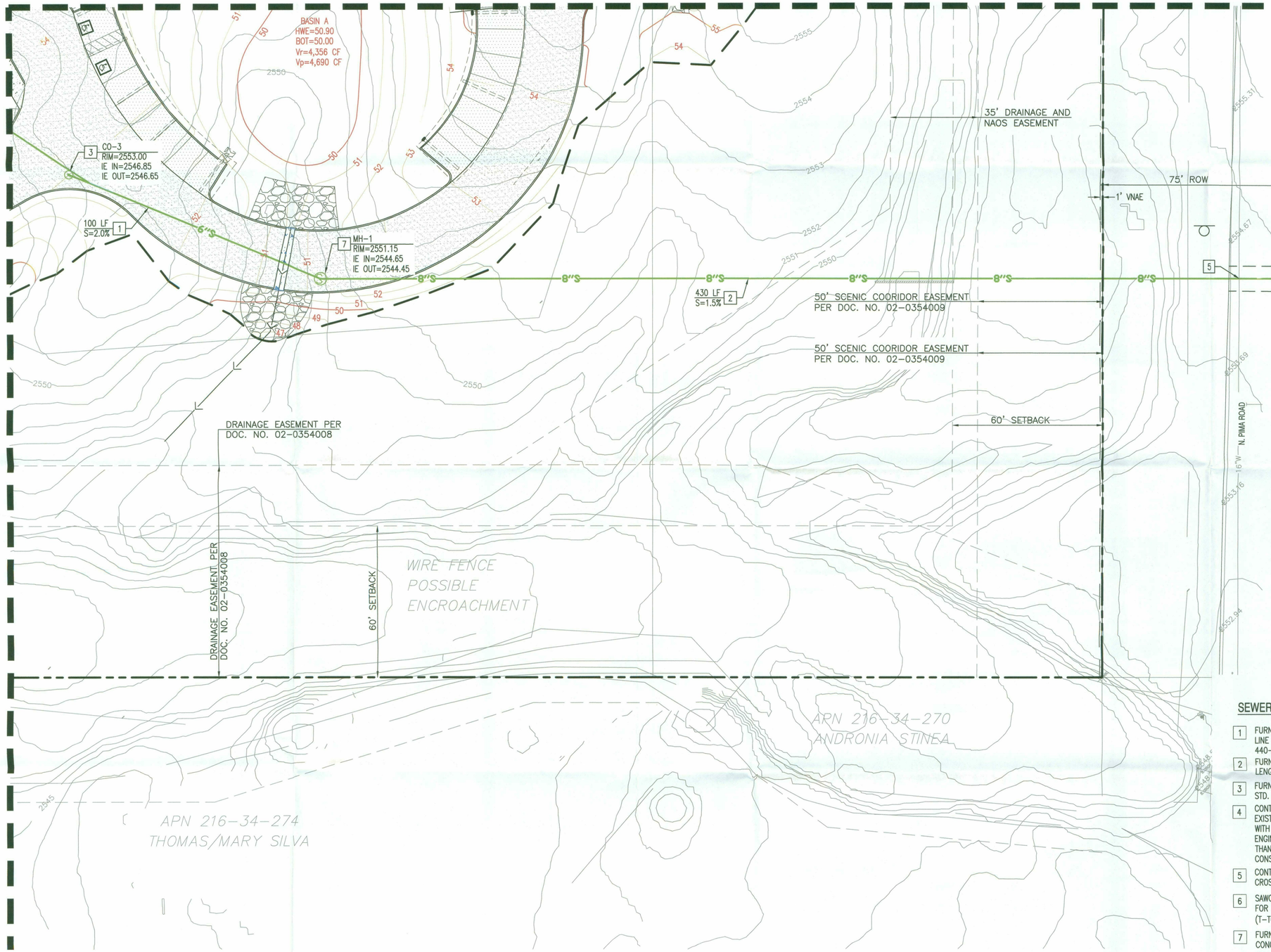
SHEET TITLE: UTILITY PLAN 2

SHEET NO.: C4.12

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

MATCHLINE REFER TO C4.11 SHEET 9

MATCHLINE REFER TO C4.12 SHEET #



C4.11
C4.12
C4.13

VICINITY MAP
(NTS)
NORTH

LEGEND:

- PROPERTY LINE
- SAW-CUT LINE
- 8"W WATER LINE
- 6"S SEWER LINE
- 2250 EXISTING 10' CONTOUR
- 50 PROPOSED 10' CONTOUR
- WATER EASEMENT
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- REDUCER
- BACKFLOW PREVENTER

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. DTL 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.

Call at least two full working days before you begin excavation.
ARIZONA 811
Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)
In Maricopa County: (602) 263-1100

Registered Professional Engineer
CERTIFICATE NO.
45621
ALI SAMIH
FAKIH
Date Signed 04-02-2019
ARIZONA, U.S.A.

SEG SUSTAINABILITY ENGINEERING GROUP
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	BEGELL
DESIGNED	BEGELL
CHECKED	COUNSELL
PROJ. MGR.	FAKIH

DATE: 04/02/2019
ISSUED FOR: DRB

REVISION NO.:	DATE:
1	
2	
3	
4	

JOB NO.: 180333

SHEET TITLE: UTILITY PLAN 3

SHEET NO.: C4.13

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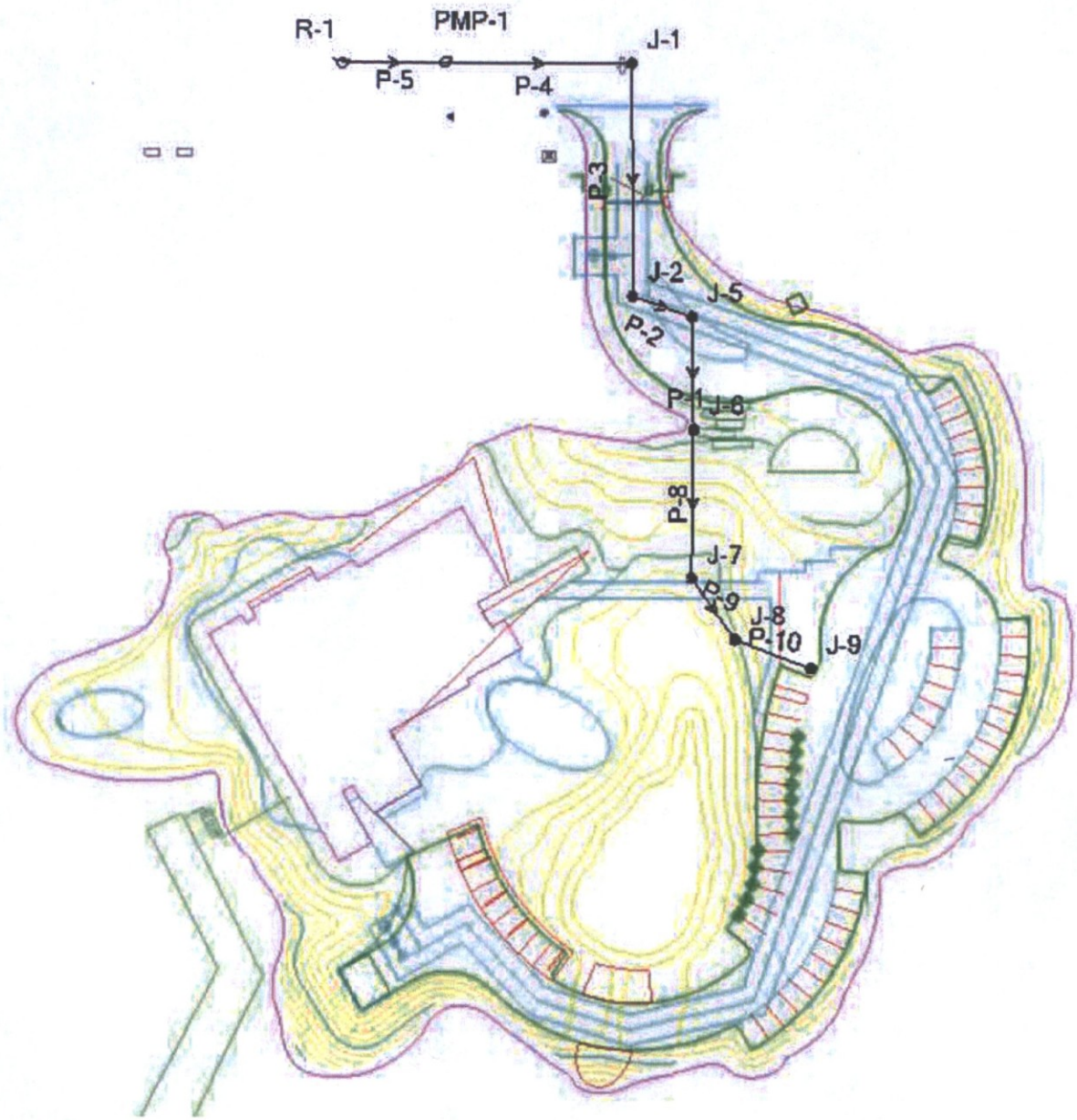

EXHIBIT 5 – MODEL MAP

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

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W
Watertown, CT 06795 USA +1-203-755-1666

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

8280 E. Gelding Dr., Suite 101
Scottsdale, AZ 85260
Sustainability Engineering Group *info@azSEG.com 480.588.7226 www.azSEG.com*

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 3

Preliminary Utility Plans