PRELIMINARY WASTEWATER REPORT

Residential Healthcare Facility

90th Street and Raintree Drive
Scottsdale, AZ 85260

Prepared For:

Greystar

3200 E. Camelback Road, Suite 225
Phoenix, AZ 85018

PRELIMINARY Basis of Design Report

- ☑ ACCEPTED
- ☐ ACCEPTED AS NOTED
- ☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE
SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

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 rsacks DATE 10/21/2020

Prepared by:

ability Engineering Group
E. Gelding Drive, Suite 101
Scottsdale, AZ 85260
8.7226 www.azSEG.com

Project Number: 200626

Submittal Date: September 24, 2020 (Rezoning)

Case No.: TBD **Plan Check No.: TBD**

16-ZN-2020
10/20/20

Table of Contents

LIST OF TABLES:

LIST OF FIGURES:

APPENDIX:

1. INTRODUCTION

1.1 SUMMARY OF PROPOSED DEVELOPMENT:

The report presents the service requirements for a residential healthcare facility located at the 90th Street and Raintree Drive in Scottsdale, AZ. The proposed development consists of a new 4-story residential healthcare building (179,296 sf) with a maximum of 152 units with a lobby, parking, and a common area with a pool. The purpose of this report is to provide an analysis of the impact that this development will have on the city's water system.

1.2 REPORT INTENT:

This report is being prepared to evaluate the existing and proposed wastewater demands compliant to the City's Design Standards and Policies Manual and the projects impact to the area's wastewater collection system along 90th street.

1.3 SITE and LEGAL DESCRIPTION:

The project property consists of land located at a portion of Section 7, Township 3 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Scottsdale, Arizona. The project site consists of the following parcels:

Parcel ID: Parcel 217-15-033; SFI Raintree Scottsdale LLC, Zoning R1-35

Refer to **FIGURE 1** - **Vicinity Map** for the project's location with respect to major cross streets.

2. DESIGN DOCUMENTATION

2.1 DESIGN COMPLIANCE:

The proposed sewer system is designed to meet the criteria of the City of Scottsdale ("the City") Water Resources Department, the Arizona Department of Environmental Quality ("ADEQ"), and Maricopa County Environmental Services Department ("MCESD").

2.2 PROCEDURES, POLICIES AND METHODOLOGIES:

The general methodology used to evaluate the wastewater infrastructure consists utilizing the DS+PM unit demands for onsite flows. Sewer pipe hydraulic capacities will be analyzing to assure conformance to the City's DS+PM criteria.

2.3 SOFTWARE ACKNOWLEDGEMENT:

Bentley FlowMaster® Version 8i is the computer software used for analyzing sewer hydraulics.

3. EXISTING CONDITIONS

3.1 ZONING & LAND USE:

Land ownership includes 4.67+/- net acres of undeveloped land zoned R1-35.

3.2 EXISTING TOPOGRAPHY, VEGETATION AND LANDFORM FEATURES:

Per Topographic Survey prepared by AW Land Surveying LLC, the site slopes from northwest to south east at approximately 0.5%. Elevation varies from approximately 1480.66 at the northwest corner to approximately 1476.82 at the southeast corner.

Refer to **FIGURE 2** for an aerial of the overall project existing conditions.

FIRM Map Number 04013C1760L dated October 16, 2013 indicates the site is designated as Zone "X" shaded. As such, it is defined as areas determined to an area of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; areas protected by levees from 1% annual chance flood.

Refer to **FIGURE 3** for the FIRM.

3.3 EXISTING SEWER MAINS:

City of Scottsdale Q-S 34-49 includes the proposed development. Existing sewer lines consist of:

- an 8" vitreous clay pipe (VCP) running north-south on 90th Street
- an 18" polyvinyl chloride pipe (PVC) running north-south on Pima Freeway
- an 8" polyvinyl chloride (PVC) running west-east to the south of the site

Refer to **FIGURE 4** for the referenced COS sewer Q-S Maps.

3.4 FLOW MONITORING:

Flow monitoring will not be needed on the main sewer line along 90th Street to analyze capacity in existing conditions.

4. PROPOSED CONDITIONS

4.1 SITE PLAN:

Proposed development consists of a new 152 unit residential healthcare facility with 3 and 4 story components, parking, and a common area with a pool.

4.2 PROPOSED SEWER SYSTEM:

Sanitary sewer service will be provided by connections to the existing 8" VCP sewer line along 90th Street. Grease interceptors will be installed for any proposed food service uses. See **APPENDIX I** for a site plan/utility plan.

4.4 SEWER REQUIREMENTS:

The City's design standards govern pipe hydraulics. Sewer should be designed to provide 2.5 fps full flow velocity while not exceeding 15 fps. The design depth over diameter (d/D) ratio of the pipe is 0.65 for pipes 12" and smaller. The d/D ratio may be bumped to 0.80 when accounting for backwash from proposed pools. Service lines will be a minimum 6" diameter at 1% minimum slope.

4.5 MAINTENANCE RESPONSIBILITIES:

The on-site sewer service lines will be private and maintained by the property owner. Any grease interceptors provided will be owned and maintained by the property owner.

4. SEWER SYSTEM COMPUTATIONS

5.1 ONSITE SEWER DEMANDS:

The proposed development at the site consists of a residential healthcare facility including a community pool. The associated DS+PM demands along with the peaking factors are shown in Table 1 below. A summary of the total sewer demands for the proposed site are presented below in Table 2.

Table 1: Sewer Demand Criteria

Use	Units	Demand (gpd)	Peaking Factor
High Density Residential	per unit	140	4.50
Pool Backwash	gpm	100	N/A

Table 2: ONSITE SEWER DEMAND CALCULATIONS PER DS+PM

Land Use	Count	Unit	ADD per Unit (gpd)	Avg. Day Demand (gpm)	Peak Demand (gpm)
High Density Residential	152	sq. Ft.	140	15	67
Pool Backwash	1	Each	144,000	100.0	100.0
			Totals	114.8	166.5

The proposed 8" sewer service line at S=3.43 % per **APPENDIX II** has a capacity of 759 gpm, at d/D=0.65, sufficient to convey the peak design flow of 167 gpm.

5.2 SOFTWARE ANALYSIS:

Bentley FlowMaster® Version 8i is the computer software tool used in this study.
Analysis input parameters included the following:

1. Pipe diameters (inches)
2. Pipes slopes
3. System demands (gpm)
4. Piping is PVC Manning's N-Values (n = 0.013)

Output parameters included but were not limited to:

1. Flow rate (gpm)
2. Velocities (fps)
3. Percent Full (d/D)

5.3 OFFSITE SEWER DEMANDS:

According to the City of Scottsdale sewermodel, the existing flow discharging from the 8" sewer line on 90th street to the 10" sewer line on Raintree Drive is 70 gpm. Per the Arizona Administrative Code, the peaking factor for the residential development to the west of the property is calculated as follows:

$PF = (6.330 \times p^{-0.231}) + 1.094$

where:

PF= Dry weather peaking factor

p= Upstream population

$PF = (6.330 \times (2500^{-0.231}) + 1.094 = 2.13$

Therefore, the existing flow from the residential development is from the 8" sewer line on 90th street to the 10" sewer line on Raintree Drive is:

70 gpm x 2.13 = **149 gpm.**

Table 3 summarizes flows to the existing 8" sewer line along 90th Street.

Table 3 - Sewer Demands - Proposed Conditions

Address	Street	Land Use	Units/ Area (sf)	Demand (gpd / unit or area)	Average Day Demand (gpd)	Peaking Factor	Peak Demand	
							gpd	gpm
Healthcare Facility	90th	High Density Residential	152	140	21,280	4.5	95,760	67
Healthcare Facility	90th	Pool	-	-	-	-	-	100
Residential Development	90th	Residential	1000	-	100,800	2.13	214,704	149
Totals					**122,080**		**310,464**	**316**

The existing 8" sewer service line at S=0.65% and d/D=0.8 has a capacity of **427 gpm**, sufficient to convey the peak flow of **316 gpm.**
Refer to **Appendix III** for City of Scottsdale Sewer Model.

6. SUMMARY

6.1 SUMMARY OF PROPOSED SEWER IMPROVEMENTS:

- The proposed wastewater improvement was designed based on the current City of Scottsdale's design standards and policies.
- All new on-site service line infrastructure will be 8" and privately maintained. The service line can adequately convey the onsite sewer peak demand of 167 gpm.
- Privately owned and maintained grease interceptors will be installed to serve all food preparation facilities.

6.2 PROJECT SCHEDULE:

The infrastructure and buildings are proposed to be constructed in a single phase.

7 SUPPORTING MAPS

7.1 SITE UTILITY PLAN

Refer to Preliminary Site Plan / Utility Plan in **APPENDIX I.**

8 REFERENCES

1. *COS QS Sewer Plan number 34-49*
2. *City of Scottsdale Design Standards & Policies Manual, 2017 (Chapter 7 – Sewer)*

FIGURES

FIGURE 1 – Vicinity Map

FIGURE 2 - Aerial

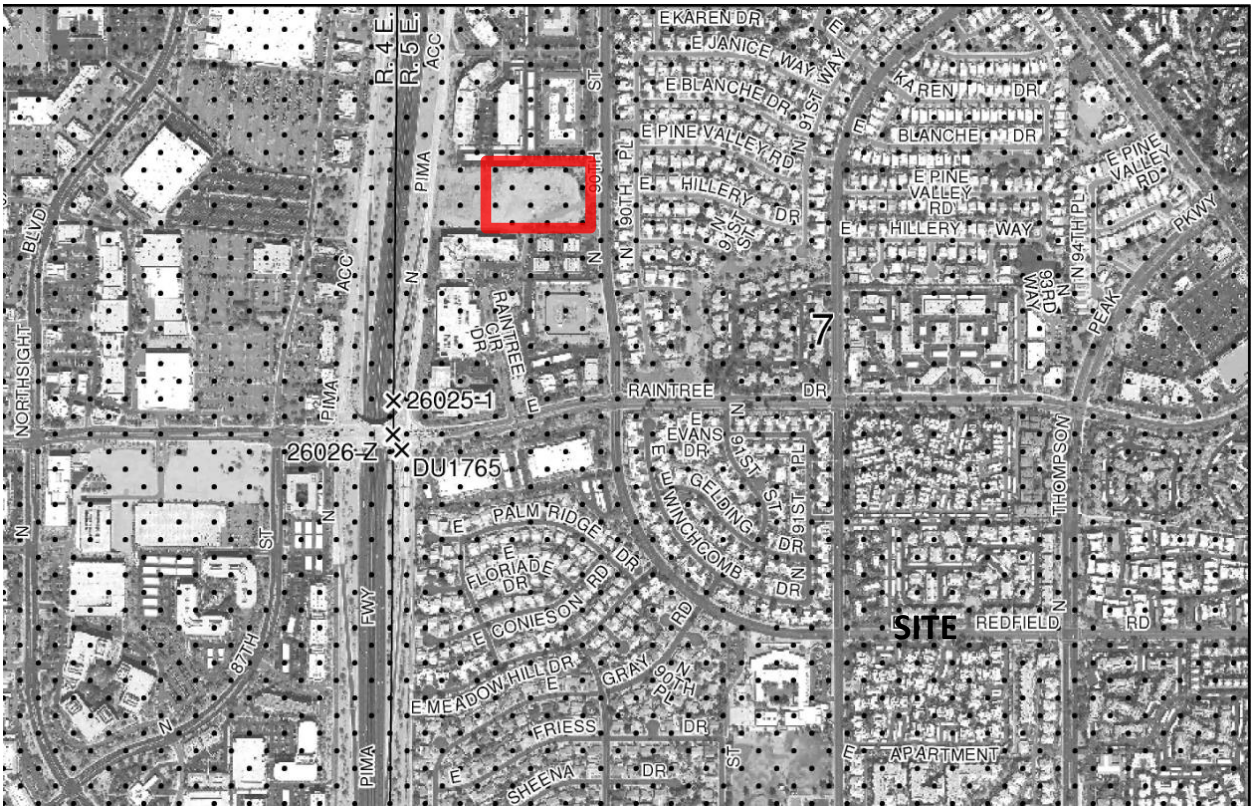


FIGURE 3 – FEMA FIRM

Excerpt from 04013C1760L

35-49

34-48

34-50

33-49

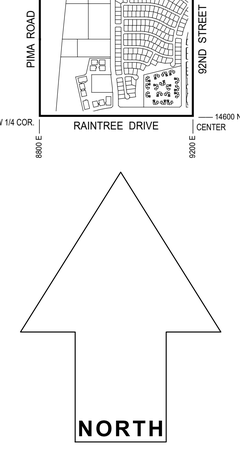
GENERAL NOTES:

- 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:

- Cleanout
- Lift Station (SLS)
- Manhole (S)
- Non-GPS Point
- Plug
- Sewer Service Point
- Sewer Tap Point
- Sewer Valve
- Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force (Force)
- Sewer Main - Private

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"

SEWER

QUARTER SECTION MAP

34-49

NW 1/4 SEC. 7 T3N R5E

FIGURE 4- CITY QS MAP

SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS

3629 North Drinkwater Boulevard
Scottsdale, Arizona 85251

05-JUL-20

10/20/20

APPENDIX I

Preliminary Site / Utility Plan

RESIDENTIAL HEALTHCARE FACILITY

90TH STREET AND RAINTREE
SCOTTSDALE, AZ 85260
PRELIMINARY UTILITY EXHIBIT

PROJECT ADDRESS
90TH STREET & RAINTREE DRIVE, SCOTTSDALE, ARIZONA 85260.

PROJECT DESCRIPTION
NEW 151-UNIT RESIDENTIAL HEALTHCARE FACILITY WITH 3 STORIES AND 4 STORIES COMPONENTS, PARKING, AND COMMON AREA.

LEGAL DESCRIPTION
A PORTION OF THE NORTHWEST QUARTER OF SECTION 7, TOWNSHIP 3 NORTH, RANGE 5 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA.

BENCHMARK:
BENCHMARK IS A BRASS FLUSH, BEING THE SOUTH QUARTER CORNER OF SECTION 7, T3N, R5E.

ELEVATION = 1447.27 (NAVD88)

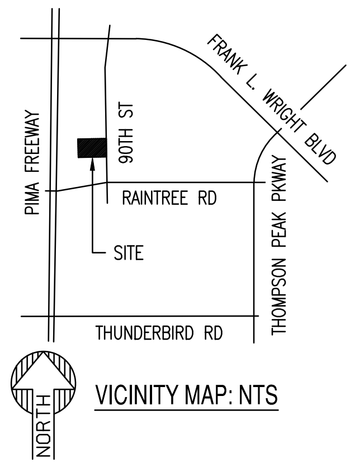
BASIS OF BEARING:
THE BASIS OF BEARING AND ALL MONUMENTATION SHOWN HEREON IS BASED ON THE MONUMENT LINE OF 90TH STREET, USING A BEARING OF SOUTH 00 DEGREES 03 MINUTES 34 SECONDS EAST, AS SHOWN ON RECORD OF SURVEY, RECORDED IN BOOK 896, PAGE 1, MARICOPA COUNTY RECORDS.

PARCEL INFORMATION:

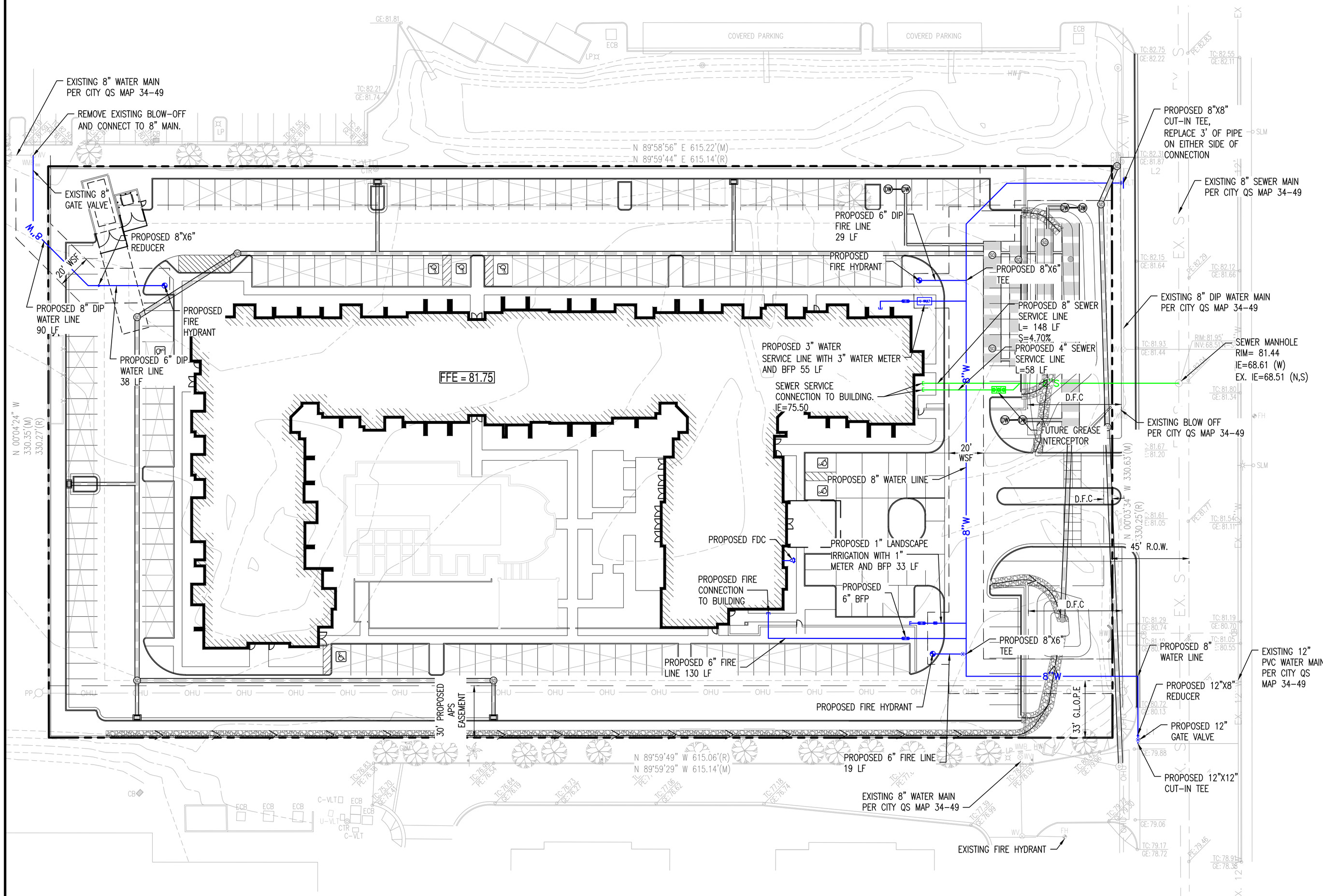
APN:	217-15-033
ZONING:	C-O
LOT SIZE:	4.66 ACRES (202,950 SF)-(NET AREA/GROSS AREA)
FLOOD ZONE:	ZONE X (0.2 % ANNUAL FLOOD HAZARD)

ARCHITECT:
TODD & ASSOCIATES, INC.
4019 N.44TH ST.
PHOENIX, AZ 85018
PHONE: 602-952-8280p

CIVIL ENGINEER:
SUSTAINABILITY ENGINEERING GROUP
8280 E GELDING DR., SUITE 101
SCOTTSDALE, AZ 85260
PHONE 480-237-2507
ATTN: ALI FAKIH
ALI@AZSEG.COM



VICINITY MAP: NTS



EXISTING LEGEND

- EX. W — EXISTING WATER LINE
- EX. S — EXISTING SEWER LINE
- PROPERTY LINE
- EXISTING EASEMENT
- EXISTING STORM LINE
- EXISTING SEWER MANHOLE
- STORM DRAIN MANHOLE
- GATE VALVE
- WATER METER BOX
- UTILITY VAULT
- FIRE HYDRANT

PROPOSED LEGEND

- PROPOSED WATER LINE
- PROPOSED SEWER LINE
- PROPOSED EASEMENT
- GATE VALVE
- WATER METER
- BACK FLOW PREVENTOR
- FIRE HYDRANT
- FDC
- MANHOLE

NORTH
0' 30' 60' 90'
SCALE: 1" = 30'

PRELIMINARY
NOT FOR
CONSTRUCTION

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

Contact Arizona 811 at least two full working days before you begin excavation
Arizona811
Call 811 or click Arizona811.com

PROJECT	RESIDENTIAL HEALTH CARE FACILITY
LOCATION	N 90TH ST & RAINTREE CIRCLE DR

DRAWN	KA	9/24/2020
DESIGNED	KA	9/24/2020
QC	SC	9/22/2020
QA		
PROJ. MGR.		

DATE: 10/8/2020
ISSUED FOR: REZONING

REVISION NO.:	DATE:
1	
2	
3	
4	

JOB NO.: 200626

SHEET TITLE: PRELIMINARY UTILITY EXHIBIT

PAGE NO.:	SHEET NO.:
1 OF 1	

LOCATION: Z:\SHARED\PROJECTS\CREYSTAR\RESIDENTIAL HEALTHCARE-90TH ST & RAINTREE-SCOTTSDALE-200626\11 CAD (SEG)\11.2 ENTITLEMENT-PLANNING\PRELIMINARY UTILITY.DWG SAVED BY: KENYA.AVINA DATE: 10/8/2020

16-ZN-2020
10/2020

APPENDIX II

Sewer Pipe Hydraulics

8IN AT S=0.0343 FT/FT, d/D=0.65

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.0343 ft/ft
Normal Depth	5.2 in
Diameter	8.0 in

Results	
Discharge	759.76 gpm
Flow Area	0.2 ft²
Wetted Perimeter	1.3 ft
Hydraulic Radius	2.3 in
Top Width	0.64 ft
Critical Depth	7.2 in
Percent Full	65.0 %
Critical Slope	0.0173 ft/ft
Velocity	7.05 ft/s
Velocity Head	0.77 ft
Specific Energy	1.21 ft
Froude Number	2.022
Maximum Discharge	1,080.48 gpm
Discharge Full	1,004.43 gpm
Slope Full	0.0196 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	65.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.2 in
Critical Depth	7.2 in
Channel Slope	0.0343 ft/ft
Critical Slope	0.0173 ft/ft

10" pipe S=1.00%, d/D=0.65

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Normal Depth	6.5 in
Diameter	10.0 in

Results	
Discharge	743.80 gal/min
Flow Area	0.4 ft²
Wetted Perimeter	1.6 ft
Hydraulic Radius	2.9 in
Top Width	0.79 ft
Critical Depth	6.9 in
Percent Full	65.0 %
Critical Slope	0.008 ft/ft
Velocity	4.42 ft/s
Velocity Head	0.30 ft
Specific Energy	0.84 ft
Froude Number	1.133
Maximum Discharge	1,057.78 gal/min
Discharge Full	983.33 gal/min
Slope Full	0.006 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	65.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.5 in
Critical Depth	6.9 in
Channel Slope	0.010 ft/ft
Critical Slope	0.008 ft/ft

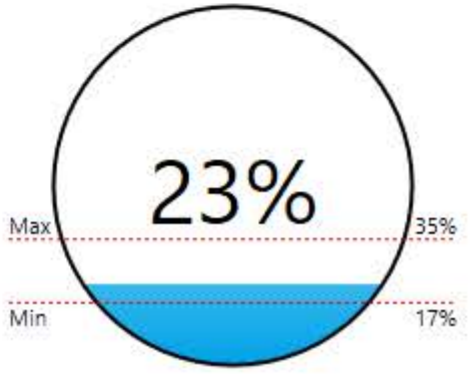
APPENDIX III

COS Sewer Model Screenshot

CONDUIT: 29356

(ID)	29356
Description	
REVIEWED	No
☑ Output	
Flow	0.10126 mgd
Flow Class	Free Surface
Depth	0.15074 ft
Critical Depth	0.18091 ft
HGL	1457.66614 ft
Velocity	2.64596 ft/s
Flow Volume	11.66602 ft3
Froude Number	1.43085
Capacity d/D	0.16963
Surcharged d/D	0.22602
Velocity*Depth	0.39884 ft2/second
Top Width	0.55756 ft
Entry Loss	0.00000 ft
Exit Loss	0.00000 ft
Seepage Rate	0.00000 mgd
Type	Circular Conduit
Flap Gate	No
Upstream Offset	0.00000 ft
Downstream Offset	0.00000 ft
Length	195.69093 ft
Friction	0.01300
Slope	0.02740
Maximum Depth	8.00000 in
Maximum Width	8.00000 ft
Full Flow	1.29283 mgd

Conduit: 29356



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