

# WASTEWATER

# PRELIMINARY BASIS OF DESIGN REPORT

## Headwaters Scottsdale Scottsdale, Arizona

### Prepared for:

Headwater Group  
5265 S Rio Grande Ste 201  
Littleton, CO 80120

### Prepared by:

# Kimley»»Horn

291753000  
November 2022  
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### 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 rsacks

DATE 4/12/2023





# Headwaters Scottsdale

## WASTEWATER BASIS OF DESIGN REPORT

MARCH 2023

Prepared By:

**Kimley»»Horn**

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## 1.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this Wastewater Basis of Design Report for the proposed minimal residential healthcare living development at the southeast corner of 100<sup>th</sup> Street and Frank Lloyd Wright Boulevard in Scottsdale, Arizona. This report will demonstrate that the proposed project conforms to the City of Scottsdale design requirements.

Headwaters Scottsdale, the “project”, encompasses approximately 6.707 gross acres and contains a 203,929 gross square foot three-story and 5 one-story minimal residential healthcare facility with 217 parking spaces. The total number of units between the three-story and one-story is 172. The complex also includes a swimming pool located in the center of the three-story multifamily complex. The project lies within a portion of the Southwest Quarter of Section 8 and a Portion of the Northeast Quarter of Section 17, Township 3 North, Range 5 East of the Gila and Salt River Base and Meridian in Maricopa County, Arizona. More specifically, the project is bound by East Frank Lloyd Wright Boulevard to the north, Belmont retirement community, 134 units, to the east, single-family to the south, and North 100<sup>th</sup> Street to the west. See **Appendix A** for the Vicinity Map.

## 2.0 WASTEWATER ANALYSIS

### 2.1 INTENT AND SCOPE

The intent of this section is to evaluate the wastewater infrastructure for the proposed development. As a result of this analysis, it will be determined if the wastewater infrastructure can satisfy the projected wastewater demands for the proposed development in accordance with the City of Scottsdale Design Standards & Policies Manual (**Reference 1**).

### 2.2 GENERAL THEORY

The hydraulic modeling program FlowMaster, a Bentley Systems product developed by Haestad Methods, was used to model the wastewater infrastructure servicing the proposed development. The program uses the Manning equation for flow analysis of non-pressurized closed pipes. This is the typical method used to evaluate wastewater distribution systems.

### 2.3 WASTEWATER SUPPLY

There is an existing 8-inch VCP sewer main located in 100<sup>th</sup> Street west of the site. There is an existing public sewer main that runs through the private access road to connect the Belmont Village (134 units) to the sewer located in 100<sup>th</sup> Street. The existing public sewer main in the private road will be relocated around the proposed building. The water/sewer easement that the sewer is located in will be abandoned.

The existing public sewer main will be cut and tie into a new manholes that will allow the system to be relocated around the proposed development. The proposed 8-inch PVC will extend south, looping around the building and reconnecting to the existing 8-inch sewer main along the private access road near 100<sup>th</sup> Street entrance. A proposed 20' sewer and sewer/water easement is proposed for the relocation of the public sewer main.

The proposed 8-inch sewer main will have services for the southern buildings and main building. Refer to **Appendix E** for the Preliminary Utility Plan.

The analysis of sewer capacities in this Basis of Design Report will be limited to the 8-inch sewer main extending into the site. This analysis is limited to the use of the proposed development and existing Belmont development.

## 2.4 WASTEWATER DEMANDS

The following calculations and demands are based on Figure 7-1.2 in the City of Scottsdale's 2018 DS&PM. For clarity of building locations, reference **Appendix B** for the Site Plan. See **Appendix C** for the Scottsdale Quarter Section Map.

**Table 1: Proposed Sewer Main Demands**

Building	Use	DUs	Demand <sup>1</sup> per unit (GPD)	Average Daily Flow (GPD)	Peak Flow <sup>2</sup> (GPD)	Peak Flow (GPM)
Headwaters Minimal Residential Healthcare Facility	Multifamily	172	140	24,080	108,360	75
Belmont Assisted Living	Multifamily	134	140	18,760	84,420	59
Pool Backwash						100
<b>Total For 8" Diameter Pipe</b>						<b>234</b>

Notes:

1. Demands are based on Figure 7-1.2 in City of Scottsdale's 2018 DS&PM
2. The design peak flow factor for multifamily use is 4.5.
3. The pool backwash rate of 100 gpm is based on correspondence with City of Scottsdale staff.

## 2.5 WASTEWATER ANALYSIS

Sanitary sewer lines will be designed to maintain a maximum depth to diameter ratio (d/D) of 0.65, a minimum full flow velocity of 2.5 ft/sec and a maximum full flow velocity of 10.0 ft/sec in the ultimate peak flow condition. To verify the proposed main has adequate capacity to serve the project, design flows were analyzed with Flow Master using pipe design slopes. Pool backwash shall be connected to the sanitary sewer system through the building service and not discharge to the storm drain system. Backwash pump and pipe sizing will be done by the pool designer under separate permit. Refer to **Table 2** below and **Appendix D** for the Sewer Capacity Calculations.

**Table 2: Proposed Sewer Main Capacity**

	Peak Flow (GPM)	Manning Roughness (n)	Slope (ft/ft)	d/D	Velocity (ft/s)
8" Diameter Pipe	234	0.010	0.0052	0.475	3.18

## 4.0 CONCLUSION

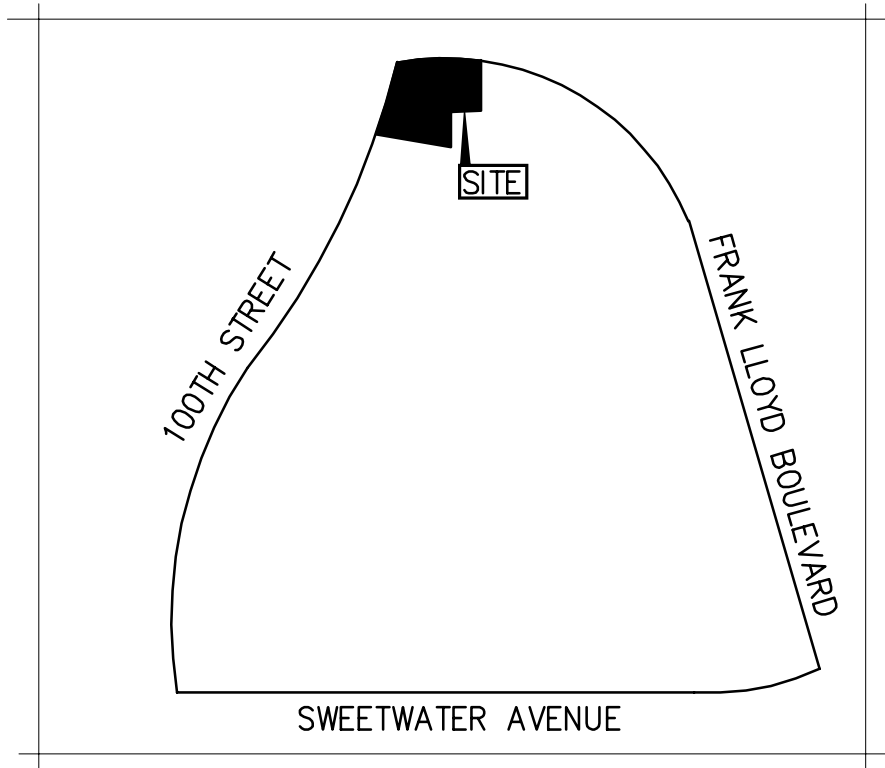
The development proposes to connect one new 8-inch sewer service to the existing 8-inch sewer main in the private access drive via manhole. The proposed sewer main will loop on the south side of the proposed building and reconnect to the existing sewer main near the 100<sup>th</sup> Street entrance. The proposed and existing sewer infrastructure as outlined by this analysis has adequate capacity for the flows generated by the proposed building located at the southeast corner of 100<sup>th</sup> Street and Frank Lloyd Wright Boulevard.

## 5.0 REFERENCES

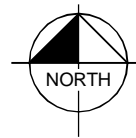
1. City of Scottsdale, *Design Standards and Policies Manual*. 2018.
2. Sustainability Engineering Group, *Preliminary Basis of Design for Wastewater*, September 2018.

# Appendix A – Vicinity Map





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



# Appendix B – Site Plan



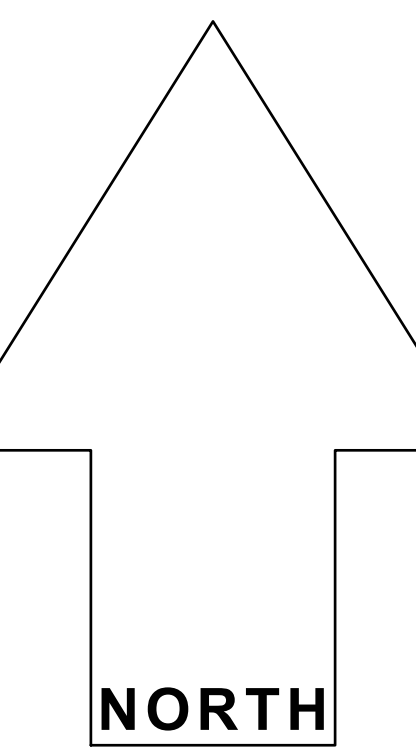
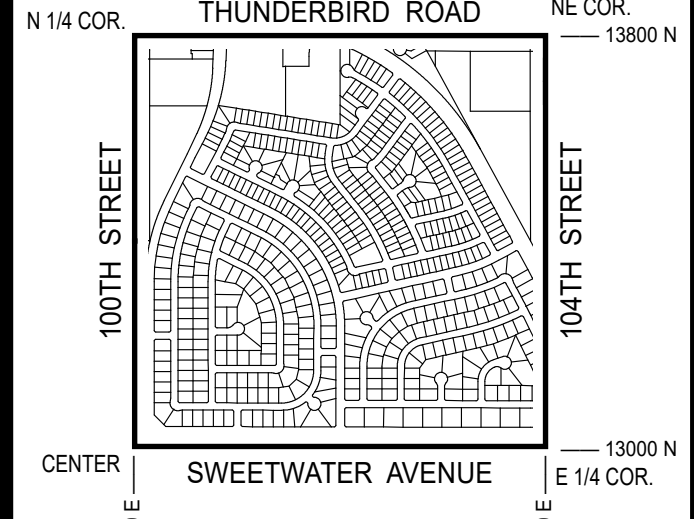
# Appendix C – Scottsdale Quarter Section Map

**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**

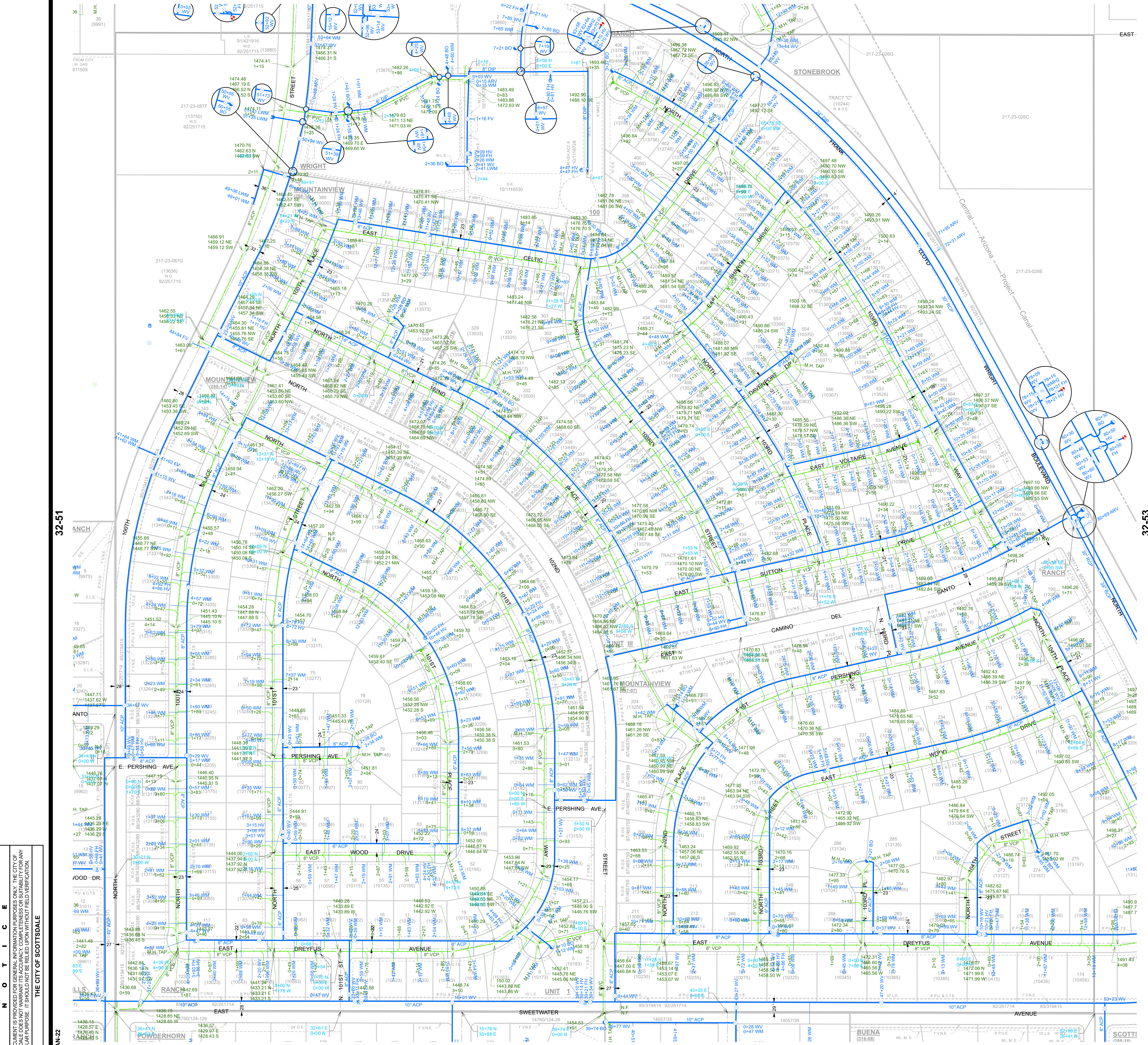


**NORTH**  
 SCALE: 1" = 100'  
 0 50 100 200  
 The map scale of 1" = 100' is based on a full size print of 30" x 36"

**WATER & SEWER**  
 QUARTER SECTION MAP

**32-52**  
 NE 1/4 SEC. 17 T3N R5E

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



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

## Appendix D – Sewer Calculations

## Sewer Capacity

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.010
Channel Slope	0.520 %
Diameter	8.0 in
Discharge	234.00 gpm
Results	
Normal Depth	3.8 in
Flow Area	0.2 ft <sup>2</sup>
Wetted Perimeter	1.0 ft
Hydraulic Radius	1.9 in
Top Width	0.67 ft
Critical Depth	4.1 in
Percent Full	47.6 %
Critical Slope	0.418 %
Velocity	3.18 ft/s
Velocity Head	0.16 ft
Specific Energy	0.47 ft
Froude Number	1.129
Maximum Discharge	546.91 gpm
Discharge Full	508.42 gpm
Slope Full	0.110 %
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	47.6 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	3.8 in
Critical Depth	4.1 in
Channel Slope	0.520 %
Critical Slope	0.418 %

# Appendix E – Utility Plan









