

FINAL SEWER CAPACITY REPORT

Wolff Legacy Scottsdale

Assisted Living
8890 E Legacy
Scottsdale, AZ

Prepared by



THE WOLFF

Since 19

FINAL Basis of Design Report

- APPROVED
- APPROVED AS NOTED
- REVISE AND RESUBMIT



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

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 scan

DATE 6/5/2018

Prepared by:



SEG



EXPIRES 12-31-18

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1. INTRODUCTION

1.1 SUMMARY OF PROPOSED DEVELOPMENT:

The proposed development consists of the construction of a new assisted living facility with 151 apartment type units within the north and south larger buildings, a communal area with a theater, salon, and 6,000 sf restaurant in the central building, and 22 cottage units. The purpose of this sewer capacity design report is to provide analysis of the impact that this development will have on the City's sewer system and to obtain a letter of capacity assurance from the City of Scottsdale.

1.2 LEGAL DESCRIPTION:

The project is located at 8890 E Legacy Blvd. in Scottsdale, AZ at the northwest corner of E. Legacy Blvd. and N. Pima Rd. The site consists of one parcel of land located in a portion of the SW ¼ of Section 30 and the NW ¼ of Section 31, Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The parcel ID number is 215-07-238 and the parcel net area is 531,822.9 sf (12.209 net acres). Refer to **FIGURE 1 - Vicinity Map** for the project's location with respect to major cross streets.

1.3 EXISTING AND PROPOSED SITE ZONING AND LAND USES:

The overall project parcel is zoned C-2 ESL (HD). The land use is designated as commercial. The site is an empty lot and will be developed into an assisted living facility.

1.4 REFERENCES:

The project falls within Environmentally Sensitive Lands overlay per C.O.S. zoning.

2. DESIGN DOCUMENTATION

2.1 DESIGN COMPLIANCE:

The analysis of the proposed and existing sewer system is done in compliance with Chapter 7 – Wastewater of the City of Scottsdale 2010 update of the Design Standards & Policies Manual (DS&PM). Design flow calculations for the on-site system will be based on the recommendations in Section 7-1.403 of the DS&PM.

3. EXISTING CONDITIONS

3.1 EXISTING ZONING & LAND USE:

Land ownership, as defined by ALTA/NSPS Land Title Survey by AW Land Surveying, LLC dated 11/13/2017 includes 531,822.9 square feet, 12.209 +/- acres (net) of commercially zoned land. City of Scottsdale zoning map designates this parcel as C-2 ESL HD. The C.O.S. conceptual land use map designates this parcel for commercial use.

3.2 EXISTING TOPOGRAPHY, VEGETATION AND LANDFORM FEATURES:

This site is an undeveloped parcel. The topography generally slopes from the north east (elevation 1660+/-) to the southwest (elevation 1638 +/-) at approximately 2% with a change in elevation of

approximately thirty-eight (38) feet. The site consists of grass, brush, rock, and other desert landscape.

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

3.3 EXISTING UTILITIES:

Sanitary Sewer: QS 39-49 City of Scottsdale

- A north-south running 8" PVC main is available in N. Pima Road at approximately 8' deep.
- An east-west 10" and 12" PVC main is available along the southern portion of the site in an easement north of E. Legacy Blvd at approximately 9' deep. This main changes from 10" to 12" around the center of the property in a manhole that has not been detected by surveyors.

Refer to **FIGURE 3** for the City quarter section map (**QS 39-49**)

4. PROPOSED CONDITIONS

4.1 SITE PLAN:

The development is proposed to be 2 new buildings for assisted living units, a community center building, 22 cottages, and parking. Refer to **APPENDIX III** for Utility Plans.

4.2 PROPOSED SEWER SYSTEM:

For the purposes of this preliminary report, it is assumed that on-site sewer will consist of the following:

- One 8" main line connected from the Legacy Blvd line at the southern end of the site and running north along the main drive to pick up the building connections.

Refer to **APPENDIX III** for Utility Plans.

4.3 MAINTENANCE RESPONSIBILITIES:

The on-site sewer line for the proposed development will be private and maintained by the property owner. The off-site sewer is a public system owned and maintained by the City of Scottsdale.

5. SANITARY SYSTEM COMPUTATIONS

5.1. SEWER FLOW DEMANDS:

The proposed development is calculated to have 151 apartment units in the two large buildings, one common area with a 6,000 sf restaurant in the central building, and 22 cottage units. The apartment units will be treated as high density condos for the purpose of this report, the cottage units will utilize the residential design flow of 100 gallons per capita per day and the standard 2.5 persons per dwelling unit as outlined in the DS&PM giving an overall flow of 250 gpd per cottage unit.

DS&PM, Chapter 7 – Wastewater specifies the following for each use:

Restaurant	1.2 GPD / sq. ft.
High Density Condo	140 GPD/ room

Refer to Table 1 below for the proposed design flow:

Table 1 - Sewer Demand Calculations - Proposed Conditions					
Use	Units / Area	Average Day Demand Factor (GPD)	Average Day Demand (GPD)	Peaking Factor	Peak Hour (GPD)
Apartments	151 rooms	140 per room	21,140	4.5	95,130
Cottages	22 bldgs	250 per bldg	5,500	4	22,000
Restaurant	6,000 sq. ft.	1.2 per sq. ft.	7,200	6	43,200
Total Flows			33,840		160,330

5.2. VARIANCE FROM STATED DESIGN FLOWS:

Stated design flows for the on-site system will be used as recommended.

5.3. DEMAND FACTORS:

DS&PM requires a peak factor of 6 for restaurant, 4.5 for high density condo uses, and 4 for residential flow. Refer to Section 5.1, Table 1, above for calculations.

5.4. SEWER CAPACITY CALCULATIONS

The sewer capacities have been calculated using FlowMaster V8i. Refer to **APPENDIX II** for pipe calculation output.

The existing 12" line is sloped at approximately 1.25%. Per the FlowMaster Calculation in **Appendix II**, the full flow capacity at a d/D of 0.65 is 1,947,266 GPD. The new flow of 160,330 GPD represents 8.23% of the pipe capacity

The slope of the new 8" sewer line varies from 0.75% to 5% and can take the design flow of 160,330 GPD with d/D equal to 0.22 and 0.14, respectively. The calculations for the capacity of these pipes can be found in **Appendix II**.

6. SUMMARY

6.1 SUMMARY OF PROPOSED IMPROVEMENTS:

- The proposed wastewater improvement was designed based on the current City of Scottsdale's design standards and policies.
- The impact on the existing 12" line is an increase of 8.23% of full flow (d/D=0.65).
- All new infrastructure on-site will be 8" in size and privately maintained.

6.2 PROJECT SCHEDULE:

The infrastructure is proposed to be constructed in a single phase.



7 SUPPORTING MAPS

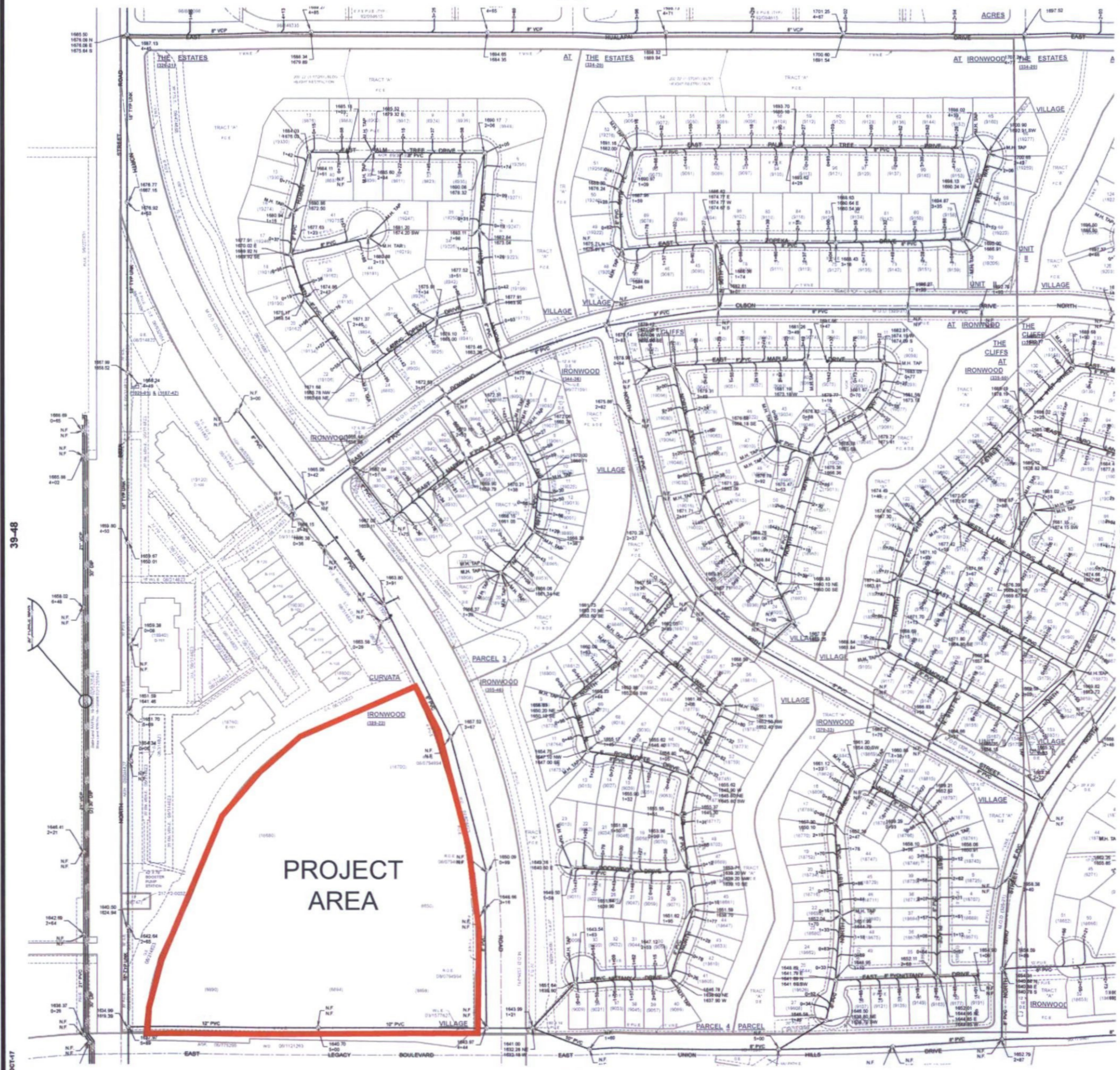
7.1 UTILITY PLANS

Refer to **APPENDIX III** for Utility Plans.

8 REFERENCES

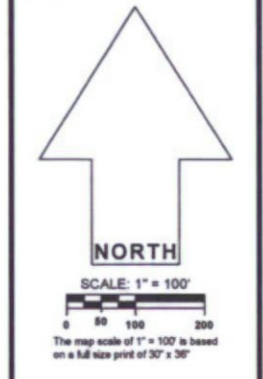
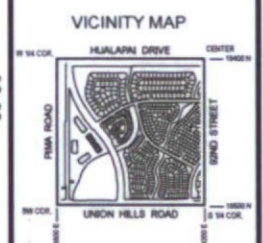
1. *COS QS Sewer Plan number 39-49*
2. *City of Scottsdale Design Standards & Policies Manual, 2010 (Chapter 7 – Wastewater)*





GENERAL NOTES:
 1. THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 310-7700.
 2. THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER 2004. BEARINGS ARE IN DEGREES AND DISTANCES ARE PLATTED TO DECIMALS. WHERE NO CORNER WAS FOUND THE BEARING AND DISTANCE TO CALCULATED SECTION CORNERS AND ARE NOTED AS CALCULATED ON THE MAP.

- LEGEND:**
- Cleanout
 - LIR Station
 - Manhole
 - Non-GPS Point
 - Plug
 - Sewer Service Point
 - Sewer Tap Point
 - Sewer Valve
 - Treatment Plant
 - Sewer Main - Gravity
 - Sewer Main - Force
 - Sewer Main - Private



SEWER
 QUARTER SECTION MAP
39-49
 SW 1/4 SEC. 30 T4N R5E
FIGURE 3

THIS DOCUMENT IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY. THE CITY OF SCOTTSDALE DOES NOT WARRANT THE ACCURACY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE. IT IS THE USER'S RESPONSIBILITY TO OBTAIN NECESSARY PERMITS FROM THE CITY OF SCOTTSDALE.

28-OCT-17



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APPENDIX I

Design Requirements

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4. The water line and sanitary sewer line will run parallel to each other, with 9 feet of separation to the pipes' centerline in order to maintain 6 feet of clearance at manholes.
 5. Deflections in the sanitary sewer line shall be designed to nominal fitting angles within standard tolerances and will occur at the same locations where the water line is deflected.
- See [Section 6-1.302](#) for related water system criteria.

DESIGN FLOWS

7-1.403

A. Residential

Sanitary sewer lines 8 to 12 inches in diameter will be designed using 100 gallons per capita per day (gpcpd) and a peaking factor of 4.

Sanitary sewer lines larger than 12 inches in diameter will be designed using 105 gpcpd and a peaking factor developed from "Harmon's Formula":

$$Q_{max} = Q_{avg} [1+14 / (4+P^{1/2})]$$

$$P = Population / 1,000$$

Residential densities are to assume 2.5 persons per dwelling unit, apartment or town home.

B. Commercial and Industrial

Wastewater flows for uses other than those listed below shall be based upon known regional or accepted engineering reference sources approved by the Water Resources Department.

AVERAGE DAY SEWER DEMANDS		
Land Use	Demand	Peaking Factor
Commercial/Retail	0.5 per sq. ft.	3
Office	0.4 per sq. ft.	3
Restaurant	1.2 per sq. ft.	6
High Density Condominium	140 per room	4.5
Resort Hotel (includes site amenities)	380 per room	4.5
School: without cafeteria	30 per student	6
School: with cafeteria	50 per student	6
Cultural	0.1 per sq. ft.	3

FIGURE 7.1-2 AVERAGE DAY SEWER DEMAND IN GALLONS

HYDRAULIC DESIGN

7-1.404

No public sanitary sewer lines will be less than 8 inches in diameter unless permission is received in writing from the Water Resources Department.

Sanitary sewer lines should be designed and constructed to give mean full flow velocities of not less than 2.5 fps, based upon Manning's Formula, using an "n" value of 0.013.

Conversely, to prevent abrasion and erosion of the pipe material, the maximum velocity will be limited to 10 fps at estimated peak flow. Where velocities exceed this maximum figure, the engineer will be required to submit a hydraulic analysis along with construction recommendations to the Water Resources Department for consideration. In no case will velocities greater than 15 fps be allowed.

Actual velocities will be analyzed under peak flow conditions for each reach of pipe.



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APPENDIX II

Calculations

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Worksheet for Design Flow for 8" Pipe @ 0.75%

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient 0.013
Channel Slope 0.00750 ft/ft
Diameter 0.67 ft
Discharge 160330.00 gal/day

Results

Normal Depth 0.22 ft
Flow Area 0.10 ft²
Wetted Perimeter 0.82 ft
Hydraulic Radius 0.12 ft
Top Width 0.63 ft
Critical Depth 0.23 ft
Percent Full 33.1 %
Critical Slope 0.00647 ft/ft
Velocity 2.46 ft/s
Velocity Head 0.09 ft
Specific Energy 0.31 ft
Froude Number 1.08
Maximum Discharge 1.13 ft³/s
Discharge Full 1.05 ft³/s
Slope Full 0.00042 ft/ft
Flow Type SuperCritical

GVF Input Data

Downstream Depth 0.00 ft
Length 0.00 ft
Number Of Steps 0

GVF Output Data

Upstream Depth 0.00 ft
Profile Description
Profile Headloss 0.00 ft
Average End Depth Over Rise 0.00 %
Normal Depth Over Rise 33.12 %
Downstream Velocity Infinity ft/s

Worksheet for Design Flow for 8" Pipe @ 0.75%

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.22	ft
Critical Depth	0.23	ft
Channel Slope	0.00750	ft/ft
Critical Slope	0.00647	ft/ft

Worksheet for Design Flow for 8" Pipe @ 5.00%

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.05000	ft/ft
Diameter	0.67	ft
Discharge	160330.00	gal/day

Results

Normal Depth	0.14	ft
Flow Area	0.05	ft ²
Wetted Perimeter	0.63	ft
Hydraulic Radius	0.08	ft
Top Width	0.54	ft
Critical Depth	0.23	ft
Percent Full	20.5	%
Critical Slope	0.00646	ft/ft
Velocity	4.83	ft/s
Velocity Head	0.36	ft
Specific Energy	0.50	ft
Froude Number	2.75	
Maximum Discharge	2.91	ft ³ /s
Discharge Full	2.70	ft ³ /s
Slope Full	0.00042	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	20.47	%
Downstream Velocity	Infinity	ft/s

Worksheet for Design Flow for 8" Pipe @ 5.00%

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.14	ft
Critical Depth	0.23	ft
Channel Slope	0.05000	ft/ft
Critical Slope	0.00646	ft/ft

Worksheet for Full Flow for Existing 12" Pipe @ d/D=0.65

Project Description

Friction Method Manning Formula
Solve For Discharge

Input Data

Roughness Coefficient 0.013
Channel Slope 0.01250 ft/ft
Normal Depth 0.65 ft
Diameter 1.00 ft

Results

Discharge 1947265.61 gal/day
Flow Area 0.54 ft²
Wetted Perimeter 1.88 ft
Hydraulic Radius 0.29 ft
Top Width 0.95 ft
Critical Depth 0.74 ft
Percent Full 65.0 %
Critical Slope 0.00876 ft/ft
Velocity 5.58 ft/s
Velocity Head 0.48 ft
Specific Energy 1.13 ft
Froude Number 1.31
Maximum Discharge 4.28 ft³/s
Discharge Full 3.98 ft³/s
Slope Full 0.00715 ft/ft
Flow Type SuperCritical

GVF Input Data

Downstream Depth 0.00 ft
Length 0.00 ft
Number Of Steps 0

GVF Output Data

Upstream Depth 0.00 ft
Profile Description
Profile Headloss 0.00 ft
Average End Depth Over Rise 0.00 %
Normal Depth Over Rise 65.00 %
Downstream Velocity Infinity ft/s

Worksheet for Full Flow for Existing 12" Pipe @ d/D=0.65

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.65	ft
Critical Depth	0.74	ft
Channel Slope	0.01250	ft/ft
Critical Slope	0.00876	ft/ft



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APPENDIX III

Utility Plan