FINAL SEWER BASIS OF DESIGN REPORT

94th Street and Bell Road

Northeast Corner of 94th Street and Bell Road
Scottsdale, Arizona

Prepared for:

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9160 East Verde Grove View
Scottsdale, AZ 85255

Prepared by:

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Mesa, Arizona 85210

291804000
August 23

FINAL SEWER BASIS OF DESIGN REPORT

94TH STREET AND BELL ROAD

NORTHEAST CORNER OF
94TH STREET AND BELL ROAD
SCOTTSDALE, ARIZONA

FINAL Basis of Design Report

☐ APPROVED

☑ APPROVED AS NOTED

☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE

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 apritchard DATE 10/17/2023

FIRST PRE-PLAT SUBMITTAL: DECEMBER 2022

SECOND PRE-PLAT SUBMITTAL: MARCH 2023

THIRD PRE-PLAT SUBMITTAL: AUGUST 2023

Prepared By:

Kimley»Horn

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INTRODUCTION

SITE LOCATION

This Final Sewer Basis of Design Report (Sewer BOD) has been prepared for the proposed 94th Street and Bell Road development located at the northeast corner of 94th Street and Bell Road in Scottsdale, Arizona (development). The development is bound to the south by Bell Road, to the west by 94th Street, to the north by DC Ranch Parcel 1.11, and to the east by undeveloped land and the Reata Wash. The development is located within Section 31 of Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. Refer to **Figure 1** for the Vicinity Map.

PROJECT SIZE AND TYPE

The development is a proposed 52-unit single family residential subdivision and a private clubhouse with a pool. The development area is approximately 37.16 acres.

PURPOSE AND OBJECTIVES

This report presents the basis of design criteria that will be used for engineering design of the proposed development. This report establishes a preliminary sewer solution for the development of the site.

- Demonstrate compliance with the City's 2018 Design Standards & Polices Manual (DSPM).
- Identify a sewer system layout for the proposed development.
- Determination of the sewer demand generated by the development.

Figure 1: Vicinity Map

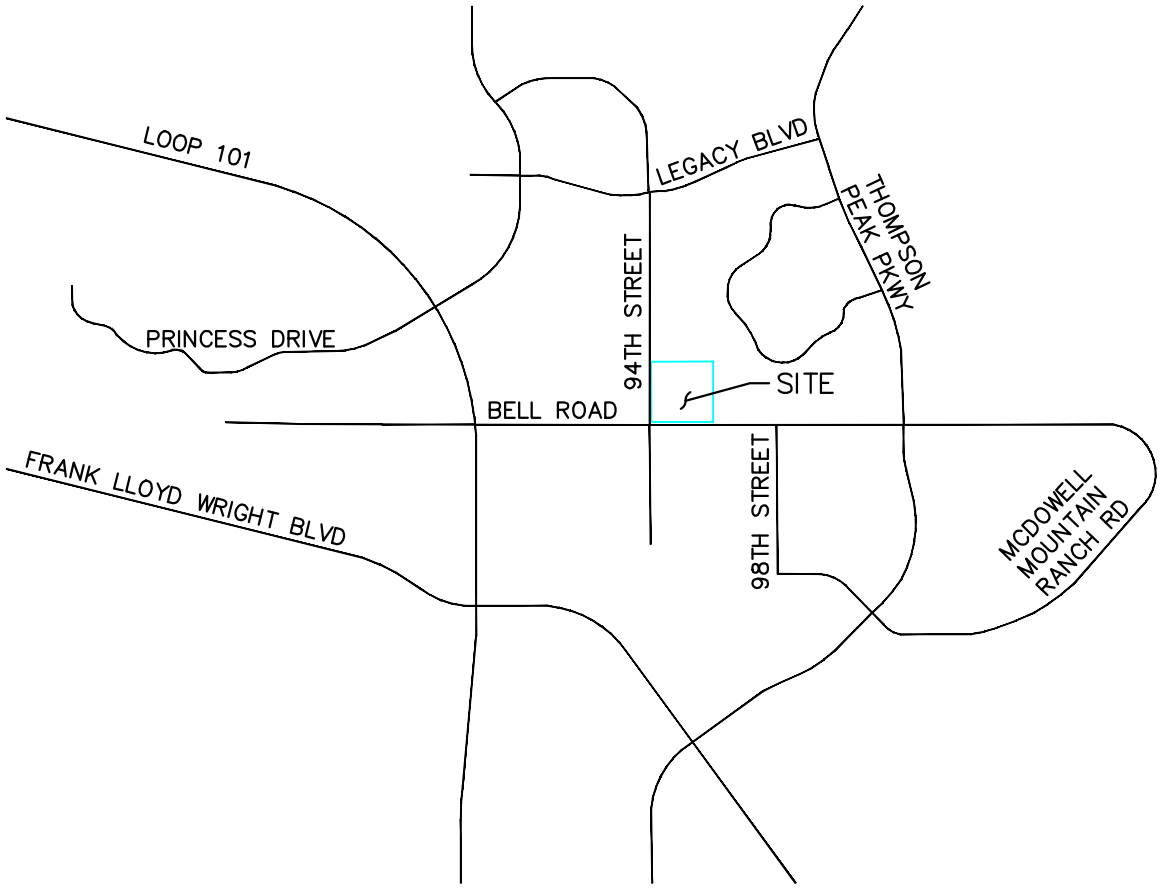

FIGURE 1
VICINITY MAP
94TH STREET AND BELL ROAD

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XREFS: xBM-PP xTP xVS

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COLLECTION SYSTEM DESCRIPTION

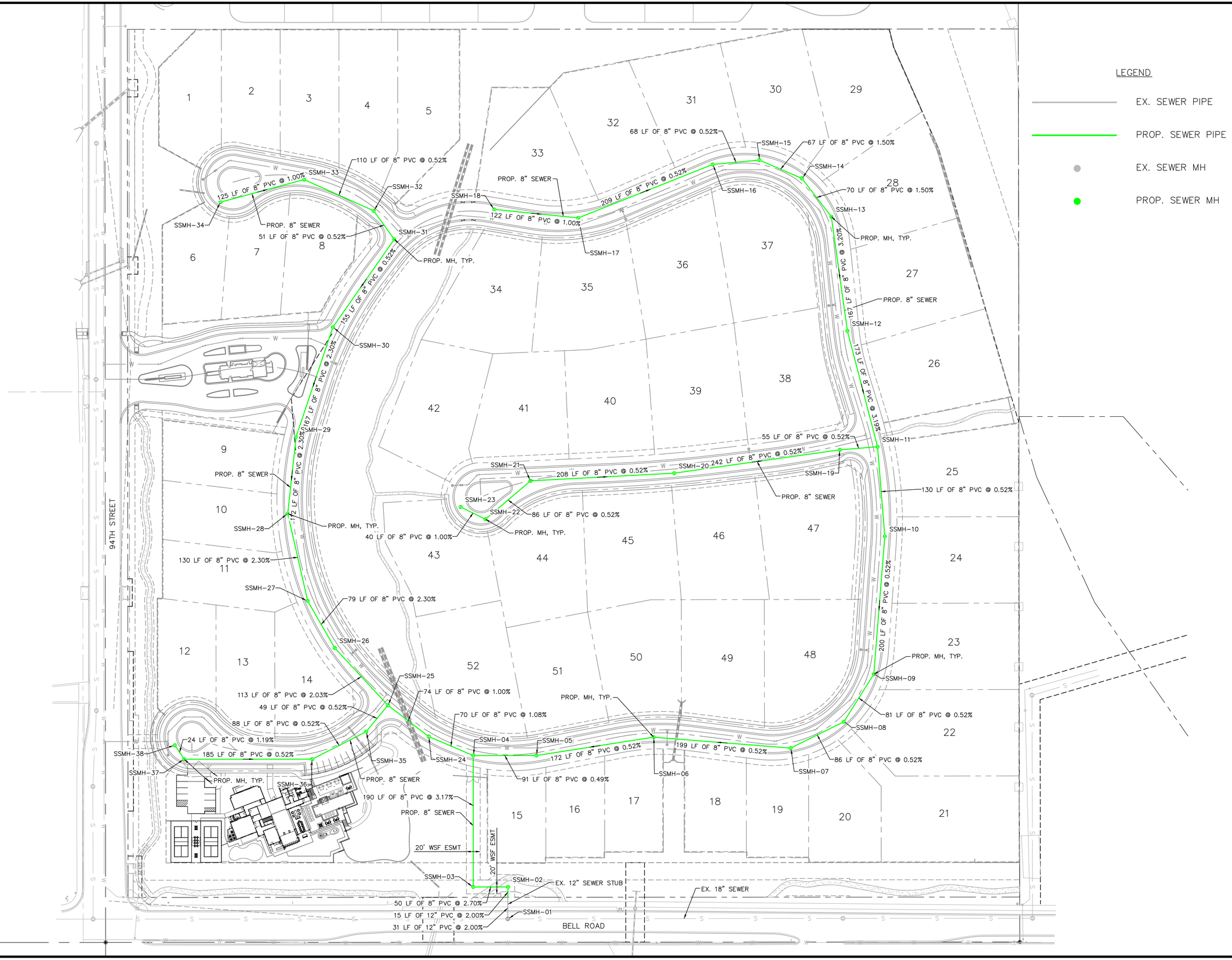
EXISTING COLLECTION SYSTEM

The existing site is undeveloped natural desert. The site slopes in a southerly direction across the development. Existing grade elevations on the site range from approximately 1567' to 1605'. Based on a review of the City Quarter Section Maps (QS37-50), there is an existing 12-inch sewer stub that will serve as the development's outfall. The sewer stub connects to an existing 18-inch sewer line in Bell Road which flows west to 94th Street.

PROPOSED COLLECTION SYSTEM

The proposed development consists of 52 single family residential units and private clubhouse with a pool. The onsite sewer collection system will consist of an 8-inch public sewer system within a private roadway tract or designated water and sewer facility easement (WSF easement). The sewer system will outfall to the existing 12-inch sewer stub in Bell Road within the City's right-of-way. A new manhole will be installed at the sewer stub so the 8-inch sewer can connect to the existing sewer system in Bell Road. Refer to **Figure 2**: Proposed Sewer System Layout.

Figure 2: Proposed Sewer System Layout



K:\FAV_CIVIL\291804000 - 94th St and Bell Rd\Reports\Final\Sewer\Figures\Figure 2-Sewer Layout.dwg Aug 28, 2023 charles.witt
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NO.	REVISION	BY	DATE	APPR.

Kimley»Horn

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Mesa, Arizona 85210 (480) 207-2666

SCALE (H): 1"=60'
SCALE (V): NONE
DESIGNED BY: CFW
DRAWN BY: CFW
CHECKED BY: JMB
DATE: AUG 2023

94TH STREET AND BELL ROAD

FINAL SEWER BOD

FIGURE 2 - PROPOSED SEWER SYSTEM LAYOUT

SCOTTSDALE, ARIZONA

Registered Professional Engineer (Civil)
CERTIFICATE NO.
52081
JASON M. BURM
Date Signed Digitally
ARIZONA, U.S.A.
Expires 06/30/25

PROJECT NO.
291804000

DRAWING NAME
SEWER BOD

01 OF 01

12-PP-2022

308-PA-2022

BASIS OF DESIGN

DESIGN CRITERIA

The design criteria for the development is based on the City of Scottsdale 2018 Design Standards and Policies Manual (DS&PM). Average daily flows and peaking factors for the proposed uses were used to determine the existing and proposed peak flows generated on site. See **Table 1** below for a summary of the design criteria used.

Table 1. Wastewater Design Criteria

WASTEWATER DESIGN CRITERIA			
Wastewater Flows			
Land Use	**Average Daily Flow (gpd)**		**Peaking Factor**
Residential	250	Per Unit	4
Wastewater Design Criteria			
Minimum Pipe Slope			
8-inch	0.52	%	
Full Flow Velocities			
Minimum	2.5	fps	
Maximum	10	fps	
Manning's Roughness Coefficient (n)	0.013		
Max Design d/D	0.65		

The proposed residential site generates a peak flow of approximately of 118.6 gpm. Per DSPM Section 7-1.202.G5.**Table 2** provides a summary of the proposed demand for this development. **See Appendix A** for calculations.

Table 2. Wastewater Flow Calculations

Wastewater Flow Calculations						
Use	**Units**	**Flow (gpd)**	**Average Daily Flow (gpd)**	**Peaking Factor**	**Peak Flow (gpd)**	**Peak Flow (gpm)**
Development	52 units	250	13,000	4.0	52,000	36.1
Clubhouse	-	-	10,400*	4.5	46,800	32.5
Pool	-	-	-	-	-	50.0**
Total	**52**	**-**	**23,400**	**-**	**98,800**	**118.6**

*Assumes 104 patrons (2 patrons per DU) and 100 gpd per patron per DSPM Figure 7-1.2.

**Pool is approximately 41,000 gallons with a 50 gpm pump-to-waste flow rate.

100 gpm per pool

WASTEWATER SYSTEM ANALYSIS

To determine the capacity of the proposed onsite wastewater collection system, the peak design flow was analyzed using the minimum design pipe slope. At the minimum design slope of 0.0052 ft/ft, an 8-inch line has the capacity to convey approximately 296 gpm with a d/D ratio of 0.65. An 8-inch line at the minimum design slope can convey the proposed peak design flow of 118.6 gpm at a normal depth of 0.25 ft or a d/D ratio of 0.38, at a velocity of 2.19 ft/s.

CONCLUSION

The proposed 52-lot development known as 94th Street and Bell Road results in a generated wastewater peak flow of 118.6 gallons per minute. The proposed wastewater flow will be conveyed through a gravity sanitary sewer to a proposed manhole within Bell Road where it will flow west in the existing 18” line towards 94th Street.

Appendix A – FlowMaster Calculations

Worksheet for Peak Flow - Normal Depth

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.0052	ft/ft
Diameter	8.0	in
Discharge	118.60	gal/min

Results		
Normal Depth	3.0	in
Flow Area	0.1	ft^2
Wetted Perimeter	0.9	ft
Hydraulic Radius	1.6	in
Top Width	0.65	ft
Critical Depth	2.8	in
Percent Full	37.8	%
Critical Slope	0.0065	ft/ft
Velocity	2.19	ft/s
Velocity Head	0.07	ft
Specific Energy	0.33	ft
Froude Number	0.893	
Maximum Discharge	420.70	gal/min
Discharge Full	391.09	gal/min
Slope Full	0.0005	ft/ft
Flow Type	Subcritical	

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	0.0	%
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	3.0	in
Critical Depth	2.8	in
Channel Slope	0.0052	ft/ft
Critical Slope	0.0065	ft/ft

Worksheet for 8-inch Pipe d/D=0.65

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.0052	ft/ft
Normal Depth	5.2	in
Diameter	8.0	in

Results		
Discharge	295.82	gal/min
Flow Area	0.2	ft^2
Wetted Perimeter	1.3	ft
Hydraulic Radius	2.3	in
Top Width	0.64	ft
Critical Depth	4.6	in
Percent Full	65.0	%
Critical Slope	0.0076	ft/ft
Velocity	2.74	ft/s
Velocity Head	0.12	ft
Specific Energy	0.55	ft
Froude Number	0.787	
Maximum Discharge	420.70	gal/min
Discharge Full	391.09	gal/min
Slope Full	0.0030	ft/ft
Flow Type	Subcritical	

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	0.0	%
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	5.2	in
Critical Depth	4.6	in
Channel Slope	0.0052	ft/ft
Critical Slope	0.0076	ft/ft

Worksheet for 8-inch Flowing Full

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.0052	ft/ft
Normal Depth	8.0	in
Diameter	8.0	in

Results		
Discharge	391.09	gal/min
Flow Area	0.3	ft^2
Wetted Perimeter	2.1	ft
Hydraulic Radius	2.0	in
Top Width	0.00	ft
Critical Depth	5.3	in
Percent Full	100.0	%
Critical Slope	0.0086	ft/ft
Velocity	2.50	ft/s
Velocity Head	0.10	ft
Specific Energy	0.76	ft
Froude Number	(N/A)	
Maximum Discharge	420.70	gal/min
Discharge Full	391.09	gal/min
Slope Full	0.0052	ft/ft
Flow Type	Undefined	

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	0.0	%
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	8.0	in
Critical Depth	5.3	in
Channel Slope	0.0052	ft/ft
Critical Slope	0.0086	ft/ft