Drainage Reports

Abbreveated Water & Sewer Need Reports

Water Study

Wastewater Study

Stormwater Waiver Application

ST. PATRICK ROMAN CATHOLIC PARISH

OFFSITE

10815 N. 84TH STREET
SCOTTSDALE, ARIZONA 85260

OFFSITE SEWER FUTURE FEASIBILITY STUDY

MARCH 28, 2018
Project No.: 15130

PREPARED FOR:
HDA ARCHITECTS, LL
459 N GILBERT ROAD, STE
GILBERT, ARIZONA 852
(480) 539-8800

PREPARED BY:
HUBBARD ENGINEERIN
1201 S. ALMA SCHOOL RD., SU
MESA, ARIZONA 852
(480) 892-3313
MICHAEL S. WOLF, PE

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 scan **DATE** 5/4/2018

Registered Professional Engineer (Civil) CERTIFICATE NO. 40063 DAVID LAREDO Date Signed 3/11/18 ARIZONA U.S.A.

Exp. 12/31/2018

HUBBARD ENGINEERING

40-DR-2017
04/12/18

TABLE OF CONTENTS

FIGURES

APPENDICES

Exp. 12/31/18

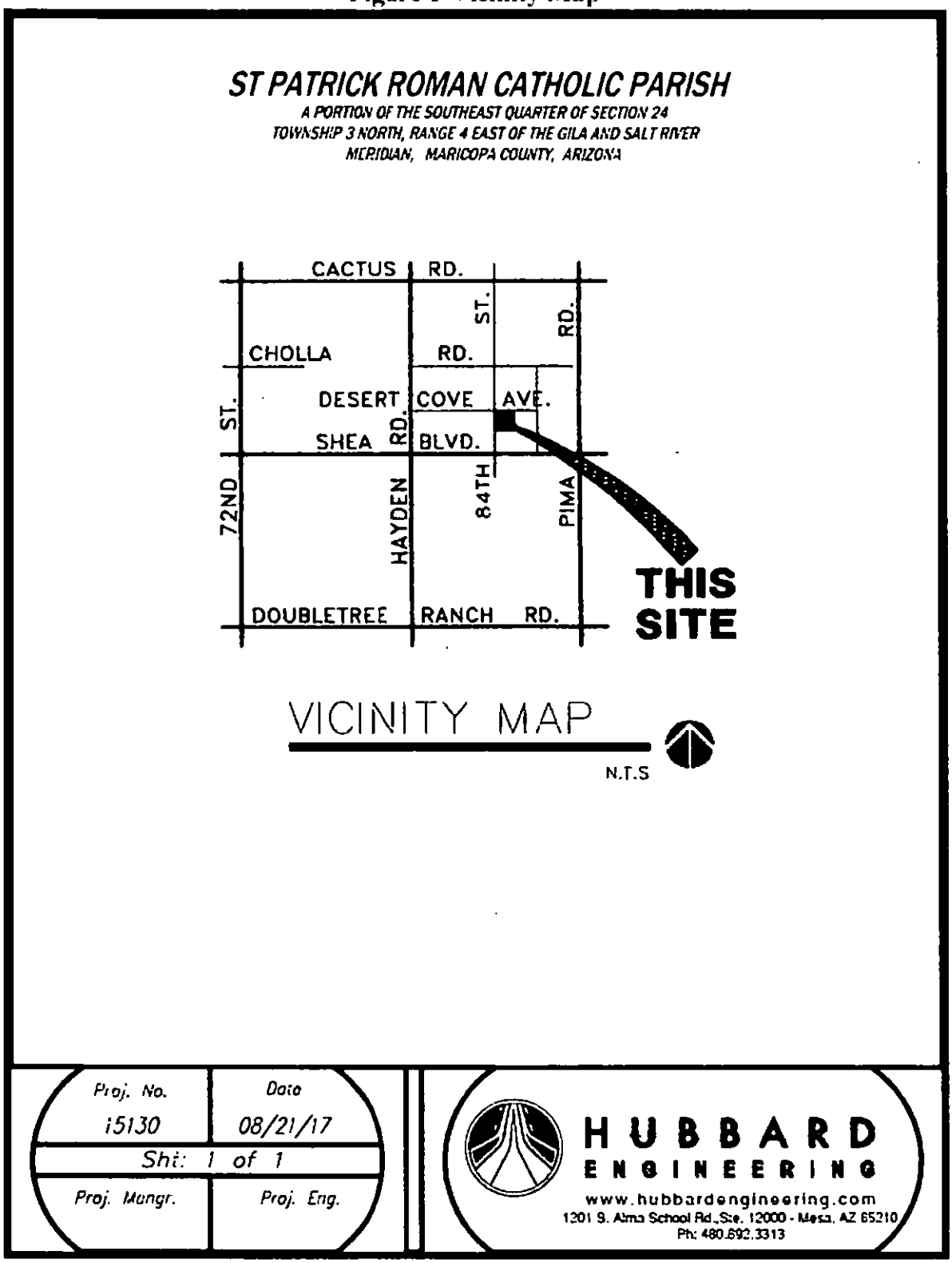
1. INTRODUCTION AND SCOPE OF WORK

This report presents the results of a *Sewer Feasibility Study* conducted by Hubbard Engineering at the request of HDA Architects, LLC ("client"), for the St. Patrick Roman Catholic Parish Offsite development ("site"). The purpose of this report is to provide an evaluation of the proposed offsite sewer main system. This report addresses basis of design as well as design criteria. This report will additionally serve to cover the requirement to extend the public sewer system along the frontage of the site as per Section 49-219 of the City of Scottsdale Ordinance.

1.1 Site Location

The site is located in the southeast quarter of Section 24 of Township 3N, Range 4E of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. More specifically, at 10815 North 84th Street, Scottsdale, AZ 85260. The location of the site is shown on the site *Vicinity Map*, **FIGURE 1**, on the next page. The project is bounded by N. 84th Street on the west, Offices at Sundown Ranch Condominiums to the south, single family homes to the east, and E. Desert Cove Avenue to the north.

Figure 1-Vicinity Map



1.2 Project Type

The site is rectangular in shape and encompasses approximately 12.20 gross acres. The site is currently developed with four existing buildings, a parking lot, and surface retention basins. The proposed development for this site includes parking lot, drainage and landscape improvements.

The proposed offsite sewer line will connect to an existing manhole to the southwest corner of the site at 84th St. This line will run to the north through 84th St. to Desert Cove Ave. At this point, the main will turn easterly and continue east down Desert Cove Ave. This line will terminate 160 feet east of the intersection of Desert Cove Ave and 84th St due to cover restrictions. The existing Parish, hall, and proposed activity building will be serviced by this proposed offsite line.

1.3 Regulatory Jurisdiction

The criterion used in the sewer design and analysis of the site was established using the guidelines as described in the following:

- *Design Standards & Policies Manual Chapter 7 Wastewater, City of Scottsdale, Dated January 2010.* (Reference 2).
- *Maricopa Association of Governments (MAG) – Uniform Standard Specifications and Details for Public Works Construction* (Reference 5)

2. PROJECT DESCRIPTION

2.1 Tie-In to Existing System

The sanitary sewer service line for this analysis will tie in to the existing manhole located in North 84th Street. This existing manhole is located about 70 feet south of the project site property line.

See **Appendix A – Offsite Sewer Plan** for the proposed tie-in location and elevations.

2.2 Physical Features

The existing manhole is located at the east side of the roadway with a rim elevation of 1367.35. It has two existing sanitary sewer lines, one discharging south with an invert elevation of 1358.3, and one collecting flow from the east with an invert elevation of 1358.4.

2.3 Service Area

The potential parcels (upstream of the discussed manhole) that may connect to the sanitary sewer line being analyzed in this report are detached residential units being currently served on septic systems. Said units were limited to 200 feet from the potential sanitary sewer line due to the following:

- Residential units are in great condition (upper scale neighborhood) without the need for large improvements in the foreseeable future.
- Smaller sewer line improvements costs from 150 to 650 per LF. With an average cost of $250.00 dollars/LF, a 200 LF project will yield a significant cost of $50,000.00 dollars. In comparison, to restore a failed septic system costs from $1,000 to $5,000 dollars (A maximum of 10% of the sewer line system).
- Existing sewer systems within the surrounding areas are closer, and therefore, more feasible to connect.

Therefore, a total of 10 residential units were found to be possible to connect to the sanitary sewer line.

2.4 Right of Way and Easements

The sanitary sewer line consists of an 8-inch main line located within the public right of way.

3. DESIGN FLOWS AND BASIS OF DESIGN

3.1 Average Daily Flow

In accordance with the *City of Scottsdale Design Standards & Policies Manual Chapter 7* Section 7-1.403 (Reference 2), the design unit wastewater load for 8 to 12-inch diameter sanitary sewer lines for residential developments is 100 gallons per capita per day, with an assumption of 2.5 persons per dwelling unit.

The total load was determined as follows:

Total Average Daily Flow = (100 gpd/capita) x (25 capita) = 2500 gal/day (1.736 gal/min)

3.2 Peak Flow

A Dry Weather Peaking Factor of 4 is applied to the Average Daily Flow, in accordance with the *City of Scottsdale Design Standards & Policies Manual Chapter 7* Section 7-1.403 (Reference 2).

Total Peak Flow = (4) x (2500 gal/day)
= 10,000 gal/day
= 6.944 gal/min
=0.02 cfs

3.3 Pipe Velocity and Capacity Calculations

A summary of the pipe velocity and capacity calculations can be found in **Appendix B – Pipe Velocity and Capacity Calculations and summarized in the following table:**

Flow Q=0.02 [cfs]		
Diameter D [in]	Slope s [%]	Velocity v [ft]
8	1	1.28

Flow Q=(2x0.02=) 0.04 [cfs]		
Diameter D [in]	Slope s [%]	Velocity v [ft]
8	1	1.41

Note: A Safety Factor of 2 was added

4. DESIGN CRITERIA

4.1 Flow Velocities

In accordance with the *City of Scottsdale Design Standards & Policies Manual Chapter 7* Section 7-1.404 (Reference 2);

- The maximum design velocity of 10.0 feet per second (fps), assuming a full flow velocity, is set to ensure that the pipe material is not affected and that turbulence is minimized
- The minimum design velocity of 2.5 feet per second (fps) is set to provide adequate velocity within the conduit to scour the conduit walls of any built-up solids.

4.2 Manholes

For an 8-15-inch diameter sewer main, the City of Scottsdale requires a manhole to be placed at a maximum distance of 500 feet from the previous manhole. Detailed requirement regarding manhole spacing can be found in the City *of Scottsdale Design Standards & Policies Manual Chapter 7* Section 7-1.405, Figure 7.1-3. Due to the length of the run based on cover, there is only a single manhole that needs to be added 300 feet upstream. Important to note is that this design may not meet the City of Scottsdale; however, it may meet the County Requirements.

4.3 Minimum Pipe Sizing

All proposed sewer pipes for this project are proposed to be 8 inches in diameter.

4.4 Pipe Material

All new sewer main lines shall be PVC, per City of Scottsdale requirements.

4.5 Sewer Cover and Separation

In accordance with the *City of Scottsdale Design Standards & Policies Manual Chapter 7* Section 7-1.407:

- The Sewer Collection system shall be designed to have a minimum 4 feet of cover.
- The Sewer Collection system shall be designed to have a minimum 6 feet of horizontal separation between sewer and water.
- The Sewer Collection system shall be designed to maintain 2 feet minimum vertical separation between water and sewer.
-

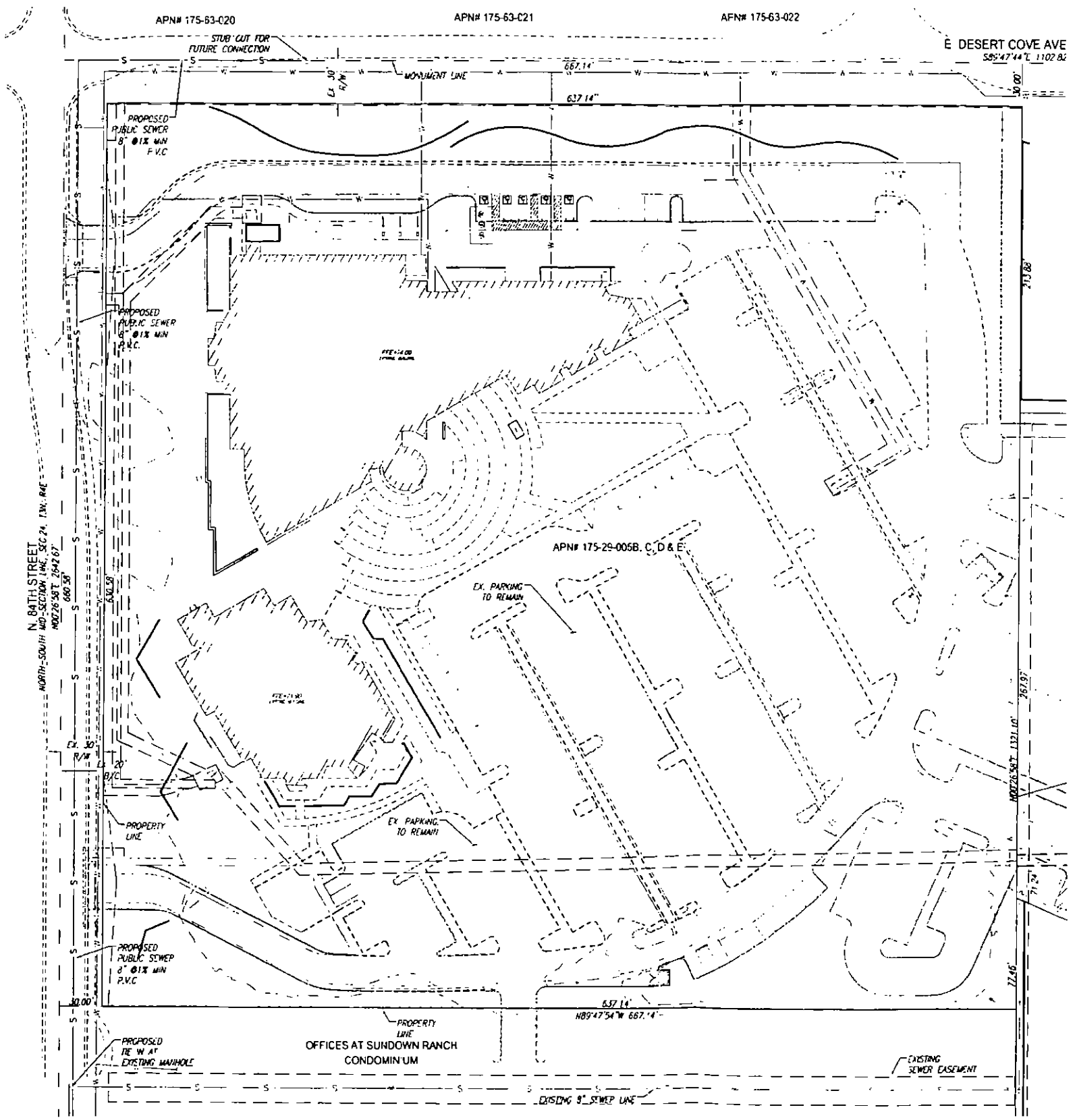
5. CONCLUSIONS AND RECOMMENDATIONS

In order to meet the minimum cover depth of 4 feet, the sewer line design is proposed at 1.0%. At this slope, the sewer line is not at full flow capacity and does not meet the minimum velocity requirements. Therefore, it will require regular maintenance and flushing to prevent build in the line.

- A total of 10 residential parcels were found to be plausible to discharge in the future into a sanitary system along the property line of the project site.
- The Average Daily Flow is 2,500 gallons per day, which is equal to 1.736 gpm.
- The Total Peak Flow is 10,000 gallons per day, which is equal to 6.944 gpm.
- The required cover depth for the 8-inch line ends 150' west of 84th street.
- An 8- inch pipe at a 1% slope has a full flow velocity of 3.44 fps and would require 1.176cfs.

Appendix A
Offsite Sewer Plan
St. Patrick Roman Catholic Parish Offsite

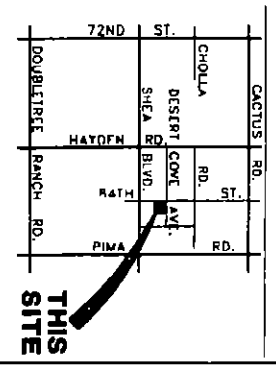
OFFSITE SEWER PLAN
FOR
ST. PATRICK - ROMAN CATHOLIC PARISH
A PORTION OF SECTION 24. RANGE 3 NORTH, TOWNSHIP 4 EAST



P:\2015\151.001\Design Reports\DRB\Sewer\Offsite Sewer\Appendix A\151.02_Offsite Sewer Map.dwg Jan 29, 2018 - 11:28am ESepola

VICINITY MAP

N.T.S.



Call before you dig.
1-800 STAKE IT
602.263.1100

NOT FOR CONSTRUCTION
PRELIMINARY
OR RECORDING
OR BID AT RISK

Project No	Date
15130	03/23/2018
Project Mgr.	Project Eng.
D. LAREDO	D. LAREDO

ST. PATRICK ROMAN CATHOLIC PARISH PHASE 1

A PORTION OF THE SOUTHEAST QUARTER OF SECTION 24
TOWNSHIP 3 NORTH RANGE 4 EAST OF THE GILA AND SALT RIVER
MERIDIAN, MARICOPA COUNTY, ARIZONA

HUBBARD ENGINEERING
www.hubbardengineering.com
1201 S Alma School Rd
Suite 12000
Mesa AZ 85210
Ph: 480 892 3313

Appendix B
Pipe Velocity and Capacity Calculations
St. Patrick Roman Catholic Parish Offsite

Channel Report

Flow For 8-Inch Public Line at 1.0%

Circular

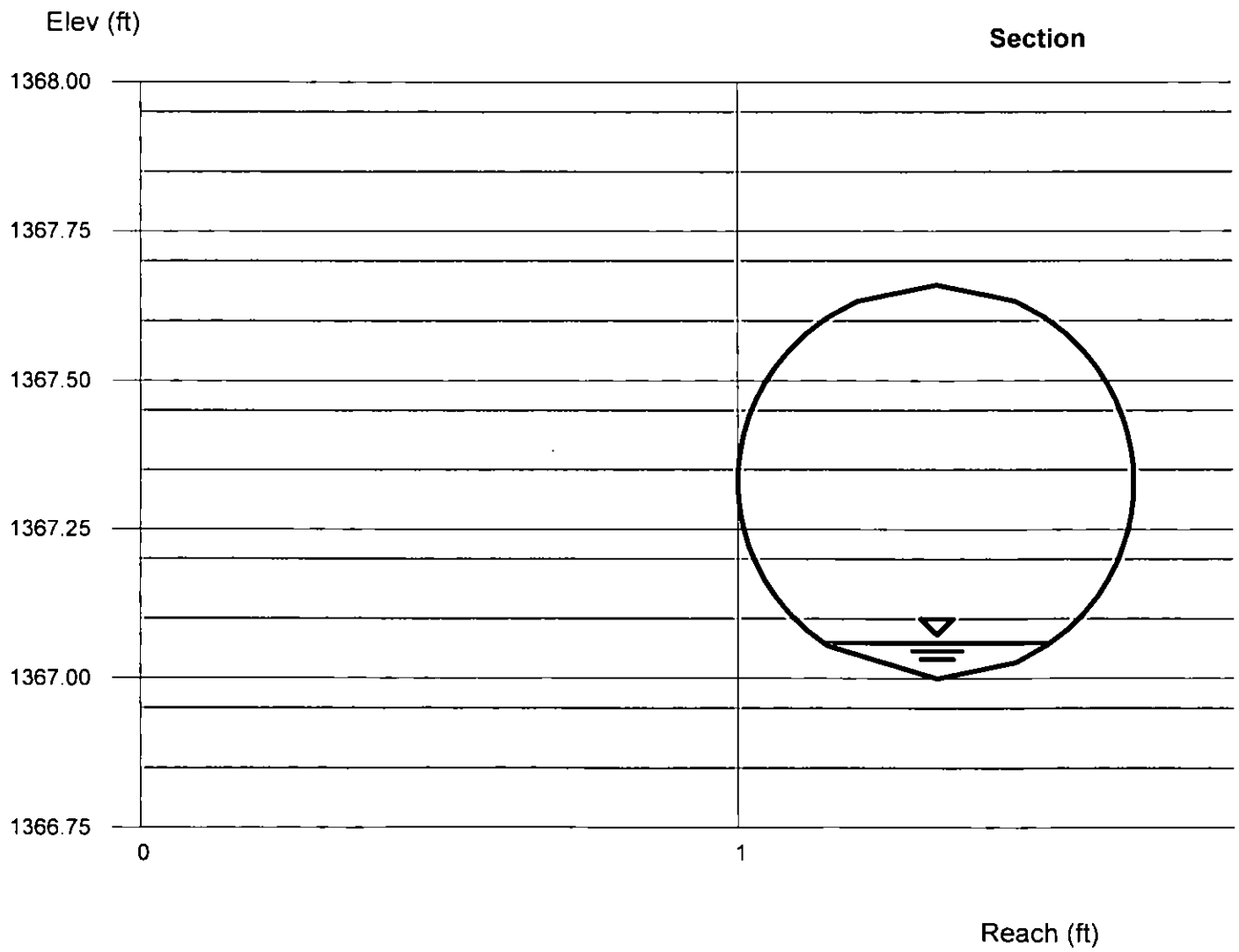
Diameter (ft)	= 0.66
Invert Elev (ft)	= 1367.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.02

Highlighted

Depth (ft)	= 0.06
Q (cfs)	= 0.020
Area (sqft)	= 0.02
Velocity (ft/s)	= 1.28
Wetted Perim (ft)	= 0.41
Crit Depth, Yc (ft)	= 0.07
Top Width (ft)	= 0.38
EGL (ft)	= 0.09



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Mar 29 2018

Flow For 8-Inch Public Line at 1.0%

Circular

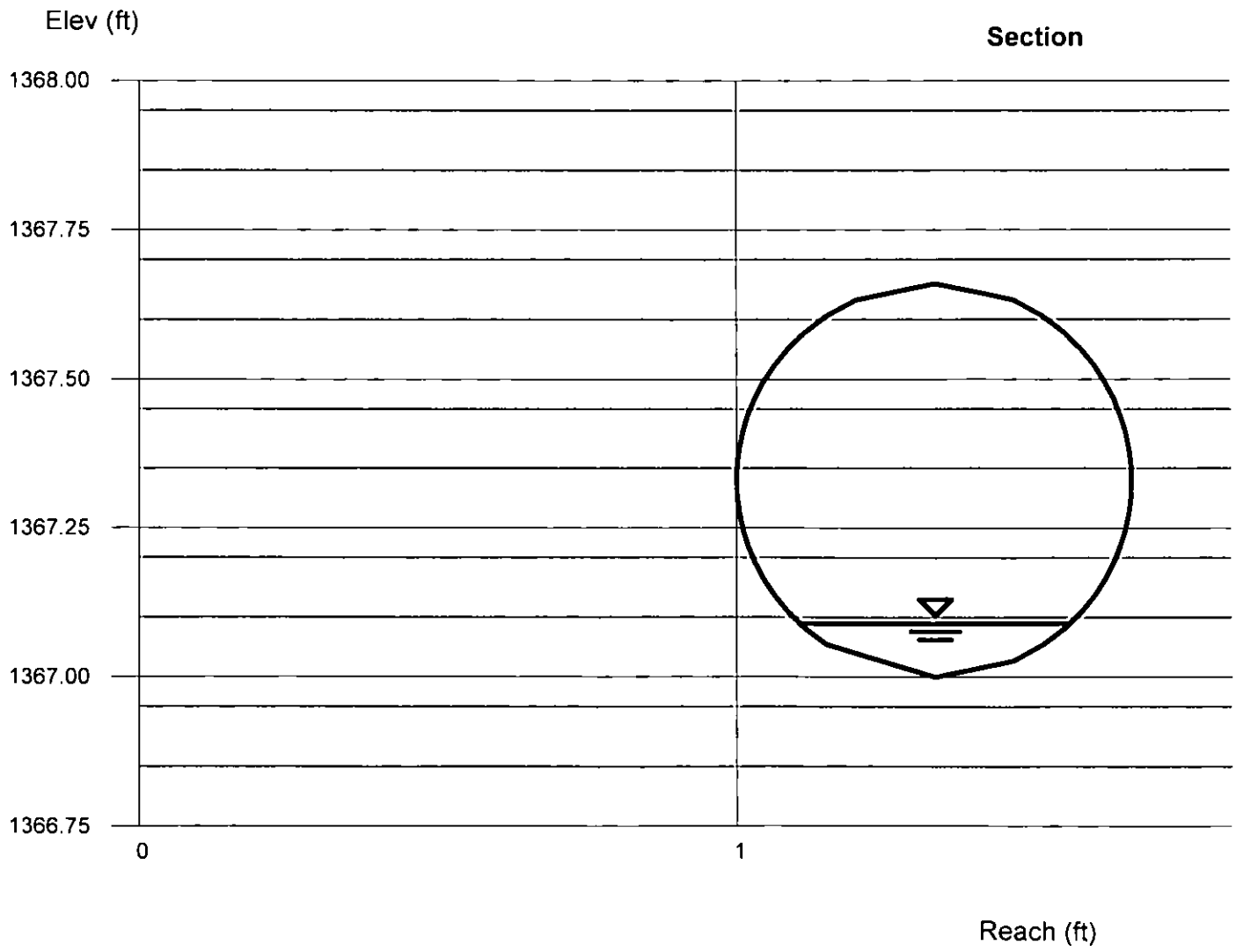
Diameter (ft)	= 0.66
Invert Elev (ft)	= 1367.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.04

Highlighted

Depth (ft)	= 0.09
Q (cfs)	= 0.040
Area (sqft)	= 0.03
Velocity (ft/s)	= 1.41
Wetted Perim (ft)	= 0.50
Crit Depth, Yc (ft)	= 0.09
Top Width (ft)	= 0.45
EGL (ft)	= 0.12



Channel Report

Full Flow Velocity For 8-Inch

Circular

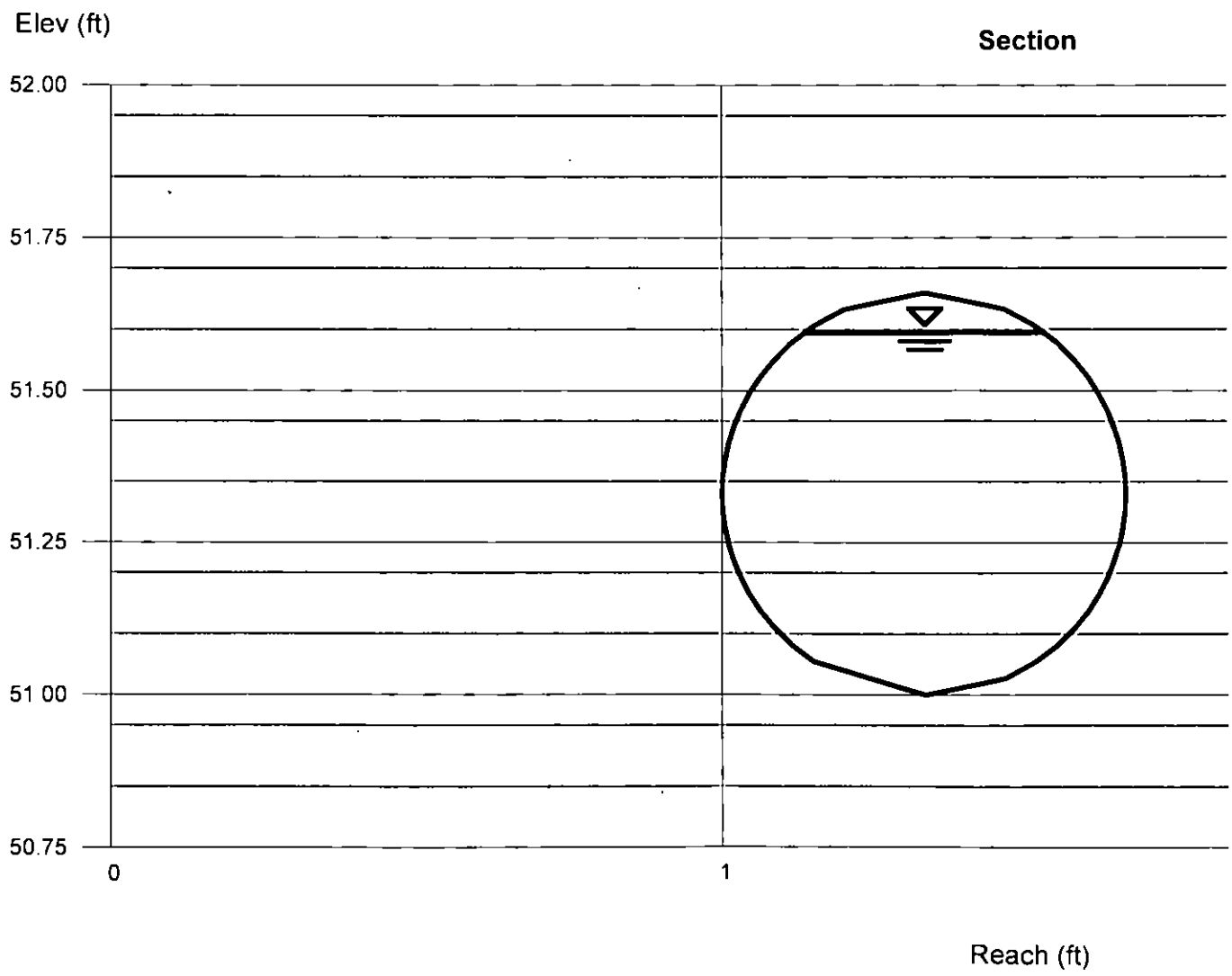
Diameter (ft)	= 0.66
Invert Elev (ft)	= 51.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 0.59
Q (cfs)	= 1.254
Area (sqft)	= 0.32
Velocity (ft/s)	= 3.86
Wetted Perim (ft)	= 1.65
Crit Depth, Yc (ft)	= 0.53
Top Width (ft)	= 0.39
EGL (ft)	= 0.83



Depth	Q	Area	Veloc	Wp
(ft)	(cfs)	(sqft)	(ft/s)	(ft)
0 07	0.025	0.018	1 38	0 43
0 13	0.104	0.049	2.12	0 61
0 20	0.231	0 086	2.67	0.77
0 26	0.397	0.128	3.10	0.90
0.33	0.592	0.172	3.44	1.04
0.40	0.793	0.215	3 69	1 17
0 46	0.987	0.256	3.85	1 31
0.53	1.150	0.294	3 92	1.46
0.59	1.254	0 324	3.86	1.65
0.66	1.176	0.342	3.44	2.07

Yc	TopWidth	Energy
(ft)	(ft)	(ft)
0.08	0.40	0.10
0.15	0.53	0.20
0.23	0.61	0.31
0.30	0.65	0.41
0.37	0.66	0 51
0.43	0.65	0 61
0 48	0.60	0.69
0 51	0.53	0.77
0 53	0.39	0.83
0.52	0 00	0.84