ST. PATRICK ROMAN CATHOLIC PARISH

DRB

10815 N. 84TH STREET
SCOTTSDALE, ARIZONA 85260

SEWER BASIS OF DESIGN REPORT

MARCH 28, 2018
Project No.: 15130

PREPARED FOR:
HDA ARCHITECTS, LL
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PREPARED BY:
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MESA, ARIZONA 8521
(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 40063 DAVID LAREDO Civil Date Signed 04.12.18 ARIZONA U.S.A.

Exp. 12/31/2018

HUBBARD ENGINEERING

40-DR-2017
04/12/18

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Exp. 12/31/2018

1. INTRODUCTION AND SCOPE OF WORK

This report presents the results of a *Sewer Basis of Design Study* conducted by Hubbard Engineering at the request of HDA Architects, LLC ("client"), for the St. Patrick Roman Catholic Parish development ("site"). The purpose of this report is to provide an evaluation of the proposed collection system for the site. This report addresses design flows and criteria, and the basis of design. 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, will be covered with the Offsite Basis of Design report for sewer.

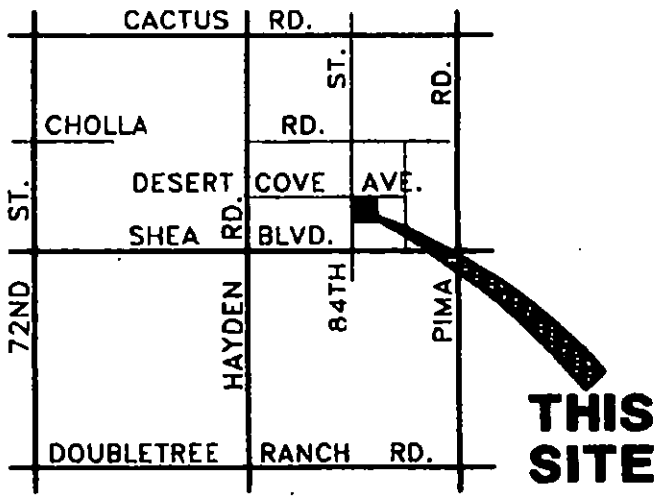
1.1 Site Location

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. The location of the site is shown on the site *Vicinity Map*, **FIGURE 1**, on the next page. The project is bounded by N. 85th Street on the East, Offices at Sundown Ranch Condominiums to the south, and E. Desert Cove Avenue to the north.

Figure 1-Vicinity Map

ST PATRICK ROMAN CATHOLIC PARISH

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



VICINITY MAP

N.T.S

Proj. No.	Date
15130	08/21/17
Sht: 1 of 1	
Proj. Mangr.	Proj. Eng.

HUBBARD ENGINEERING
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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 sewer line will be a public 8-inch line through an existing public utility easement on the East side of the site. This line will terminate in a manhole on the north side of the property line and a private 6-inch line will exit the PUE at the manhole. This private line will be used to connect the existing buildings on the site and will be stubbed out to connect to the other building at a future time. The existing buildings are currently on septic.

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:

- *2006 Edition of the International Plumbing Code* (Reference 1)
- *Design Standards & Policies Manual Chapter 7 Wastewater, City of Scottsdale, Dated January 2010.* (Reference 2).
- *Arizona Department of Environmental Quality (ADEQ) Engineering Bulletin 11: Minimum Requirements for Design, Submission of Plans and Specifications of Sewage Works (July 1978)* (Reference 3)
- *Arizona Department of Environmental Quality (ADEQ) – Aquifer Protection Permit (APP) Program* (Reference 4)
- *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 proposed sewer service line for this project will tie in to the existing 8" public sewer stub located to the south in the Offices at Sundown Ranch development.

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

2.2 Physical Features

The existing site is developed and consists of a church building, an existing hall building, and two existing residences, parking, drainage, and landscaping. The sewer improvements proposed for the site will tie in to the existing stub to the south of the site. The invert elevation of this tie in is 1363.15.

2.3 Service Area

The proposed sewer line will eventually service two existing residential buildings that are being converted into office space.

2.4 Right of Way and Easements

The proposed 8-inch sanitary sewer main will be located within a Public Utility Easement. The 6-inch private sewer line will not be located within a Public Utility Easement, nor will the 4-inch service connections.

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 office spaces is 0.4 gpd per sq. ft.
The total load was determined as follows:

Total Average Daily Flow = (0.4 gpd/sq. ft.) x (15079 sq.ft.) = 6031.6 gal/day (4.1886 gal/min)

3.2 Peak Flow

A Dry Weather Peaking Factor of 3 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 = (3) x (6031.6 gal/day)
= 18094.8 gal/day
= 12.57 gal/min
= 0.027 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**.

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) is set to ensure that the pipe material is not affected and that turbulence is minimized.
- The minimum design velocity of, for a full flow pipe, is 2.5 feet per second (fps) and is set to provide adequate velocity within the conduit to scour the conduit walls of any built-up solids.
- The Total Peak Flow for this site has been added to the existing load from Offices at Sundown Ranch Condominiums for the Pipe Velocity and Capacity Calculations. This adds an additional 0.105 cfs to the system to more accurately depict the effect on the system. This leads to an ultimate sewer velocity of 2.18 fps.
- The full flow velocity for the 6-inch private line is 2.86 feet per second with a slope of 1% and would require 0.56 cfs to reach full flow. The full flow velocity for the public 8-inch main line is 3.44 feet per second with a slope of 1% and would require 1.176 cfs to reach full flow.

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. Additionally, a manhole must be placed wherever there is a change in direction of the line. 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. There will be one manhole installed at the termination of the 8-inch public line. This will be the only manhole on the site. At any location where there is a change in direction in the private line, a sewer cleanout will be placed two feet upstream from the location.

4.3 Minimum Pipe Sizing

All proposed public sewer connections for this project are proposed to be 8-inches in diameter. The proposed private sewer line will be 6-inches in diameter. The proposed service line connection from the private 6-inch line will be 4-inches in diameter.

4.4 Pipe Material

All new sewer 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;

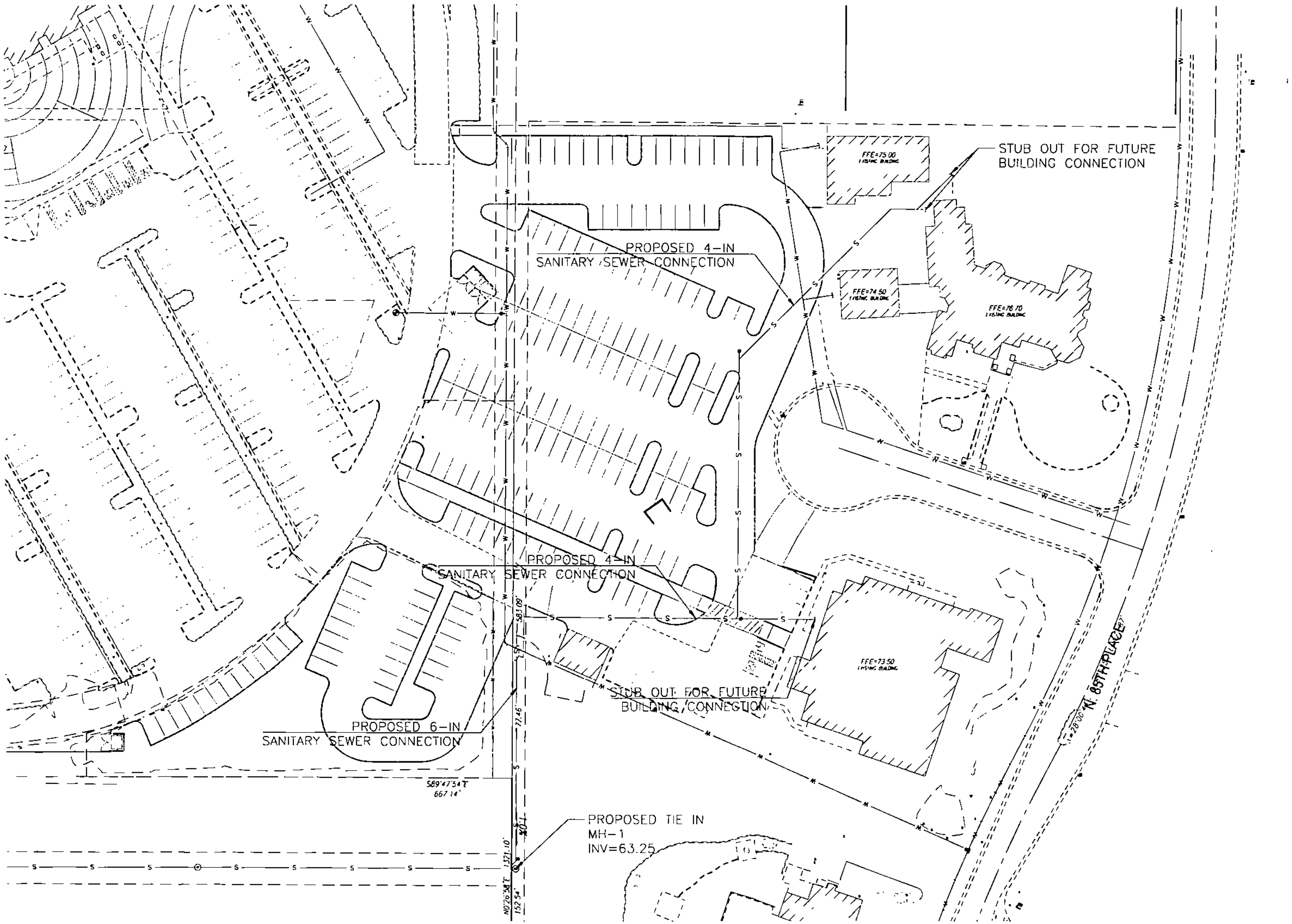
- The Sewer Collection system shall be designed to have a minimum 4 feet of cover.
- The Sewer Collection system shall be designed to have a minimum 6 feet of horizontal separation between sewer and water.
- The Sewer Collection system shall be designed to maintain 2 feet minimum vertical separation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

5. CONCLUSIONS AND RECOMMENDATIONS

- The Average Daily Flow is 6031.6 gallons per day, which is equal to 4.19 gpm.
- The Total Peak Flow is 18094.8 gallons per day, which is equal to 12.57 gpm.
- The proposed public main size is 8 inches in diameter and will be constructed at a slope of 1%. This will tie into the existing sewer stub at a slope of 1% through a manhole.
- The proposed private line is 6 inches in diameter and will be constructed at a slope of 1%. This will tie into the proposed 8-inch public main through a manhole.
- The proposed 6-inch diameter sewer connection has a full flow velocity of 2.86 fps with a flow of 0.56 cfs.
- The proposed 8-inch diameter public sewer line has a full flow velocity of 3.44 fps with a flow of 1.176 cfs.
- At a slope of 1%, the proposed load added to the existing load in the line will yield a total load of 0.18022 cfs.

Appendix A
Proposed Sewer System Map
St. Patrick Roman Catholic Parish DRB

PROPOSED SEWER MAP
FOR
ST. PATRICKS ROMAN CATHOLIC PARISH- DRB



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30 0 30 60
feet

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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

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

NOT FOR CONSTRUCTION
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OR RECORDING
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Appendix B
Pipe Velocity and Capacity Calculations
St. Patrick Roman Catholic Parish Offsite

Channel Report

Full Flow Velocity For 6-Inch

Circular

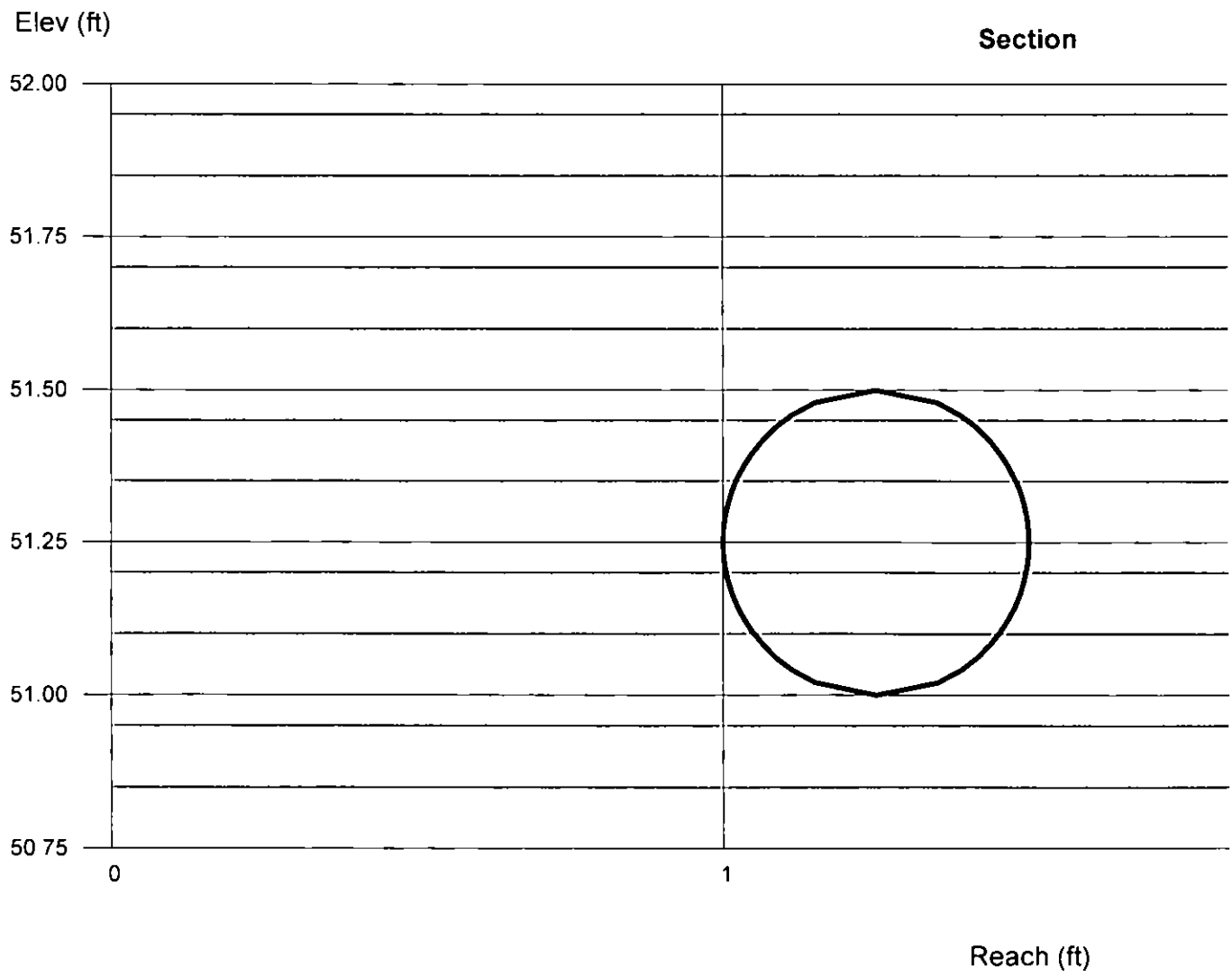
Diameter (ft)	= 0.50
Invert Elev (ft)	= 51.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 0.50

Highlighted

Depth (ft)	= 0.50
Q (cfs)	= 0.561
Area (sqft)	= 0.20
Velocity (ft/s)	= 2.86
Wetted Perim (ft)	= 1.57
Crit Depth, Yc (ft)	= 0.39
Top Width (ft)	= 0.00
EGL (ft)	= 0.63



Channel Report

Full Flow Velocity For 8-Inch

Circular

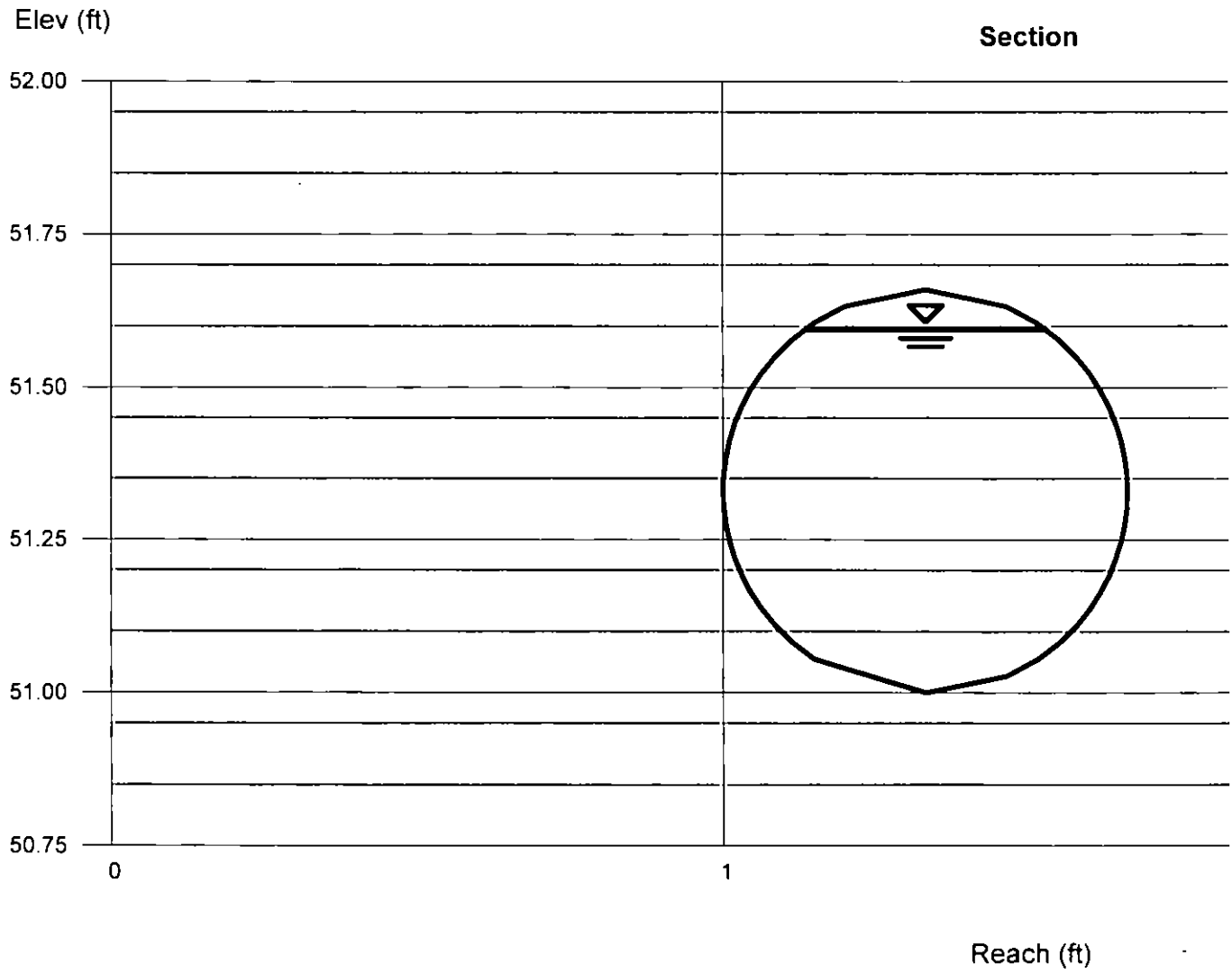
Diameter (ft)	= 0.66
Invert Elev (ft)	= 51.00
Slope (%)	= 1.00
N-Value	= 0.013

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