# CAVASSON

LOCATED NEAR THE NORTHWEST CORNER OF THE HAYDEN ROAD AND LOOP 101
FRONTAGE ROAD INTERSECTION

# FINAL SEWER REPORT-RETAIL NORTH AND M.O.B.
# BASIS OF DESIGN

October 23, 2024
Revised: January 29, 2025

Project No.: 18114-506

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 4/23/2025

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34-DR-2024

# TABLE OF CONTENTS



## FIGURES

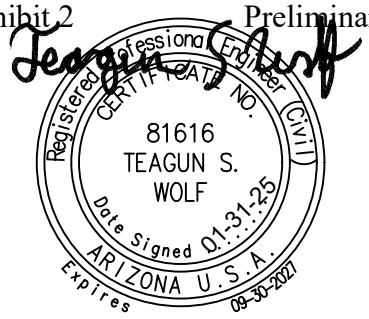


## APPENDICES



## EXHIBITS





# 1. INTRODUCTION

## 1.1 Project Scope

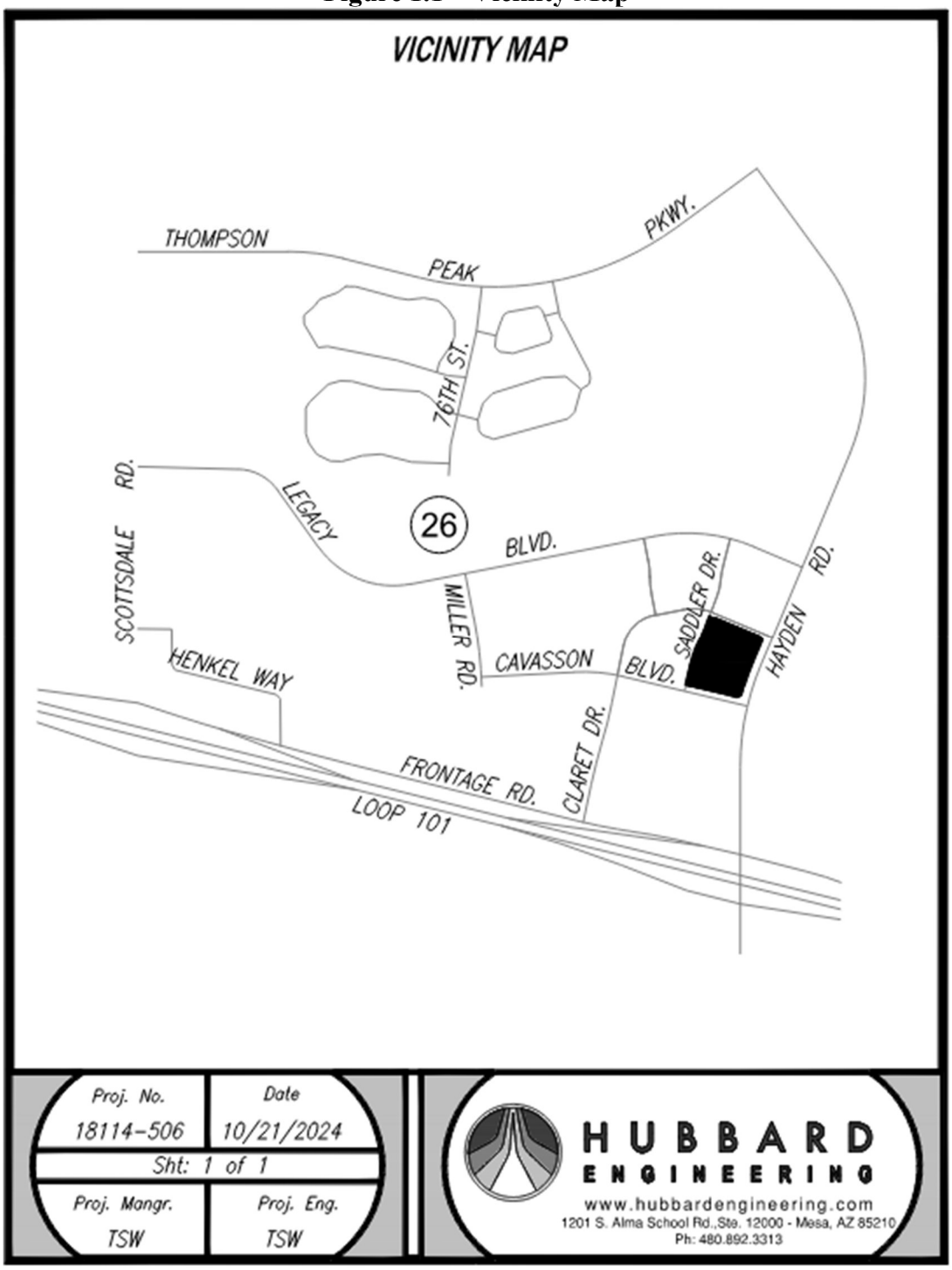
This report presents the results of a *Final Sewer Study* conducted by Hubbard Engineering at the request of Butler Design Group ("Client"), for the Retail North and M.O.B. development ("Site"). The purpose of this report is to provide a detailed analysis for the proposed sanitary sewer system for the development. The sewer analysis in this report adheres to the City of Scottsdale's *2012 Water Reuse Master Plan Update* and the approved *Cavasson Master Wastewater Report* dated December 14, 2023.

## 1.2 Site Description

The project site is located in the southeast quarter of Section 26, Township 4N, Range 4E of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The site is currently undeveloped, and prior to Nationwide Realty Investor's acquisition, was held in trust by the Arizona State Land Department (ASLD) as a portion of the overall Crossroads East development, which encompasses approximately 883 gross acres. The land naturally falls from northeast to southwest.

Retail North and M.O.B. is specifically located in the northeast portion of the Cavasson Development and is bounded by Cavasson Boulevard to the south, Claret Drive to the north, undeveloped desert to the west, and Hayden Road to the east. The site location is shown in **Figure 1.1 – Vicinity Map**.

**Figure 1.1 – Vicinity Map**



### 1.3 Project Type

The overall Cavasson project is being developed by Nationwide Reality Investors as a master planned, mixed use development with office, retail, hotels, and multifamily residential parcels with public and private roadways that run adjacent and through the development.

Retail North and M.O.B. is proposing a 37,000 square foot medical office building and 13,000± square foot retail building located on Lot 5 of Cavasson Phase 3C. Improvements will include proposed parking and drive aisles, proposed public water main and private sewer, as well as the private street Saddler Drive (Private).

The analysis for the overall development was conducted in Hubbard's *Master Sewer Report Phase 3 Update* and will be referenced as it applies to the Retail North and M.O.B. development.

### 1.4 Regulatory Requirements

The following documents were utilized in the preparation of this report:

- City of Scottsdale, *Design Standards & Policies Manual*.
- City of Scottsdale, *Water Reuse Master Plan Update 2012.*
- Arizona Department of Environmental Quality (ADEQ), *Engineering Bulletin 11: Minimum Requirements for Design, Submission of Plans and Specifications of Sewage Works.*
- Arizona Department of Environmental Quality (ADEQ), *Aquifer Protection Permit (APP) Program.*
- Maricopa Association of Governments (MAG), *Uniform Standard Specifications and Details for Public Works Construction, 2024 Edition.*
- *2021 Edition of the International Plumbing Code.*
- City of Scottsdale, *Ordinance No. 4346.*
- Hubbard Engineering, *Master Wastewater Report for Cavasson, Phase 3 Update, December 14, 2023.*

## 2. PROJECT DESCRIPTION

### 2.1 Tie in to Existing System

The Retail North and M.O.B. development sewer system will ultimately tie into the existing sewer system through a single 12-inch diameter stub provided from Cavasson Boulevard that will run north in a proposed private sewer to the onsite connection point. There will additionally be a stub provided to the future development located south of the Retail North and M.O.B. development.

See **Exhibit 1** for tie in locations.

### 2.2 Service Area

The proposed Cavasson development is located within the City of Scottsdale's Service Area, specifically within the Sub-basin 4 collection area, per Figure 1-3 in the City of Scottsdale's *2012 Water Reuse Master Plan Update.* Details regarding the capacity and infrastructure within this service area are further discussed in the approved *Cavasson Master Wastewater Report*.

The proposed sewer for the Retail North and M.O.B. development will service a 37,000 square foot medical office building and 13,000± square foot retail building. See **Exhibit 1** for the proposed sewer layout. The proposed stub for the future development is currently planned to service a hotel with the remaining 163 keys that the Cavasson Development is entitled to.

### 2.3 Right of Way and Easements

All proposed sewer lines installed with the Retail North and M.O.B. development will be private and will be outside of any public easement or right of way. These private mains will connect to the public sewer at the existing stub described in Section 2.1 of this report.

## 3. DESIGN FLOWS AND BASIS OF DESIGN

### 3.1 Average Daily Flow

In accordance with the City of Scottsdale Design Standard & Policies Manual Chapter 7 Section 7-1.403 (Reference 1), the design unit load for Office is 0.4 gallons per day per square foot.

Similarly, the design unit load for Commercial/Retail is 0.5 gallons per day per square foot.

Similiarily, the design unit load for Hotel is 380 gallons per day per room.

The contributory area for the medical office building is 37,000 sq. ft., the contributory area for the retail building is 13,000 sq. ft. and the contributory area for the future hotel is assumed to be the remaining 163 rooms that the Cavasson development is entitled to use.

Office Average Daily Flow = (0.4 gpd/sq. ft) x (37,000 sq. ft.) = 14,800 gpd = 10.28 gpm
Retail Average Daily Flow = (0.5 gpd/sq. ft.) x (13,000 sq. ft.) = 6,500 gpd = 4.51 gpm
Hotel Average Daily Flow = (380 gpd/room) x (163 rooms) = 61,940 gpd = 43.01 gpm

**Total Average Daily Flow = 14,800 gpd + 6,500 gpd + 61,940 gpd = 83,240 gpd = 57.81 gpm**

### 3.2 Peak Daily Flow

In accordance with the City of Scottsdale Design Standards & Policies Manual Chapter 7 Section 7-1.403 (Reference 1), a peaking factor of 3.0 was applied to the Retail and Office Average Daily Flow, and a peaking factor of 4.5 was applied to the Hotel Average Daily Flow to determine the Peak Daily Flow.

Pool backwash is not separately added for the possibility of a pool with the future planned hotel development as the unit load is for a Hotel Resort which is assumed to include pools and other water feature amenities. Therefore, the total peak flow is:

Peak Flow (Office) = (3.0) x (14,800 gpd) = 44,400 gpd = 30.83 gpm
Peak Flow (Retail) = (3.0) x (6,500 gpd) = 19,500 gpd = 13.54 gpm
Peak Flow (Hotel) = (4.5) x (61,940 gpd) = 278,730 gpd = 193.58 gpm

**Total Peak Flow = 30.83 gpm + 13.54 gpm + 193.58 gpm = 237.94 gpm = 0.53 cfs**

### 3.3 Pipe Capacity and Velocity Calculations

The pipe capacity of the proposed system was calculated using the Manning's Equation:

$$Q = (k/n) \times (R_h^{2/3}) \times (S^{1/2}) \times A$$

where:

$Q$ = flow rate, $ft^3/s$;
$k$ = conversion factor = 1.4859 $ft^{1/3}/s$;
$n$ = headloss coefficient;
$R_h$ = hydraulic radius, ft;
$S$ = slope, ft/ft;
$A$ = pipe cross sectional area, ft.

A summary of the calculated full flow pipe capacities and velocities can be found in **Appendix A**.

## 4. DESIGN CRITERIA

## 4.1 Flow Velocities

In accordance with the City of Scottsdale's *Design Standards and Policies Manual,* all sanitary sewers within the city shall be designed and constructed such that the mean velocity in the pipe, when flowing full, shall not be less than two and a half (2.5) feet per second (fps). At this velocity, the sewer flow will typically allow the pipe to be "self-cleaning" and minimizes the settlement of solids within the pipe.

Additionally, to prevent abrasion and erosion of the pipe material, the velocity of the peak flow shall not exceed 10 fps.

## 4.2 Manholes

In accordance with the City of Scottsdale's *Design Standards and Policies Manual,* manholes are required at all changes of grade, pipe size, pipe material or alignment and at distances not to exceed 500 feet for 8-15 inch diameter lines. Additional sewer manhole requirements include:

- The horizontal angle between two lines cannot be less than 90 degrees.
- Manholes shall have a minimum 0.10-foot drop across the trough.
- The difference in invert elevations between inflow and outflow lines shall not exceed one pipe diameter unless a drop connection is installed.

## 4.3 Minimum Pipe Sizing

The existing stub is a 12-inch diameter stub. The proposed stubs that will service the onsite development will be 8-inch diameter.

## 4.4 Pipe Material

All new sewer lines are proposed be PVC SDR-35, in accordance with the City of Scottsdale's *Design Standards and Policies Manual.*

## 4.5 Sewer Cover and Separation

In accordance with the City of Scottsdale's *Design Standards and Policies Manual:*

- The sewer collection system shall have a minimum cover of four feet from the crown of a sewer pipe to finish grade.
- The sewer collection system shall have a minimum horizontal distance of six feet from a water line.
- The minimum vertical clearance of a water line crossing under or over a sanitary sewer line must be two feet.

## 5. CONCLUSIONS AND RECOMMENDATIONS

1. The project site is located within the City of Scottsdale Sub-basin 4 collection area.
2. Design unit flows for each land use type were determined from the City of Scottsdale's *2012 Water Reuse Master Plan Update.*
3. The Average Daily Flow is 20,316 gallons per day = ~~14.11 gpm~~ 57.81 gpm
4. The Total Peak Flow, including pool backwash is ~~136.68 gpm~~ = 0.304 cfs 237.94 gpm

## 6. REFERENCES


1. City of Scottsdale, *Design Standards & Policies Manual*, January 18, 2018.
2. Carollo Engineers, *City of Scottsdale Water Reuse Master Plan Update 2012,* 2012.
3. Coe & Van Loo Consultants, Inc. (CVL) *Arizona State Land Department- Crossroads East Wastewater Master Plan Update,* April 13, 2008.
4. Arizona Department of Environmental Quality (ADEQ). *Engineering Bulletin 11: Minimum Requirements for Design, Submission of Plans and Specifications of Sewage Works.* May 1978.
5. Arizona Department of Environmental Quality (ADEQ). *Aquifer Protection Permit (APP) Program*.
6. Maricopa Association of Governments (MAG). *Uniform Standard Specifications and Details for Public Works Construction.* January 2018.
7. International Code Council. *2021 Edition of the International Plumbing Code*. January 1, 2021.
8. City of Scottsdale, *Ordinance No. 4346,* June 17, 2018.
9. City of Scottsdale, Ordinance No. 11147, June 17, 2018.

**Appendix A**
Sewer Capacity and Velocity Calculations
*Retail North and M.O.B.*

# Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Oct 21 2024

## Existing 12-inch Stub Full Flow

**Circular**

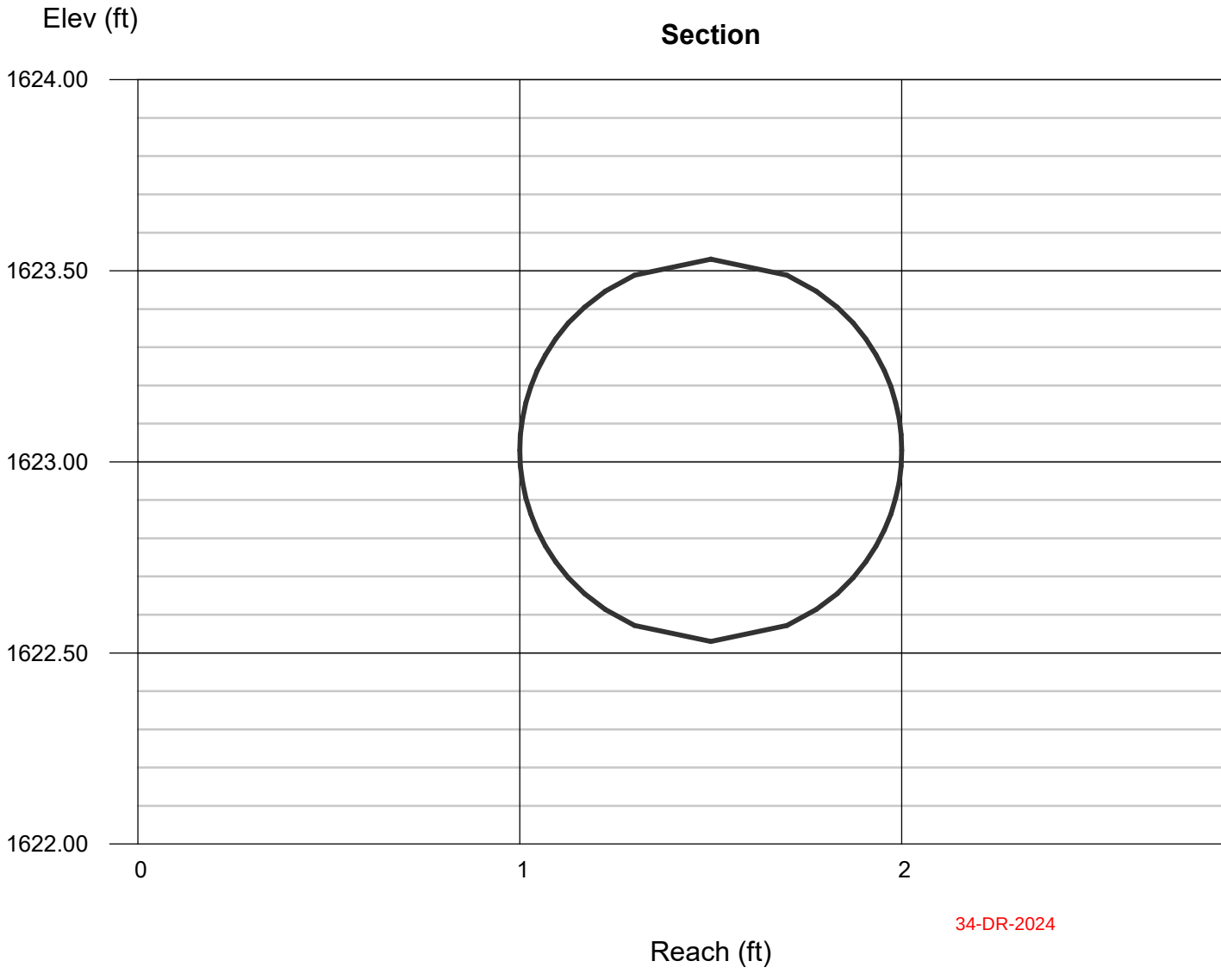
| | |
|---|---|
| Diameter (ft) | = 1.00 |
| Invert Elev (ft) | = 1622.53 |
| Slope (%) | = 0.32 |
| N-Value | = 0.013 |

**Calculations**

| | |
|---|---|
| Compute by: | Known Depth |
| Known Depth (ft) | = 1.00 |

**Highlighted**

| | |
|---|---|
| Depth (ft) | = 1.00 |
| Q (cfs) | = 2.014 |
| Area (sqft) | = 0.79 |
| Velocity (ft/s) | = 2.56 |
| Wetted Perim (ft) | = 3.14 |
| Crit Depth, Yc (ft) | = 0.61 |
| Top Width (ft) | = 0.00 |
| EGL (ft) | = 1.10 |



# Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jan 29 2025

## Existing 12-inch Stub Peak Daily Flow

**Circular**

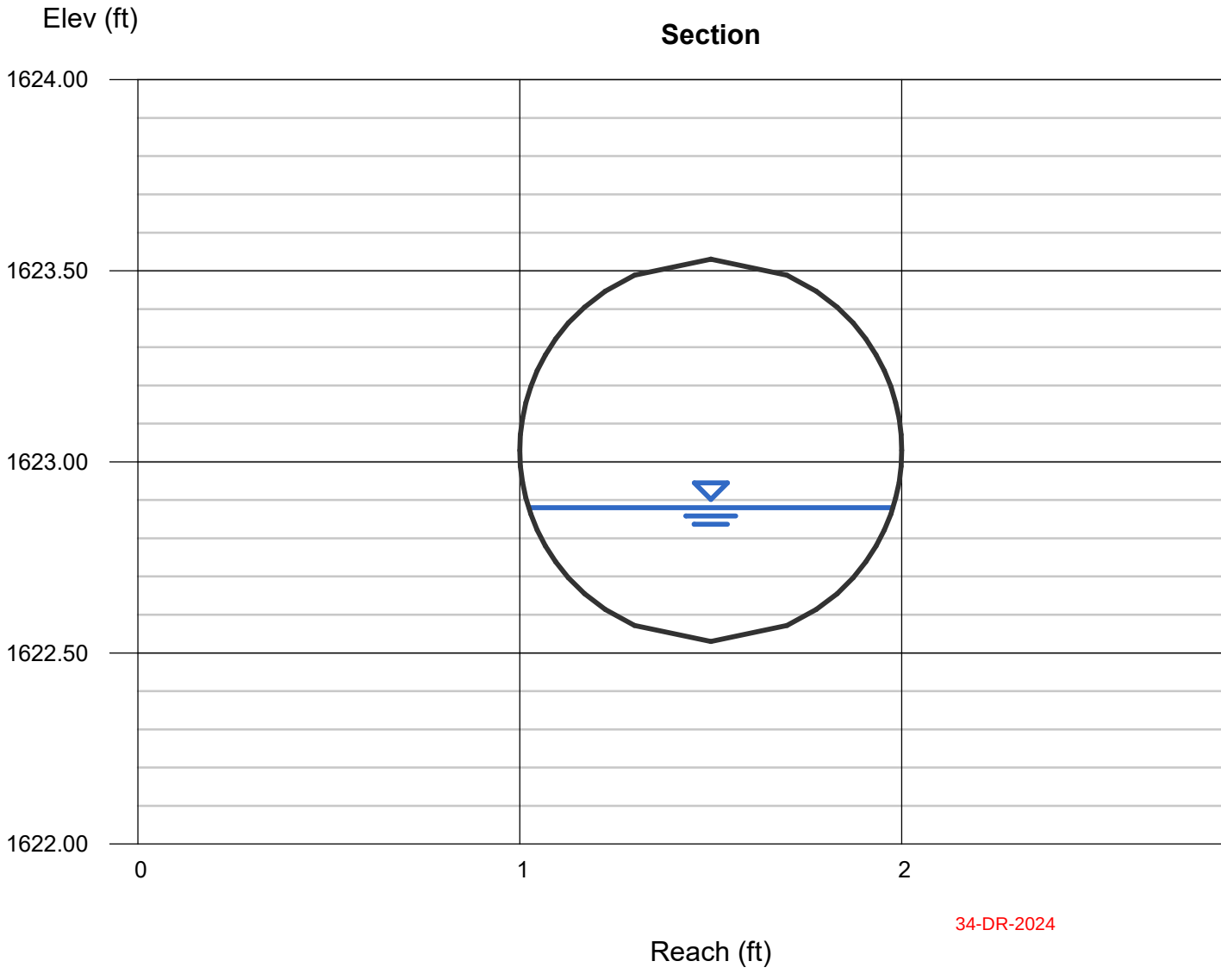
| | |
|---|---|
| Diameter (ft) | = 1.00 |
| Invert Elev (ft) | = 1622.53 |
| Slope (%) | = 0.32 |
| N-Value | = 0.013 |

**Calculations**

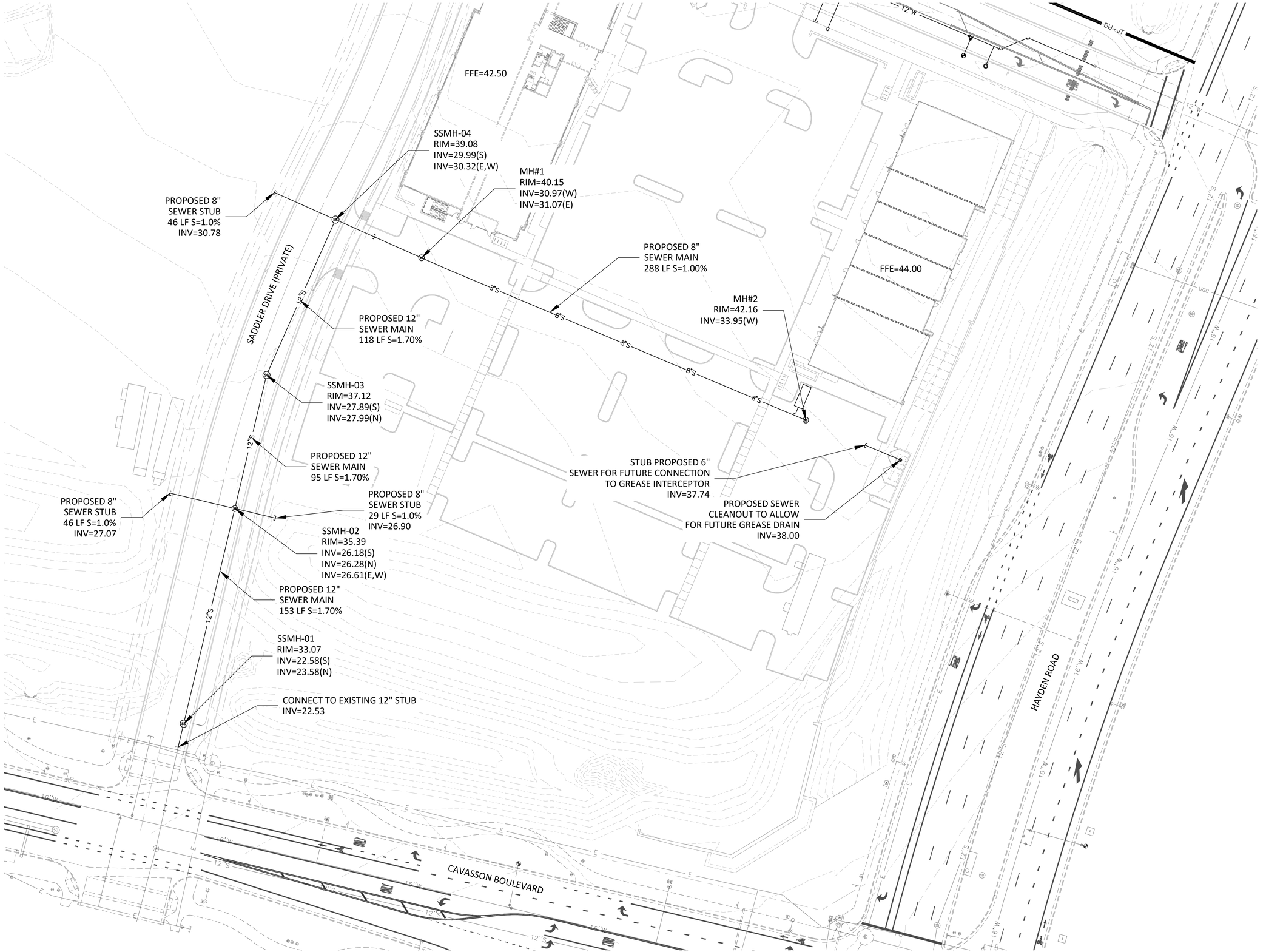
| | |
|---|---|
| Compute by: | Known Q |
| Known Q (cfs) | = 0.53 |

**Highlighted**

| | |
|---|---|
| Depth (ft) | = 0.35 |
| Q (cfs) | = 0.530 |
| Area (sqft) | = 0.25 |
| Velocity (ft/s) | = 2.15 |
| Wetted Perim (ft) | = 1.27 |
| Crit Depth, Yc (ft) | = 0.31 |
| Top Width (ft) | = 0.96 |
| EGL (ft) | = 0.42 |



**Exhibits**
*Retail North and M.O.B.*

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# SEWER MAP
## RETAIL NORTH AND M.O.B.

| Date | Project Eng. |
|---|---|
| 10/22/2024 | TSW |
| Project No. | Project Mgr. |
| 18114-506 | TSW |

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PRELIMINARY
OR RECORDING
BID AT RISK

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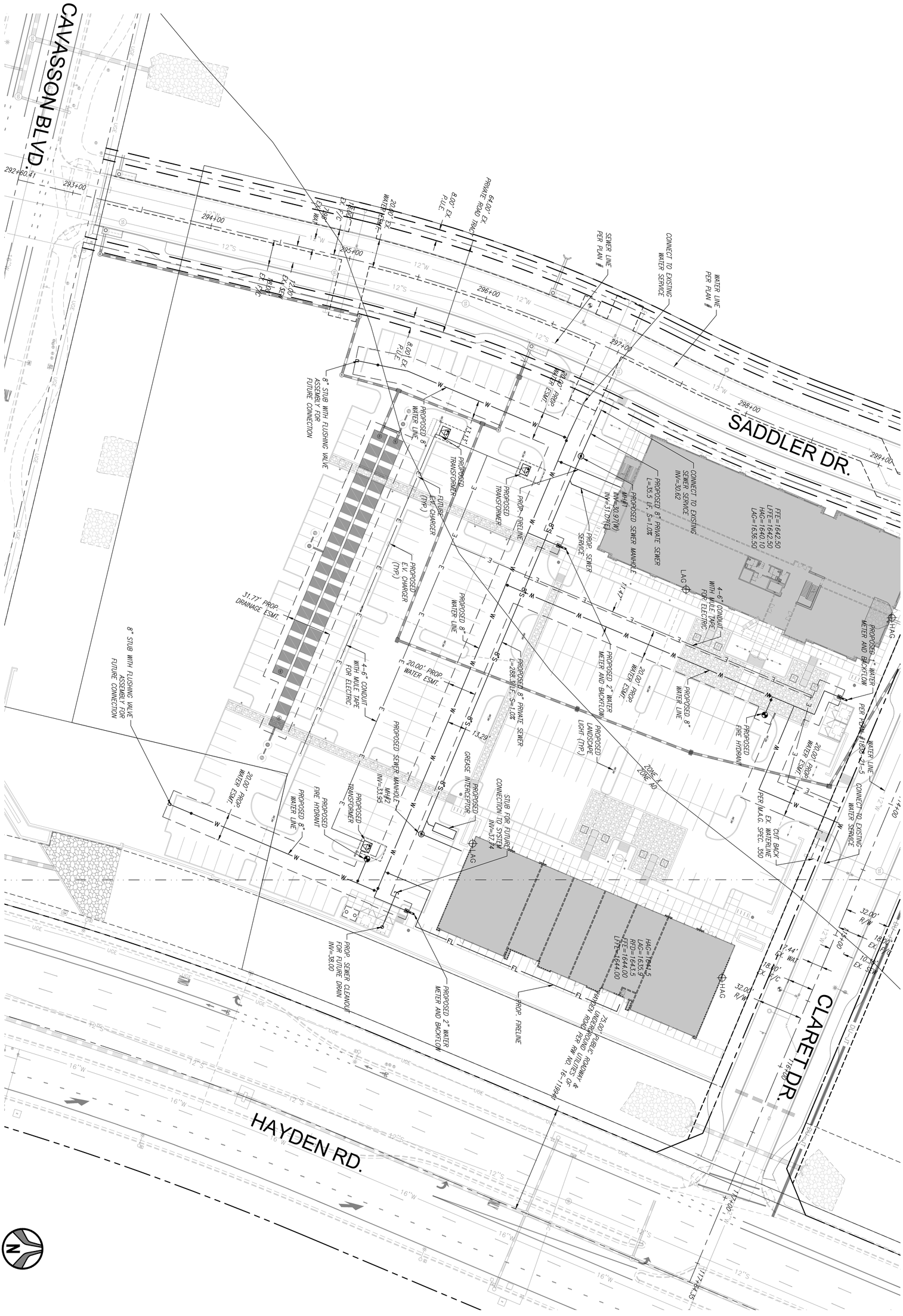
602.263.1100

EX 01






| | | | |
|---|---|---|---|
| SHT: 12 OF 13 | PU-01 | Project No. 18114-506 | Date 01/28/2025 |
| | | Project Mgr. TSW | Project Eng. TSW |

Call before you dig. 811 1.800.STAKE.IT 602.263.1100

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# PRELIMINARY UTILITY PLAN

## RETAIL NORTH AND M.O.B. - PRELIMINARY

A PORTION OF THE EAST HALF OF SECTION 26 AND THE WEST HALF OF SECTION 25, TOWNSHIP 4 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER MERIDIAN, MARICOPA COUNTY, ARIZONA

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