CITY OF SCOTTSDALE

Abbreviated Water and Sewer Needs

CAVASSON

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

FINAL SEWER REPORT-CAVASSON PHASE 1 RETAIL
BASIS OF DESIGN

October 31, 2019

Project No.: 18114-503

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 ldillon DATE 3/24/2020

Approved on behalf of and per the direction of Scott Anderson.

PREPARED FOR:
NATIONWIDE REALTY INVESTORS
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PREPARED BY:
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Date Signed 10-31-19
ARIZONA U.S.A.
Expires 03-31-2021

HUBBARD ENGINEERING

6-DR-2020
2/6/2020

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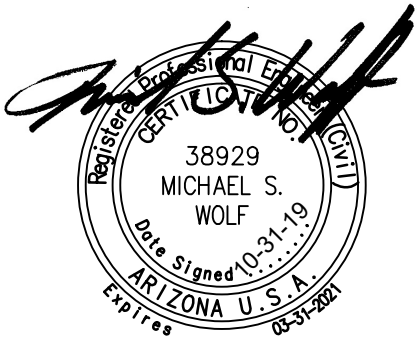


1. INTRODUCTION

1.1 Project Scope

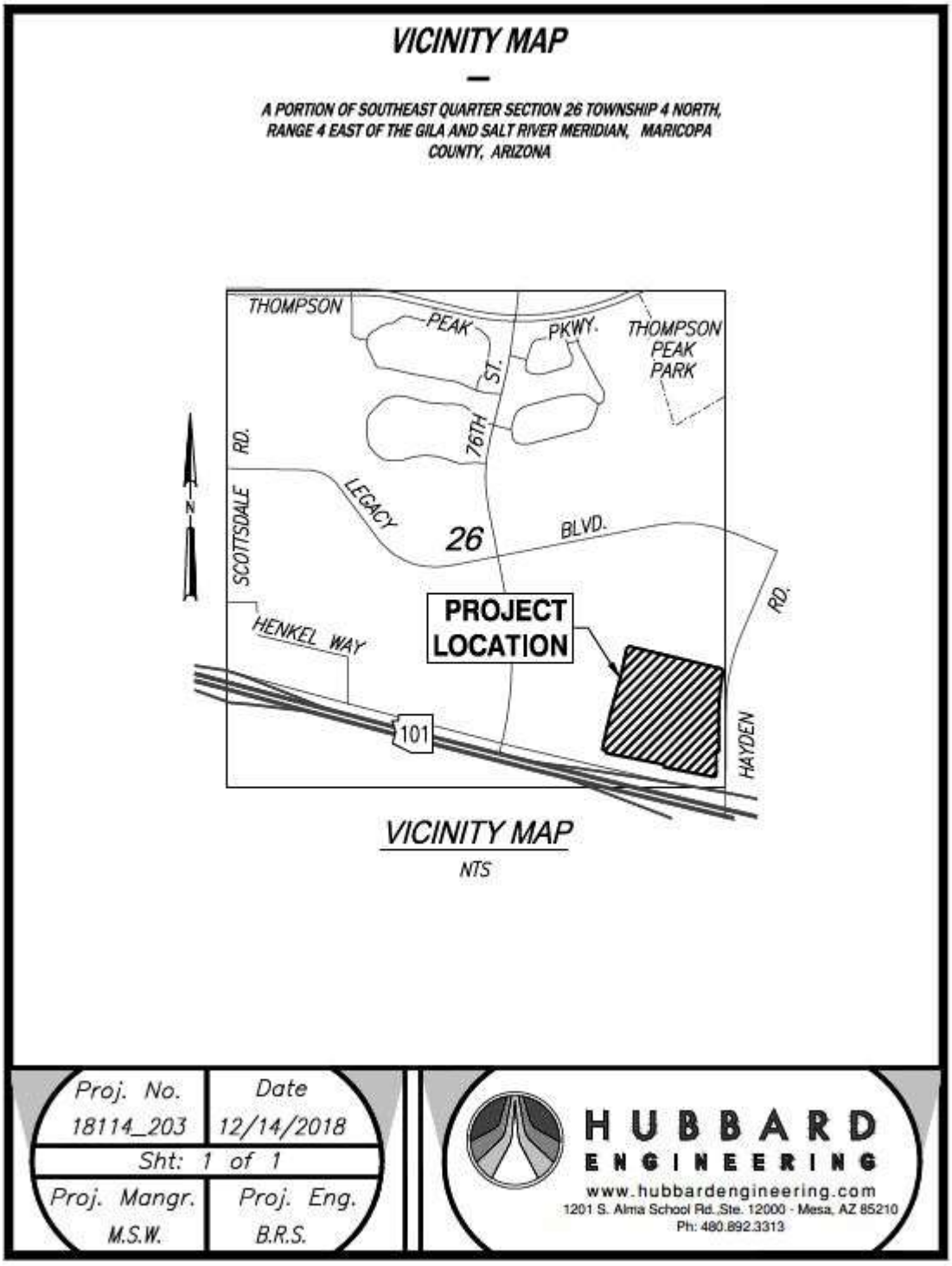
This report presents the results of a *Final Sewer Study* conducted by Hubbard Engineering at the request of Nationwide Realty Investors ("Client"), for the Phase I Retail of the Cavasson Master Development ("Site"). The purpose of this report is to provide a detailed analysis for the proposed sanitary 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 March 26, 2019.

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. Phase I of the Cavasson site development is located in the southwest corner of the overall Crossroads East development, near the Hayden Road and Loop 101 Frontage Road intersection. The land naturally falls from northeast to southwest.

The project site is bounded by the Loop 101 Freeway to the south, North Hayden Road to the east, and undeveloped land to the west and north. The site location is shown in **Figure 1.1 – Vicinity Map**. The Retail is specifically located in the northeast corner of the site.

Figure 1.1 – Vicinity Map



6-DR-2020
2/6/2020

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. The Phase 1 Retail for Cavasson will include construction of a new 14,000 sf retail building. Improvements will also include surrounding access drives, parking, and extending existing private utility stubs to service the building.

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, 2018 Edition.*
- *2015 Edition of the International Plumbing Code.*
- City of Scottsdale, *Ordinance No. 4346.*

2. PROJECT DESCRIPTION

2.1 Tie in to Existing System

As part of the Phase 1 development, a 12-inch diameter public sewer main was installed (by others) within the proposed Cavasson Boulevard right-of-way located along the north side of the Phase I site. A 12-inch diameter sewer stub has been provided off of this main to service portions of the Phase I development. The Phase 1 Retail development will connect to this sewer main line through the provided 8-inch stub to the property. 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 Phase I Retail will service the new retail building. See **Exhibit 1** for the proposed sewer layout.

2.3 Right of Way and Easements

All proposed sewer lines installed with the Phase I development will be private. These private mains will connect to the public sewer at existing stubs described in Section 2.1 of this report.

3. DESIGN FLOWS AND BASIS OF DESIGN

3.1 Average Daily Flow

In accordance with Table 2-4 of the City of Scottsdale's *2012 Water Reuse Master Plan Update*, the design unit loads for each land use type associated with the Phase I development are as follows:

Land Use Type	Zoning Category	Unit Load (gpad)
Employment	C-2	1,001
Commercial	S-S	1,173
Resorts/Tourism	R-4R	3,985

In coordination with the City of Scottsdale staff, a multiplying factor of 1.06 is applied to the Average Daily Flow to account for the development's increased allowable Floor Area Ration (FAR) of 0.85 from the City's Zoning Ordinance standard of 0.80. Determination of this multiplying factor is discussed in further detail in the approved *Cavasson Master Wastewater Report.*

Total Average Daily Flow = (1,173 gpad) x (0.8 acres) x (1.06) = 994.7 gpd = 0.69 gpm

3.2 Peak Daily Flow

In accordance with the approved *Cavasson Master Wastewater Report*, a peaking factor of 2.6 is applied to the Average Daily Flow (ADF) to determine the Peak Daily Flow (PDF). Therefore, the total peak flow is:

Total Peak Flow = (2.6) x (994.7 gpd) = 2,586 gpd =1.79 gpm = 0.004 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 8-inches in 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 994.7 gallons per day = 0.69 gpm
4. The Total Peak Flow is 2,586 gallons per day = 1.79 gpm = 0.004 cfs
5. The sewer service connection is an existing 8-inch stub

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. *2015 Edition of the International Plumbing Code*. January 1, 2015.
8. City of Scottsdale, *Ordinance No. 4346,* June 17, 2018.
9. City of Scottsdale, Ordinance No. 1147, June 17, 2018.

Appendix A
Sewer Capacity and Velocity Calculations
Cavasson - Phase I Hotel

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Oct 30 2019

Sewer Capacity At Stub

Circular

Diameter (ft)	= 0.66
Invert Elev (ft)	= 51.00
Slope (%)	= 2.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.00

Highlighted

Depth (ft)	= 0.03
Q (cfs)	= 0.004
Area (sqft)	= 0.01
Velocity (ft/s)	= 0.72
Wetted Perim (ft)	= 0.28
Crit Depth, Yc (ft)	= 0.03
Top Width (ft)	= 0.28
EGL (ft)	= 0.04

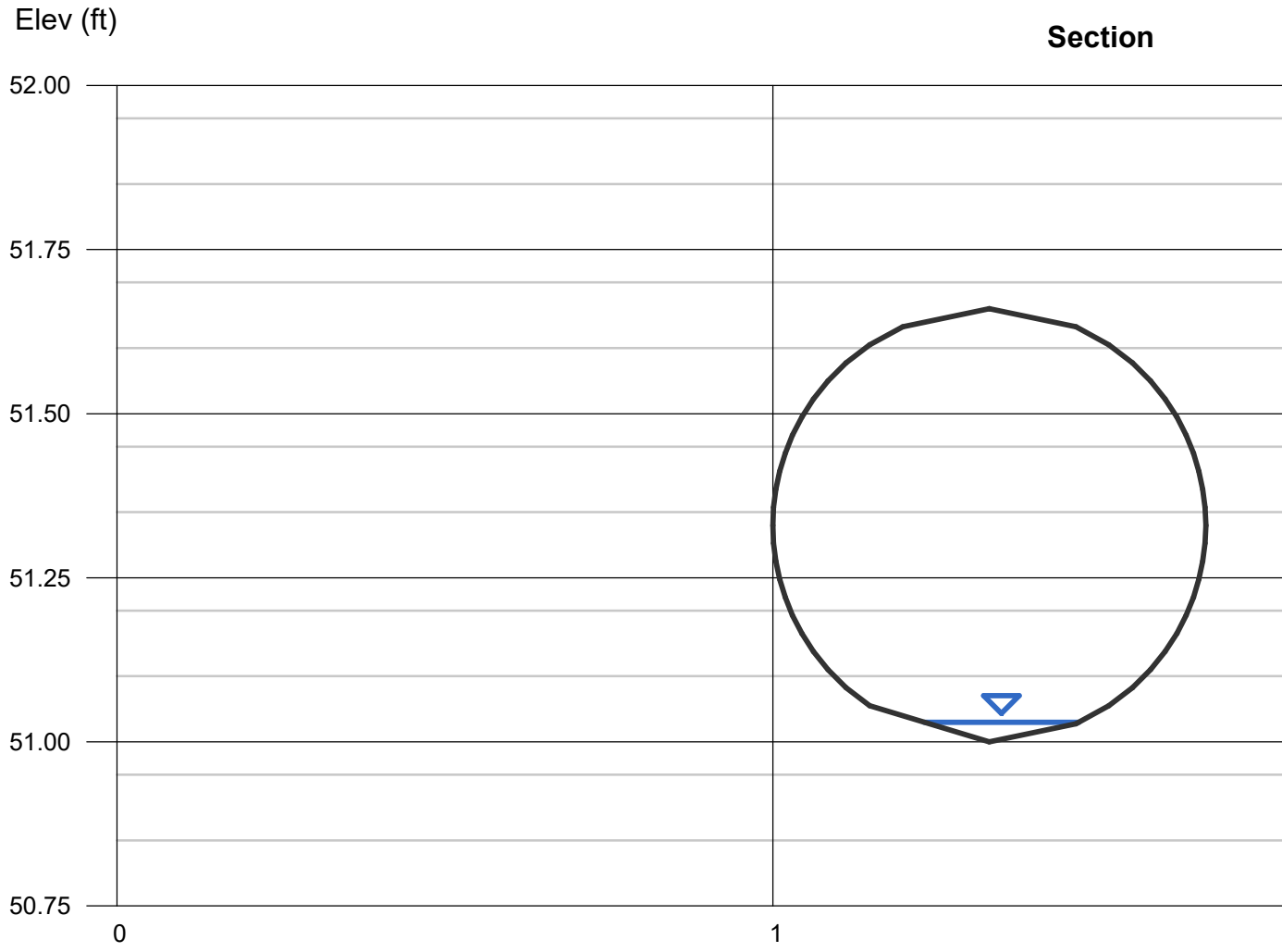


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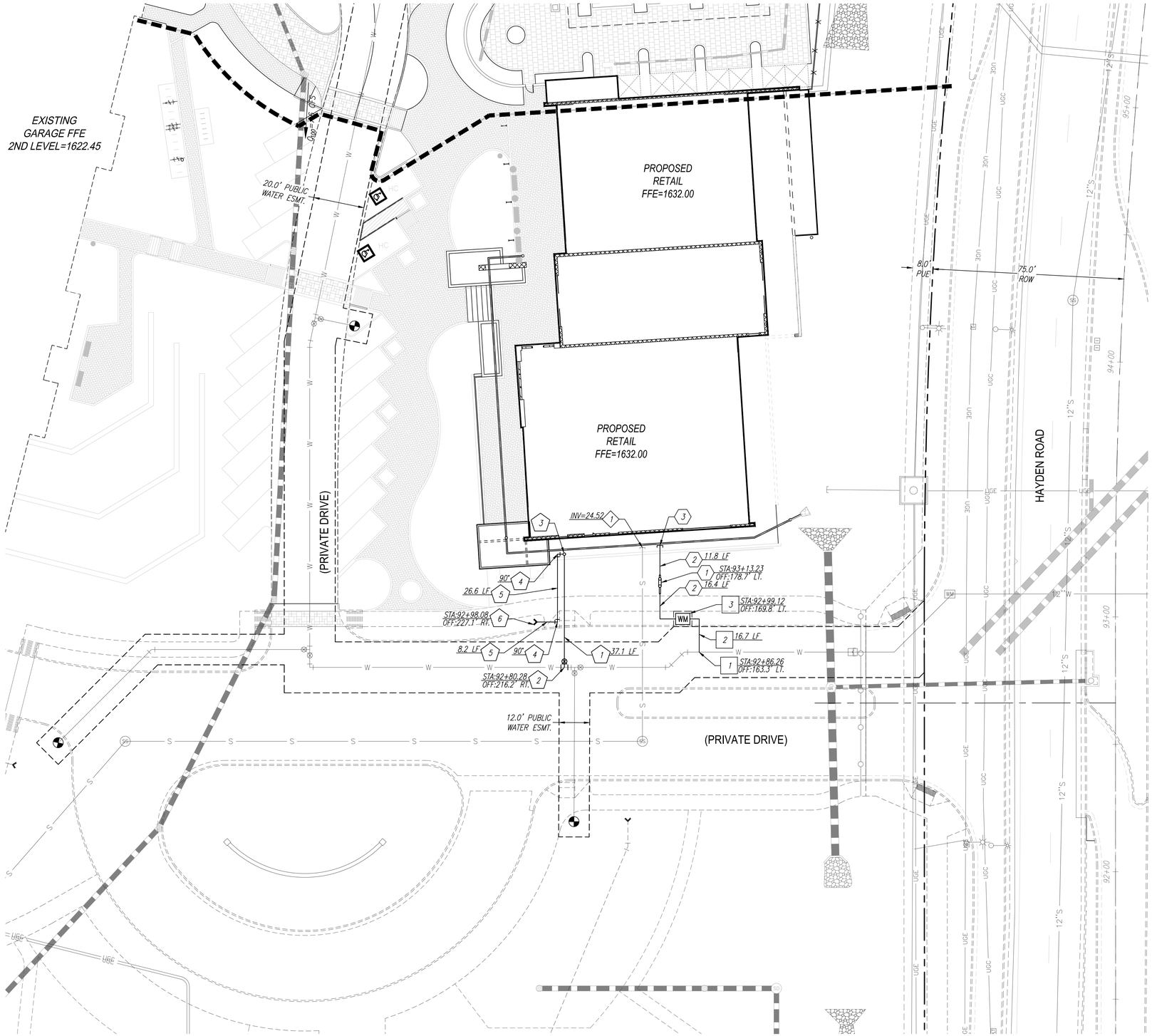
Exhibit 1
Sewer System Layout
Cavasson - Phase I Hotel



PRIVATE SANITARY SEWER NOTES:

1. REMOVE PLUG AND CONNECT TO EXISTING 8" SEWER LINE STUB. CONTRACTOR TO VERIFY DEPTH AND LOCATION OF CONNECTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES. INVERT AS NOTED

PUBLIC WATER NOTES:

1. INSTALL 2" WATER SERVICE LINE CONNECTION TO EXISTING 12" WATERLINE PER C.O.S. STD. DTL. 2330.
2. INSTALL 2"ø TYPE "K" COPPER PIPE PER M.A.G. SPEC. 754.1 LENGTH AS NOTED.
3. INSTALL 2" WATER METER PER C.O.S. STD. DTL. 2345-1

PRIVATE WATER NOTES:

1. INSTALL 2 1/2" BACKFLOW PREVENTION ASSEMBLY PER C.O.S. STD. DTL. 2354.
2. INSTALL 3"ø SCHEDULE 40 PVC PIPE. LENGTH AS NOTED.
3. STUB AND PLUG 2" WATER SERVICE LINE 5' FROM BUILDING FOR CONNECTION BY OTHERS. REFER TO PLUMBING PLANS FOR CONTINUATION.

FIRELINE NOTES:

1. INSTALL 6"ø D.I.P. CLASS 350 POLY-WRAPPED PER M.A.G. STD. SPEC. 610. MECHANICAL RESTRAINT JOINTS PER M.A.G. STD. DTL. 303-1, 303-2 WITH MIN. 3' COVER. LENGTH AS NOTED.
2. CONNECT TO EXISTING 12" WATER LINE. CONTRACTOR TO VERIFY DEPTH AND LOCATION OF CONNECTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES. INVERT AS NOTED.
3. BRING 6" FIRELINE TO FIRE RISER ROOM FOR CONNECTION TO FIRE SPRINKLER RISER PER C.O.S. STD. DTL. 2368. REFER TO PLUMBING PLANS FOR CONTINUATION.
4. INSTALL WATERLINE BEND, D.I.P. CLASS 350 POLY-WRAPPED WITH MEGALUG SERIES 1100 MECHANICAL RESTRAINT JOINT OR APPROVED EQUAL. SIZE AND ANGLE AS NOTED.
5. INSTALL 4"ø D.I.P. CLASS 350 POLY-WRAPPED PER M.A.G. STD. SPEC. 610. MECHANICAL RESTRAINT JOINTS PER M.A.G. STD. DTL. 303-1, 303-2 WITH MIN. 3' COVER. LENGTH AS NOTED.
6. INSTALL FIRE DEPARTMENT REMOTE SIAMESE CONNECTION PER C.O.S. STD. DTL. 2367.

NOTE:

ALL DRY UTILITIES UNDER SEPARATE PERMIT, SHOWN FOR REFERENCE ONLY.

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architects & planners
5017 East Washington St. #107
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Phone 602-957-1800

PRELIMINARY
NOT FOR
CONSTRUCTION

CAVASSON

RETAIL BUILDING
SCOTTSDALE, AZ

Case #:
Plan Check #:
Date: 2019.11.01
Revisions:

Project Number: 15148.300 HE#18114-503
Drawn By: K.CLARKE / G.BROWN
Title: PUBLIC AND PRIVATE UTILITY PLAN

C502
SHEET 02 OF 02
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HUBBARD ENGINEERING
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1201 S. Alma School Rd.,Ste. 12000 - Mesa, AZ 85210
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CAVASSON

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

FINAL

~~PRELIMINARY~~ WATER REPORT – PHASE I RETAIL BASIS OF DESIGN

October 31, 2019

Project No.: 18114-503

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

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BY ldillon DATE 3/24/2020

Approved on behalf and at the direction of Scott Anderson.

PREPARED FOR:

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MICHAEL S. WOLF, PE

Registered Professional Engineer (Civil) CERTIFICATE NO. 38929 MICHAEL S. WOLF Date Signed 10-31-19 ARIZONA U.S.A. Expires 03-31-2021

HUBBARD ENGINEERING

6-DR-2020
2/6/2020

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EXHIBITS

1. INTRODUCTION

1.1 Project Scope

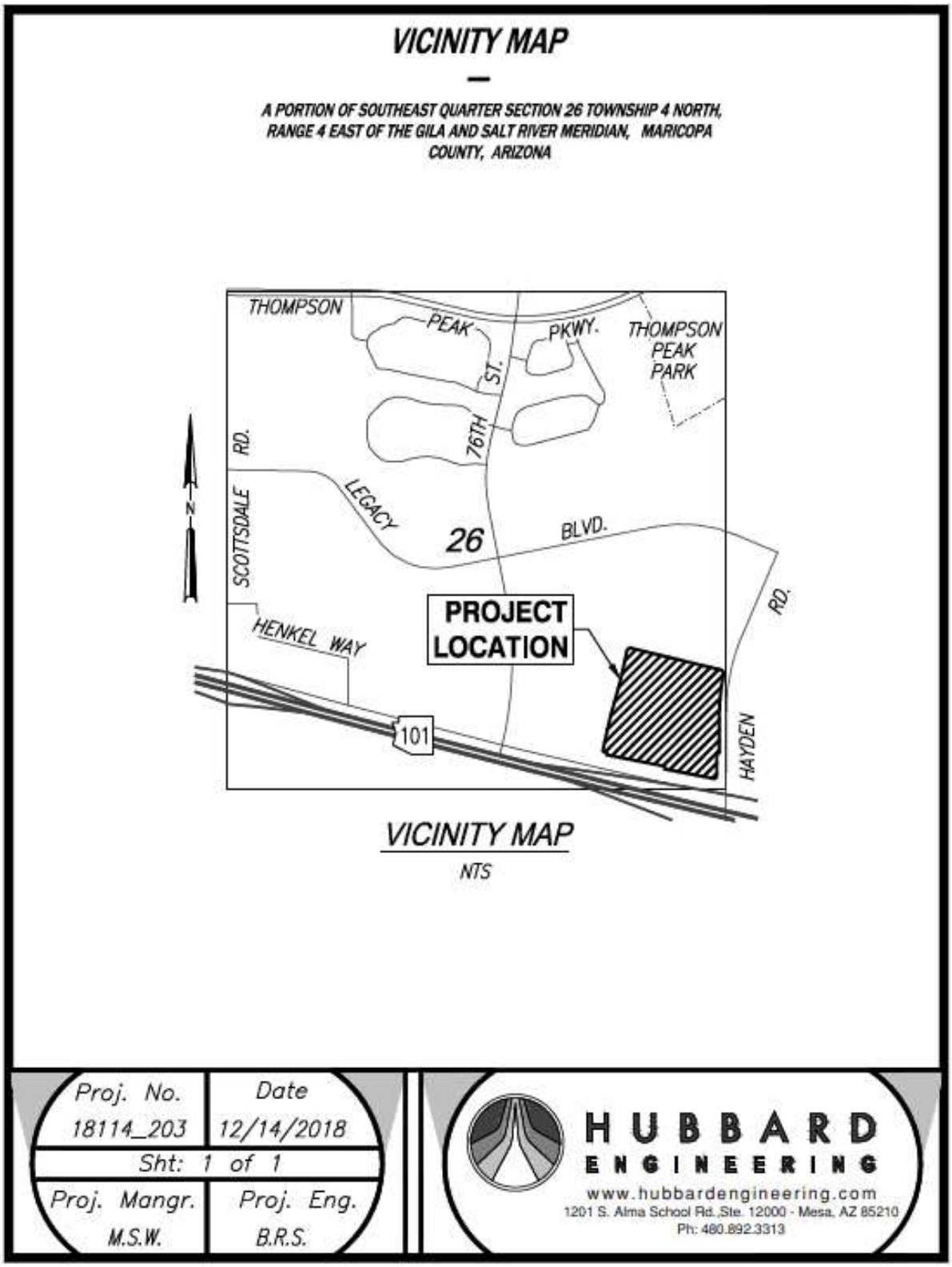
This report presents the results of a *Final Water Study* conducted by Hubbard Engineering at the request of Nationwide Realty Investors ("client"), for the Phase I Retail of the Cavasson master development ("site"). The purpose of this report is to provide an evaluation of the proposed distribution system for the site. This report addresses design flows and basis of design as well as design criteria. The water analysis of this report will adhere to Hubbard Engineering's submitted and approved *Master Water Report*.

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. Phase I of the Cavasson site development is located in the southwest corner of the overall Crossroads East development, near the Hayden Road and Loop 101 Frontage Road intersection. The land naturally falls from northeast to southwest.

The project site is bounded by the Loop 101 Freeway to the south, North Hayden Road to the east, and undeveloped land to the west and north. The site location is shown in **Figure 1.1 – Vicinity Map**. The Retail is specifically located in the northeast corner of the site.

Figure 1.1 – Vicinity Map



6-DR-2020
2/6/2020

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. The Phase 1 Retail for Cavasson will include construction of a new 14,000 sf retail building. Improvements will also include surrounding access drives, parking, and extending existing private utility stubs to service the building.

The analysis for the overall development was conducted in Hubbard's *Master Water Report* and will be referenced as it applies to Phase I.

1.4 Regulatory Requirements

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

- City of Scottsdale, *Design Standards & Policies Manual*.
- 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, 2016 Edition.*
- *2015 Edition of the International Fire Code.*
- *2015 Edition of the International Plumbing Code.*
- Hubbard Engineering*, Master Water Report for Cavasson, February 14, 2019.*

2. PROJECT DESCRIPTION

2.1 Tie-In to Existing System

The proposed water system for Phase 1 of the Cavasson Development will include connections to an existing 12" water line stub off of Hayden Road, 12" water line stub off of Claret Drive, 12" water line stub off of Cavasson Boulevard and a 12" water line stub off of the 12" public water line located within the private access drive at the south side of the Phase I site.

The proposed on-site system will tap into the existing 12" public water main that was constructed with Phase 1.

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

2.2 Service Area

The water service provider for the existing site is the City of Scottsdale. The Cavasson development is being developed by Nationwide Realty 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. The Cavasson development is located within Zone 4 and is discussed in more detail in the previously submitted *Cavasson Master Water Plan*.

The Phase I Retail will include construction of a new retail building with a square footage of approximately 14,000± square feet including a restaurant. Improvements will include surrounding access drives and utilities through the property to provide domestic water, fire, and sewer services to the proposed building. The building construction type for the retail building will be Type VB and it will be equipped with an automatic sprinkler system (NFPA13) per the 2015 International Fire Code.

2.3 Right of Way and Easements

The proposed water lines will be private and therefore will not be within an easement.

3. DESIGN FLOWS AND BASIS OF DESIGN

3.1 Average Daily Demands

In accordance with the *City of Scottsdale Design Standards & Policies Manual Chapter 6* Section 6-1.205 (Reference 1), the design unit water demand for a restaurant is 1.81 E-03 gallons per minute per square foot.

The total service area tributary to the proposed water main consists of 13,992 sf.

Thus, the total Average Daily Demand is:

(1.81E-03 gpm/sf) x (13,992 sf) = **25.33 gpm**

3.2 Maximum Daily Demand and Peak Hour Flow

In accordance with the *City of Scottsdale Design Standards & Policies Manual Chapter 6* Section 6-1.404 (Reference 1), the maximum day peaking factor and peak hour peaking factor are as follows:

3.2.1 Maximum Day Demand

Max Day Demand = ADD * 2

3.2.2 Peak Hour Demand

Peak Hour Demand = ADD * 3.5

3.3 Water and Fire Demand Calculations

A summary of the water and fire demand calculations can be found in **Table 1** below.

Table 1: Water and Fire Demand Calculation Summary

Land Use	Square Footage	ADD (gpm/sf)	ADD (gpm)	Max Day Demand (ADD x 2) (gpm)	Peak Hour Demand (ADD x 3.5) (gpm)	Fire Flow Required (gpm)	Max Day Plus Fire Flow (gpm)
Restaurant	13,922	1.81E-03	25.33	50.65	88.64	1,625	1,675.65

4. DESIGN CRITERIA

4.1 Minimum Pressure

The water distribution system shall be designed and constructed to maintain the following minimum pressures:

1. Max Day Demand plus Fire Flow – minimum of 20 psi
2. Peak Hour Demand – $\geq$ 50 psi and $\leq$ 80 psi, to achieve minimum service pressure of 40 psi.

4.2 Fire Flows

Fire flow requirements are typically determined by the local fire department. The latest version of the International Fire Code (IFC), adopted by the City of Scottsdale, will serve as guidelines. A minimum Fire Flow of 3,250 gpm for 3 hours is based on a 14,000 sq. ft. building, per City of Scottsdale Fire Code, with 50% reduction Minimum Fire Flow of 1,625 gpm will be used due to NFPA 13 sprinkler system.

4.3 Minimum Pipe Sizing

The proposed fire line to the building will be 6-inch diameter. The proposed domestic line will be 3-inch diameter.

4.4 Pipe Material

All new fire lines will be Ductile Iron Pipe.

5. SUMMARY

- Per the City of Scottsdale Water System Pressure Zone Map, the Cavasson Development is located within Pressure Zone 4.

- The planned future Average Daily Demand for development is 25.33 gpm. This conforms to the Master Study.

- The planned future Maximum Daily Demand for the development is 50.65 gpm. This conforms to the Master Study.

- The planned future Peak Hour Demand for the development is 88.64 gpm. This conforms to the Master Study.

- The required fire flow is 1,625 gpm.

6. REFERENCES

1. City of Scottsdale. *Design Standards & Policies Manual.* January 18, 2018.
2. Carollo Engineers. *2008 Scottsdale Integrated Water Resources Master Plan.* March 2008.
3. Coe & Van Loo Consultants, Inc. (CVL) *Arizona State Land Department- Crossroads East Water 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.
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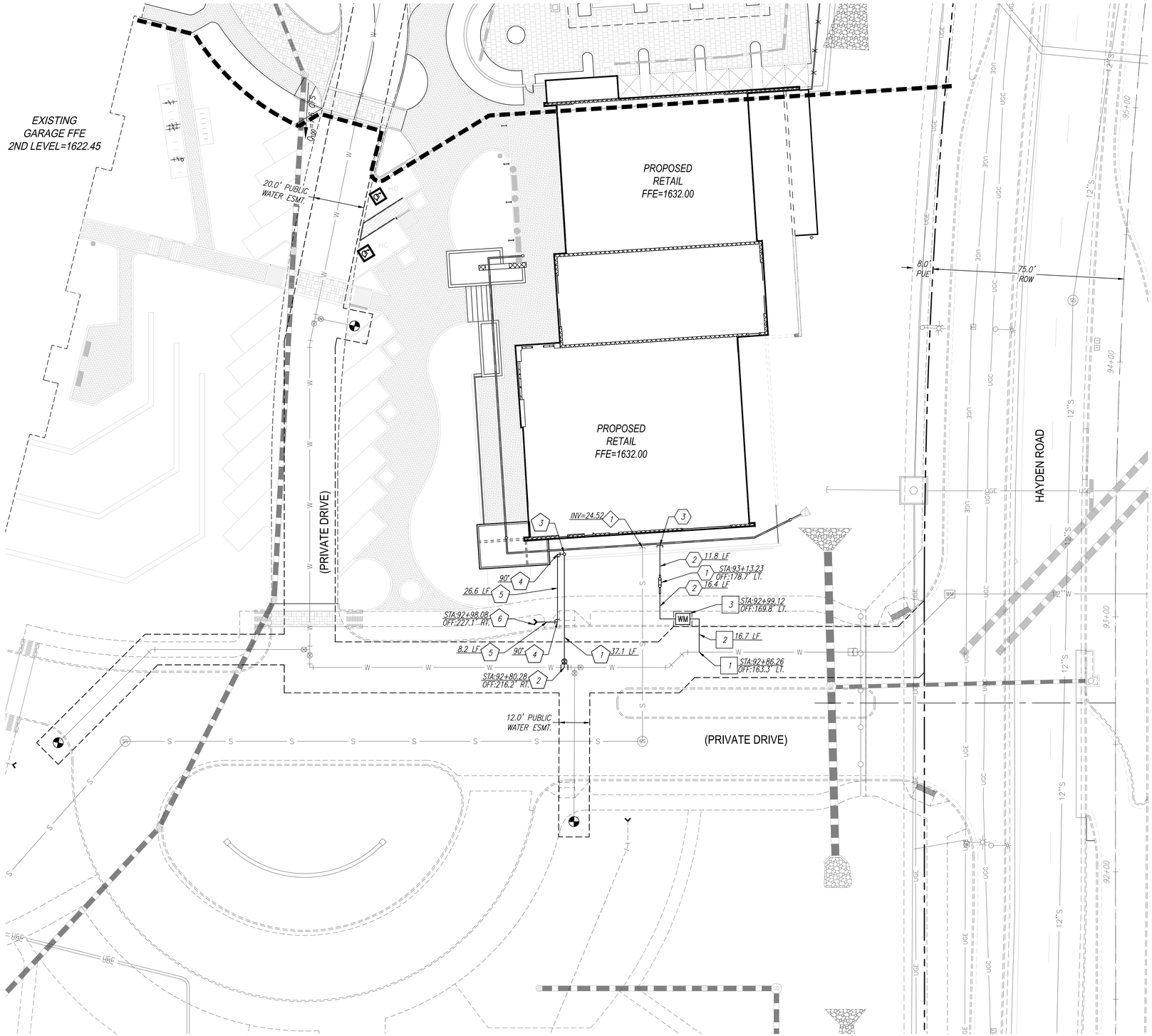
9. City of Scottsdale, *Ordinance No. 4346,* June 17, 2018.
10. City of Scottsdale, *Resolution No. 1147,* June 17, 2018.

Exhibits
Cavasson – Phase I Retail



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1. REMOVE PLUG AND CONNECT TO EXISTING 8" SEWER LINE STUB. CONTRACTOR TO VERIFY DEPTH AND LOCATION OF CONNECTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES. INVERT AS NOTED

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3. BRING 6" FIRELINE TO FIRE RISER ROOM FOR CONNECTION TO FIRE SPRINKLER RISER PER C.O.S. STD. DTL. 2368. REFER TO PLUMBING PLANS FOR CONTINUATION.
4. INSTALL WATERLINE BEND, D.I.P. CLASS 350 POLY-WRAPPED WITH MEGALUG SERIES 1100 MECHANICAL RESTRAINT JOINT OR APPROVED EQUAL. SIZE AND ANGLE AS NOTED.
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6. INSTALL FIRE DEPARTMENT REMOTE SIAMESE CONNECTION PER C.O.S. STD. DTL. 2367.

NOTE:

ALL DRY UTILITIES UNDER SEPARATE PERMIT, SHOWN FOR REFERENCE ONLY.

Butler Design Group Inc.
architects & planners
5017 East Washington St. #107
Phoenix, Arizona 85034
Phone 602-957-1800

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CONSTRUCTION

CAVASSON

RETAIL BUILDING
SCOTTSDALE, AZ

Case #:
Plan Check #:
Date: 2019.11.01
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Project Number: 15148.300 HE#18114-503
Drawn By: K.CLARKE / G.BROWN
Title: PUBLIC AND PRIVATE UTILITY PLAN

C502
SHEET 02 OF 02
6-DR-2020
2/6/2020

20 0 20 40
scale feet

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