



## Drainage Reports

PRELIMINARY DRAINAGE REPORT  
FOR  
SOUTH SCOTTSDALE

June 23<sup>rd</sup> 2020



CLOUSE ENGINEERING, INC.  
JOB NO. 190303

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## **1.0 INTRODUCTION**

### 1.1 PROJECT DESCRIPTION

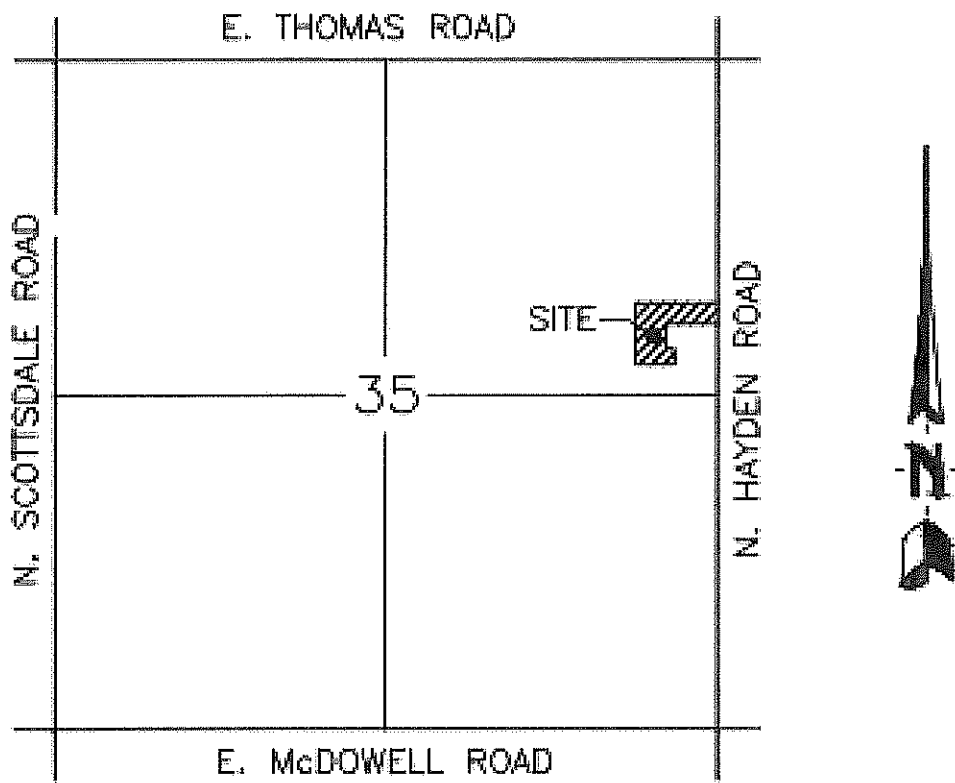
**SOUTH SCOTTSDALE** is a proposed single-family development located in south Scottsdale encompassing a total of 5.22-acres. At completion the site will consist of 26 single family home sites under the R-4 zoning category with the remainder of the property being the existing Church site.

### 1.2 PROJECT LOCATION

The subject development is located within the City of Scottsdale. The site is located on the west side of Hayden Road approximately a ½ mile south of Thomas Road. Legally, SOUTH SCOTTSDALE lies in a portion of the N.E. ¼ of Section 35, T. 2 N., R 4 E., G. & S. R. B. & M., Maricopa County, Arizona. Figure 1.1 illustrates the site's location.

### 1.3 SITE TOPOGRAPHY

The site currently is currently a parking lot and grass field apart of an existing Church site. The site slopes to the southwest at an average grade of 0.40%.



VICINITY MAP  
SECTION 35, T. 2 N., R. 4 E.

Figure 1.1 – Site Location

# National Flood Hazard Layer FIRMette



SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

**Legend**

**SPECIAL FLOOD HAZARD AREAS**

- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AP
- Regulatory Floodway

**OTHER AREAS OF FLOOD HAZARD**

- 0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

**OTHER AREAS**

- Area of Minimal Flood Hazard Zone X
- Effective LOMFRs
- Area of Undetermined Flood Hazard Zone D

**GENERAL STRUCTURES**

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

**OTHER FEATURES**

- Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

**MAP PANELS**

- Digital Data Available
- No Digital Data Available
- Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/4/2019 at 4:32:48 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL or effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



18-ZN-2019  
7/2/2020

## **2.0 DRAINAGE CONCEPTS**

### 2.1 EXISTING CONDITIONS

The project site is an existing Church property consisting of a main chapel, a church parking lot, and undeveloped field. The general drainage pattern of the site is to the south west. No existing drainage facilities are provided on the site.

### 2.2 PROPOSED CONDITIONS

The developed site will provide for 26 single family homes under the R-4 zoning category and redeveloped Church site. Streets will be public and designed to convey runoff to a designated retention basin at the southern end of the site. It is anticipated that runoff will be directed to the basin via surface improvements. Runoff will be removed from the interior streets via a scupper. The retention basin will be designed to retain the 100-year, 2-hour storm event per the City of Scottsdale D&SM Chapter 4. The retention facilities will for the subdivision and the Church property will be separate and each shall retain the 100-year storm event. The site will ultimately outfall at the southeast corner of the site. Finish floor for homes within the development will be designed to be above the 100-year storm event and a minimum of 1-foot above the ultimate outfall for the site.

### 3.0 HYDROLOGY

Peak flows are calculated using the Rational Method:

Where:

$$Q = c I A$$

Q = peak runoff (cfs)  
C = runoff coefficient – 0.86  
I = rainfall intensity (in/hr)  
A = drainage area (acres)

Runoff calculations for the development will be provided in the final drainage report for the site.



## **4.0 HYDRAULICS**

### 4.1 INTERIOR STREETS

Streets within the development are designed to carry the 10-year storm event at or below the top of curb not to exceed 6 inches. The 100-year storm event shall be conveyed within the right-of-way. Street depths and capacities will be provided in the final drainage report for the site.

### 4.2 INLET SIZING

Catch basins and storm drain lines are used to remove runoff from the streets. Inlet sizing is calculated using the Federal Highway Department's HEC-12 Circular, March 1984 with clogging factors applied as outlined in the Flood Control District's Hydraulics Manual. Inlet sizing calculations will be provided in the final drainage report for the site.

### 4.3 STORM DRAIN

Storm drain lines are sized to maintain the 10-year hydraulic grade line (HGL) a minimum of one foot below all inlet and manhole rim elevations. Detailed HGL calculations will be provided in the final drainage report for the site.

### 4.4 FINISHED FLOOR ELEVATIONS

Finished floors will be set a minimum of 14 inches above the lot outfall and 12 inches above the ultimate outfall for the site.

## 5.0 RETENTION

### 5.1 RETENTION CALCULATIONS

The required retention volume for the subject property is calculated using the following formula:

$$V_r = \frac{D}{12} A C$$

Where:  $V_r$  = required retention volume (ac-ft)  
 $D$  = 100 yr, 2 hr rainfall depth (2.2 in)  
 $A$  = contributing area (ac)  
 $C$  = respective runoff coefficient = 0.86

The overall drainage areas for the site will consist of two drainage areas, the subdivision and the Church site. The drainage area for each is defined on the enclosed Drainage Map. Each drainage area will be designed to retain the 100-year storm event for its drainage area. The subdivision will have one retention basin located in the southeast corner of the site. The Church site will have two retention basins connected via an equalizer pipe. Table 5.1 and 5.2 below detail the required and provided retention in each of the drainage areas shown on the enclosed drainage map.

Site	Area (SF)	"C"	D (in)	Volume Required (CF)
Area A	160,591	0.86	2.2	25,320
Area B	66,935	0.86	2.2	10,553
<b>Total</b>				<b>35,873</b>

**Table 5.1 – Retention Volume Required**

Area	Basin	Avg. (SF)	Depth (feet)	Volume Provided (CF)	Volume Required (CF)
A	Basin A	9,506	3.0	28,518	25,320
B	Basin B <sub>1</sub>	2,304	2.5	5,760	
	Basin B <sub>2</sub>	1,925	2.5	4,813	
	Sub-Total			10,573	10,553
<b>Total</b>				<b>37,574</b>	<b>35,873</b>

**Table 5.2 – Retention Volume Provided**



## 6.0 REFERENCES

City of Scottsdale, Design Standards & Policies Manual – Chapter 4, 2018.

Flood Control District of Maricopa County, Drainage Design Manual for Maricopa County, - Volume 1, Hydrology, 2011.

Flood Control District of Maricopa County, Drainage Design Manual for Maricopa County, - Volume 2, Hydraulics, 2013.

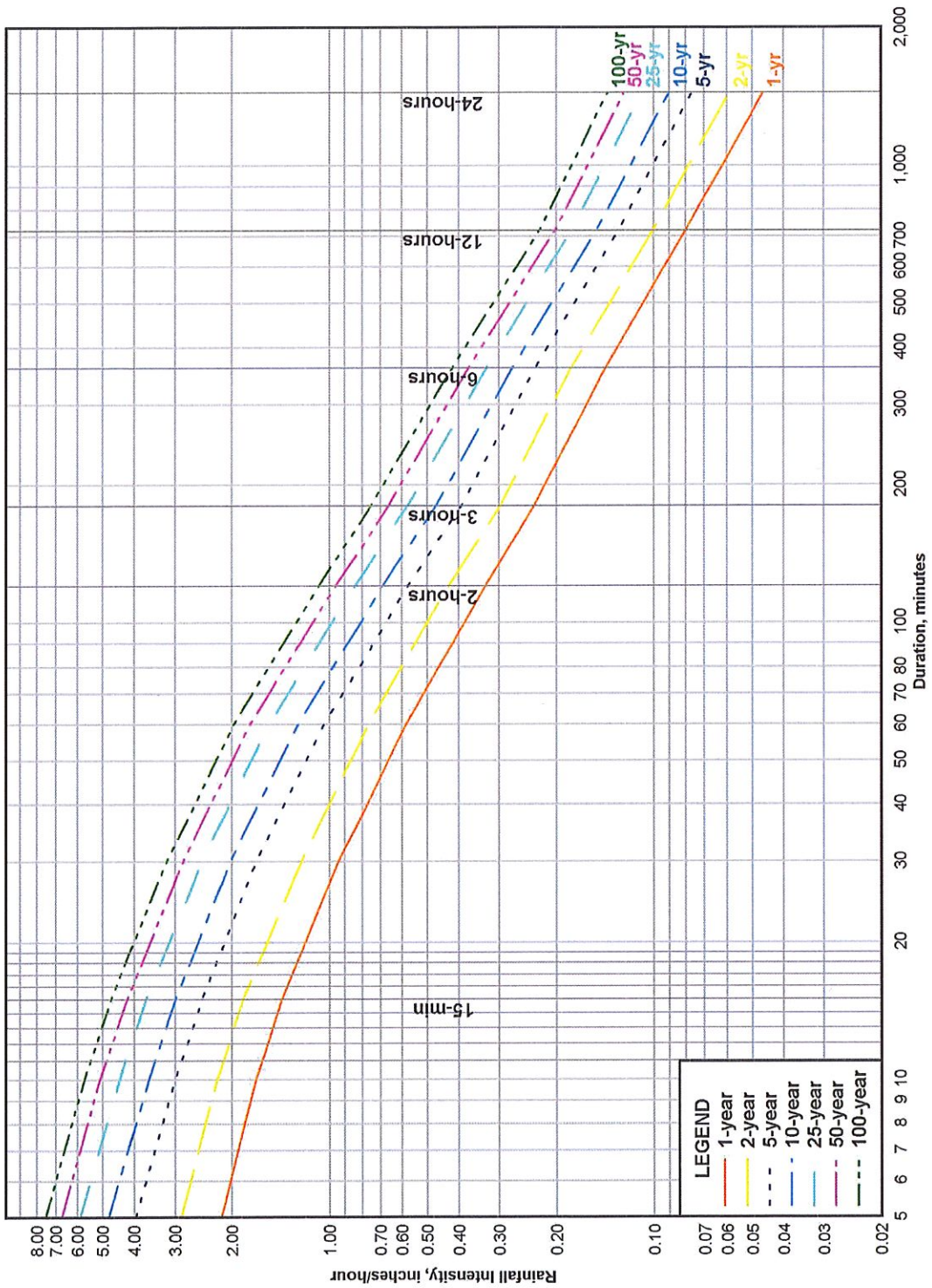
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***APPENDIX***

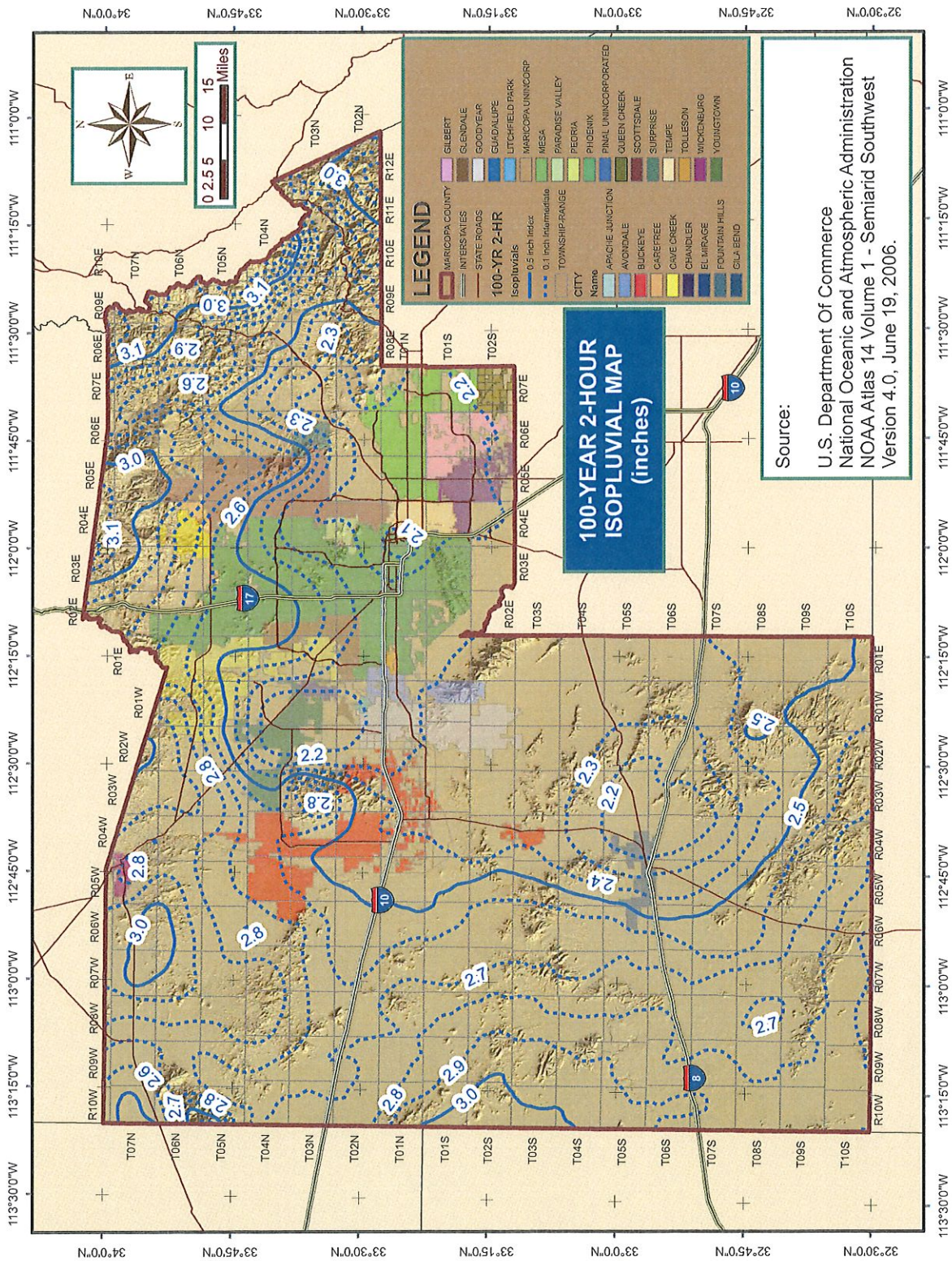
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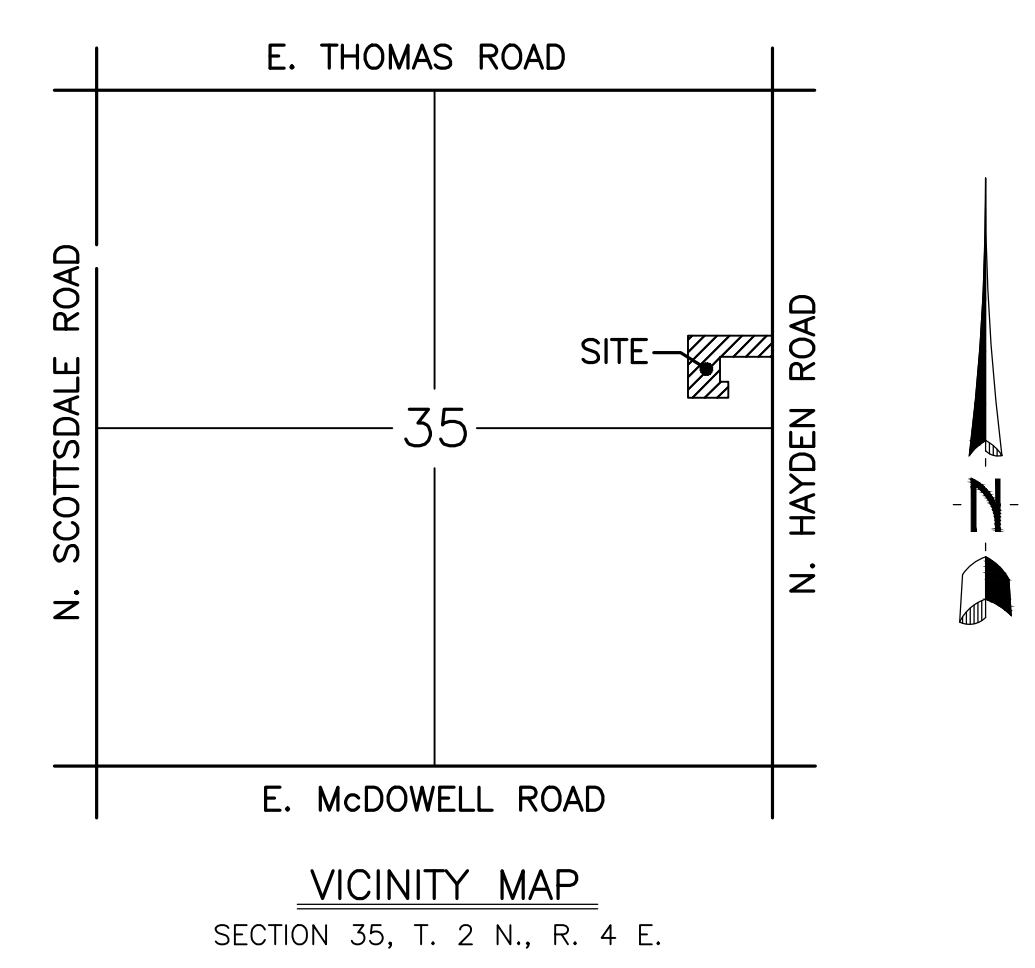
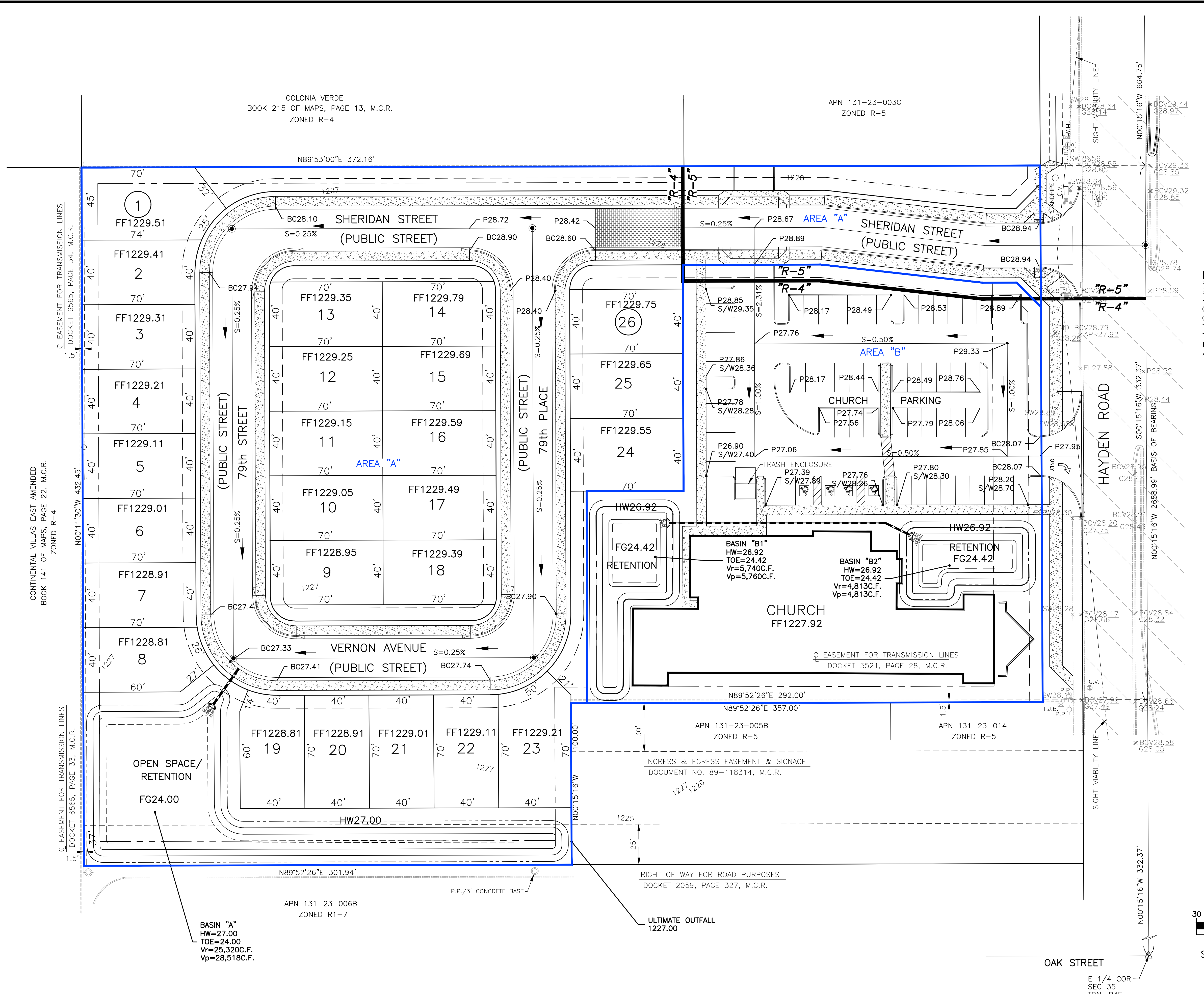
7/2/2020

**Figure B.2**  
**NOAA ATLAS 14 I-D-F CURVES AT PHOENIX-SKY HARBOR**



**FIGURE A.56**  
**100-YEAR 2-HOUR RAINFALL ISOPLUVIALS**



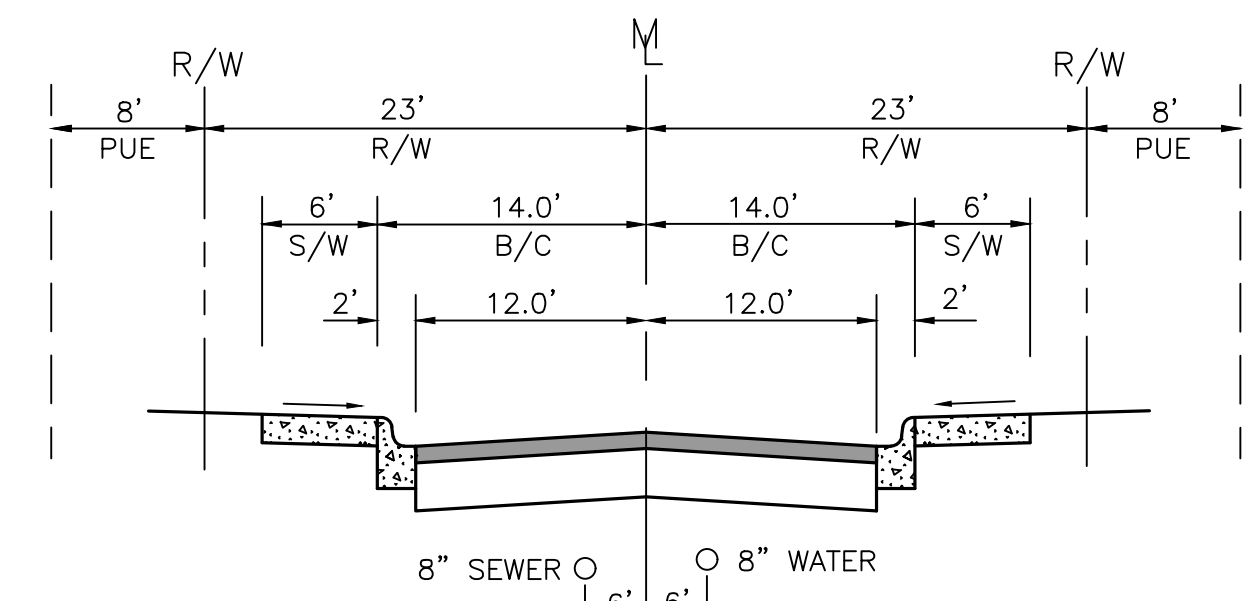


**RESIDENTIAL SITE SUMMARY**

EXISTING ZONING: R-5 & R1-7  
 PROPOSED ZONING: R-4  
 GROSS ACRES: 3.89 ACRES  
 OPEN SPACE: 0.61 ACRES (15.7%)  
 TOTAL NUMBER OF LOTS: 27  
 TYPICAL LOT SIZE: 40' X 70'  
 DENSITY: 6.94 LOTS/ACRE  
 ASSESSOR PARCEL NO: 131-23-005A & A  
 PORTION OF 131-23-008

**BENCHMARK**

CITY OF SCOTTSDALE BRASS CAP IN HANDHOLE  
 AT THE INTERSECTION OF HAYDEN ROAD AND  
 OAK STREET. NAVD 88 DATUM, ELEVATION  
 1226.907



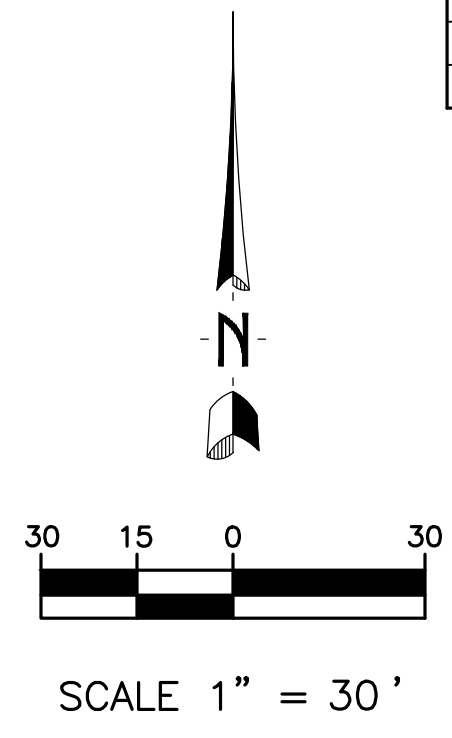
TYPICAL INTERIOR STREET

**RETENTION CALCULATIONS**

RETENTION VOLUME REQUIRED = A X C X (2.2/12)

RETENTION VOLUME REQUIRED			
SUB-BASIN	AREA (SF)	RUNOFF COEFF.	VOLUME REQUIRED (CF)
A	160,591	0.86	25,320
B	66,935	0.86	10,553
<b>TOTAL</b>	<b>227,526</b>		<b>35,873</b>

RETENTION VOLUME PROVIDED			
BASIN	AVG. AREA (SF)	DEPTH/LENGTH (FT)	VOLUME PROVIDED (CF)
A	9,506	3.0	28,518
B1	2,304	2.5	5,760
B2	1,925	2.5	4,813
<b>TOTAL</b>			<b>39,091</b>

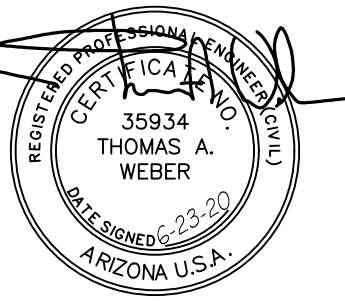


ENGINEER'S CERTIFICATION: THE LOWEST FLOOR ELEVATIONS AND/OR FLOOR FINISHING ELEVATIONS ON THIS PLAN, ARE SUFFICIENTLY HIGH TO PROVIDE PROTECTION FROM FLOODING CAUSED BY A ONE-HUNDRED YEAR STORM, AND ARE IN ACCORDANCE WITH CITY OF SCOTTSDALE, FLOODWAYS & FLOODPLAIN ORDINANCE (CHAPTER 37, S.R.C.).

COMMUNITY NUMBER	PANEL NUMBER	SUFFIX	DATE OF FIRM	FIRM ZONE	BASE FLOOD ELEVATION (IN AO ZONE, USE DEPTH)
045012	2235	L	10-16-13	X	N/A

**Clouse Engineering, Inc.**  
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**PRELIMINARY DRAINAGE MAP**  
**SOUTH SCOTTSDALE**  
 2340 N. HAYDEN ROAD



Revised 6-23-20

Date 11-4-19  
 As-Built  
 Job No. 190303