PRELIMINARY DRAINAGE REPORT

FOR

CORE CENTER - SBC

SCOTTSDALE, ARIZONA

Prepared for:

GOLD STANDARD PROPERTY, LLC 14500 N. Northsight Boulevard, Suite 204 Scottsdale, AZ 85260

Prepared by:



1955 S. Val Vista Drive, Suite 121 Mesa, AZ 85204 480-553-9433

Plan #	
Case # <u>1-DR-2023</u>	
Q-S #	
X Accepted	
Corrections	
M.R.	09/11/2023
Reviewed By	Date



January 9, 2023 Revised May 26, 2023 Revised August 7, 2023 Job # 1986

PRELIMINARY DRAINAGE REPORT

FOR

CORE CENTER - SBC

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1.0 INTRODUCTION

Core Center SBC is a proposed commercial development including a bar, gallery, recording studio, office and retail facilities. The site and parent property were formerly a commercially-zoned car dealership (Sun Pontiac) but is currently vacant. In 2014 the Scottsdale City Council approved a General Plan amendment and rezoning to allow non-commercial redevelopment of the property consisting of apartments and a church. The Core apartments were subsequently built but Impact Church decided not to pursue its relocation and sold the property. The property was subsequently rezoned and is now being developed as a commercial use.

The site is located southeast of Hayden Road and to the southwest of Northsight Boulevard in Section 1, Township 3 North, Range 4 East. The site is bounded by Hayden Road to the northwest, commercial development (Home Depot) to the east and undeveloped Lot 1A to the south and west. The site has been rough-graded and has minimal vegetation. It slopes generally from northeast to southwest.

The purpose of this report is to present a drainage design that is in compliance with the City of Scottsdale's Design Standards and Policies Manual (DS&PM), and is compatible with the existing development in the area.

2.0 FLOODPLAIN DESIGNATION

The site is currently located within FEMA Flood Zone "X" as shown on the FEMA Flood Insurance Rate Map 04013C1305L dated October 16, 2013 (see Figure 1).

Flood Zone "X" is defined as:

"Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood."

3.0 EXISTING CONDITIONS

Offsite flows entering the site from the north (Hayden Road) are conveyed by storm drain across the northwest corner of the subject parcel. The pipes and drainage structure are encompassed by a public drainage easement. This flow is ultimately conveyed in the storm drain to the southwest through Lot 1A and discharged into an existing channel located on the Costco property directly west of the site. This channel conveys these offsite flows to the south. No other offsite flows affect the site.

Temporary retention basins were constructed on the site as part of the development of the Core Apartments. These basins drain by percolation. Retention for the Core Apartments is accomplished with underground retention tanks located along the south and east side of the buildings. These tanks are drained with a storm water pump which outlets into the existing drainage channel running along the west side of the property. The pump station is located on the southwest corner of the Core Apartments site (see Figure 3).

4.0 PROPOSED DRAINAGE PLAN

Offsite Flows

The proposed development will maintain the existing storm drain pipes along the property frontage which convey offsite flows through the property.

Onsite Flows

Onsite stormwater runoff will be collected and conveyed to a proposed underground retention chamber system as shown in the *Preliminary Grading & Drainage Plan*. Calculations and sizing for underground storm drain pipes and appurtenances will be provided with the final design.

Stormwater Storage

Stormwater storage will be provided on-site for the 100-year, 2-hour volume in accordance with the City of Scottsdale DS&PM. The required volume will be stored by a combination of surface retention basin and underground retention chamber system (StormTech). The retention system will be drained within 36-hours of the runoff event by a combination of direct percolation and drywell as shown in the *Preliminary Grading & Drainage Plan*. Stormwater storage calculations can be found in Appendix B. The proposed underground retention system will be encompassed by a Drainage and Flood Control (DFC) easement to be dedicated at the time of final design.

Lowest Floor Elevation

Lowest floor elevations and/or flood proofing elevation(s) will be sufficiently high to provide protection from flooding caused by a 100-year storm, and are in accordance with Scottsdale's revised code, chapter 37 – Floodplain & Stormwater Regulation.

5.0 CONCLUSIONS

- The project is located within FEMA Flood Zone "X".
- The site does not have any Army Corp. of Engineers jurisdictional areas requiring a 404 Permit.
- This project will comply with the National Pollutant Discharge Elimination System (NPDES) program. A Notice of Intent (NOI) will be submitted to ADEQ and an Authorization to Discharge (ATD) letter will be obtained prior to construction. The total area of disturbance is approximately 6.6 acres.
- Stormwater storage facilities shall be maintained so as to not cause or contribute to the creation of a public nuisance. At a minimum, maintenance shall include the removal of all debris and sediment from stormwater storage facilities immediately following a storm event.
- All stormwater storage facilities will be designed to drain within 36-hours of the rainfall event.
- All off-site flows will enter and exit the site as per historical conditions with no adverse effects to adjacent properties.

- Lowest floor elevations and/or flood proofing elevation(s) are sufficiently high to provide protection from flooding caused by a 100-year storm, and are in accordance with Scottsdale's revised code, chapter 37 Floodplain & Stormwater Regulation.
- This project will not adversely impact drainage conditions on adjacent properties.





PRELIMINARY GRADING & DRAINAGE PLAN

SITE INFORMATION

APN: ADDRESS:

EXISTING ZONING:

NET ACREAGE:

215-52-107 15465 N. HAYDEN ROAD SCOTTSDALE, AZ 85260 PCP/AMU 1.037 ACRES

BENCHMARK

ALUMINUM CAP FLUSH AT THE NORTHEAST CORNER OF SECTION 12, T3N, R4E. MCDOT UNIQUE ID 4926

ELEVATION = 1492.91 (NAVD 88 DATUM)

AND CONTOURS SHOWN IN THIS PLAN.

NOTE: ADD 1400 FEET TO ALL SPOT ELEVATION

CONSTRUCTION NOTES:

- 1. INSTALL ASPHALT CONCRETE PAVEMENT PER SOILS REPORT.
- 2. CONSTRUCT 6" VERTICAL CURB & GUTTER PER M.A.G. STD. DET. 220 TYPE 'A'.
- 3. CONSTRUCT 6" SINGLE CURB PER M.A.G. STD. DTL. 222.
- 4. CONSTRUCT CONCRETE VALLEY GUTTER PER M.A.G. STD. DTL. 240.
- 5. CONSTRUCT EXTRUDED CURB.
- 6. REMOVE EXISTING 6' WIDE SIDEWALK AND CONSTRUCT NEW 8' WIDE CONCRETE SIDEWALK PER M.A.G. STD. DTL. 230 AND C.O.S. SPEC. 340 (WIDTH PER PLAN). SEE ARCHITECTURAL PLANS FOR FINISH AND COLOR.
- CONSTRUCT SIDEWALK RAMP.
 SAWCUT AND REMOVE 2' MIN. OF AC PAVEMENT. REPLACE AC PAVEMENT IN KIND.
- 9. CONSTRUCT CMU SCREEN WALL. SEE ARCHITECTURAL PLANS FOR DETAILS.
- 10. CONSTRUCT TRASH ENCLOSURE. SEE ARCHITECTURAL PLANS FOR DETAILS.
- 11. INSTALL RIP-RAP EROSION PROTECTION. RIP-RAP TO BE D50=6" (12" THICK) WITH FILTER FABRIC UNDERLAYMENT. RIP-RAP TO BE INDIGENOUS NATIVE STONE.
- 12. CONSTRUCT OPEN FACED BLOCK WALL OPENINGS AT GRADE FOR DRAINAGE (10' O.C.). REFER TO STRUCTURAL DETAILS 101 AND 102 SHEET S001 AND LANDSCAPE PLAN SHEET 8 FOR WALL DETAILS.
- 13. CONSTRUCT CURB OPENING WITH RIPRAP SPILLWAY.
- 14. CONSTRUCT THICKENED ASPHALT EDGE PER M.A.G. STD. DTL. 201, TYPE 'A'.

STORM DRAIN NOTES:

- 1. INSTALL 10 CHAMBER MC-7200 STORMTECH STORMWATER RETENTION SYSTEM PER MANUFACTURER'S SPECIFICATIONS.
- 2. INSTALL MAXWELL IV DRYWELL PER MANUFACTURER'S RECOMMENDATIONS. DURING CONSTRUCTION, ONCE THE EXCAVATION HAS BEEN COMPLETED FOR THE STORMTECH SYSTEM, THE DEVELOPER WILL HAVE THE OPTION TO DELETE THE DRYWELL SHOWN IN THIS PLAN BY PERFORMING PERCOLATION TESTS AND PROVIDING A CERTIFIED SOILS REPORT WITH ACTUAL SURFACE STABILIZED PERMEABILITY RATES. CALCULATIONS MUST BE PROVIDED DEMONSTRATING THE 36-HOUR MAXIMUM DRY-UP TIME. THE CERTIFIED SOILS REPORT AND REVISED DRY-UP CALCULATIONS SHALL BE SUBMITTED DIRECTLY TO THE ASSIGNED FIELD INSPECTOR FOR REVIEW AND APPROVAL.
- CONSTRUCT CONCRETE CATCH BASIN PER M.A.G. STD. DTL. 535 TYPE 'F'.
 INSTALL MAXWELL PLUS DRYWELL (DUAL-CHAMBER) PER MANUFACTURER'S RECOMMENDATIONS.
- 5. INSTALL HDPE (ADS N-12, OR APPROVED EQUAL) STORM DRAIN PIPE. SIZE PER FINAL DESIGN.
- 6. INSTALL 30" NYLOPLAST DRAIN BASIN AND 24" ADS N-12 DRAIN PIPE CONNECTION TO STORMTECH SYSTEM AS SHOWN. INSTALL TRAFFIC LOADING (H20) FRAME AND GRATE WITH CONCRETE COLLAR PER M.A.G. DTL. 422.
- 7. INSTALL 18" NYLOPLAST DRAIN BASIN (OR APPROVED EQUAL) WITH CAST IRON GRATE ASSEMBLY PER MANUFACTURERS RECOMMENDATION.
- 8. CONSTRUCT 'U' TYPE HEADWALL PER M.A.G. STD. DTL. 501.

DRYWELL NOTE:

DURING CONSTRUCTION, ONCE THE EXCAVATION HAS BEEN COMPLETED FOR THE STORMTECH SYSTEM, THE DEVELOPER WILL HAVE THE OPTION TO DELETE THE DRYWELL SHOWN IN THIS PLAN BY PERFORMING PERCOLATION TESTS AND PROVIDING A CERTIFIED SOILS REPORT WITH ACTUAL SURFACE STABILIZED PERMEABILITY RATES. CALCULATIONS MUST BE PROVIDED DEMONSTRATING THE 36-HOUR MAXIMUM DRY-UP TIME. THE CERTIFIED PERCOLATION TEST AND REVISED DRY-UP CALCULATIONS SHALL BE SUBMITTED DIRECTLY TO THE ASSIGNED FIELD INSPECTOR FOR REVIEW AND APPROVAL.

EASEMENT DEDICATIONS NOTE:

EASEMENT DEDICATIONS, VIA MAP OF DEDICATION (MOD), WILL BE REQUIRED FOR ANY PUBLIC INFRASTRUCTURE RUNNING THROUGH PRIVATE PARCELS. EASEMENTS IN CONFLICT WITH PROPOSED DEVELOPMENT WILL BE ABANDONED VIA MAP OF RELEASE (MOR). THE MOD AND MOR WILL BE COMPLETED WITH FINAL DESIGN AND PRIOR TO ANY PERMIT ISSUANCE.

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	CONSULTING	1955 S. V Mesa, A Ph: (48C Iandcore	Val Vista Di 2 85204 1) 223-8573 consulting.c	rive, Suite 121 com
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NO	DESCRIPTION OF REVISIONS			DATE

PRELIMINARY GRADING & DRAINAGE PLAN

1968

DATE:

8/7/23

JOB NO.:

APPENDIX B

STORMWATER STORAGE CALCULATIONS

CORE CENTER SBC STORMWATER STORAGE CALCULATIONS

STORAGE VOLUME REQUIRED:

				Vr	Vp
		Area (S.F.)	Area (AC.)	Volume (C.F.)	Volume (C.F.)
DA1		15,701	0.36	2,543	3,033
DA2		29,914	0.69	4,845	5,346
	_	45,615		7,388	8,379
	Cw =	0.86			
	P =	2.26 in	ches (NOAA 14)		
	Vr =	(P/12) x A	A x C =		
	Vr =	7,388 C	.F. =	0.17	AC-FT

STORAGE VOLUME PROVIDED:

Retention Basin:

	Contour Elev.	Top Area (SF)	Area (SF)	Depth (FT)	Incremental Volume (CF)	Cumulative Volume (CF)
Retention Basin (DA1)	88-89	1,437	429	1.00	933	933
	89-90	2,763	1,437	1.00	2,100	3,033
	90-90.66	3,625	2,763	0.66	2,108	5,141

Underground Retention:

Drainage	MC7200 Volume		Volume Provided	No. Drywells
Area ID	per chamber	# chambers	Vp (C.F.)	Required*
DA1	267.3	0	0	0
DA2	267.3	20	5,346	1

DRAIN TIME CALCULATIONS:

	Voume to be Drained (C.F.)	Drywell Discharge Rate (CFS)	Drain Time (hours)
DA1	5,346	0.1	15
DA2	5,141	0.1	14

NOAA Atlas 14, Volume 1, Version 5 Location name: Scottsdale, Arizona, USA* Latitude: 33.6257°, Longitude: -111.8978° Elevation: 1489 ft**

* source: ESRI Maps ** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF tabular | PF graphical | Maps & aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
Duration	1	2	5	10	25	50	100	200	500	1000
5-min	0.193	0.252	0.339	0.407	0.498	0.567	0.639	0.710	0.807	0.881
	(0.160-0.236)	(0.211-0.308)	(0.281-0.414)	(0.336-0.494)	(0.404-0.603)	(0.455-0.681)	(0.504-0.767)	(0.551-0.850)	(0.610-0.968)	(0.653-1.06)
10-min	0.293	0.383	0.516	0.619	0.757	0.863	0.973	1.08	1.23	1.34
	(0.243-0.359)	(0.321-0.469)	(0.428-0.629)	(0.511-0.753)	(0.615-0.917)	(0.693-1.04)	(0.767-1.17)	(0.838-1.29)	(0.929-1.47)	(0.993-1.61)
15-min	0.364	0.475	0.640	0.768	0.939	1.07	1.21	1.34	1.52	1.66
	(0.302-0.445)	(0.398-0.581)	(0.530-0.780)	(0.634-0.933)	(0.763-1.14)	(0.859-1.29)	(0.951-1.45)	(1.04-1.60)	(1.15-1.83)	(1.23-1.99)
30-min	0.490	0.640	0.862	1.03	1.26	1.44	1.62	1.80	2.05	2.24
	(0.407-0.599)	(0.536-0.782)	(0.714-1.05)	(0.853-1.26)	(1.03-1.53)	(1.16-1.73)	(1.28-1.95)	(1.40-2.16)	(1.55-2.46)	(1.66-2.69)
60-min	0.606	0.792	1.07	1.28	1.56	1.78	2.01	2.23	2.54	2.77
	(0.503-0.741)	(0.663-0.968)	(0.884-1.30)	(1.06-1.56)	(1.27-1.90)	(1.43-2.14)	(1.58-2.41)	(1.73-2.67)	(1.92-3.04)	(2.05-3.32)
2-hr	0.709	0.917	1.22	1.45	1.77	2.01	2.26	2.50	2.84	3.10
	(0.597-0.847)	(0.776-1.10)	(1.02-1.45)	(1.21-1.72)	(1.46-2.09)	(1.63-2.37)	(1.80-2.65)	(1.97-2.94)	(2.18-3.34)	(2.33-3.66)
3-hr	0.788	1.01	1.32	1.56	1.90	2.18	2.46	2.76	3.16	3.49
	(0.664-0.965)	(0.853-1.24)	(1.11-1.61)	(1.30-1.90)	(1.56-2.30)	(1.76-2.61)	(1.95-2.95)	(2.15-3.30)	(2.39-3.78)	(2.58-4.17)
6-hr	0.950 (0.816-1.13)	1.20 (1.03-1.43)	1.53 (1.30-1.81)	1.79 (1.51-2.11)	2.15 (1.79-2.52)	2.43 (2.00-2.84)	2.72 (2.20-3.17)	3.02 (2.40-3.53)	3.42 (2.65-3.99)	3.74 (2.83-4.37)
12-hr	1.06	1.34	1.69	1.97	2.34	2.62	2.92	3.21	3.61	3.92
	(0.916-1.26)	(1.15-1.58)	(1.45-1.99)	(1.67-2.30)	(1.96-2.73)	(2.18-3.06)	(2.39-3.39)	(2.60-3.74)	(2.85-4.22)	(3.03-4.61)
24-hr	1.24	1.58	2.03	2.39	2.90	3.30	3.72	4.15	4.76	5.23
	(1.09-1.44)	(1.38-1.83)	(1.78-2.35)	(2.08-2.77)	(2.50-3.34)	(2.82-3.80)	(3.15-4.28)	(3.48-4.78)	(3.91-5.48)	(4.25-6.06)
2-day	1.34	1.70	2.23	2.64	3.22	3.68	4.16	4.66	5.36	5.92
	(1.16-1.54)	(1.48-1.97)	(1.93-2.57)	(2.28-3.04)	(2.76-3.71)	(3.12-4.23)	(3.50-4.80)	(3.89-5.39)	(4.40-6.21)	(4.78-6.88)
3-day	1.44	1.84	2.42	2.88	3.54	4.07	4.63	5.22	6.05	6.73
	(1.26-1.65)	(1.61-2.11)	(2.11-2.77)	(2.51-3.30)	(3.06-4.05)	(3.49-4.65)	(3.94-5.30)	(4.40-6.00)	(5.02-6.97)	(5.51-7.78)
4-day	1.54	1.97	2.61	3.12	3.86	4.46	5.10	5.78	6.75	7.54
	(1.36-1.76)	(1.74-2.25)	(2.29-2.97)	(2.74-3.55)	(3.36-4.39)	(3.86-5.07)	(4.38-5.80)	(4.91-6.61)	(5.65-7.73)	(6.24-8.68)
7-day	1.74 (1.52-1.99)	2.22 (1.95-2.54)	2.94 (2.58-3.37)	3.53 (3.08-4.04)	4.37 (3.79-4.99)	5.05 (4.35-5.76)	5.78 (4.93-6.61)	6.55 (5.54-7.52)	7.66 (6.38-8.82)	8.56 (7.04-9.90)
10-day	1.88 (1.66-2.15)	2.41 (2.12-2.76)	3.19 (2.80-3.64)	3.82 (3.34-4.35)	4.71 (4.09-5.36)	5.44 (4.69-6.17)	6.20 (5.31-7.06)	7.02 (5.95-8.01)	8.16 (6.82-9.35)	9.10 (7.51-10.5)
20-day	2.33 (2.06-2.66)	3.00 (2.65-3.41)	3.97 (3.49-4.51)	4.71 (4.13-5.34)	5.70 (4.99-6.47)	6.48 (5.64-7.35)	7.27 (6.29-8.28)	8.08 (6.95-9.23)	9.19 (7.81-10.5)	10.0 (8.46-11.6)
30-day	2.74 (2.41-3.11)	3.52 (3.11-4.00)	4.65 (4.09-5.27)	5.51 (4.84-6.24)	6.68 (5.83-7.56)	7.58 (6.58-8.57)	8.50 (7.35-9.62)	9.45 (8.11-10.7)	10.7 (9.13-12.2)	11.7 (9.88-13.4)
45-day	3.18 (2.82-3.61)	4.11 (3.64-4.65)	5.42 (4.80-6.13)	6.40 (5.64-7.24)	7.70 (6.76-8.71)	8.70 (7.60-9.84)	9.70 (8.43-11.0)	10.7 (9.26-12.2)	12.1 (10.3-13.8)	13.1 (11.1-15.0)
60-day	3.53 (3.14-3.99)	4.57 (4.06-5.16)	6.02 (5.34-6.78)	7.08 (6.26-7.98)	8.47 (7.46-9.55)	9.51 (8.34-10.7)	10.6 (9.21-11.9)	11.6 (10.1-13.1)	13.0 (11.2-14.8)	14.0 (12.0-16.0)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

14 12 Precipitation depth (in) 10 8 6 4 2 0 60-min 0-112-hr Duration 7-day 10-day 45-day 60-day 5-min 10-min 15-min 30-min 2-hr 3-hr 24-hr 2-day 3-day 4-day 20-day 30-day 14 12 Precipitation depth (in) 10 8 6 4 2 0 1 2 5 10 25 50 100 200 500 1000 Average recurrence interval (years)

NOAA Atlas 14, Volume 1, Version 5

Created (GMT): Fri May 26 23:48:53 2023

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Maps & aerials

Small scale terrain

Large scale terrain

Large scale map

Large scale aerial

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US Department of Commerce National Oceanic and Atmospheric Administration National Weather Service National Water Center 1325 East West Highway Silver Spring, MD 20910 Questions?: <u>HDSC.Questions@noaa.gov</u>

Disclaimer

APPENDIX C

WARNING & DISCLAIMER OF LIABILITY

The Drainage and Floodplain Regulations and Ordinances of the City of Scottsdale are intended to "minimize the occurrence of losses, hazards and conditions adversely affecting the public health, safety and general welfare which might result from flooding caused by the surface runoff of rainfall" (Scottsdale Revised Code §37-16).

As defined in S.R.C. §37-17, a flood plain or "*Special flood hazard* area means an area having flood and/or flood related erosion hazards as shown on a FHBM or FIRM as zone A, AO, A1-30, AE, A99, AH, or E, and those areas identified as such by the floodplain administrator, delineated in accordance with subsection 37-18(b) and adopted by the floodplain board." It is possible that a property could be inundated by greater frequency flood events or by a flood greater in magnitude than a 100-year flood. Additionally, much of the Scottsdale area is a dynamic flood area; that is, the floodplains may shift from one location to another, over time, due to natural processes.

WARNING AND DISCLAIMER OF LIABILITY PURSUANT TO S.R.C §37-22

"The degree of flood protection provided by the requirements in this article is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Floods larger than the base flood can and will occur on rare occasions. Floodwater heights may be increased by manmade or natural causes. This article (Chapter 37, Article II) shall not create liability on the part of the city, any officer or employee thereof, or the federal government for any flood damages that result from reliance on this article or any administrative decision lawfully made thereunder."

Compliance with Drainage and Floodplain Regulations and Ordinances does not insure complete protection from flooding. The Floodplain Regulations and Ordinances meet established local and federal standards for floodplain management, but neither this review nor the Regulations and Ordinances take into account such flood related problems as natural erosion, streambed meander or man-made obstructions and diversions, all of which may have an adverse affect in the event of a flood. You are advised to consult your own engineer or other expert regarding these considerations.

I have read and understand the above. If I am an agent for an owner I have made the owner aware of and explained this disclaimer.

Plan Check No.

Owner or Agent

2/18/19

Date

APPENDIX D

EXCERPTS FROM DRAINAGE REPORT FOR SUNRISE COMMONS

DRAINAGE REPORT For SUNRISE COMMONS SCOTTSDALE, ARIZONA

December 23, 2015 WP#113725.02 C.O.S. NO.: 31-DR-2014 COS Plan Check Number: 6191-15-5

Prepared for:

Sunrise Hayden Apartments, LLC 5773 Woodway Drive Suite 415 Houston, Texas 77057 (832) 443-7052

Submitted to:

City of Scottsdale 7447 East Indian School Road Scottsdale, Arizona 85251

Prepared by:

Wood, Patel & Associates, Inc. 2051 West Northern Avenue Suite 100 Phoenix, Arizona 85021 Phone: (602) 335-8500 Website: <u>www.woodpatel.com</u>

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EXHIBITS

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EXHIBIT 2	Architectural Site Plan
EXHIBIT 3	FEMA Flood Insurance Rate Map (FIRM)
EXHIBIT 4	Aerial Photo
EXHIBIT5	Drainage Map

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WOOD/PATEL

1.0 INTRODUCTION

This Drainage Report has been prepared to describe the proposed drainage methodology for the Sunrise Commons development. The project is located within Section 12, Township 3 North, Range 4 East of the Gila and Salt River Meridian. More specifically, the site is located on the east side of North Hayden Road between North Hayden Road and North Northsight Boulevard, south of Frank Lloyd Wright Boulevard, and north of East Raintree Drive in Scottsdale, Arizona. The project is located on the former Sun Pontiac car dealership site just south of Scottsdale Airpark (refer to Exhibit 1 - Vicinity Map and Exhibit 4 - Aerial Photo).

The existing 11.2 acre site is proposed to be divided into two separate properties, with the northern 6.4 acre parcel planned to be developed as a future church facility (Church) and the southern 4.8 acre parcel proposed to be developed as the Sunrise Commons project. Sunrise Commons will consist of a 4-story, 288- unit luxury apartment complex with a 6-story parking garage. The development of this project will necessitate the removal of the existing buildings, parking lot, and other existing onsite improvements associated with the former car dealership (refer to Exhibit 2 - Architectural Site Plan).

This Drainage Report has been prepared in accordance with Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the City of Scottsdale *Design Standards and Policy Manual* (DS&PM) (Ref. 1) for redevelopment of an improved site to accommodate the proposed multi-family project. The purpose of this report is to obtain City of Scottsdale approval for the Sunrise Commons project with regard to drainage.

1

2.0 EXISTING DRAINAGE CONDITIONS

2.1 FEMA Floodplain Classification

The overall project site falls within Federal Emergency Management Agency (FEMA) designated Zone X, per Flood Insurance Rate Map (FIRM) Panel 04013C1245H and 04013C1685F, dated September 30, 2005 (refer to Exhibit 3 – *FEMA FIRM Map*).

Zone "X" is defined by FEMA as follows:

"Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood."

Development within Zone "X" is understood to be acceptable as long as the lowest finish floor elevations are properly protected from the anticipated 100-year water surface elevations.

2.2 Offsite Drainage Conditions

Offsite flows generated from the north are routed around the overall property by an existing storm drain system (in Hayden Road and along the north side of the site) and discharged into the adjacent channel on the west side of the site. The drainage channel conveys the offsite flows to the south. Businesses to the west, south, and east have existing drainage systems that capture flows generated on each property and do not impact the project site (refer to Exhibit 5 - Drainage Map).

2.3 Onsite Drainage Conditions

The existing 11.2+/- acre property drains from the north to the south at slopes of 1 to 2 percent. Elevations range from 1,492 feet in the northeast to 1,479 feet in the south. Runoff generated from the existing car dealership site is stored in a large detention basin located on the south side of the property. The existing basin is currently drained by a gravity bleed-off pipe flowing into an adjacent drainage channel west of the site. The existing detention basin will be removed as part of the proposed development and the associated drainage easement will be abandoned. The drainage easement recordation

documents, Sun Pontiac Conceptual Drainage Study, and excerpts from the Sun Pontiac Improvement Plans are included in Appendix C of this report.

2.4 U.S. Army Corps of Engineers' Section 404 Compliance

The site does not have a wash onsite, and is therefore, in our opinion, in compliance with the U.S. Army Corps of Engineers' Section 404 requirements.

3.0 PROPOSED DRAINAGE PLAN

3.1 Onsite Drainage Conditions

Proposed site improvements have been designed to conform to Wood/Patel's understanding of the City of Scottsdale technical requirements for drainage. As part of the Sunrise Commons development, the existing car dealership building and parking lot will be demolished. Sunrise Commons will be constructed on the southern portion of the existing property, and will require improvements within the northern portion of the site to serve vehicular, pedestrian and emergency service access as well as utility service to the apartment site. Timing of the future Church project on the northern portion of the site is unknown; therefore, as part of the Sunrise Commons project improvements will be made on the Church site to accommodate interim storm water conveyance and retention. The storm water storage requirements for the future Church site presented within this report are for the interim condition only. Storm water storage analysis for the final build out of the future Church site is the responsibility of the Church's design team, and is not addressed in this report.

Proposed grading within the Sunrise Commons site will be designed to direct storm water runoff away from the proposed building, toward catch basins and ultimately conveyed by storm drain into underground detention pipes. Proposed grading within the future Church site during development of the Sunrise Commons site will consist of removing the existing asphalt parking lot, scarifying the exposed subgrade 6" deep, and grading shallow temporary retention basins (less than or equal to 1 foot in depth). Subgrade preparation within the future church site is specified on the Sunrise Commons grading plan based upon conversations with the project's geotechnical engineer, with the intent to

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lower the Church site's runoff coefficient to a level similar to the "desert landscaping" land use criteria specified within the DS&PM.

Proposed storm drain collections systems have been designed to capture and convey the anticipated 100-year peak flow from contributing onsite drainage areas to the proposed underground detention system. With the exception of the internal courtyard, grading is designed to allow runoff in excess of the 100-year event to overland flow to the site's ultimate outfall, which is located at the southwest corner of the Church property. Wall openings are proposed to be constructed at the base of the existing screen wall at this location in order to serve as an emergency outfall for the Sunrise Commons and Church properties. This outfall location will drain directly into the adjacent drainage channel, which is the historic outfall for both properties. The ultimate outfall elevation for the project is approximately 1480.5 feet, which is 4.5 feet below the proposed building floor elevation.

The storm drain system serving the internal courtyard is designed with sufficient capacity for the design storm event. Additional storm CAD modeling is provided for this system showing the systems performance when the receiving detention tank is completely full. The lowest courtyard elevation is approximately 3.4 feet above the lowest rim in the drainage system and 3.6 feet above the ultimate outfall elevation.

Hydrologic and hydraulic calculations associated with the sizing of the proposed storm drain systems are provided in Appendix A – Hydrologic Calculations and Appendix B – Hydraulic Calculations. Refer to section 3.2 - Onsite Storm Water Storage for more information regarding storm water storage calculations for both the Sunrise Commons and the Church site.

3.2 Onsite Storm Water Storage

Storm water storage is required for contributing areas for the 100-year, 2-hour storm. Per the DS&PM, required storm water storage volume is defined as:

Storm Water Storage Volume Required = $(P/12) \times A \times C$

Where:

WOOD/PATEL

P = Precipitation amount (100-year, 2-hour from figure in Appendix 4-1D, P=2.28)
A = Area of developed portion in acres (11.2 acres total for both parcels)
C = Runoff Coefficient

The southern portion of Hayden Road, adjacent to the overall site, has not been included in the volume calculation. This is because the existing improvements in Hayden prevent runoff from entering the property, directing flow into the existing channel located along the west side of the property.

The runoff coefficients utilized for hydrologic calculations are based on Figure 4.1-4 of the DS&PM and Table 3.2 from the Flood Control District of Maricopa County (FCDMC) Drainage Design Manual for Maricopa County, Arizona, Hydrology (Ref. 3) for the applicable land uses. The required storm water storage volumes for each site are summarized in Appendix A – Hydrologic Calculations. Refer to Exhibit 5 – Drainage Map for drainage area delineation.

As mentioned previously, proposed grading on the Church site will direct storm runoff to temporary onsite retention basins. The proposed grading on the Sunrise Commons site will direct storm runoff to underground detention facilities, which are designed in conformance with Section 4-1.403 of the DS&PM. The use of underground detention for the Sunrise Commons site is necessary due to the lack of surface area that can be utilized for storm water storage. It is our understanding that the temporary retention basins on the Church property will be replaced with permanent detention facilities when the Church site is developed.

Due to the elevation relationship between the proposed underground detention system and the existing drainage channel outfall, a storm water pump system is required to drain the detention system. According to the DS&PM, it is preferred that detention systems drain the design storm event storage volume (100-year, 2-hour storm) within the time frame of 12 to 24 hours. In the interim condition, the Church site's storm water stored in temporary retention basins will drain by surface percolation. In order to verify the stormwater will be evacuated via percolation within 36 hours, a double ring infiltrometer test will be performed by the contractor once the proposed temporary retention basins

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have been built. Therefore, only the underground detention system for Sunrise Commons will utilize the storm water pump station. The design flow rate of the storm water pump station is 372 gallons per minute (gpm), which equates to draining the required storage volume for Sunrise commons in 12 hours. The pump station is designed at this rate in order to satisfy the DS&PM requirement of 12 hour minimum drain time. In the anticipated full build-out condition of the project, storm water detention for both Sunrise Commons and the Church will be pumped by the storm water pump station. At the design rate of 372 gpm storm water stored from both properties will be drained within 28 hours. While this slightly exceeds the City's desired drain time range, the anticipated full build-out drain time is well below the 36-hour requirement. Refer to Appendix B – *Hydraulic Calculations* for drain time calculations.

As part of the improvement plan process, drainage easements will be dedicated to the City of Scottsdale for the proposed underground detention system on the Sunrise Commons site, as well as the storm water pump station and temporary retention basins on the Church site, via a Final Plat. Future drainage easement dedication will be needed as the Church is developed and the temporary surface retention basins are replaced with detention systems. The Church will dedicate drainage easements to the City of Scottsdale associated with their project's storm water detention systems.

3.3 Operation, Maintenance and Liability

The proposed storm water drainage system shall be operated and maintained in accordance with the City of Scottsdale's DS&PM. Proposed underground storm water storage pipes shall be operated and maintained in accordance with the City's underground storm water storage policy as outlined in Chapter 4 of the DS&PM. The property owner shall be solely responsible for the operation and maintenance of the storm water drainage system. The storm water pump station will be maintained by Sunrise Hayden Apartments.

In accordance with Chapter 4 of the City's DS&PM, the property owner shall assume all liability for the design, construction, maintenance and failure of the underground storm water storage system, and shall hold the City harmless from any such liability. Refer to Appendix D - City of Scottsdale & ADEQ Forms.

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Ongoing maintenance of the designed or recommended drainage system will be required to preserve the design integrity and purpose of the drainage system. Failure to provide maintenance can prevent the drainage system from performing to its intended design purpose and can result in reduced performance. Maintenance is the responsibility of the property owner. A regular maintenance program is necessary to have drainage systems perform to the level of protection or service as presented in this statement.

4.0 CONCLUSIONS

The Sunrise Commons project is believed to be capable of development with regard to drainage. The proposed drainage methodology is in accordance with Wood/Patel's understanding of the City of Scottsdale technical requirements for drainage. The project's major drainage highlights are as follows:

- The project is located within a FEMA Zone "X" in both the current and postdevelopment conditions.
- Existing roadway and drainage infrastructure route offsite flow around the project. No offsite flows are anticipated to impact the project.
- No washes exist onsite. The project is believed to be in compliance to the U.S. Army Corps of Engineers' Section 404 requirements.
- Proposed grading for Sunrise Commons is designed to direct storm water away from the proposed building, into storm drain and ultimately to underground detention pipes.
 Proposed grading on the Church site is designed to direct storm water to temporary retention basins. Storm drain systems for Sunrise Commons are designed to capture and convey the anticipated 100-year peak flow.
- Underground storm water storage will be provided for the 100-year, 2-hour storm event for the contributing Sunrise Commons site. Temporary retention will be provided for the 100-year, 2-hour storm event for the contributing Church site.
- A storm water pump station has been designed to drain the underground detention system into the adjacent drainage channel and will be maintained by Sunrise Hayden Apartments. The temporary retention basins will drain by surface percolation and a double ring infiltrometer test will be performed by the contractor once the proposed temporary retention basins have been built to verify percolation rate. The pump station is sized for both the interim condition and the anticipated full build-out condition, with the interim condition draining the design storm in approximately 12 hours and the anticipated full build-out condition draining in approximately 28 hours.

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• The ultimate outfall for both Sunrise Commons and the Church is located at the southwest corner of the Church property. The ultimate outfall is located adjacent to the existing drainage channel, which is the historic outfall for the both properties. The proposed building floor is approximately 4.5 feet above the ultimate outfall.

5.0 REFERENCES

- 1. City of Scottsdale, Design Standards & Policies Manual, January 2010.
- 2. Flood Control District of Maricopa County, Drainage Design Manual for Maricopa County, Arizona, Hydraulics, August 2013
- 3. Flood Control District of Maricopa County, Drainage Design Manual for Maricopa County, Arizona, Hydrology, August 2013

APPENDIX A

Hydrologic Calculations

WOOD/PATEL

 CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

 Project:
 Sunrise Commons

Location: Scottsdale, Arizona

City of Scottsdale IDF Curves

RAINFALL INTENSITY-DURATION-FREQUENCY RELATION FOR MARICOPA COUNTY, ARIZONA

FIGURE 4.1-3 RAINFALL INTENSITY (I) VALUES FOR USE IN RATIONAL METHOD

CIVIL ENGINEERS + HYDROLOGISTS + LAND SURVEYORS + CONSTRUCTION MANAGERS

Post Q10 (cfs)

10YR Runoff Coefficient "C"¹

10 YR Intensity "i" (in/hr)

Post Q10 "Tc" (min)³

0.4

0.85

4.80

5.0 5.0 5.0

0.3 0.7 0.2 0.2 0.3

0.90

0.85

4.80 4.80

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6.1 0.2

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ethod Summar

		Longest		Drainage	Watershed			Basin		Post	100 YR		2
Drainage ID ²	Longest Watercourse (ft)	Watercourse "L" (mi)	Drainage Area (sq.ft)	Area "A" (acres)	Resistance Coefficient "K ₆ "	Top Elev. (ft)	Bottom Elev. (ft)	Stope "S" (ft/mi)	Land Use Description	Q100 "Tc"	Intensity "I" (in/hr)	100YR Runoff Coefficient "C" ¹	Post Q100 (cfs)
A1	130	0.025	4,126	0.09	0.0465	1484.70	1483.50	48	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	06.0	0.6
R1	25	0.005	3,477	0.08	0.0469	8.33	0.00	1666	ROOF	5.0	7.60	0.95	9.0
A2	60	0.011	7,982	0.18	0.0447	1484.50	1483.90	55	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	06.0	1.2
R2	25	0.005	2,037	0.05	0.0481	8.33	0.00	1666	ROOF	5.0	7.60	0.95	0.4
A3	41	0.008	2,060	0.05	0.0481	1484.50	1484.10	50	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	06.0	0.3
R3	25	0.005	3,196	0.07	0.0472	8.33	0.00	1666	ROOF	5.0	7.60	0.95	0.5
A4	86	0.019	7,605	0.17	0.0448	1484.40	1481.80	137	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	06.0	1.2
R4	25	0.005	5,203	0.12	0.0458	8.33	0.00	1666	ROOF	5.0	7.60	0.95	0.9
A5	99	0.013	1,023	0.02	0.0506	1482.50	1481.20	100	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	0.90	0.1
R5	25	0.005	1,188	0.03	0.0495	8.33	0.00	1666	ROOF	5.0	7.60	0.95	0.2
A6	111	0.021	5,054	0.12	0.0458	1487.50	1483.80	176	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	0:00	0.8
R6	25	0.005	1,395	0.03	0.0495	8.33	0.00	1666	ROOF	5.0	7.60	0.95	0.2
A7	37	0.007	2,234	0.05	0.0481	1487.90	1483.80	586	CONCRETE, PAVEMENT &	5.0	7.60	0.90	0.3
R7	25	0.005	1,112	0.03	0.0495	8.33	0.00	1666	ROOF	5.0	7.60	0.95	0.2
AB	48	0.009	3,908	0.09	0.0465	1484.30	1480.69	401	CONCRETE, PAVEMENT &	5.0	7.60	0:00	9.6
R8	25	0.005	3,605	0.08	0.0469	8.33	0.00	1666	ROOF	5.0	7.60	0.95	0.6
A9	55	0.010	2,155	0.05	0.0481	1487.80	1483.80	400	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	06.0	0.3
R9	25	0.005	1,275	0.03	0.0495	8.33	0.00	1666	ROOF	5.0	7.60	0.95	0.2
A10	51	0.010	2,210	0.05	0.0481	1484.30	1483.80	50	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	06.0	0.3
A20	51	0.010	2,067	0.05	0.0481	1484.30	1483.80	50	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	06.0	0.3
R20	25	0.005	12,268	0.28	0.0435	8.33	0.00	1666	ROOF	5.0	7.60	0.95	2.0
A11	41	0.008	5,210	0.12	0.0458	1480.30	1479.34	120	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	06.0	0.8
R11	25	0.005	2,747	0.06	0.0476	8.33	0.00	1666	ROOF	5.0	7.60	0.95	0.4
A12	67	0.013	3,604	0.08	0.0469	1484.30	1482.70	123	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	06.0	0.5
R12	80	0.015	3,302	0.08	0.0469	8.33	0.00	555	ROOF	5.0	7.60	0.95	9.6
A13	124	0.023	5,140	0.12	0.0458	1485.40	1482.70	117	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	06.0	0.8
R13	291	0.055	12,268	0.28	0.0435	8.33	0.00	151	ROOF	5.0	7.60	0.95	2.0
A14	172	0.033	7,548	0.17	0.0448	1483.60	1481.50	64	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	0:00	1.2
A15	60	0.011	3,714	60.0	0.0465	1482.46	1481.50	87	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	0:00	0.6
A16	60	0.011	3,822	0.09	0.0465	1482.46	1481.50	87	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	0.90	0.6
A17	23	0.011	3,673	0.08	0.0469	1482.50	1481.50	91	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	0.90	0.5
A18	86	0.016	4,505	0.10	0.0463	1482.50	1481.00	94	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	0:90	0.7
A19	55	0.010	6,842	0.16	0.0450	1480.10	1479.15	95	CONCRETE, PAVEMENT & LANDSCAPING	5.0	7.60	0.90	1.1
R19	25	0.005	7,644	0.18	0.0447	8.33	00.0	1666	ROOF	5.0	7.60	0.95	1.3
8	387	0.073	46,874	1.08	0.0398	1492.00	1487.00	68	LANDSCAPING	5.0	7.60	0.45	3.7
5	89	0.017	5,810	0.13	0.0455	1490.20	1488.80	82	CONCRETE, PAVEMENT &	5.0	7.60	0:00	0.9
8	180	0.034	12,930	0:30	0.0433	1490.20	1484.00	182	CONCRETE, PAVEMENT &	5.0	7.60	0.95	2.2
Motor.						1							

Notes: 1. Weighted runoff coefficients based upon Figure 4.1.4 of the City of Scottsdale Design Standards and Policy Manuals, CH-04 Grading and Drainage 2. Drainage IDs with "R" prefix relates to roof drainage areas within drainage area "A" 3. Calculated "Tc" is less than 5 minutes, therefore the minimun "Tc" of 5 minutes is utilized.

0.5

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4.80

1.2

WOOD/PATEL

Table 1 - Rational Me

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Table 2 - Storage Volume Required (For Proposed Improvements)

 Description:
 Calculation of required storage volume for proposed improvements for Sunrise Commons

 Date:
 06/26/15

 Location:
 Sunrise Commons

 Scottsdale, Arizona
 Scottsdale, Arizona

Reference: Design Standards & Policies Manual - Chapter 4 Grading & Drainage, City of Scottsdale, January 2010 Drainage Design Manual for Maricop County, Arizona, Hydrology, Flood Control District of Maricopa County, Arizona, Hydrology, Flood County, Arizona, Hydrology, Flood County, Arizona, Hydrology, Hydrology, Hydrology, Hydrology, Hydrolo

Known Values Design storm 100-yr, 2-hr Rainfall, D: 2.28 inches

Calc. Values: $Vrequired = \frac{P}{12} \times A \times C$

Where: V = Storage Volume Required P = Depth of Rainfall A = Area of Watershed Contributing C = Runoff Coefficient

Drainage Area	Area (sq.ft)	Area (ac.)	Land Use	Weighted Runoff Coefficient ^{1,2,} _{3,4}	100-Year, 2- Hour Volume (cu.ft)	100-Year, 2- Hour Volume (ac.ft)
A (Sunrise Commons Site)	200,688	4.61	APARTMENT SITE	0.94	35,843	0.82
В	157,434	3.61	10% GRAVEL ROAD 90% DESERT LANDSCAPING	0.49	14,657	0.34
С	103,280	2.37	10% GRAVEL ROAD 20% PAVEMENT 70% DESERT LANDSCAPING	0.59	11,578	0.27
D	9,780	0.22	40% GRAVEL ROAD 60% DESERT LANDSCAPING	0.62	1,152	0.03
Total	471,182	10.81			63,230	1.46

Notes:

1. Apartment site runoff coefficient estimated at 0.94 per City of Scottsdale DS&PM figure 4.1-4

2. Runoff coefficient for pavement and concrete on the church property is established from the 100 Year coefficient value of 0.95 from the COS DS&PM.

3. Runoff coefficient for pervious areas of the church property is established from the "desert landscaping" 100 Year coefficient value of 0.45 from the COS DS&PM. Complete removal of existing pavement and scarification of exisitng subgrade will be specified within these areas in order to achieve a lower runoff coefficient.

4. Runoff coefficient for the proposed firelane on the church property is estimated based on the "gravel roadway" 100 Year coefficient value of 0.88 from the FCDMC Hydrology Manual.

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Table 3 - Storage Volume Provided

Description: Calculation of proposed storage volume provided Date: 06/26/15 Location: Sunrise Commons Scottsdale, Arizona

Drainage Area IDs	Bottom Contour Area (sq.ft)	Top Contour Area (sq.ft)	Bottom Elevation (ft)	Top Elevation (ft)	Volume Provided (cu.ft)	Volume Provided (ac.ft)
A	720 LF OF	8' DIA. UNDER	GROUND STOP	RAGE PIPE	36,191	0.83
В	16,818	19,891	1483.5	1484.4	16,519	0.38
С	10,903	14,544	1480.5	1481.5	12,724	0.29
D	468	1,969	1479.5	1480.5	1,219	0.03
				Total	66,653	1.53

66,653

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Table 4 - Storage Volume Required (Anticipated Full Build-out Condition)

 Description:
 Calculation of required storage volume for the anticipated full build-out condition

 Date:
 06/26/15

 Location:
 Sunrise Commons

 Scottsdale, Arizona
 Scottsdale, Arizona

 Reference:
 Design Standards & Policies Manual - Chapter 4 Grading & Drainage, City of Scottsdale, January 2010

 Drainage Design Manual for Maricop County, Arizona, Hydrology, Flood Control District of Maricopa County, Arizona, Hydrology, Flood Control District of Marico

Known Values Design storn 100-yr, 2-hr Rainfall, D: 2.28 inches

Calc. Values: $Vrequired = \frac{P}{12} \times A \times C$

Where: V = Storage Volume Required P = Depth of Rainfall A = Area of Watershed Contributing C = Runoff Coefficient

Drainage Area	Area (sq.ft)	Area (ac.)	Land Use	Runoff Coefficient ^{1,2}	100-Year, 2- Hour Volume (cu.ft)	100-Year, 2- Hour Volume (ac.ft)
A (Sunrise Commons Site)	200,688	4.61	APARTMENT SITE	0.94	35,843	0.82
Future Church Site	287,185	6.59	COMMERCIAL	0.86	46,926	1.08
Total	487,873	11.20			82,769	1.90

Notes:

1. Apartment site runoff coefficient estimated at 0.94 per City of Scottsdale DS&PM figure 4.1-4

2. Future church site runoff coefficient estimated at 0.86 per City of Scottsdale DS&PM figure 4.1-4

