PRELIMINARY DRAINAGE REPORT

MODUS SCOTTSDALE 6

7801 E San Miguel Ave.

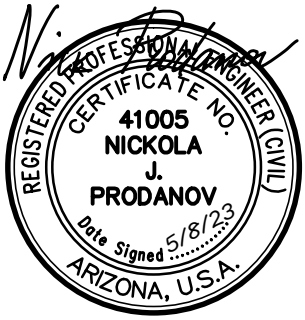
Case #: 28-DR-2022

LDG PROJECT #2206207

Prepared for:
Modus Development
3219 E Camelback Rd, #291
Phoenix, Arizona 85018

Submitted to:
City of Scottsdale
Stormwater Management
7447 E Indian School Road, Suite #125
Scottsdale, Arizona 85251

Prepared by:
Land Development Group, LLC
8808 N Central Ave., Ste 288
Phoenix, Arizona 85020
Contact: Nick Prodanov, PE, PMP
P: 602 889 1984



May 8th, 2023

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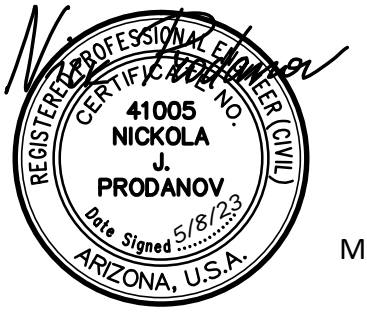


May 8th, 2023

1. INTRODUCTION

This drainage report and related design have been developed in accordance with the current Maricopa County and City of Scottsdale drainage ordinances, standards and policies.

The site is located at 7801 E San Miguel Avenue, Scottsdale, AZ 85250 (APN – 173-03-012E). It is fully developed with a single-family residence and accessory structure. Its total area is 0.845 acres. The property is bounded by San Miguel Avenue on the north, 78th Street on the west and multifamily development on the east and south. The parcel is located within the Scottsdale Q.S. 20-46. The subject property is currently not a part of a recorded subdivision. It is described as a portion of the NW ¼ of the SE ¼ of the NE ¼ Section 14, Township 2 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. Refer to Appendix A-1 – Vicinity Map.

As a part of the project development process, a plat map subject to the City of Scottsdale review and approval is prepared for this project. The owner is proposing to split the property into six lots. The proposed plat map defines the new property divider lines, new tract for private roadway, location and distances of new building setback lines and public utility easements.

The proposed multifamily project (townhomes) will consist of three separate buildings on two levels, housing total of 6 dwelling units with total building area of 14,078 s.f. New driveways, landscape and site improvements are proposed for the surrounding area.

The analysis presented herein focuses on evaluating existing and proposed drainage conditions, as well as stormwater runoff resulting from a statistical evaluation of storm events of particular frequency, up to and including 100-year event as required by the Governing Agency. A storm event exceeding the 100-year will probably cause or create the risk of a greater storm impact than is presented and addressed herein. The procedures used herein are derived from, and performed with, currently accepted engineering methodologies and practices.

2. DESCRIPTION OF EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

A field survey and visual reconnaissance inspection was conducted in June, 2022 to observe and collect information regarding the existing topographic characteristics, drainage conditions, document any local disturbances to the historic flows, and location and condition of the existing storm drainage structures and conveyance corridors. A topographic map was developed with a one-foot contour interval for the site and the adjacent streets. The elevation contours and survey spot elevations are tied to the section monuments and are based on the City of Scottsdale vertical datum (NAVD'88).

The overall existing terrain on site is flat with existing structures and fencing. San Miguel Avenue drains easterly and 78th Street drains southerly. Streets are paved with asphalt and bounded by concrete vertical curb and gutter (for 78th Street) and concrete rolled curb (for San Miguel Avenue). Existing 4' wide sidewalks are located next to both street's curbing. Existing multifamily residential

development located east and south of the project appears to slope southeasterly towards the Indian Bend Wash, which is located approximately 1,200 feet east of this project.

Curb inlets located in 78th Street were noted upstream of the intersection with San Miguel Ave. They are connected to a 36" storm drain pipe running to the east.

Site is located within the Lower Indian Bend Wash Area Drainage Master Study, Tempe/South Scottsdale Drainage Improvement Area. Based on the FLO-2D model created as part of the Lower Indian Bend Area Drainage Master Study, there are flows that run in the streets' right of way and are well contained within their cross-sections. 5.3 cfs are estimated to run south along 78th Street and 4.0 cfs run easterly along San Miguel Ave. No off-site flows impact the subject project.

3. FEMA FLOOD ZONE CLASSIFICATION

Site is located in Flood Zone "X" (shaded) according to Flood Insurance Rate Map (FIRM) #: 045012, Panel 1770, Suffix M, dated September 18th, 2020, as published by FEMA. The FIRM Panels defines Zone "X" as follows: "*Areas determined to be outside the 0.2% annual chance floodplain.*".

See Appendix A-4 for FEMA Flood Insurance Rate Map and Appendix A-5 FCDMC Floodplain Viewer exhibits.

4. PROPOSED DRAINAGE PLAN

Grading and drainage plan shows proposed grades and slopes away from the buildings.
Runoff generated on site is captured by area drains and storm drain piping that convey the flows to an underground stormwater storage tank – concrete vault. A separate tract is designated for the underground storage tank. The collected water is dissipated through a drywell at minimum rate of 0.1 cfs. Dry well is sized to infiltrate the collected water into the ground within 36 hrs. Since a common underground tank is utilized for the retention of the runoff generated by all six lots, a legal agreement for shared application will be required.

The underground stormwater storage tanks (USSTs) must meet the City's USST policy in Section 4-1.202 of the City's Design Standards & Policies Manual (DSPM), which includes but is not limited to the following:
a. The owner must dedicate a public drainage easement over the USST, with no major vegetation such as trees within the easement. At a minimum, the easement should extend at a projected slope of 1:1 from the bottom of the pipe. In the proposed design, a separate tract is designated for the concrete vault that will be designed for surcharge loads. Excavation for the vault would utilize shoring at all times to limit the amount of cut next to the existing street.
b. The USST must have at least a 75-year life, including the lining and coating.
c. The USST must drain by gravity.
d. A minimum of two access points must be provided for each USST. Considering the footprint of the vault, this is not required.

f. An Operations and Maintenance (O&M) Manual must be prepared for the system prior to approval of final plans.
g. Final plans must include signs at each end of the USST.
h. A signed and notarized Ownership and Responsibility Statement must be provided prior to approval of final plans.
i. Add the required warning signs

Inlets and stormdrain piping calculations will be provided during the final plans preparation. First flush mitigation is required if the project is disturbing more than one acre, which is not applicable in this case. See Appendix A-2 Grading and Drainage Plan and Appendix A-6 Drainage Calculations.

Finish floor elevations of the proposed structures are set to a 1 ft minimum above the adjacent high curb elevation at San Miguel Avenue and 78th Street and minimum 2.5 ft above the ultimate outfall of the site. In the event of an extreme storm event exceeding 100 year storm peak discharge, the overflow of the system would occur at the drywell and ultimately at the historic outfall location near the northeast property corner.

Grades are matched with the street elevations where the new driveways are proposed.

5. CONCLUSIONS AND RECOMMENDATIONS

The Grading and Drainage plan has been designed in conformance with the recommendations and results presented in this report as well as the City of Scottsdale, Maricopa County, Arizona State and Federal requirements and standards.

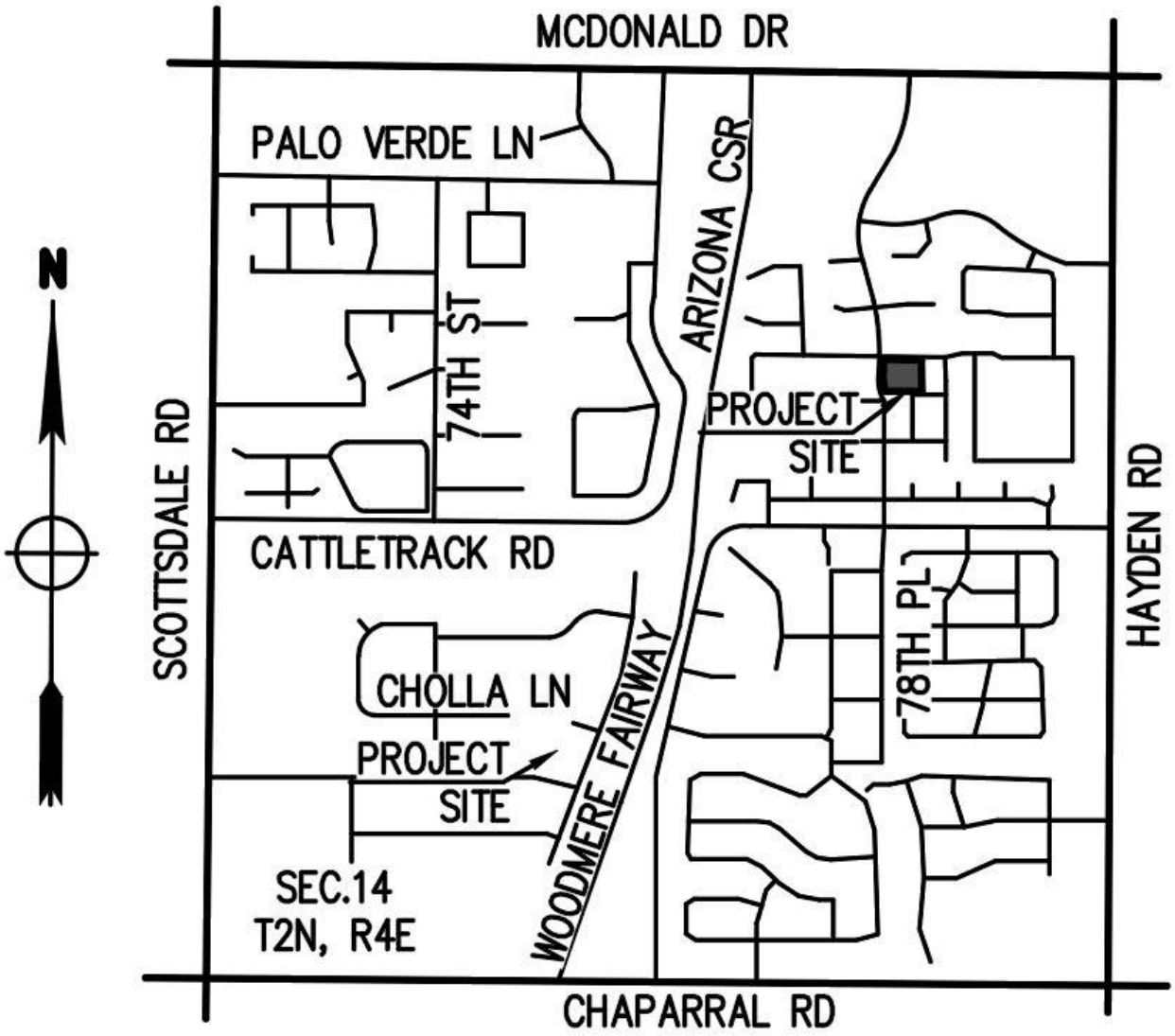
Regular inspections and maintenance of the wall openings and subsurface drainage systems after every major storm must be performed. Any obstructions of flow need to be promptly cleared out in order to keep the performance of the storm drain system as designed. It is the Owner's responsibility to inspect and properly maintain all on-site drainage structures.

In conclusion, the project site has the potential to collect, convey, and discharge runoff effectively while meeting County, City guidelines. The proposed improvements do not impact drainage conditions of neighboring lots and will not result in significant changes to the existing drainage patterns or magnitudes.

6. REFERENCES

- Drainage Design Manual for Maricopa County, Arizona – Volume I Hydrology, Flood Control District of Maricopa County
- Drainage Design Manual for Maricopa County, Arizona – Volume II Hydraulics, Flood Control District of Maricopa County
- Drainage Policies and Standards Manual for Maricopa County, Arizona, Flood Control District of Maricopa County
- City of Scottsdale Design Standards & Policies Manual
- City of Scottsdale Stormwater Management System
- Lower Indian Bend Wash Area Drainage Master Study

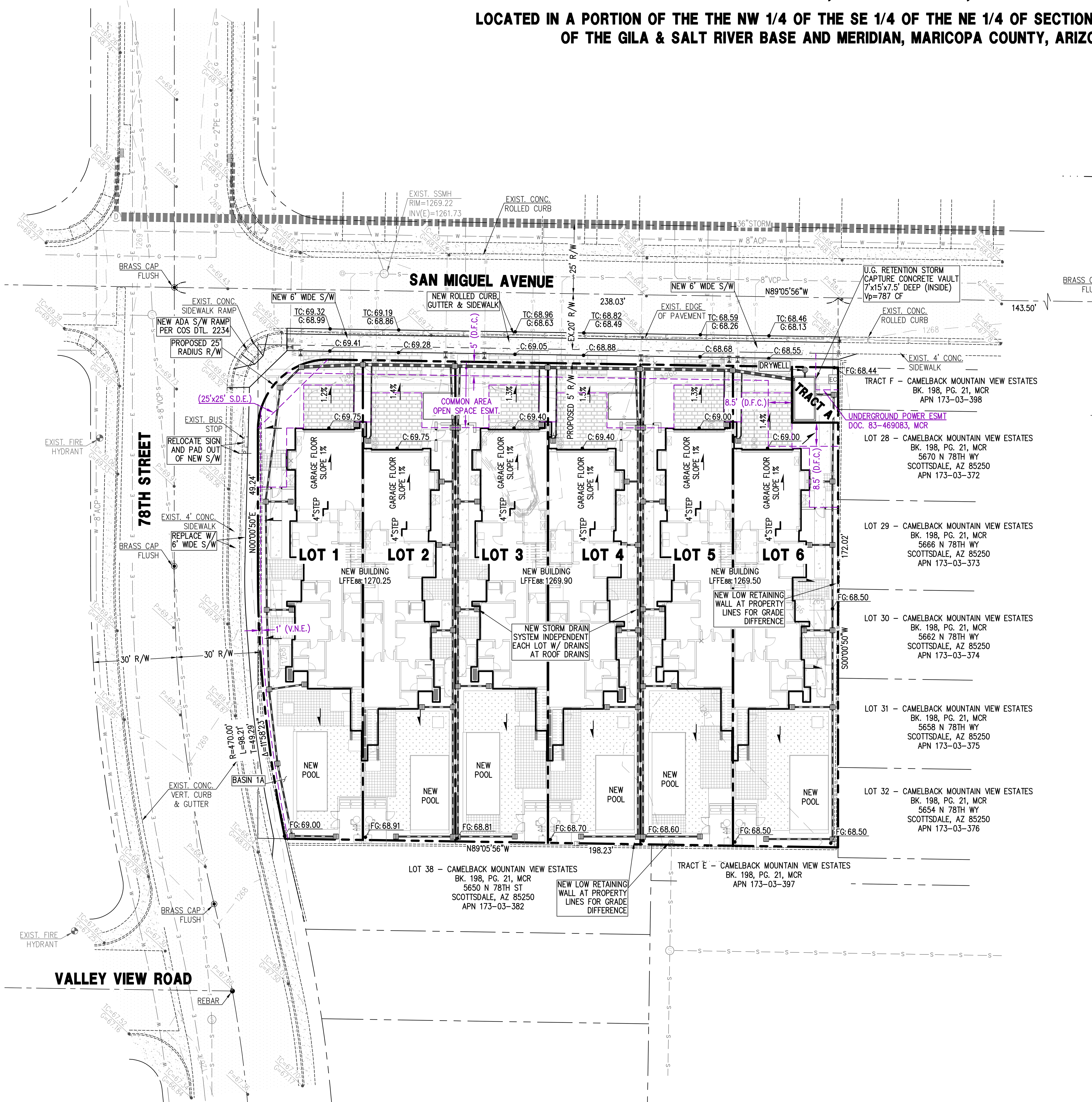
APPENDIX A-1
Vicinity Map



APPENDIX A-2
Preliminary Grading and Drainage Plan

PRELIMINARY GRADING & DRAINAGE PLAN
"MODUS SCOTTSDALE 6"
7801 E SAN MIGUEL AVE, SCOTTSDALE, AZ 85250

LOCATED IN A PORTION OF THE THE NW 1/4 OF THE SE 1/4 OF THE NE 1/4 OF SECTION 14, T.2N, R.4E OF THE GILA & SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

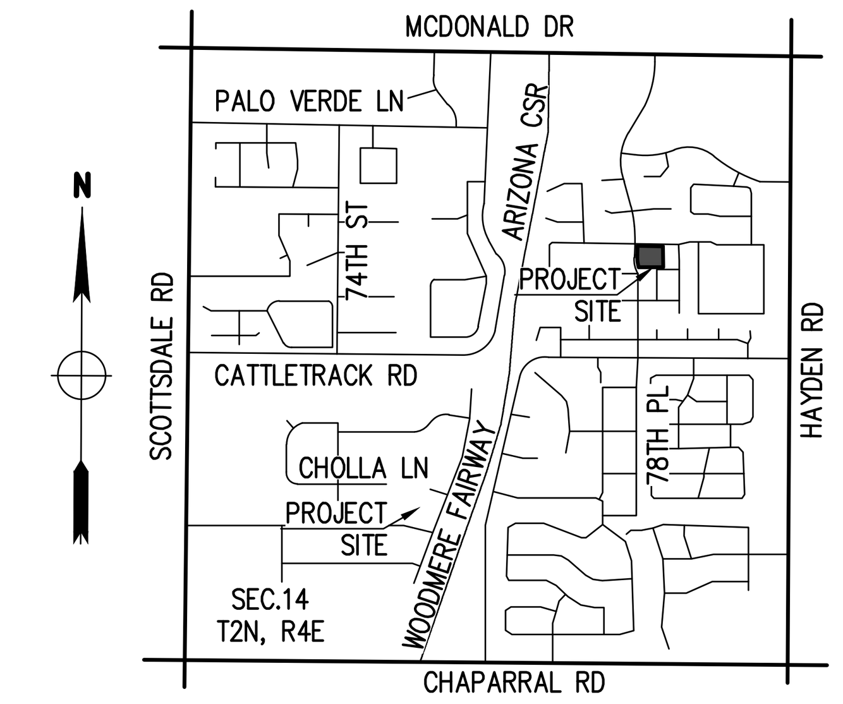


LEGEND

- PROPERTY LINE
- EASEMENT LINE
- MONUMENT LINE
- WATER METER
- SIGN
- VALVE
- FIRE HYDRANT
- UTILITY BOX
- CABLE TV RISER
- SEWER MANHOLE
- TELEPHONE PEDESTAL
- LIGHT POLE
- ELECTRIC BOX
- SEWER LINE
- COMMUNICATIONS LINE
- CATV, PHONE
- GAS LINE
- WATER LINE
- ELECTRIC LINE
- SLOPE DIRECTION
- FLOW LINE
- 22.25 PROPOSED SPOT ELEVATION
- 22 PROPOSED CONTOUR
- CATCH BASIN/DRYWELL
- STORM DRAIN PIPE
- EXIST. SPOT ELEVATION
- ASPHALT CONCRETE PAVEMENT
- CONCRETE PAVEMENT

ABBREVIATIONS

ESMT	EASEMENT
EX, EXIST.	EXISTING
G	GUTTER, GAS
(M)	MEASURED
MCR	MARICOPA COUNTY RECORDER
MH	MANHOLE
P, PVMT	PAVEMENT
PUE	PUBLIC UTILITY EASEMENT
(R), REC.	RECORDED
R	RADIUS
R/W	RIGHT OF WAY
T	TANGENT, TELEPHONE
TC	TOP OF CURB
TG	TOP OF GRATE
M	WEST, WATERLINE
WM	WATER METER



VICINITY MAP
NTS

DEVELOPER
MODUS DEVELOPMENT
3219 E CAMELBACK RD, #291
PHOENIX, AZ 85018
P: 602-421-2221
CONTACT: ED GORMAN

ARCHITECT
DREWETT WORKS ARCHITECTURE
7144 E STETSON DR, STE, 204,
SCOTTSDALE, AZ 85251
P: 480-329-7504
CONTACT: ROB BANACH

SITE DATA
APN: 716-03-012E
ADDRESS: 7801 E SAN MIGUEL AVE, SCOTTSDALE, AZ 85250
LOT AREA: 35,332 S.F. (0.811 AC.) NET; 46,605 S.F. (1.070 AC.) GROSS
QS #: 20-46

CIVIL ENGINEER
LAND DEVELOPMENT GROUP
8808 N CENTRAL AVE, SUITE 288
PHOENIX, AZ 85020
P: 602 889 1984
CONTACT: NICK PRODANOV

BASIS OF BEARINGS
THE BASIS OF BEARINGS FOR THIS SURVEY IS NORTH 00°16'12" EAST ALONG THE EAST LINE OF THE NORTHEAST QUARTER OF SECTION 14, TOWNSHIP 2 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER MERIDIAN, ACCORDING TO BOOK 734 OF MAPS, PAGE 10, MARICOPA COUNTY RECORDS.

BENCHMARK
MCDOT BRASS CAP IN A HAND HOLE AT THE INTERSECTION OF HAYDEN ROAD AND MCDONALD DRIVE.
MCDOT UNIQUE POINT ID: 3607
POINT NAME (AS SURVEYED): 24550-1
MCDOT PROJECT NAME: GDACS, PROJECT NO. 40069012
MCDOT DETERMINATION STATUS: ACCEPTED
ELEVATION=1265.90' (NAVD 88)

I HEREBY CERTIFY THAT ALL ELEVATIONS PRESENTED ON THIS PLAN ARE BASED ON NAVD-1988 AND MEET THE FEMA BENCHMARK MAINTENANCE (BMM) CRITERIA.

PARENT LEGAL DESCRIPTION
THE NORTH 197 FEET OF THE WEST 208 FEET OF THAT PART OF THE NORTHEAST QUARTER OF SECTION 14, TOWNSHIP 2 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA DESCRIBED AS FOLLOWS:
BEGINNING AT THE EAST QUARTER CORNER OF SAID SECTION 14;
RUN THENCE NORTH 0 DEGREES 28 MINUTES 52 SECONDS WEST 989.98 FEET;
THENCE WEST 825 FEET TO THE TRUE POINT OF BEGINNING;
THENCE SOUTH 0 DEGREES 28 MINUTES 52 SECONDS EAST 619.17 FEET;
THENCE SOUTH 89 DEGREES 59 MINUTES 38 SECONDS WEST 495.17 FEET;
THENCE NORTH 0 DEGREES 26 MINUTES 22 SECONDS WEST 619.11 FEET;
THENCE EAST 494.59 FEET TO THE TRUE POINT OF BEGINNING;
EXCEPT THE NORTH 20 FEET THEREOF.

FLOOD INSURANCE RATE MAP (FIRM) DATA

COMMUNITY # 045012	PANEL # 1770 OF 4425		SUFFIX M	BASE FLOOD ELEVATION N/A
MAP # 04013C	PANEL DATE 09/18/2020	FIRM INDEX DATE 07/20/2021	ZONE X*	

*AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

RETENTION CALCULATIONS
PRE VS. POST DEVELOPMENT RUNOFF FROM 100-YEAR, 2-HOUR STORM EVENT

$V_r = D \times A \times (C - C_E)/12$

Vr=VOLUME REQUIRED
Vp=VOLUME PROVIDED
D=RAINFALL DEPTH=2.18, INCHES (100-YR, 2HR RAINFALL DEPTH - NOAA ATLAS 14, VOL.1, VER. 5)
C=0.80 (PROPOSED SITE RUN OFF COEFFICIENT)
C_E=0.68 (EXISTING SITE RUN OFF COEFFICIENT PER EXIST. SITE CONDITIONS & ALTA SURVEY)
C_W=0.12 (PRE VS. POST RUN OFF COEFFICIENT
A=AREA IN S.F.
Vr=770 C.F. *Vp=1,381 C.F. (RET. BASIN & BUBBLER)

DRAINAGE CALCULATIONS

DRAINAGE AREA	AREA S.F.	Cw - RUNOFF COEFFICIENT C	VOLUME REQUIRED C.F.
LOT 1	6,024	0.12	131
LOT 2	5,707	0.12	124
LOT 3	5,707	0.12	124
LOT 4	5,707	0.12	124
LOT 5	5,707	0.12	124
LOT 6	6,151	0.12	134
TRACT A	328	0.12	7
TOTAL	35,332		770
VOLUME PROVIDED UNDERGROUND VAULT		787	770

DRY WELL CALCULATIONS
OF DRY WELLS=STORAGE VOLUME V, CF/(36 HRS MAX. DRY-UP TIME X 0.1 DISPOSAL RATE R, CFS X 3,600)
= 787/12,960=0.06 REQUIRED DRYWELLS (1 PROVIDED)

SCALE 1" = 20'

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA811
Call 811 or click Arizona811.com

DATE: 05/08/23
JOB: 2206207
VERSION: 1.2
PLOT DATE: 05/08/23
SCALE: 1"=20'
DESIGNED BY: NP
DRAWN BY: DW
CHECKED BY: NP
REVISIONS:

PRELIMINARY GRADING & DRAINAGE PLAN

"MODUS SCOTTSDALE 6"
7801 E SAN MIGUEL AVE,
SCOTTSDALE, AZ 85250

land DEVELOPMENT GROUP
P 602 889 1984 | F 602 445 9482
8808 N CENTRAL AVE., SUITE 288
PHOENIX, AZ 85020
PHOENIX @ LDGENG.COM

PRELIMINARY NOT FOR CONSTRUCTION

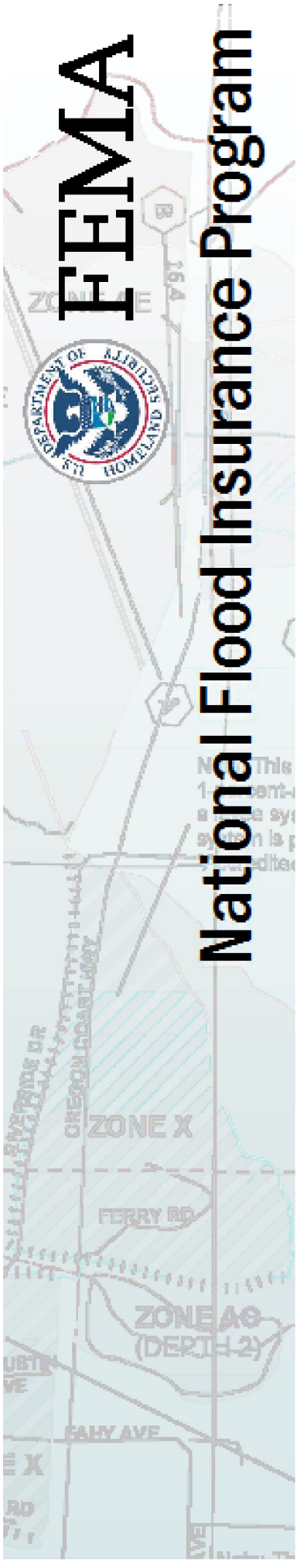
PGD
1 OF 1

28-DR-2022

APPENDIX A-3
Aerial Topography Map Exhibit


N
SAN MIGUEL AVE
78TH ST
PROJECT SITE

APPENDIX A-4
FEMA FIRM Exhibit



NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA
and Incorporated Areas

PANEL 1770 OF 4425

FEMA

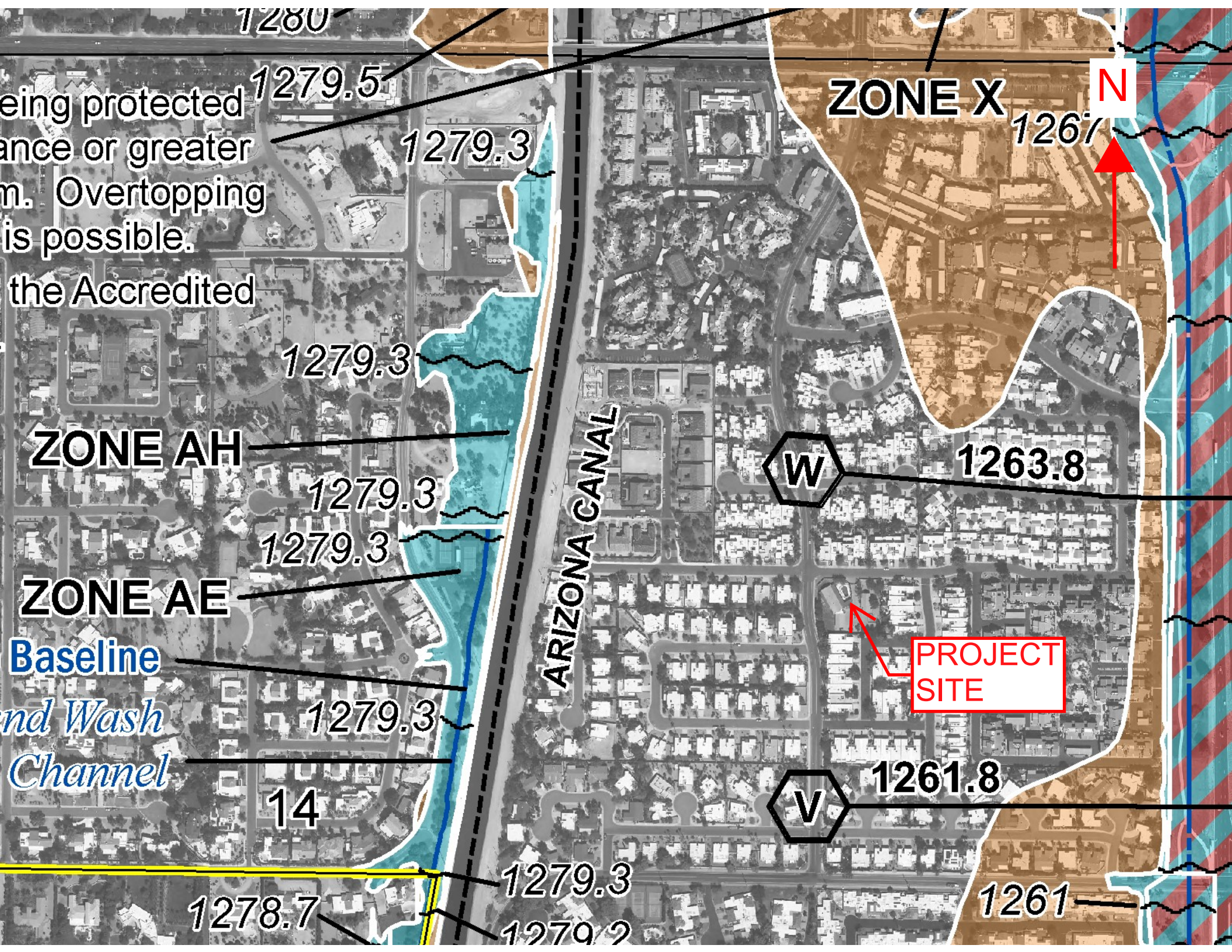
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1770	M
PARADISE VALLEY, TOWN OF	040049	1770	M
SCOTTSDALE, CITY OF	045012	1770	M

VERSION NUMBER
2.3.3.2

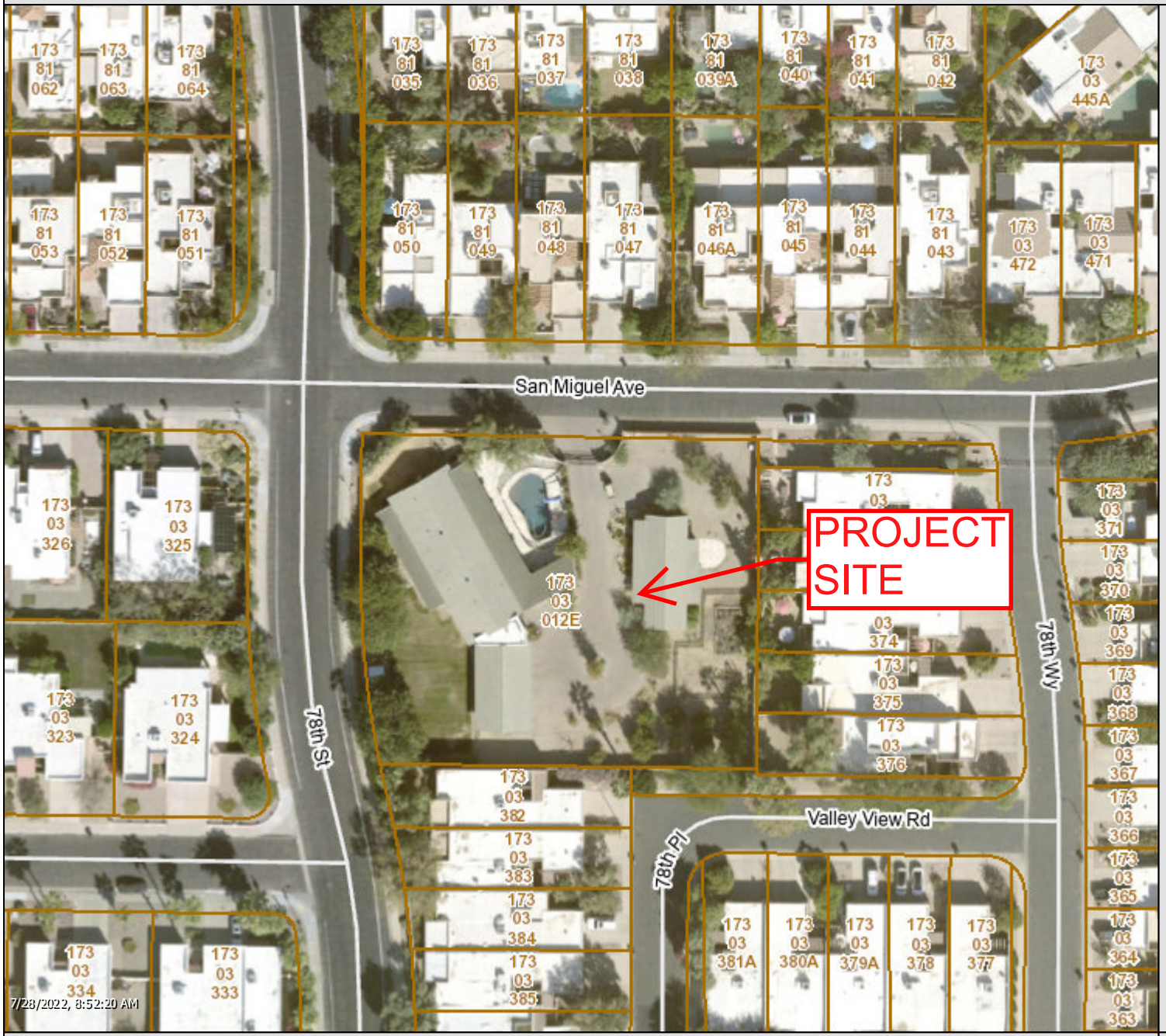
MAP NUMBER
04013C1770M

MAP REVISED
September 18, 2020


1280
1279.5
eing protected
ance or greater
m. Overtopping
is possible.
the Accredited
1279.3
ZONE X
N
1279.3
ZONE AH
1279.3
1279.3
ZONE AE
Baseline
nd Wash
Channel
14
1279.3
ARIZONA CANAL
W
1263.8
PROJECT SITE
V
1261.8
1279.3
1278.7
1279.2
1261

APPENDIX A-5
FCDMC Flood Plain Viewer

Floodplain and Elevation Certificate Map



Elevation Certificate

Highway

- Interstate Highway
- State\US\Other Highway
- Interchange\Ramp
- Arterial
- Local
- Parcel

Floodplain (Pending FEMA Approval)

- Floodway
- 100-Year Flood Zone

Floodplain (FEMA Effective)

- Floodway
- 100-Year Flood Zone

Flood Control District of Maricopa County
2801 W Durango St
Phoenix, AZ 85009
(602) 506-2419
http://www.fcd.maricopa.gov

Unofficial Document

This document cannot be used for floodplain determinations. Current studies, erosion setbacks and other factors may also affect the floodplain status of the property. The information shown for pending floodplains are the best technical information available at this time to determine the 1% chance flood and are subject to change.

N

1:1,128 — 1 inch = 94 feet

0 0.0075 0.015 0.03 mi

APPENDIX A-6
Drainage Calculations

RETENTION CALCULATIONS

PRE VS. POST DEVELOPMENT RUNOFF FROM 100-YEAR, 2-HOUR STORM EVENT

$Vr = DxAx(C - C_E)/12$

Vr=VOLUME REQUIRED
Vp=VOLUME PROVIDED
D=RAINFALL DEPTH=2.18, INCHES (100-YR, 2HR RAINFALL DEPTH – NOAA ATLAS 14, VOL.1, VER. 5)
C=0.80 (PROPOSED SITE RUN OFF COEFFICIENT)
C_E=0.68 (EXISTING SITE RUN OFF COEFFICIENT PER EXIST. SITE CONDITIONS & ALTA SURVEY)
Cw=0.12 (PRE VS. POST RUN OFF COEFFICIENT
A=AREA IN S.F.

Vr=770 C.F. *Vp=1,381 C.F. (RET. BASIN & BUBBLER)

DRAINAGE CALCULATIONS

DRAINAGE AREA	AREA	Cw – RUNOFF COEFFICIENT	VOLUME REQUIRED
	S.F.	C	C.F.
LOT 1	6,024	0.12	131
LOT 2	5,707	0.12	124
LOT 3	5,707	0.12	124
LOT 4	5,707	0.12	124
LOT 5	5,707	0.12	124
LOT 6	6,151	0.12	134
TRACT A	328	0.12	7
TOTAL	35,332		770
VOLUME PROVIDED UNDERGROUND VAULT		787	770

DRY WELL CALCULATIONS

OF DRY WELLS=STORAGE VOLUME V, CF/(36 HRS MAX. DRY-UP TIME X 0.1 DISPOSAL RATE R, CFS X 3,600)
= 787/12,960=0.06 REQUIRED DRYWELLS (1 PROVIDED)

NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, USA*
Latitude: 33.5191°, Longitude: -111.9129°
Elevation: 1268.5 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)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.184** (0.154-0.226)	**0.241** (0.203-0.295)	**0.328** (0.273-0.399)	**0.394** (0.327-0.478)	**0.484** (0.394-0.584)	**0.553** (0.445-0.664)	**0.624** (0.493-0.747)	**0.696** (0.540-0.832)	**0.792** (0.599-0.949)	**0.866** (0.642-1.04)
10-min	**0.281** (0.235-0.344)	**0.367** (0.308-0.450)	**0.499** (0.416-0.608)	**0.600** (0.497-0.727)	**0.736** (0.600-0.889)	**0.842** (0.677-1.01)	**0.949** (0.750-1.14)	**1.06** (0.822-1.27)	**1.21** (0.912-1.44)	**1.32** (0.977-1.58)
15-min	**0.348** (0.291-0.426)	**0.456** (0.382-0.558)	**0.619** (0.515-0.753)	**0.744** (0.616-0.902)	**0.913** (0.744-1.10)	**1.04** (0.839-1.25)	**1.18** (0.930-1.41)	**1.31** (1.02-1.57)	**1.50** (1.13-1.79)	**1.63** (1.21-1.96)
30-min	**0.469** (0.392-0.574)	**0.613** (0.515-0.751)	**0.834** (0.694-1.01)	**1.00** (0.830-1.22)	**1.23** (1.00-1.48)	**1.41** (1.13-1.69)	**1.59** (1.25-1.90)	**1.77** (1.37-2.11)	**2.01** (1.52-2.41)	**2.20** (1.63-2.64)
60-min	**0.581** (0.485-0.711)	**0.759** (0.637-0.929)	**1.03** (0.859-1.26)	**1.24** (1.03-1.50)	**1.52** (1.24-1.84)	**1.74** (1.40-2.09)	**1.96** (1.55-2.35)	**2.19** (1.70-2.62)	**2.49** (1.89-2.98)	**2.72** (2.02-3.27)
2-hr	**0.674** (0.573-0.807)	**0.873** (0.742-1.05)	**1.17** (0.987-1.39)	**1.39** (1.16-1.66)	**1.70** (1.41-2.01)	**1.93** (1.58-2.29)	**2.18** (1.75-2.57)	**2.42** (1.91-2.86)	**2.75** (2.12-3.25)	**3.01** (2.27-3.57)
3-hr	**0.739** (0.625-0.894)	**0.947** (0.804-1.15)	**1.24** (1.05-1.50)	**1.48** (1.24-1.78)	**1.81** (1.49-2.16)	**2.07** (1.68-2.46)	**2.34** (1.87-2.79)	**2.63** (2.06-3.12)	**3.02** (2.30-3.59)	**3.34** (2.48-3.97)
6-hr	**0.889** (0.768-1.05)	**1.12** (0.974-1.33)	**1.44** (1.24-1.70)	**1.69** (1.45-1.98)	**2.04** (1.72-2.37)	**2.31** (1.91-2.68)	**2.59** (2.11-3.00)	**2.87** (2.30-3.34)	**3.27** (2.55-3.80)	**3.57** (2.73-4.17)
12-hr	**0.990** (0.863-1.15)	**1.25** (1.09-1.46)	**1.58** (1.37-1.84)	**1.84** (1.59-2.13)	**2.20** (1.87-2.54)	**2.47** (2.08-2.84)	**2.75** (2.28-3.16)	**3.03** (2.48-3.49)	**3.41** (2.72-3.95)	**3.70** (2.90-4.32)
24-hr	**1.17** (1.04-1.34)	**1.49** (1.32-1.70)	**1.93** (1.71-2.20)	**2.28** (2.01-2.59)	**2.76** (2.42-3.14)	**3.14** (2.73-3.56)	**3.54** (3.06-4.01)	**3.95** (3.39-4.48)	**4.52** (3.83-5.13)	**4.97** (4.17-5.66)
2-day	**1.27** (1.12-1.44)	**1.62** (1.44-1.85)	**2.13** (1.88-2.42)	**2.53** (2.23-2.87)	**3.09** (2.71-3.51)	**3.54** (3.09-4.02)	**4.02** (3.47-4.56)	**4.51** (3.87-5.13)	**5.20** (4.41-5.92)	**5.75** (4.83-6.57)
3-day	**1.34** (1.19-1.53)	**1.72** (1.52-1.95)	**2.26** (2.00-2.56)	**2.70** (2.37-3.05)	**3.31** (2.90-3.75)	**3.80** (3.31-4.30)	**4.33** (3.74-4.90)	**4.88** (4.18-5.53)	**5.65** (4.79-6.41)	**6.28** (5.26-7.14)
4-day	**1.42** (1.26-1.61)	**1.81** (1.61-2.06)	**2.39** (2.11-2.71)	**2.86** (2.52-3.24)	**3.53** (3.09-3.98)	**4.06** (3.53-4.59)	**4.64** (4.00-5.23)	**5.24** (4.49-5.93)	**6.10** (5.16-6.89)	**6.80** (5.69-7.70)
7-day	**1.58** (1.40-1.80)	**2.02** (1.79-2.30)	**2.67** (2.35-3.03)	**3.19** (2.81-3.62)	**3.94** (3.44-4.46)	**4.54** (3.94-5.13)	**5.17** (4.46-5.85)	**5.85** (5.00-6.62)	**6.80** (5.74-7.71)	**7.57** (6.32-8.60)
10-day	**1.71** (1.52-1.95)	**2.19** (1.94-2.49)	**2.90** (2.56-3.28)	**3.46** (3.04-3.91)	**4.25** (3.72-4.79)	**4.89** (4.25-5.50)	**5.56** (4.81-6.26)	**6.27** (5.38-7.07)	**7.26** (6.15-8.19)	**8.06** (6.76-9.10)
20-day	**2.11** (1.87-2.38)	**2.71** (2.41-3.06)	**3.58** (3.18-4.03)	**4.24** (3.75-4.76)	**5.13** (4.51-5.76)	**5.81** (5.09-6.52)	**6.50** (5.67-7.31)	**7.20** (6.25-8.11)	**8.15** (7.01-9.20)	**8.88** (7.58-10.0)
30-day	**2.46** (2.18-2.78)	**3.17** (2.81-3.57)	**4.18** (3.70-4.70)	**4.95** (4.37-5.55)	**5.98** (5.25-6.71)	**6.77** (5.92-7.58)	**7.58** (6.60-8.49)	**8.40** (7.28-9.40)	**9.51** (8.18-10.7)	**10.4** (8.85-11.6)
45-day	**2.85** (2.54-3.20)	**3.67** (3.27-4.12)	**4.84** (4.30-5.43)	**5.70** (5.06-6.40)	**6.84** (6.04-7.67)	**7.69** (6.78-8.63)	**8.56** (7.50-9.60)	**9.42** (8.22-10.6)	**10.6** (9.15-11.9)	**11.4** (9.83-12.9)
60-day	**3.15** (2.81-3.53)	**4.06** (3.63-4.55)	**5.34** (4.76-5.98)	**6.27** (5.58-7.02)	**7.48** (6.64-8.37)	**8.38** (7.41-9.38)	**9.28** (8.17-10.4)	**10.2** (8.91-11.4)	**11.3** (9.86-12.7)	**12.2** (10.5-13.7)

[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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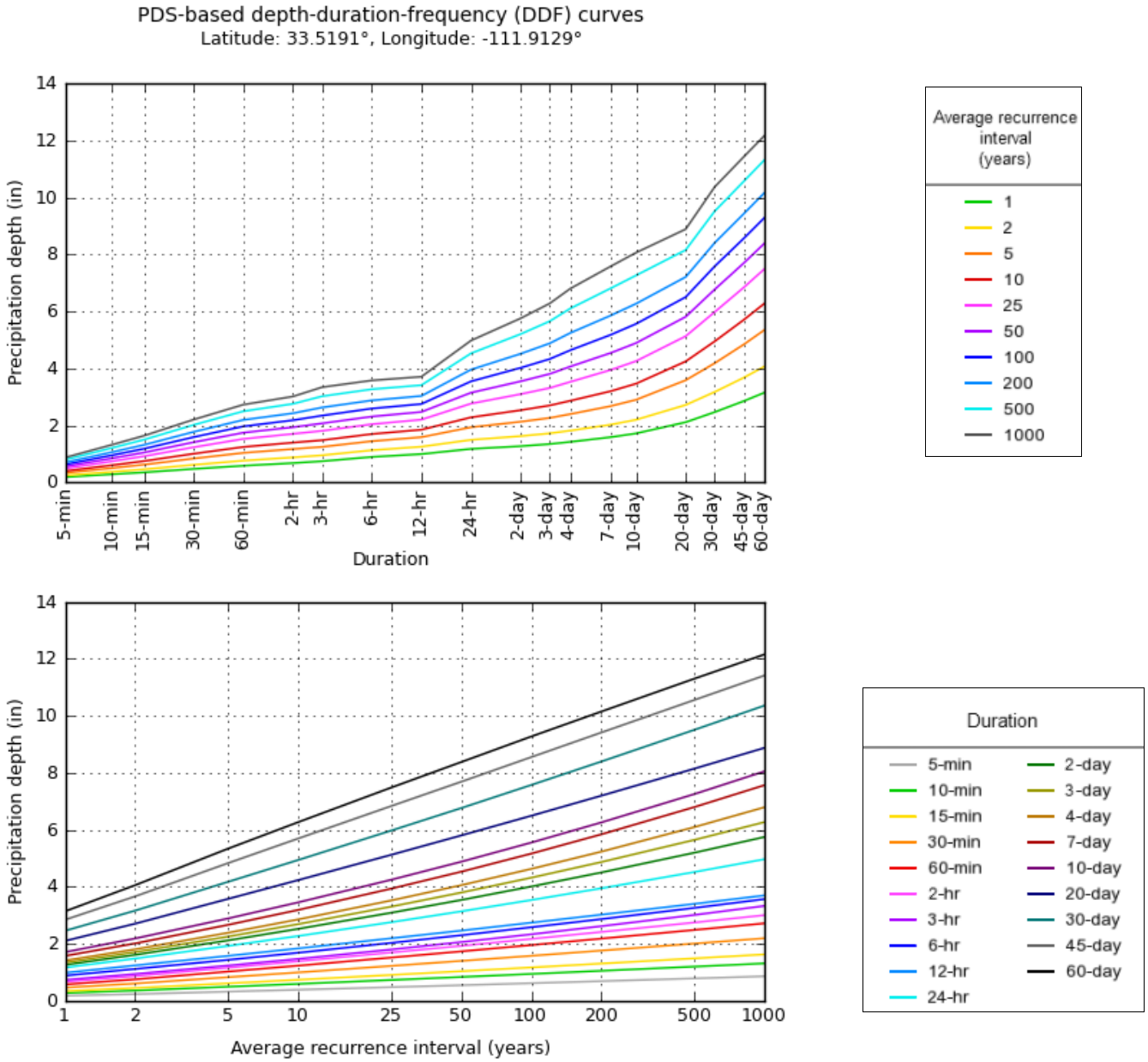
PF graphical



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Maps & aerials

Small scale terrain

NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, USA*
Latitude: 33.5191°, Longitude: -111.9129°
Elevation: 1268.5 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/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**2.21** (1.85-2.71)	**2.89** (2.44-3.54)	**3.94** (3.28-4.79)	**4.73** (3.92-5.74)	**5.81** (4.73-7.01)	**6.64** (5.34-7.97)	**7.49** (5.92-8.96)	**8.35** (6.48-9.98)	**9.50** (7.19-11.4)	**10.4** (7.70-12.5)
10-min	**1.69** (1.41-2.06)	**2.20** (1.85-2.70)	**2.99** (2.50-3.65)	**3.60** (2.98-4.36)	**4.42** (3.60-5.33)	**5.05** (4.06-6.07)	**5.69** (4.50-6.82)	**6.35** (4.93-7.60)	**7.24** (5.47-8.66)	**7.91** (5.86-9.49)
15-min	**1.39** (1.16-1.70)	**1.82** (1.53-2.23)	**2.48** (2.06-3.01)	**2.98** (2.46-3.61)	**3.65** (2.98-4.40)	**4.18** (3.36-5.01)	**4.71** (3.72-5.64)	**5.25** (4.08-6.28)	**5.98** (4.52-7.16)	**6.54** (4.84-7.84)
30-min	**0.938** (0.784-1.15)	**1.23** (1.03-1.50)	**1.67** (1.39-2.03)	**2.00** (1.66-2.43)	**2.46** (2.00-2.97)	**2.81** (2.26-3.37)	**3.17** (2.50-3.80)	**3.54** (2.75-4.23)	**4.03** (3.05-4.82)	**4.40** (3.26-5.28)
60-min	**0.581** (0.485-0.711)	**0.759** (0.637-0.929)	**1.03** (0.859-1.26)	**1.24** (1.03-1.50)	**1.52** (1.24-1.84)	**1.74** (1.40-2.09)	**1.96** (1.55-2.35)	**2.19** (1.70-2.62)	**2.49** (1.89-2.98)	**2.72** (2.02-3.27)
2-hr	**0.337** (0.286-0.404)	**0.436** (0.371-0.524)	**0.584** (0.494-0.696)	**0.696** (0.582-0.830)	**0.850** (0.703-1.01)	**0.966** (0.790-1.14)	**1.09** (0.874-1.28)	**1.21** (0.956-1.43)	**1.38** (1.06-1.62)	**1.51** (1.13-1.79)
3-hr	**0.246** (0.208-0.298)	**0.315** (0.268-0.383)	**0.414** (0.349-0.500)	**0.492** (0.412-0.591)	**0.601** (0.496-0.718)	**0.688** (0.559-0.820)	**0.779** (0.622-0.928)	**0.874** (0.686-1.04)	**1.00** (0.765-1.20)	**1.11** (0.825-1.32)
6-hr	**0.148** (0.128-0.175)	**0.188** (0.163-0.222)	**0.241** (0.207-0.283)	**0.283** (0.241-0.331)	**0.340** (0.287-0.396)	**0.385** (0.320-0.447)	**0.432** (0.353-0.501)	**0.480** (0.385-0.558)	**0.545** (0.426-0.634)	**0.597** (0.455-0.696)
12-hr	**0.082** (0.072-0.096)	**0.104** (0.090-0.121)	**0.131** (0.114-0.152)	**0.153** (0.132-0.177)	**0.182** (0.155-0.210)	**0.205** (0.172-0.236)	**0.228** (0.189-0.263)	**0.251** (0.206-0.290)	**0.283** (0.226-0.328)	**0.307** (0.241-0.358)
24-hr	**0.049** (0.043-0.056)	**0.062** (0.055-0.071)	**0.080** (0.071-0.092)	**0.095** (0.084-0.108)	**0.115** (0.101-0.131)	**0.131** (0.114-0.148)	**0.148** (0.127-0.167)	**0.165** (0.141-0.187)	**0.189** (0.159-0.214)	**0.207** (0.174-0.236)
2-day	**0.026** (0.023-0.030)	**0.034** (0.030-0.038)	**0.044** (0.039-0.050)	**0.053** (0.046-0.060)	**0.064** (0.056-0.073)	**0.074** (0.064-0.084)	**0.084** (0.072-0.095)	**0.094** (0.081-0.107)	**0.108** (0.092-0.123)	**0.120** (0.101-0.137)
3-day	**0.019** (0.017-0.021)	**0.024** (0.021-0.027)	**0.031** (0.028-0.036)	**0.037** (0.033-0.042)	**0.046** (0.040-0.052)	**0.053** (0.046-0.060)	**0.060** (0.052-0.068)	**0.068** (0.058-0.077)	**0.078** (0.066-0.089)	**0.087** (0.073-0.099)
4-day	**0.015** (0.013-0.017)	**0.019** (0.017-0.021)	**0.025** (0.022-0.028)	**0.030** (0.026-0.034)	**0.037** (0.032-0.042)	**0.042** (0.037-0.048)	**0.048** (0.042-0.055)	**0.055** (0.047-0.062)	**0.064** (0.054-0.072)	**0.071** (0.059-0.080)
7-day	**0.009** (0.008-0.011)	**0.012** (0.011-0.014)	**0.016** (0.014-0.018)	**0.019** (0.017-0.022)	**0.023** (0.020-0.027)	**0.027** (0.023-0.031)	**0.031** (0.027-0.035)	**0.035** (0.030-0.039)	**0.040** (0.034-0.046)	**0.045** (0.038-0.051)
10-day	**0.007** (0.006-0.008)	**0.009** (0.008-0.010)	**0.012** (0.011-0.014)	**0.014** (0.013-0.016)	**0.018** (0.016-0.020)	**0.020** (0.018-0.023)	**0.023** (0.020-0.026)	**0.026** (0.022-0.029)	**0.030** (0.026-0.034)	**0.034** (0.028-0.038)
20-day	**0.004** (0.004-0.005)	**0.006** (0.005-0.006)	**0.007** (0.007-0.008)	**0.009** (0.008-0.010)	**0.011** (0.009-0.012)	**0.012** (0.011-0.014)	**0.014** (0.012-0.015)	**0.015** (0.013-0.017)	**0.017** (0.015-0.019)	**0.019** (0.016-0.021)
30-day	**0.003** (0.003-0.004)	**0.004** (0.004-0.005)	**0.006** (0.005-0.007)	**0.007** (0.006-0.008)	**0.008** (0.007-0.009)	**0.009** (0.008-0.011)	**0.011** (0.009-0.012)	**0.012** (0.010-0.013)	**0.013** (0.011-0.015)	**0.014** (0.012-0.016)
45-day	**0.003** (0.002-0.003)	**0.003** (0.003-0.004)	**0.004** (0.004-0.005)	**0.005** (0.005-0.006)	**0.006** (0.006-0.007)	**0.007** (0.006-0.008)	**0.008** (0.007-0.009)	**0.009** (0.008-0.010)	**0.010** (0.008-0.011)	**0.011** (0.009-0.012)
60-day	**0.002** (0.002-0.002)	**0.003** (0.003-0.003)	**0.004** (0.003-0.004)	**0.004** (0.004-0.005)	**0.005** (0.005-0.006)	**0.006** (0.005-0.007)	**0.006** (0.006-0.007)	**0.007** (0.006-0.008)	**0.008** (0.007-0.009)	**0.008** (0.007-0.010)

[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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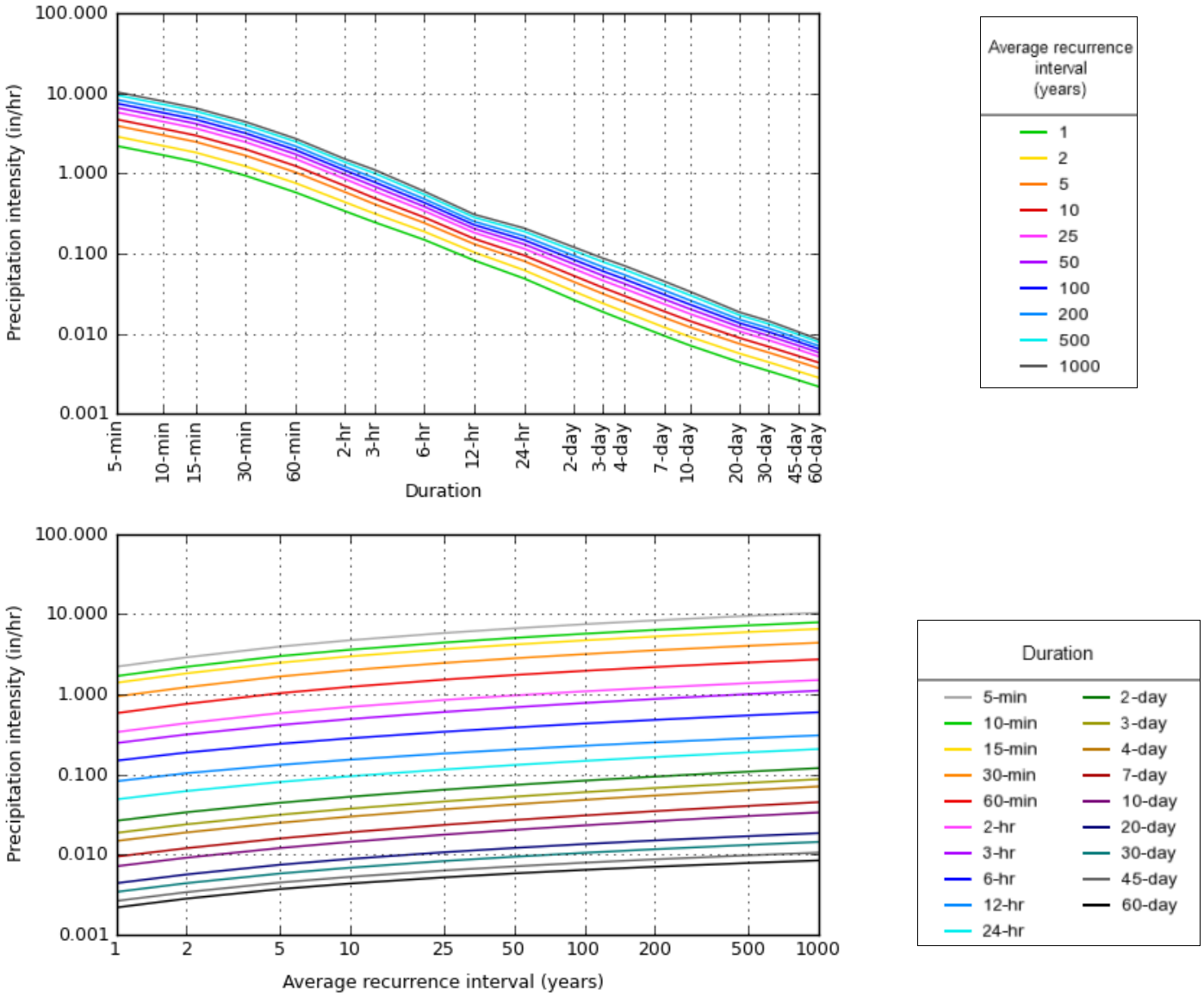
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 33.5191°, Longitude: -111.9129°



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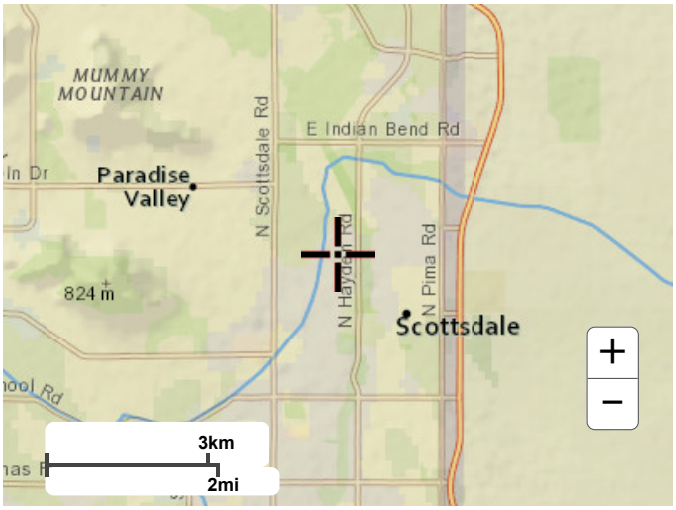
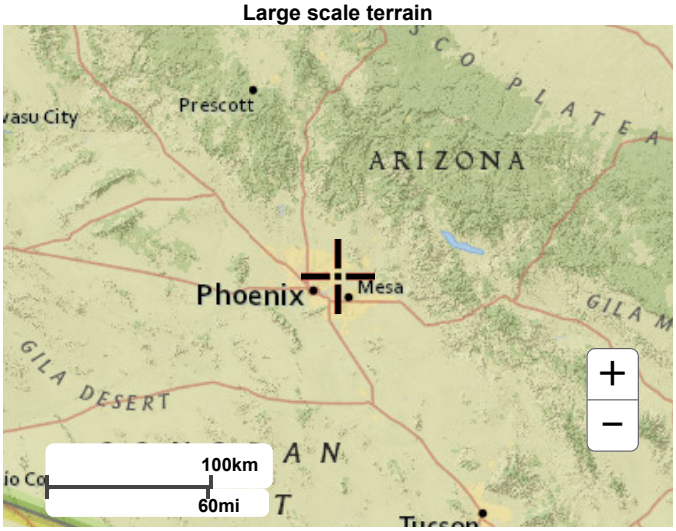
Maps & aerials

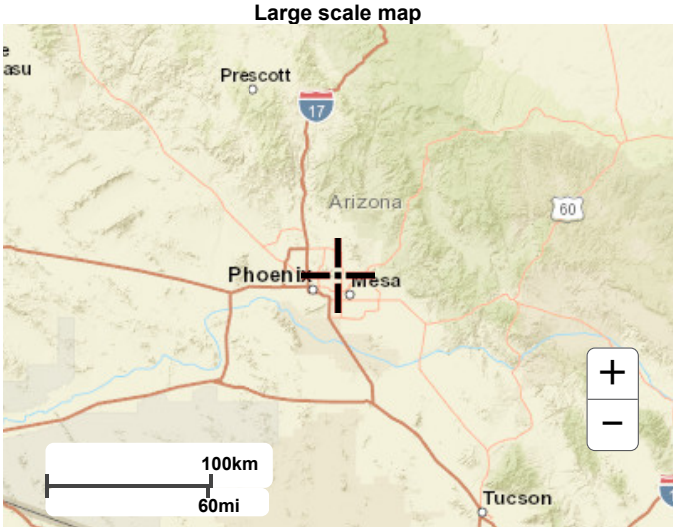
Small scale terrain



Large scale terrain

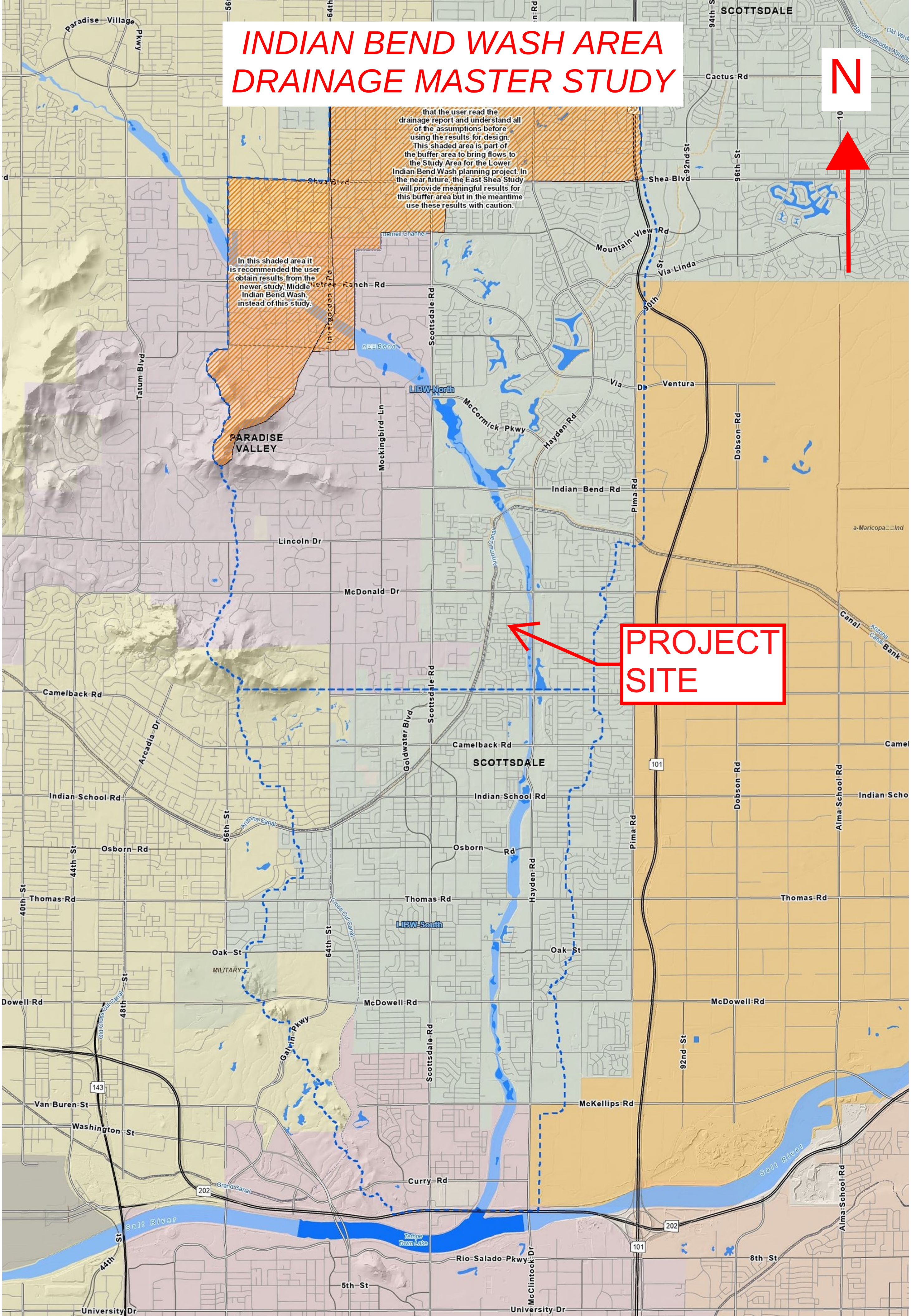


Large scale map

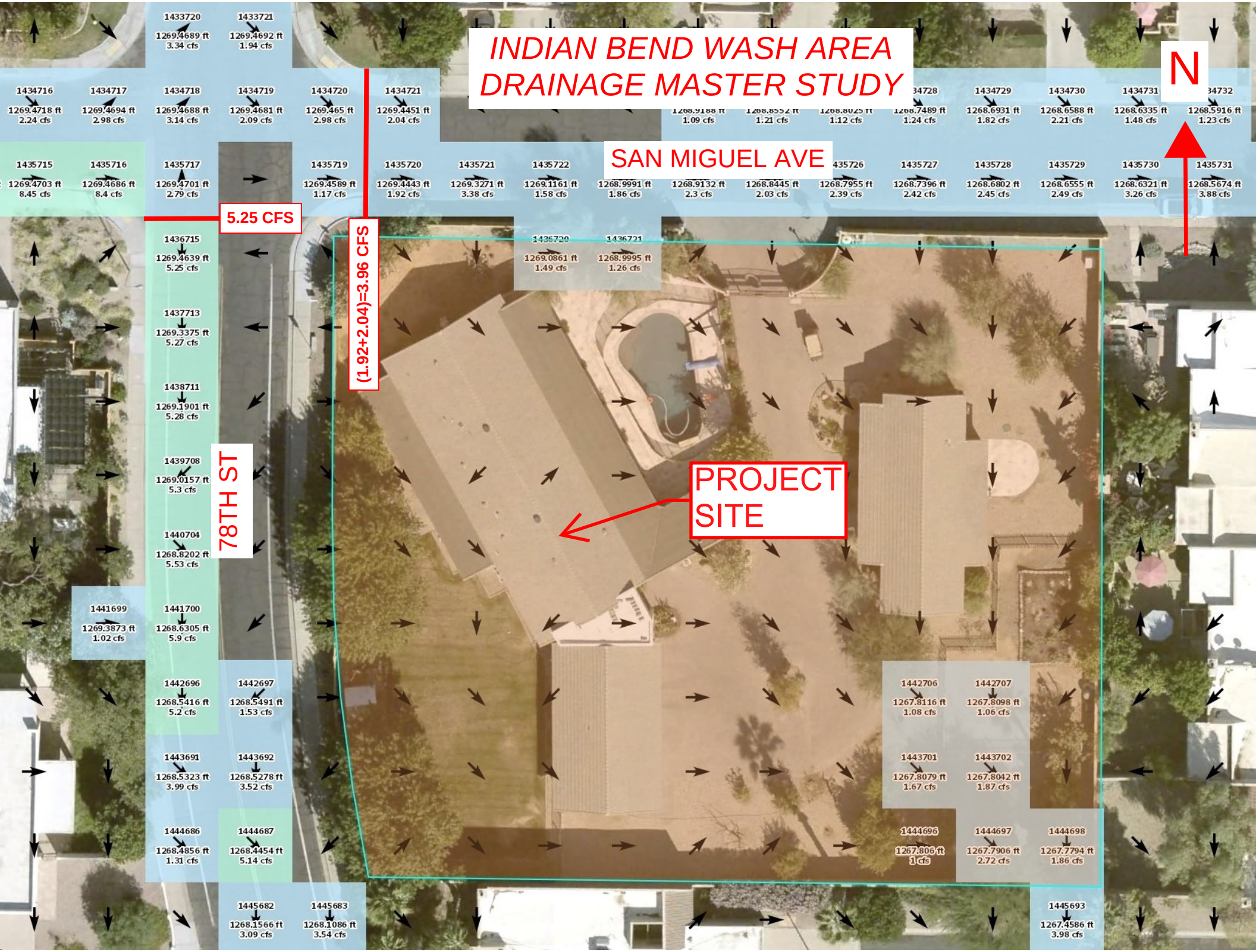


Large scale aerial

APPENDIX A-7
Lower Indian Bend Wash ADMS


INDIAN BEND WASH AREA
DRAINAGE MASTER STUDY
N
that the user read the drainage report and understand all of the assumptions before using the results for design. This shaded area is part of the buffer area to bring flows to the Study Area for the Lower Indian Bend Wash planning project. In the near future, the East Shea Study will provide meaningful results for this buffer area but in the meantime use these results with caution.
In this shaded area it is recommended the user obtain results from the newer study, Middle Indian Bend Wash, instead of this study.
PROJECT SITE
SCOTTSDALE
PARADISE VALLEY
LIBW-North
LIBW-South
Shea Blvd
Cactus Rd
Mountain View Rd
Via Linda
Indian Bend Rd
Lincoln Dr
McDonald Dr
Camelback Rd
Indian School Rd
Osborn Rd
Thomas Rd
Oak St
McDowell Rd
McKellips Rd
Van Buren St
Washington St
Curry Rd
Rio Salado Pkwy
University Dr
Scottsdale Rd
Hayden Rd
Pima Rd
Tatum Blvd
56th St
64th St
44th St
40th St
48th St
92nd St
96th St
Dobson Rd
Alma School Rd
McClintock Dr
Goldwater Blvd
Mockingbird Ln
McCormick Pkwy
Galvin Pkwy
Arcadia Dr
Arizona Canal
Cross Cut Canal
Grand Canal
Salt River
Tempe Town Lake
101
143
202

APPENDIX A-8
FLO-2D Map Exhibit


INDIAN BEND WASH AREA
DRAINAGE MASTER STUDY
N
SAN MIGUEL AVE
5.25 CFS
(1.92+2.04)=3.96 CFS
78TH ST
PROJECT SITE
1433720
1269.4689 ft
3.34 cfs
1433721
1269.4692 ft
1.94 cfs
1434716
1269.4718 ft
2.24 cfs
1434717
1269.4694 ft
2.98 cfs
1434718
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3.14 cfs
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2.09 cfs
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1269.465 ft
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2.04 cfs
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1435716
1269.4686 ft
8.4 cfs
1435717
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2.79 cfs
1435719
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1435720
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1.92 cfs
1435721
1269.3271 ft
3.38 cfs
1435722
1269.1161 ft
1.58 cfs
1268.9991 ft
1.86 cfs
1268.9132 ft
2.3 cfs
1268.8445 ft
2.03 cfs
1268.7955 ft
2.39 cfs
1435727
1268.7396 ft
2.42 cfs
1435728
1268.6802 ft
2.45 cfs
1435729
1268.6555 ft
2.49 cfs
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1268.6321 ft
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1436721
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1.26 cfs
1437713
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1438711
1269.1901 ft
5.28 cfs
1439708
1269.0157 ft
5.3 cfs
1440704
1268.8202 ft
5.53 cfs
1441699
1269.3873 ft
1.02 cfs
1441700
1268.6305 ft
5.9 cfs
1442696
1268.5416 ft
5.2 cfs
1442697
1268.5491 ft
1.53 cfs
1442706
1267.8116 ft
1.08 cfs
1442707
1267.8098 ft
1.06 cfs
1443691
1268.5323 ft
3.99 cfs
1443692
1268.5278 ft
3.52 cfs
1443701
1267.8079 ft
1.67 cfs
1443702
1267.8042 ft
1.87 cfs
1444686
1268.4856 ft
1.31 cfs
1444687
1268.4454 ft
5.14 cfs
1444696
1267.806 ft
1 cfs
1444697
1267.7906 ft
2.72 cfs
1444698
1267.7794 ft
1.86 cfs
1445682
1268.1566 ft
3.09 cfs
1445683
1268.1086 ft
3.54 cfs
1445693
1267.4586 ft
3.98 cfs

APPENDIX A-9
Warning and 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 man-made 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	Date