Case #: 37-DR-2021

Review Cycle: 4

Status: Accepted

Reviewed By: GA

Date: 07/28/2022

PRELIMINARY
DRAINAGE REPORT
FOR
CAMELBACK RESIDENTIAL
"AZURE AND HAZEL"

July 2022
ATWELL PROJECT NO. 21000702

PRELIMINARY DRAINAGE REPORT
FOR

Camelback Residential
"Azure & Hazel"

PREPARED FOR

ZT Scottsdale Owner, LLC
2001 Summit Park Drive, Suite 300
Orlando, FL 32810

PREPARED BY

ATWELL GROUP, LLC
4700 SOUTHERN AVE
MESA, AZ. 85206
(805)260-5574

July 2022
ATWELL PROJECT NO. 21000702

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1	Vicinity Map
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1.0 INTRODUCTION

This report has been prepared under a contract with ZT Scottsdale Owner, LLC for the Camelback Residential project in Scottsdale. The purpose of this report is to provide drainage analyses, required by the City of Scottsdale, to support the construction documents submittal for the site improvements. Preparation of this report has been done in accordance with the procedures detailed in the *City of Scottsdale Design Standards and Policies Manual* (Reference #1) along with the City of Scottsdale *Supplement to MAG Uniform Standard Specifications For Public Works Construction* (Reference #2) and *Drainage Design Manuals for Maricopa County, Arizona, Hydrology and Hydraulics volumes* (References #3 and #4).

The site is located approximately 600 feet to the northeast of the intersection of Scottsdale Road and Camelback Road in Section 23, Township 2 North, Range 4 East of the Gila and Salt River Base and Meridian. The Camelback Residential project is separated into two building developments being permitted and constructed in tandem. The two buildings will be under separate ownership; however, the overall drainage management plan will be common to both buildings, and easements required will be documented on the corresponding plat. The north and south building sites are respectively named Building A "Hazel" and Building B "Azure" which are separated by the Fashion Square private street. Vehicular access to the both the Building A and B (Hazel & Azure) sites will be provided from Fashion Square. The project will include underground parking under the building structures. Refer to Appendix A for a vicinity map that shows the location of the site in relation to the City of Scottsdale street system.

This report contains the combined discussion and analysis for the Hazel and Azure building sites and related offsite roadways, which has a total area of approximately 3.7 acres. Onsite improvements include site grading and the construction of new mixed-use buildings with associated hardscape and landscaped areas. A Final Drainage Report will be submitted along with final construction documents and permit applications.

2.0 EXISTING DRAINAGE CONDITIONS

The general slope of the northern half of the Camelback Residential Site is approximately 0.5% in a southeasterly direction. The south portion of the site slopes south and east toward the Arizona Canal at an approximate 3% grade. The north half of the existing Site consists of an excavated dirt lot adjacent to Fashion Square and Scottsdale Road. The site historically was developed as the Safari Hotel, imagery from the year 1999 is shown in the pre-development condition maps located in the Appendix. As is evident in the older aerial, the site was occupied with buildings and hardscape. After the Hotel's demolition and removal in 1999, the site remained as a dirt lot until 2014. The northern portion of the site was excavated as a borrow pit and remains in this condition today.

The north portion of the site is surrounded by Scottsdale Road, Coolidge Street, and Fashion Square, which are all improved streets with vertical curb and storm drain infrastructure. Scottsdale

Road slopes in a southerly direction past the Camelback Residential site towards Camelback Road. The project site is located within the study area of the Lower Indian Bend Wash Area Drainage Master Study/Plan (LIBW ADMS/P). Stormwater flows that impact the project site, including the flow along Camelback Road, have been derived from the study output. See Appendix G for supporting excerpts and documentation. The modelling results have been reviewed and are considered to be the most current and valid results within the study area to date. The purpose of this study was to provide a detailed flood hazard analysis within the 29 square mile LIBW watershed. According to the Maricopa County Flood Control District's FLO-2D analysis GIS map derived from the LIBW ADMP, approximately 5.7 CFS of runoff along the east half-street of Scottsdale Road overtops the grade break at the intersection of Coolidge Street. Based on field observation, this 5.7 CFS will enter existing catch basin inlets and storm drains along Coolidge Street, and will not impact the project Site. This Coolidge storm drain network conveys flow to the east and outfalls into the existing box culvert network, discussed below, which ultimately drains into the Camelback Road storm drain system. A remaining 43 CFS continues past Coolidge Street within Scottsdale Road. At the southwest corner of the site, the County's FLO-2D model shows 56 CFS total within the Scottsdale Road eastern half-street. Approximately 31 CFS flows past the intersection of Fashion Square entrance road/drive, where the remaining 25 CFS enters Fashion Square entrance road/drive, and then enter and cross the south half of the Camelback Residential site. Refer to Appendix G for the FLO-2D model results.

The south portion of the site historically sheet flows to the southeast toward the Arizona Canal and into an existing grated inlet and box culvert network that outfalls to the Camelback Road storm drain system, and is discussed below.

South of the site is the Arizona Canal, a ridge line/channel that acts as a drainage boundary for the drainage area upstream and including the site. There is a drainage swale and inlet structure system running along the north of the canal bank that captures runoff from the maintenance road along the canal and discharges it to an 8'x6' box culvert system and outfalls to the Camelback Road storm drain system. Some of the grate inlets are several feet in diameter and can capture a large amount of runoff. The previously approved drainage report for the Safari Drive development prepared by David Evans and Associates estimates that 324 CFS is conveyed over and within the box culverts along the Camelback Residential southern property line. However, based on the more recent Lower Indian Bend Wash FLO-2D analysis discussed above, there is only 25 CFS that enters the southern half of the site at the intersection of Scottsdale Road and Fashion Square. These flows are shown exiting the site along the canal at the existing grated inlet structures. The grated inlets collect the 25 CFS and convey it into the Camelback Road storm drain system.

3.0 FEMA FLOOD ZONE DESIGNATION

The current published FEMA Flood Insurance Rate Map (FIRM) panel that covers the Site is map number 04013C1770M with effective date of September 18th, 2020. It shows that a majority of the site falls under Zone X, and the southern portion near the canal is currently designated as Zone AH at

a BFE of 1277 feet (NAVD-88). The FIRMette of the corresponding effective FIRM is provided in Appendix B of this report.

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."

Zone AH is defined as "Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet."

Atwell, LLC has process a CLOMR application through the City of Scottsdale (plan check #4486-21) and FEMA (Case #22-09-0008R) to re-delineate a portion of the existing Zone AH on the property to Zone X, based on a preliminary plan of the Camelback Residential development. The CLOMR application has been approved. A copy of the CLOMR approval letter is included in Appendix H. The annotated FIRM in the CLOMR letter documents reflects the flood zone revision.

The basis of the CLOMR application includes providing compensatory storage volume in an underground stormwater retention system on the site. Adjacent to the Arizona Canal is an existing Flood Zone AH designation at a BFE of 1277 feet, which currently overlays the footprint of Building B. The CLOMR requests that the building and surrounding area be removed from the floodplain, as is illustrated in the construction documents accompanying this Report. Though fill is proposed within the current flood zone to protect the building finished floor, compensatory storage volume will be provided within an underground storage tank located within the fire lane adjacent to Building B. This underground storage tank will additionally provide the applicable onsite stormwater storage requirements as discussed in this report.

4.0 PROPOSED DRAINAGE MANAGEMENT PLAN

The proposed drainage concept is presented in three parts: off-site drainage, on-site drainage and retention requirements. See Exhibit A, located in the Appendix, for an illustration of the proposed drainage concept.

4.1 Off-site Drainage

The drainage areas surrounding the site will not be modified from existing patterns and their conveyance will be maintained along the respective historic paths. Runoff overflow from Scottsdale Road will be routed through the southwest portion of the project site using sheet flow, storm drains and/or street conveyance. Flows will ultimately outfall to the storm drain inlet structures adjacent to the canal, matching the historical drainage conditions today. Details will be provided with the final construction documents.

4.2 Swimming Pools

The project will include rooftop swimming pools. The backwash system will discharge to sanitary sewer and will not be connected to storm drain.

4.3 Underground Parking Structure

The project will have underground parking under each of the two building structures. The garage ramp entry elevations are set higher than the existing base flood elevation, as well as the adjacent 100-year peak flow water surface elevations. Nuisance runoff generated within the driveway ramps down into the garages will be collected and conveyed to mechanical devices to treat the first flush peak flow before it is pumped out to the adjacent sewer system as discussed in Section 4.4. The bottom of the garage entrance ramps will have a drain that discharges to sewer via the internal plumbing system. Pumps will be designed by the building mechanical engineer.

4.4 On-site Drainage Conveyance

On-site improvements include two buildings extending across the property with surrounding hardscape and landscape areas, and the realignment of the existing private road Fashion Square within the project parcel boundary.

The Camelback Residential site runoff will mostly be generated on-site from roof areas and hardscape areas surrounding the proposed buildings. The runoff generated on roofs will be conveyed into roof drains and subsequent storm drains that direct the runoff into the proposed retention storage system. Nuisance stormwater located within landscape areas surrounding the proposed buildings will be directed via storm drain inlets and/or drainage swales into the Camelback Residential storm drain and underground retention system. Any runoff collected within the underground parking garages will be collected and conveyed to mechanical devices to treat the first flush peak flow before it is pumped out to the adjacent sewer system. Runoff in the garages is therefore not accounted for in the peak flow calculations within this report.

Runoff generated within the south portion of Fashion Square will be conveyed via sheet flow and curb and gutter to catch basin inlets that drain into an underground retention storage system. Two separate storm drains are proposed to bleed off the underground retention system. The first of which is an 8” pipe with 6” orifice plate that matches the invert of the underground storage system, which provides 1 CFS capacity to drain the onsite-generated pre-vs.-post retention volume within the required 36 hours. A second pipe at 30” diameter, with the crown set to match the crown of the underground retention system, is proposed to provide a 25 CFS discharge capacity. The 30” pipe allows compensatory flood volume to enter the underground system, while providing capacity for offsite flows to discharge into the Canal’s side ditch. Both the 8” bleed-off pipe and 30” pipe are designed to outfall into storm drain manholes which ultimately connect to the existing Flood Control/USACE drain inlet along the Canal side channel. Refer to Appendix E for this storm drain layout in the Preliminary Grading and Drainage Plan. This design allows onsite and offsite flows to reach their historic outfall location without negatively impacting adjacent or downstream properties and maintains existing conditions.

4.5 Lowest Floor Elevation

The finished floors of the proposed Building A – “Hazel” will be set higher than the adjacent 100-year water surface elevation within Scottsdale Road, and Building B – “Hazel” is designed to be

6” higher than the weir-over elevation along the Arizona Canal and 12” minimum higher than the 100-year Floodplain water surface elevation. A separate analysis was performed using the 100-year 6-hour FLO-2D result output flows within Scottsdale Road for comparison to the adjacent finished floor elevations within Building A. Cross-sections were used to compare the water surface elevation adjacent to each of Building A’s finished floor elevations; it is Atwell’s opinion that the water surface table being below FFE by at least 6 inches, the flow would need to be more than doubled to reach the FFE. Therefore, the FFE will be free from inundation during 100-year storm events with no changes to upstream conditions.

4.6 Onsite Stormwater Storage and First Flush Mitigation Requirements

Since the Site has been previously developed, the stormwater storage requirements will be based on post minus pre storm runoff volume of 100-year, 2-hour storm, in addition to any existing stormwater storage on the Site. Additionally, when first flush mitigation requirements are accommodated through storing the first flush volume, such as the case for this project, the ultimate stormwater storage requirements will be based on the higher requirements of the two. Impervious area in the pre-development condition, being the Safari Hotel, is similar to the proposed Camelback Residential site and therefore only minor retention volume is required to be compensated for. The calculations for first flush and pre-vs.-post runoff for Buildings A and B (Hazel & Azure) are included in the Appendix C. The first flush storage requirements for Building A – “Hazel” and B – “Azure” are summarized in the next section. The underground stormwater storage system will be designed to meet all requirements per the City of Scottsdale DS&PM, 2018.

4.7 Project Phasing

No phasing is proposed for the Camelback Residential project. However, the construction documents for Building A and Building B, “Hazel and Azure,” are being submitted under separate permit. The two developments are expected to be built simultaneously and therefore no interim conditions are considered in this Report.

4.8 Pre-vs.-Post Stormwater Storage Volume Analysis

The Camelback Residential project will provide underground retention capacity for the pre-vs.-post runoff volume. The required pre-vs.-post volume is based on the following equation:

$$V_R = \Delta C * (R/12) * A$$

Where: V_R = Volume of retention required
C = Weighted runoff coefficient
R = Precipitation depth for the 100-year, 2-hour storm = 2.42 inches
A = Site are in square feet = 104,553 SF

4.9 First Flush Volume Analysis

Prior to discharging into the existing storm drain inlet and underground box culvert, runoff will be pre-treated via a mechanical device after passing through the 8" bleed-off pipe. This will be designed and detailed further in the final grading and drainage plan. The first flush volume shall be calculated using the following formula:

$$V_R = C*P*A,$$

Where: V_R = the required first flush storage volume, in cubic feet;
C = the weighted average runoff coefficient for the disturbed area of the proposed development;
P = the required precipitation depth of 0.5 inches, converted to feet; and
A = the disturbed area of the proposed development, in square feet.

4.10 ADEQ Water Quality Requirements

The project site is over 1 acre, therefore, an NOI will be submitted to ADEQ and an approved NOI Certification from ADEQ with an AZCON number will submitted during the Final Improvement Plans.

5.0 ONSITE HYDROLOGIC ANALYSIS

The hydrologic analysis for this report was prepared using City of Scottsdale's *Supplement to MAG Uniform Standard Specifications for Public Works Construction* and the *Drainage Design Manuals for Maricopa County, Arizona, Hydrology*. Peak flows were computed using the Rational Method. The project area was divided into several drainage areas to determine peak flows at outfall locations from the project site for the pre and post development. The weighted C values for the pre-development condition has been determined by using historical aerial photography from Maricopa County Assessor.

The following establishes the Rational Method equation and the basic input data required:

$$Q = C_{wt} * I * A$$

Where: Q = Peak discharge in cubic feet per second
C_{wt} = Weighted runoff coefficient =0.73 post and 0.69 pre
I = Rainfall intensity in inches per hour
A = Drainage area in acres

A summary of peak flows for the 100-year (Q_{100}) storm event for the existing off-site drainage conditions are shown in the following Table 4.1. Table 4.2 shows the onsite peak flows for the 10-year (Q_{10}) and 100-year (Q_{100}) storm events.

Table 4.1
Summary of Existing Offsite Peak Flows – Lower Indian Bend Wash Study

Drainage Area	Q_{100} (cfs)
Building A	5.7
Building B	25

Table 4.2
Summary of Onsite Proposed Peak Flows

Drainage Area	Q_{10} (cfs)	Q_{100} (cfs)
A1	1.92	3.09
A3	0.85	1.45
B1	2.94	4.65
B3	0.94	1.48
B4	0.14	0.22
B5	0.52	0.82
B6	0.23	0.36
B7	0.36	0.56
A2-1	3.43	5.43
A2-2	3.48	5.51
EX-1	0.44	0.69

Appendix C contains detailed calculation sheets that establish the input data and estimated peak flow values for the existing and proposed drainage areas.

5.0 HYDRAULIC ANALYSIS

The hydraulic analyses of the proposed storm water management facilities are based on the City of Scottsdale's *Supplement to MAG Uniform Standard Specifications for Public Works Construction* and the *Drainage Design Manuals for Maricopa County, Arizona, Hydraulics*.

FlowMaster, a Bentley computer program, has been utilized to analyze the hydraulic capacity for the adjacent Fashion Square private street, and to determine the 100-year high water surface elevations under existing and developed conditions. Additionally, FlowMaster and StormCAD

have been utilized to analyze the hydraulic capacity of the proposed storm drain systems. FlowMaster analysis is based on Manning's equation. Peak flows to be used in this analysis are based on the Rational Method. Refer to the Onsite Drainage Map for contributing areas used in the peak flow calculations. Refer to Rational Analysis in Appendix D for peak flow calculations.

6.0 CONCLUSIONS

Based on the results of this study, it can be concluded that:

- The site will be developed according to the City of Scottsdale Design Standards and Policies Manual.
- The proposed finished floor elevations are designed to be safe from inundation from 100-year storm event high water surface elevations.
- Retention onsite for greater of pre-vs.-post and first flush requirements is compensated for per the latest version of the City of Scottsdale Design Standards & Policies Manual.
- The site will retain the first flush runoff volume.
- Proposed drainage conditions will match existing drainage conditions to maintain the historic outfall conditions as closely as possible.
- The disturbed area of the project site is over 1 acre, therefore an NOI and SWPPP is required through ADEQ.

7.0 REFERENCES

1. City of Scottsdale Design Standards and Policies Manual, January 2018.
2. City of Scottsdale *Supplement to MAG Uniform Standard Specifications for Public Works Construction, December 2020*.
3. Maricopa County Drainage Design Manual, Hydrology, Flood Control District of Maricopa County, 2018.
4. Maricopa County Drainage Design Manual, Hydraulics, Flood Control District of Maricopa County, 2018.

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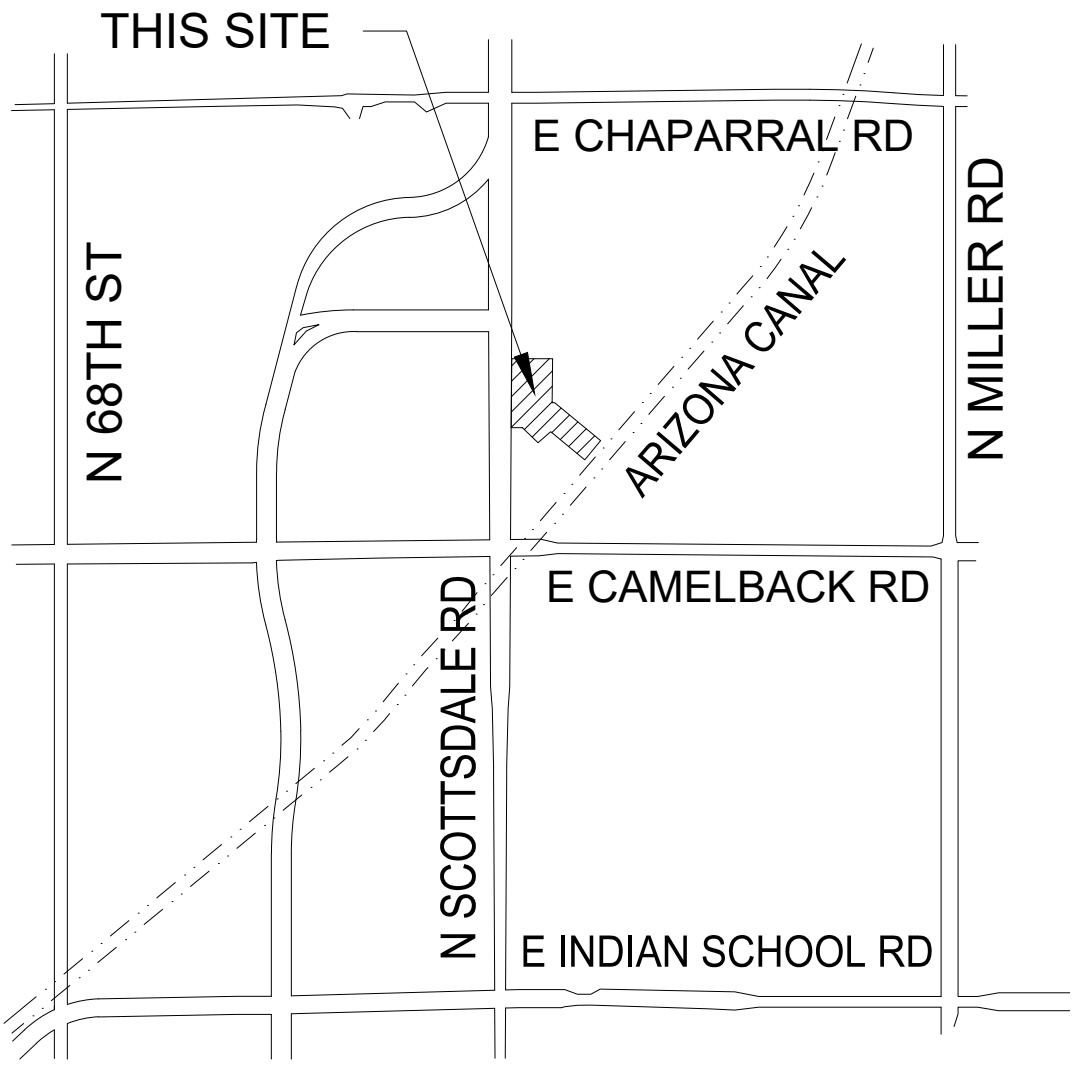
APPENDIX A
EXHIBITS



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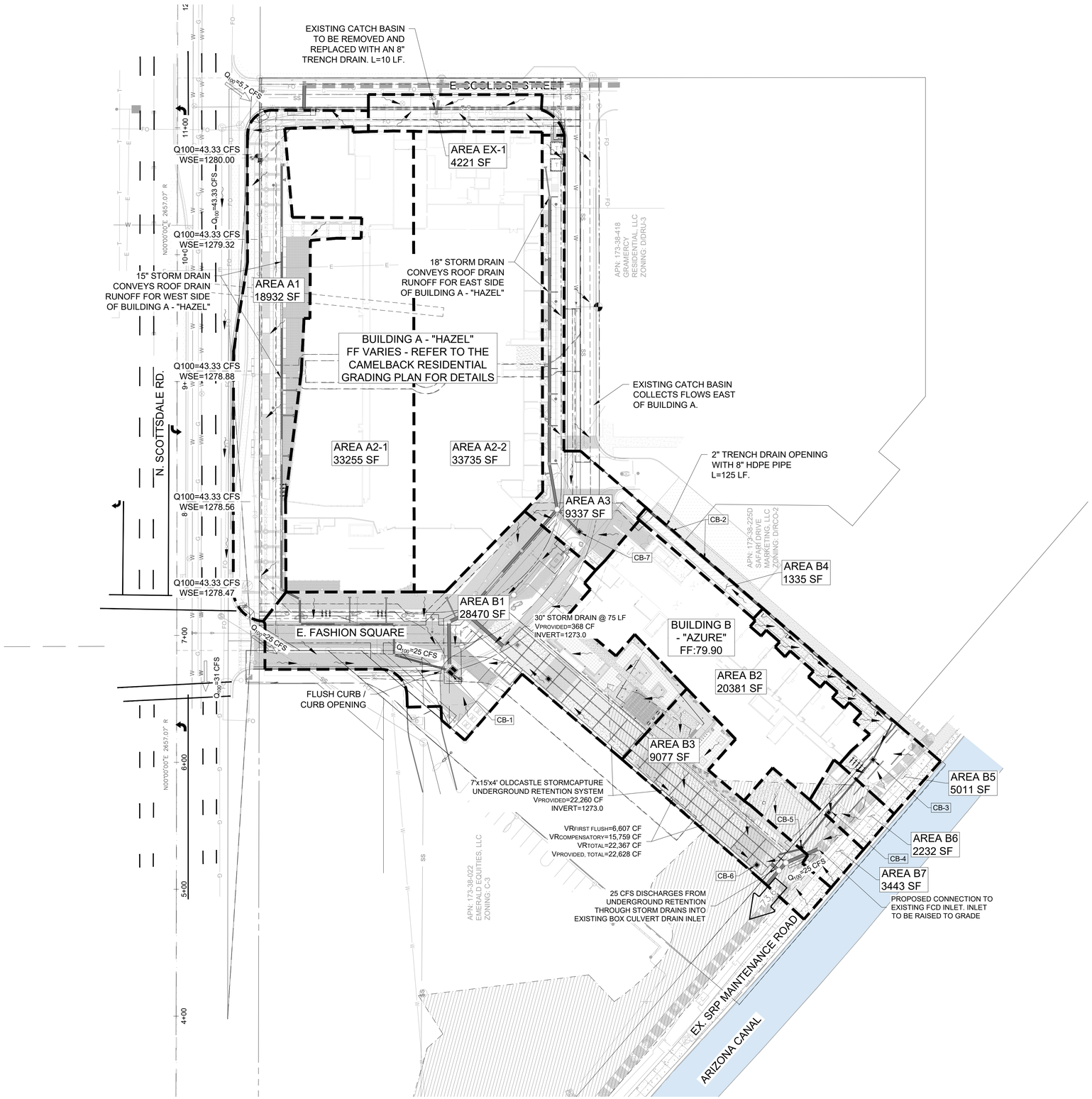
4700 E. SOUTHERN AVENUE
MESA, AZ 85206
480.218.8831

EXHIBIT A
VICINITY MAP

Camelback Residential

SCOTTSDALE, AZ



LEGEND

- AREA A1 — DRAINAGE SUBBASIN
- FLOW DIRECTION
- Q_{100}=XX CFS — OFFSITE FLOW
- 73.6 — ULTIMATE OUTFALL

N

40 20 0 40 80

GRAPHIC SCALE
1" = 40'

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR; NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

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ONSITE DRAINAGE MAP

DRAINAGE REPORT
CAMELBACK RESIDENTIAL
SCOTTSDALE, ARIZONA

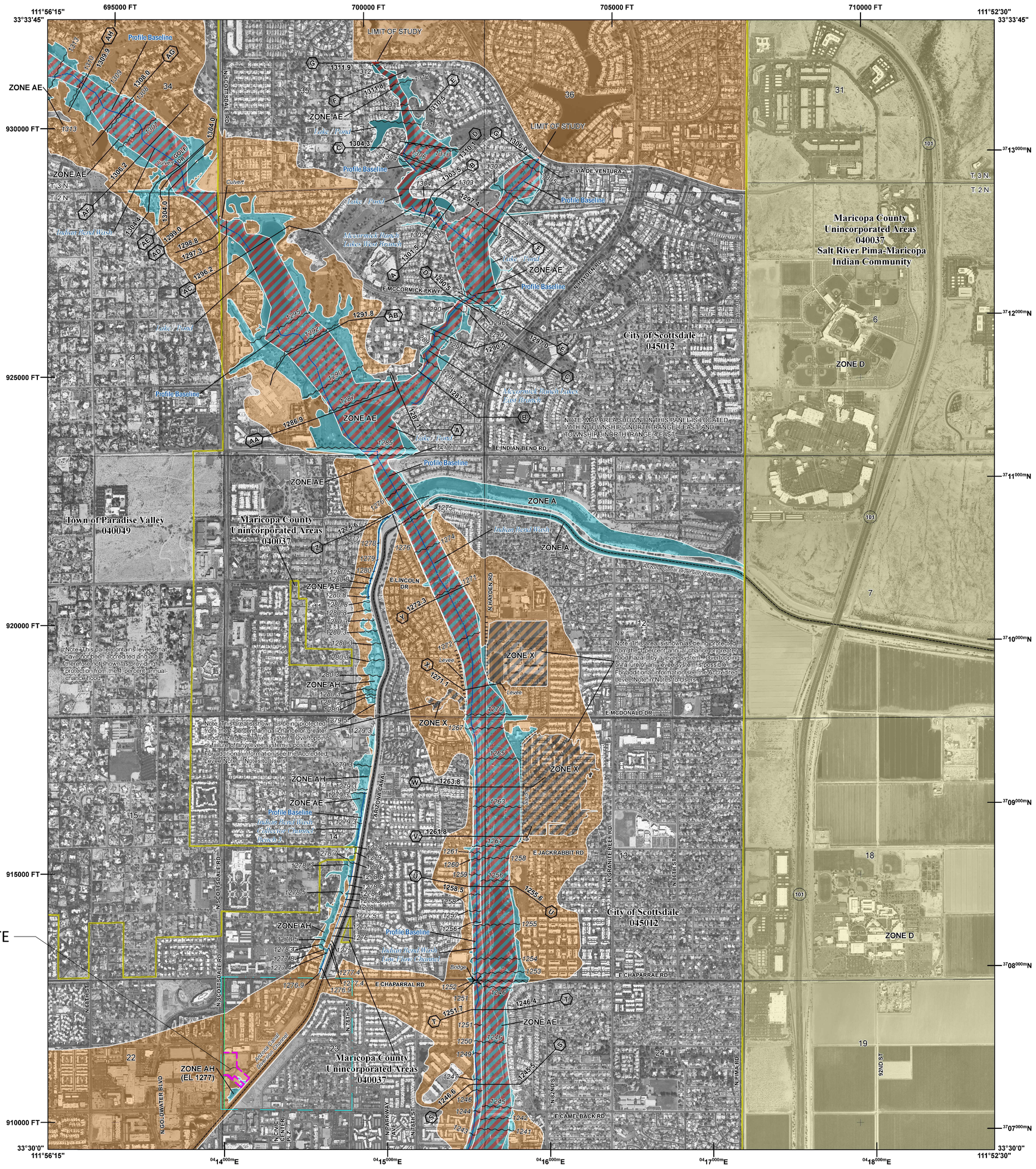
Know what's below. Call before you dig.

REVISIONS:

PM.	BH
DR.	TLC
JOB NO.	21000702
FILE NO.	21000702-Onsite Drainage Map

SHEET NO.
01 OF 01

APPENDIX B
FLOOD INSURANCE RATE MAP



FLOOD HAZARD INFORMATION

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

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- 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
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

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

OTHER FEATURES
- E 18.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 — Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was derived from U.S. Census Bureau TIGER files, dated 2014, and digital data provided by the Flood Control District of Maricopa County. Digital orthophotograhy was provided by the Flood Control District of Maricopa County. The imagery was flown in Fall 2013 and was produced with a 0.8 foot ground sample distance.

ACCREDITED LEVEE NOTES TO USERS: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/national-flood-insurance-program.

SCALE

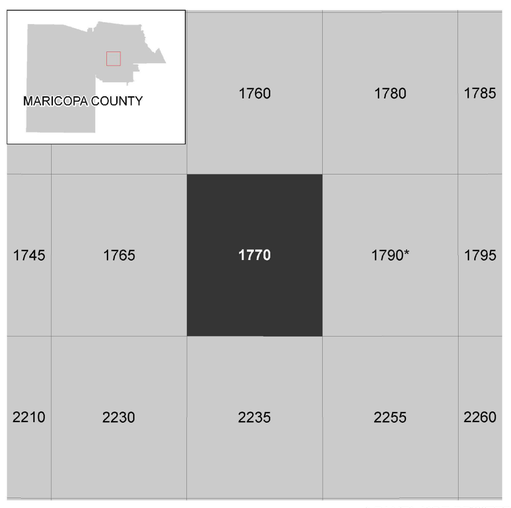
Map Projection:
NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl.
Western Hemisphere; Vertical Datum: NAVD88

1 inch = 1,000 feet 1:12,000

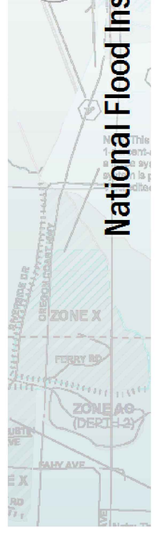
0 1,000 2,000 4,000 feet

0 250 500 1,000 meters

PANEL LOCATOR



* PANEL NOT PRINTED



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

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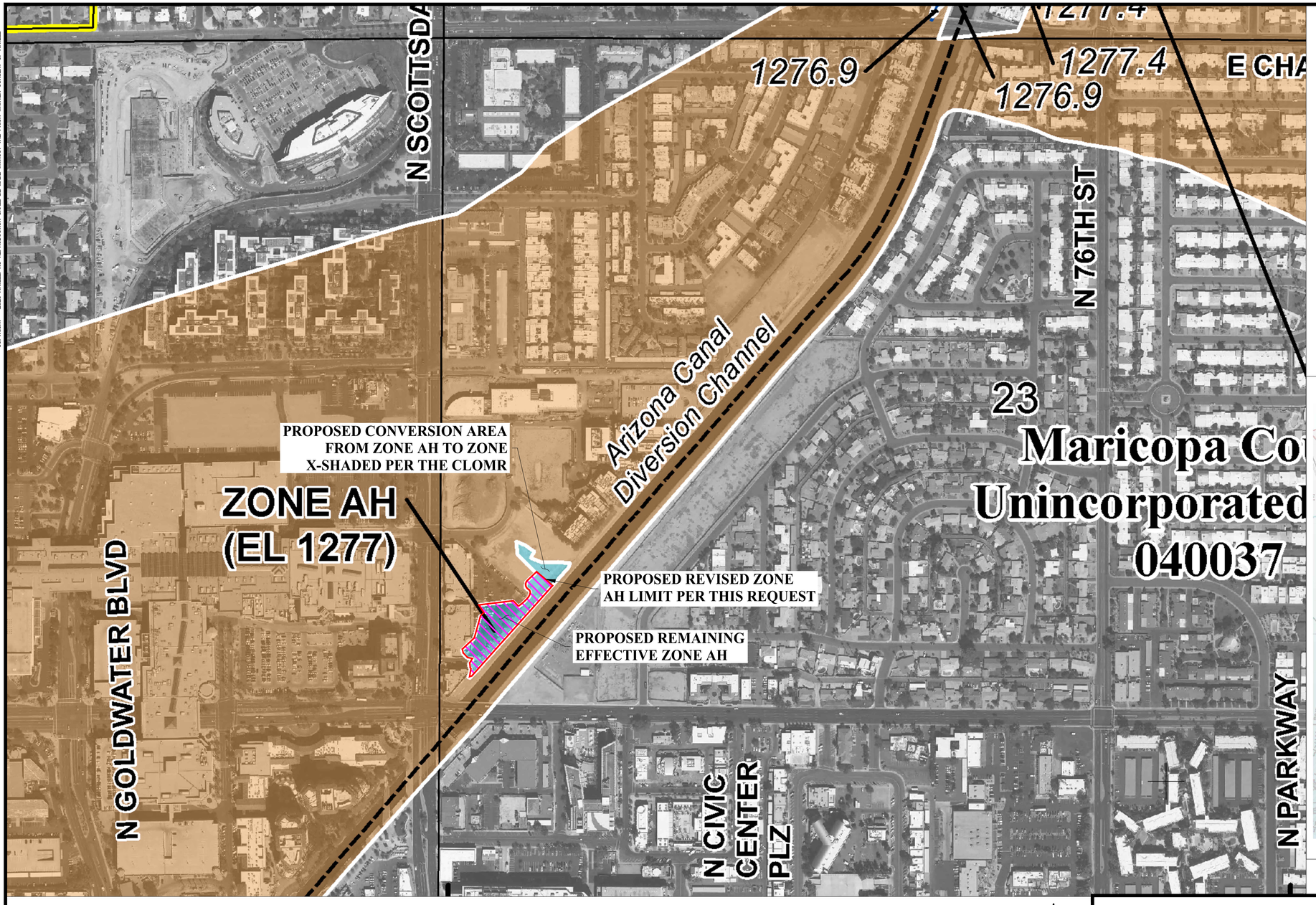
FEMA FIRM PANEL

ZOM BLUESKY
CLOMR
SCOTTSDALE, AZ



LEGEND

- EFFECTIVE FLOODPLAIN (AS OF FEMA FIRM 04013C1770M)
- REVISED FLOODPLAIN (PER THIS REQUEST)

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

500 0 500 1,000
Scale Feet

NOT FOR CONSTRUCTION

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EXHIBIT 3
ANNOTATED FIRM PANEL
ZOM BLUESKY

SCOTTSDALE, AZ

APPENDIX C
HYDROLOGIC CALCULATIONS AND DATA SHEETS

NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, USA*
Latitude: 33.5044°, Longitude: -111.925°
Elevation: 1278.56 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** (0.154-0.225)	**0.241** (0.203-0.294)	**0.328** (0.273-0.398)	**0.394** (0.327-0.476)	**0.484** (0.394-0.582)	**0.553** (0.445-0.662)	**0.624** (0.493-0.744)	**0.696** (0.540-0.830)	**0.792** (0.599-0.946)	**0.866** (0.642-1.04)
10-min	**0.281** (0.235-0.342)	**0.367** (0.308-0.448)	**0.498** (0.416-0.605)	**0.599** (0.497-0.725)	**0.736** (0.600-0.885)	**0.841** (0.677-1.01)	**0.949** (0.750-1.13)	**1.06** (0.822-1.26)	**1.21** (0.912-1.44)	**1.32** (0.977-1.58)
15-min	**0.348** (0.291-0.424)	**0.455** (0.382-0.555)	**0.618** (0.515-0.751)	**0.743** (0.616-0.898)	**0.912** (0.744-1.10)	**1.04** (0.839-1.25)	**1.18** (0.929-1.40)	**1.31** (1.02-1.57)	**1.49** (1.13-1.78)	**1.63** (1.21-1.95)
30-min	**0.468** (0.392-0.572)	**0.612** (0.515-0.747)	**0.832** (0.694-1.01)	**1.00** (0.829-1.21)	**1.23** (1.00-1.48)	**1.40** (1.13-1.68)	**1.58** (1.25-1.89)	**1.77** (1.37-2.11)	**2.01** (1.52-2.40)	**2.20** (1.63-2.63)
60-min	**0.579** (0.485-0.707)	**0.757** (0.637-0.925)	**1.03** (0.859-1.25)	**1.24** (1.03-1.50)	**1.52** (1.24-1.83)	**1.74** (1.40-2.08)	**1.96** (1.55-2.34)	**2.19** (1.70-2.61)	**2.49** (1.88-2.97)	**2.72** (2.02-3.26)
2-hr	**0.672** (0.572-0.804)	**0.871** (0.741-1.04)	**1.16** (0.986-1.39)	**1.39** (1.16-1.65)	**1.70** (1.40-2.00)	**1.93** (1.58-2.28)	**2.17** (1.75-2.56)	**2.42** (1.91-2.85)	**2.75** (2.12-3.24)	**3.01** (2.27-3.56)
3-hr	**0.735** (0.622-0.886)	**0.942** (0.801-1.14)	**1.24** (1.05-1.49)	**1.47** (1.23-1.76)	**1.80** (1.48-2.14)	**2.06** (1.68-2.45)	**2.33** (1.86-2.77)	**2.62** (2.05-3.10)	**3.01** (2.29-3.57)	**3.33** (2.47-3.95)
6-hr	**0.884** (0.764-1.04)	**1.12** (0.970-1.32)	**1.44** (1.24-1.69)	**1.69** (1.44-1.97)	**2.03** (1.71-2.36)	**2.30** (1.91-2.66)	**2.58** (2.11-2.99)	**2.86** (2.30-3.32)	**3.25** (2.55-3.78)	**3.56** (2.72-4.15)
12-hr	**0.987** (0.862-1.15)	**1.25** (1.09-1.45)	**1.58** (1.37-1.83)	**1.84** (1.59-2.13)	**2.19** (1.87-2.53)	**2.46** (2.08-2.83)	**2.74** (2.28-3.16)	**3.02** (2.48-3.48)	**3.40** (2.72-3.94)	**3.70** (2.90-4.31)
24-hr	**1.17** (1.04-1.33)	**1.49** (1.33-1.70)	**1.94** (1.71-2.20)	**2.28** (2.02-2.59)	**2.77** (2.43-3.14)	**3.15** (2.74-3.56)	**3.55** (3.07-4.01)	**3.97** (3.40-4.48)	**4.54** (3.85-5.13)	**4.99** (4.19-5.66)
2-day	**1.27** (1.13-1.44)	**1.62** (1.44-1.84)	**2.13** (1.89-2.41)	**2.54** (2.24-2.87)	**3.10** (2.73-3.51)	**3.55** (3.10-4.02)	**4.03** (3.50-4.56)	**4.53** (3.90-5.12)	**5.22** (4.44-5.92)	**5.78** (4.87-6.57)
3-day	**1.34** (1.19-1.53)	**1.72** (1.53-1.95)	**2.26** (2.00-2.56)	**2.70** (2.38-3.05)	**3.32** (2.91-3.74)	**3.81** (3.32-4.30)	**4.34** (3.75-4.90)	**4.89** (4.20-5.53)	**5.67** (4.81-6.41)	**6.30** (5.29-7.14)
4-day	**1.42** (1.26-1.61)	**1.82** (1.61-2.06)	**2.40** (2.12-2.71)	**2.87** (2.52-3.23)	**3.53** (3.09-3.98)	**4.07** (3.54-4.59)	**4.64** (4.01-5.23)	**5.25** (4.50-5.93)	**6.12** (5.17-6.90)	**6.82** (5.70-7.70)
7-day	**1.58** (1.40-1.80)	**2.02** (1.79-2.29)	**2.67** (2.36-3.02)	**3.19** (2.81-3.61)	**3.94** (3.44-4.45)	**4.54** (3.94-5.12)	**5.17** (4.46-5.84)	**5.85** (5.01-6.61)	**6.81** (5.75-7.70)	**7.58** (6.34-8.59)
10-day	**1.71** (1.52-1.94)	**2.19** (1.95-2.48)	**2.90** (2.56-3.27)	**3.46** (3.05-3.90)	**4.25** (3.73-4.79)	**4.89** (4.26-5.49)	**5.57** (4.82-6.25)	**6.28** (5.39-7.06)	**7.27** (6.17-8.18)	**8.07** (6.78-9.10)
20-day	**2.11** (1.88-2.37)	**2.71** (2.41-3.05)	**3.58** (3.18-4.02)	**4.24** (3.75-4.76)	**5.13** (4.52-5.75)	**5.81** (5.10-6.51)	**6.50** (5.68-7.30)	**7.21** (6.27-8.10)	**8.16** (7.03-9.19)	**8.89** (7.60-10.0)
30-day	**2.46** (2.18-2.77)	**3.17** (2.81-3.57)	**4.18** (3.70-4.69)	**4.95** (4.37-5.54)	**5.98** (5.25-6.70)	**6.77** (5.93-7.57)	**7.58** (6.61-8.48)	**8.41** (7.29-9.40)	**9.52** (8.20-10.7)	**10.4** (8.87-11.6)
45-day	**2.85** (2.54-3.20)	**3.67** (3.27-4.12)	**4.84** (4.31-5.43)	**5.70** (5.06-6.39)	**6.84** (6.06-7.66)	**7.70** (6.79-8.63)	**8.57** (7.52-9.61)	**9.43** (8.25-10.6)	**10.6** (9.18-11.9)	**11.4** (9.87-12.9)
60-day	**3.15** (2.82-3.53)	**4.07** (3.64-4.55)	**5.35** (4.78-5.98)	**6.28** (5.59-7.02)	**7.50** (6.66-8.37)	**8.40** (7.43-9.38)	**9.30** (8.20-10.4)	**10.2** (8.94-11.4)	**11.3** (9.90-12.7)	**12.2** (10.6-13.7)

[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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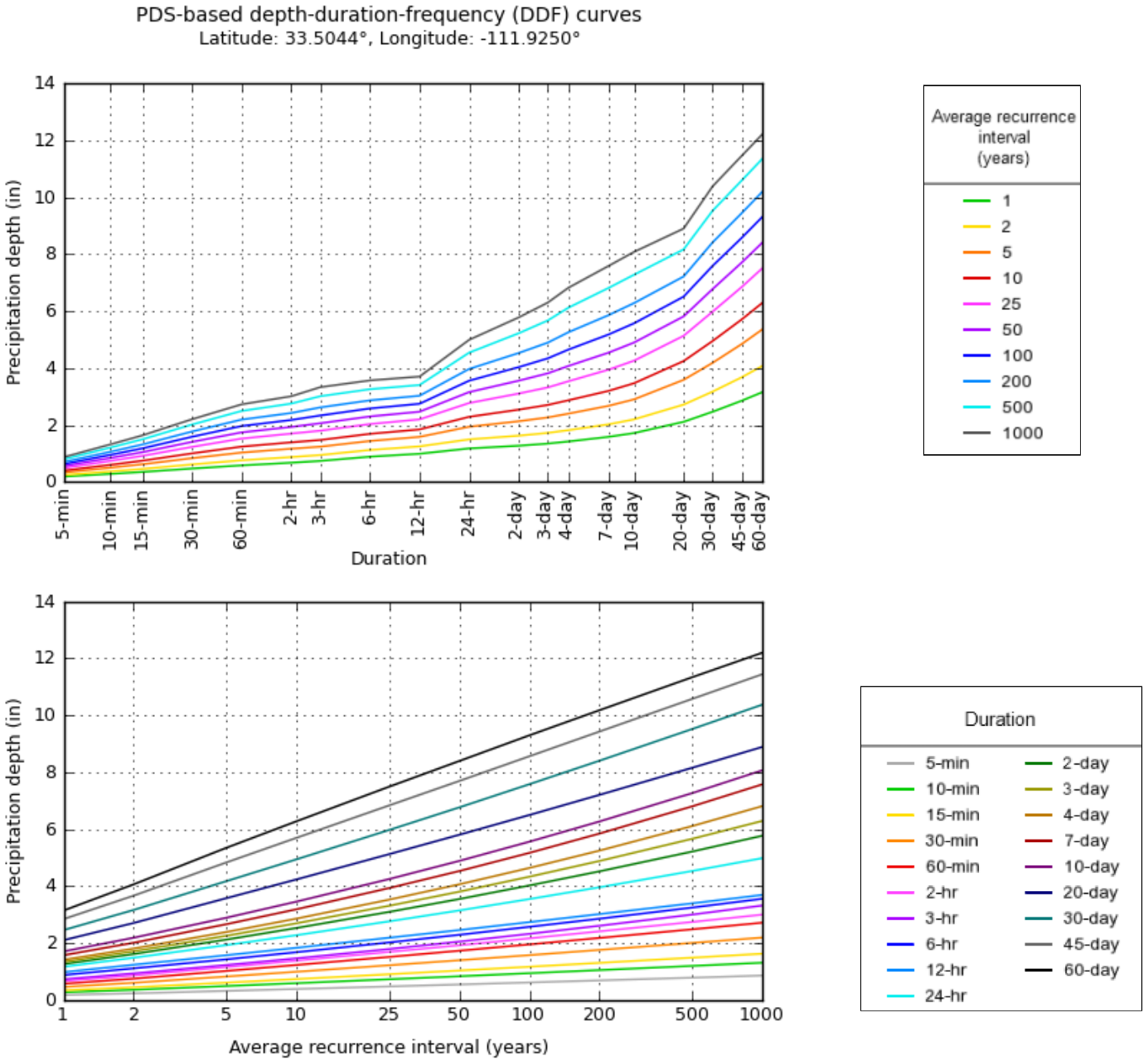
PF graphical



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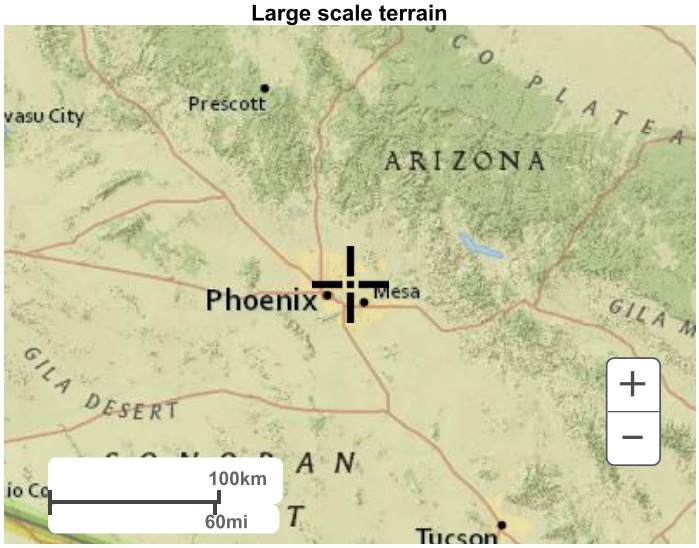
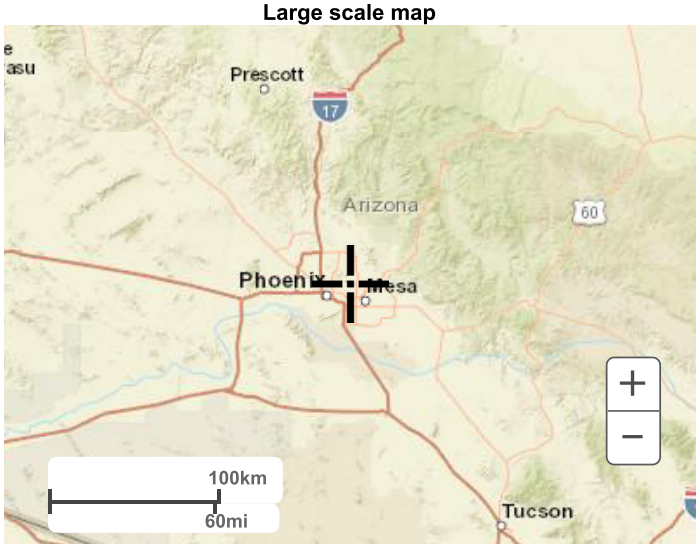
Maps & aerials

Small scale terrain

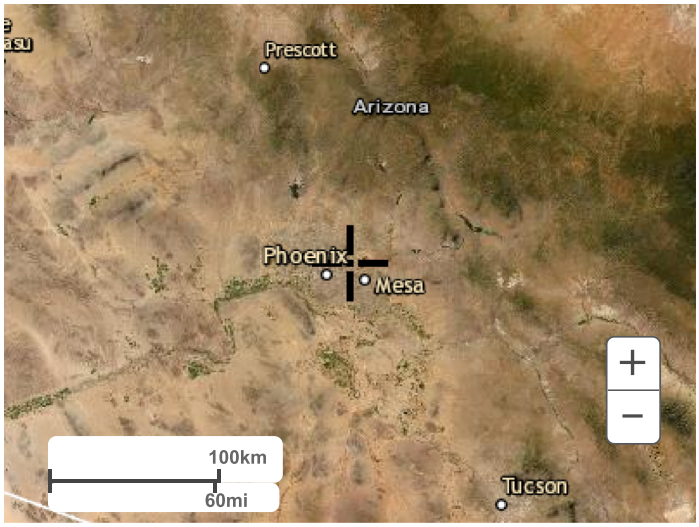
Large scale terrain



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?: HDSC.Questions@noaa.gov

Disclaimer

Rainfall Data

Project Name: ATWELL Project Number: 21000702
Prepared By: NPC
Date: 6/29/2021

Site Specific Rainfall data

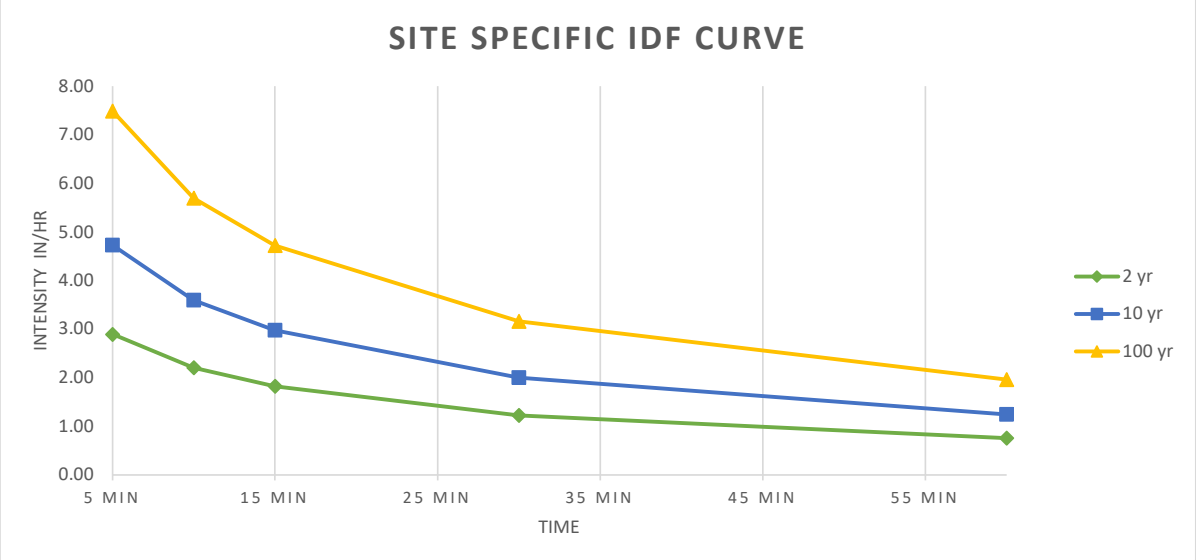
Storm Event Return Period

Duration	1 yr	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr	200 yr	500 yr	1,000 yr
5 min	0.184	0.241	0.328	0.394	0.484	0.553	0.624	0.696	0.792	0.866
10 min	0.281	0.367	0.498	0.599	0.736	0.841	0.949	1.06	1.21	1.32
15 min	0.348	0.455	0.618	0.743	0.912	1.04	1.18	1.31	1.49	1.63
30 min	0.468	0.612	0.832	1	1.23	1.4	1.58	1.77	2.01	2.2
60 min	0.579	0.757	1.03	1.24	1.52	1.74	1.96	2.19	2.49	2.72
2 hr	0.672	0.871	1.16	1.39	1.7	1.93	2.17	2.42	2.75	3.01
3 hr	0.735	0.942	1.24	1.47	1.8	2.06	2.33	2.62	3.01	3.33
6 hr	0.884	1.12	1.44	1.69	2.03	2.3	2.58	2.86	3.25	3.56
12 hr	0.987	1.25	1.58	1.84	2.19	2.46	2.74	3.02	3.4	3.7
24 hr	1.17	1.49	1.94	2.28	2.77	3.15	3.55	3.97	4.54	4.99

Site Specific IDF Curve

Storm Event Return Period

Time	1 yr	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr	200 yr	500 yr	1,000 yr
5 min	2.21	2.89	3.94	4.73	5.81	6.64	7.49	8.35	9.50	10.39
10 min	1.69	2.20	2.99	3.59	4.42	5.05	5.69	6.36	7.26	7.92
15 min	1.39	1.82	2.47	2.97	3.65	4.16	4.72	5.24	5.96	6.52
30 min	0.94	1.22	1.66	2.00	2.46	2.80	3.16	3.54	4.02	4.40
60 min	0.58	0.76	1.03	1.24	1.52	1.74	1.96	2.19	2.49	2.72
2 hr	0.34	0.44	0.58	0.70	0.85	0.97	1.09	1.21	1.38	1.51
3 hr	0.25	0.31	0.41	0.49	0.60	0.69	0.78	0.87	1.00	1.11
6 hr	0.15	0.19	0.24	0.28	0.34	0.38	0.43	0.48	0.54	0.59
12 hr	0.08	0.10	0.13	0.15	0.18	0.21	0.23	0.25	0.28	0.31
24 hr	0.05	0.06	0.08	0.10	0.12	0.13	0.15	0.17	0.19	0.21



Project: Zom Bluesky
Prepared By: Atwell, LLC
Date: 6/9/2022

Zom Bluesky - Building A Retention Calculations

FIRST FLUSH VOLUME REQUIREMENT

Area, A (SF)	Precipitation Depth, P (inches)	Runoff Coefficient, C		Volume Required (ft^3)	Volume Required (Ac-ft)
110940.0	0.5	0.95		4,391	0.10
First Flush Volume, V = C*P*A, Where;					
C = Average runoff coefficient					
P = Precipitation Depth			***Required***	**4,391**	**0.10**
A = Disturbed Area					

PRE-VS.-POST CALCULATIONS

PRE-CONDITION VOLUME REQUIREMENT

Type	Area (ft^2)	Area (Ac)	'C' Coefficient C	Precipitation (Inches)	Retention Required (ft^3)	Retention Required (Ac-ft)
Rooftop	54,690	1.26	0.95	2.17	9,395	0.22
Pavement/Concrete	39,693	0.91	0.95	2.17	6,819	0.16
Landscaped	13,288	0.31	0.45	2.17	1,081	0.02
Total	107,671	2.47			**17,296**	**0.40**

POST-CONDITION VOLUME REQUIREMENT

Type	Area (ft^2)	Area (Ac)	'C' Coefficient C	Precipitation (Inches)	Retention Required (ft^3)	Retention Required (Ac-ft)
Rooftop	66,500	1.53	0.95	2.17	11,424	0.26
Pavement/Concrete	44,440	1.02	0.95	2.17	7,634	0.18
Total	110,940	2.55	0.95		**19,059**	**0.44**

Pre-Condition Volume Required	17,296	0.40
Post-Condition Volume Required	19,059	0.44
Total Pre-vs.-Post Retention Volume Required	**1,763**	**0.04**
****Total First Flush Volume Required***	**4,391**	**0.10**

*First flush is the controlling volume requirement for the Building A site.

Prepared By: Atwell, LLC
Date: 6/9/2022

Zom Bluesky - Building B Retention Calculations

FEMA FLOOD ZONE AH COMPENSATORY VOLUME REQUIRED

Elevation	Delta Depth (ft)	Surface Area (ft^2)*	Volume Provided *(ft^3)	Σ (ft^3)	(Ac-ft)	Σ (Ac-ft)
77.0	1.0	12,652	9,153	15,759	0.21	0.36
76.0	1.0	6,055	4,243	6,606	0.10	0.15
75.0	1.0	2,661	1,794	2,363	0.04	0.05
74.0	1.0	1,050	519	569	0.01	0.01
73.0	0.9	133	50	50	0.00	0.00
72.1		8	0	*0*	0.00	*0.00*
		Total Volume Displaced:		15,759		0.36

**Area and volume displacement computations per AutoCAD Civil 3D, 2020 edition.*

FEMA Flood Zone AH HWE
1277.00

FIRST FLUSH VOLUME REQUIREMENT

Area, A (SF)	Precipitation Depth, P (inches)	Runoff Coefficient, C	Volume Required (ft^3)	(Ac-ft)
56215.0	0.5	0.95	2,216	0.05

First Flush Volume, V = C*P*A, Where;
C = Average runoff coefficient
P = Precipitation Depth
A = Disturbed Area

Required **2,216** **0.05**

PRE-CONDITION VOLUME REQUIREMENT

Type	Area (ft^2)	Area (Ac)	'C' Coefficient C	Precipitation (Inches)	Retention Required (ft^3)	Retention Required (Ac-ft)
Pavement/Concrete	22,231	0.51	0.95	2.17	3,819	0.09
Landscaped	18,582	0.43	0.45	2.17	1,512	0.03
Total	58,001	1.33			**8,284**	**0.19**

POST-CONDITION VOLUME REQUIREMENT

Type	Area (ft^2)	Area (Ac)	'C' Coefficient C	Precipitation (Inches)	Retention Required (ft^3)	Retention Required (Ac-ft)
Rooftop	24,112	0.55	0.95	2.17	4,142	0.10
Pavement/Concrete	31,655	0.73	0.95	2.17	5,438	0.12
Desert Landscaped	448	0.01	0.45	2.17	36	0.00
Total	56,215	1.29	0.95		**9,617**	**0.22**

Pre-Condition Volume Required	8,284	0.19
Post-Condition Volume Required	9,617	0.22
Total Pre-vs.-Post Retention Volume Required	**1,333**	**0.03**
****Total First Flush Retention Volume Required***	**2,216**	**0.05**

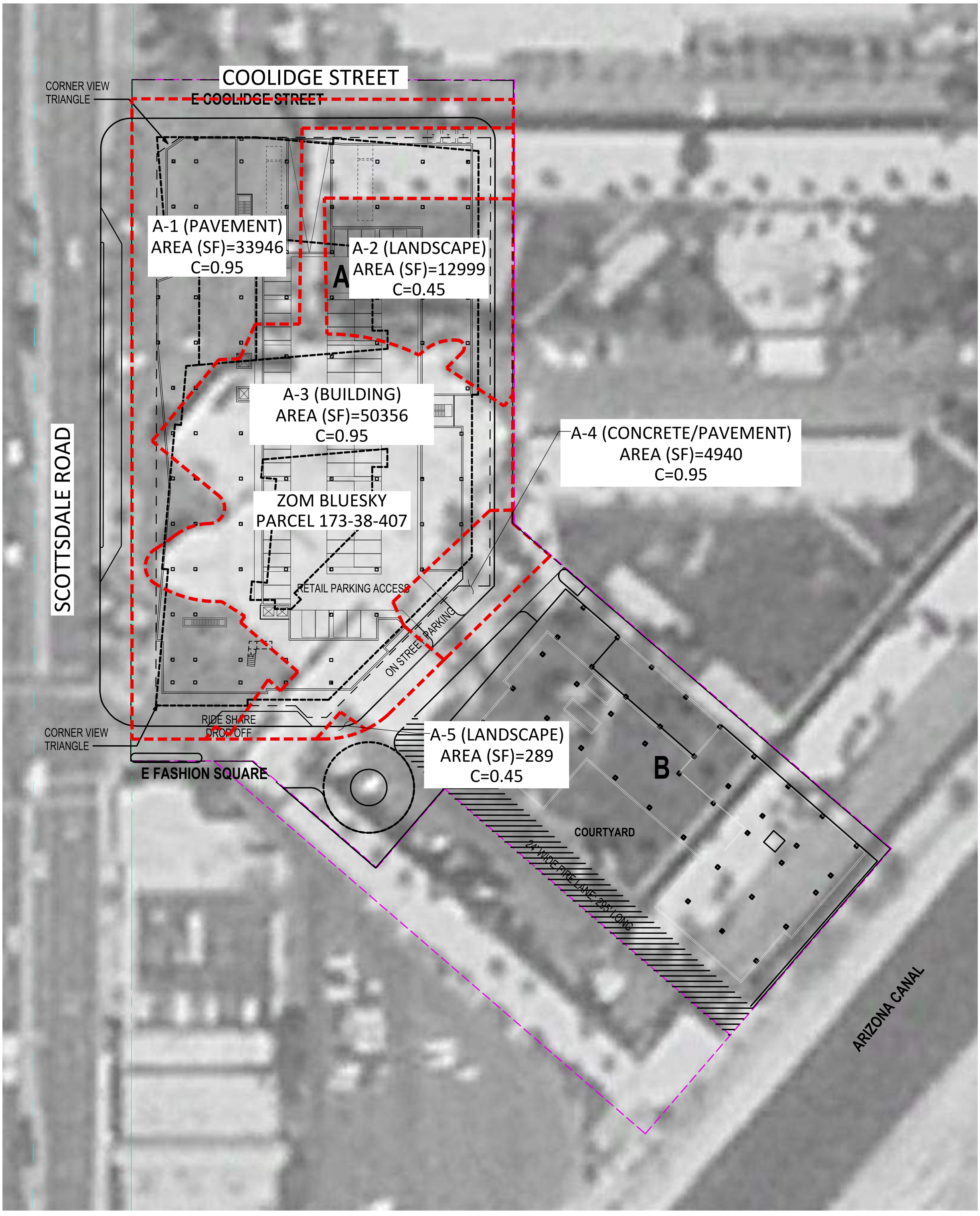
*First flush is the controlling volume requirement for the Building B site.

UNDERGROUND RETENTION VOLUME PROVIDED

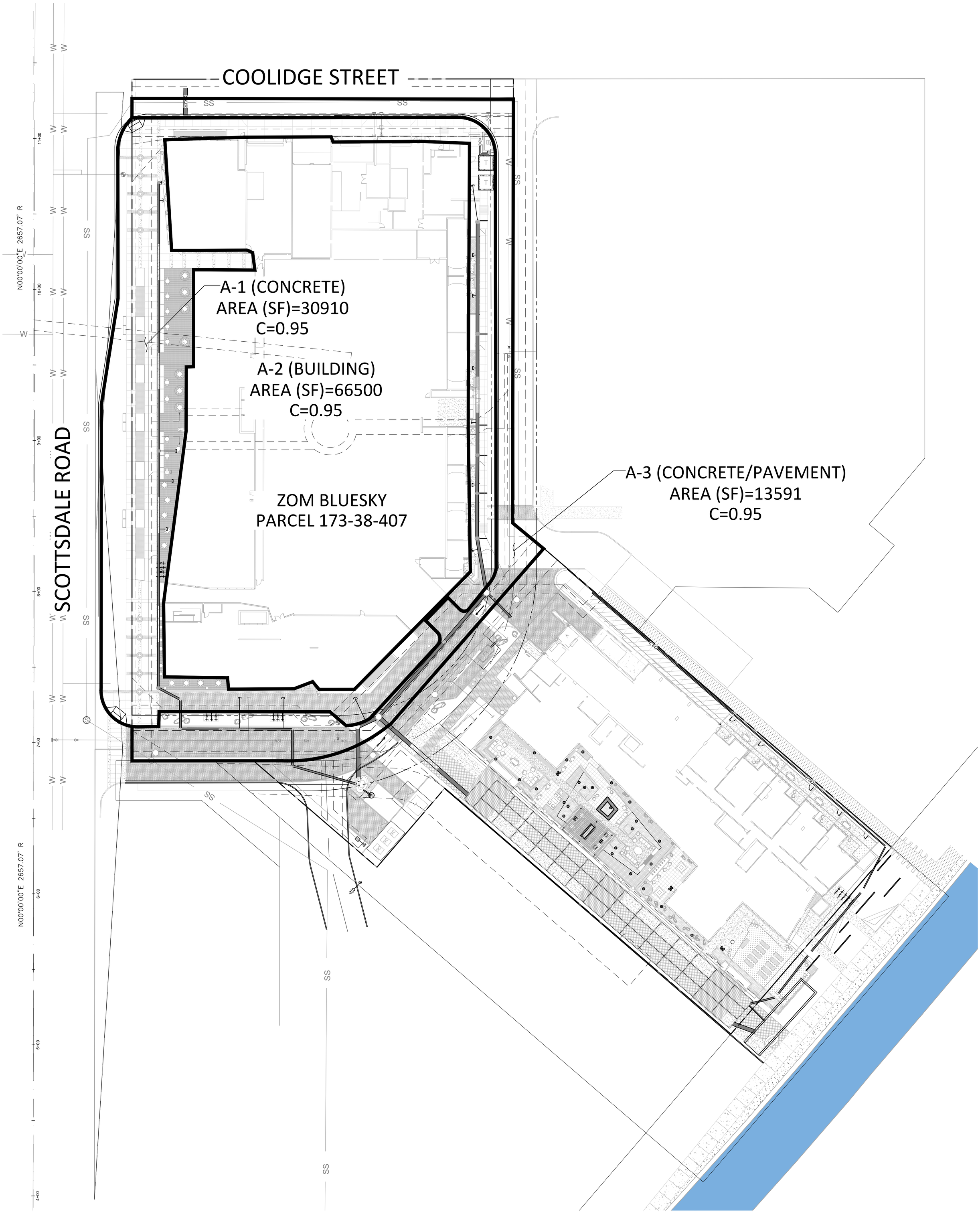
Volume per 7'x15'x4' Stormcapture System Module (CF)	Number of Proposed Modules	Volume Provided (ft^3)	Volume Provided (Ac-ft)
420.0	53.0	22,260	0.51
30" Pipe @ 75 LF Volume Provided		368	0.01
Underground Retention Volume Provided		22,628	0.52
Building A + B First Flush Required Volume		6,607	0.15
Compensatory Storage Volume Required		15,759	0.36
TOTAL Required Volume		22,367	0.51
Balance		**262**	**0.01**

Volume per foot of depth in chamber	105	cf/ft	
Depth in System required for First Flush Volume	1.19 ft	6,607 cf	
Excess Retention in System (Volume below the 30" pipe)	0.31 ft	1,740 cf	
Total Volume below 30" pipe	1.50 ft	7,087 cf	

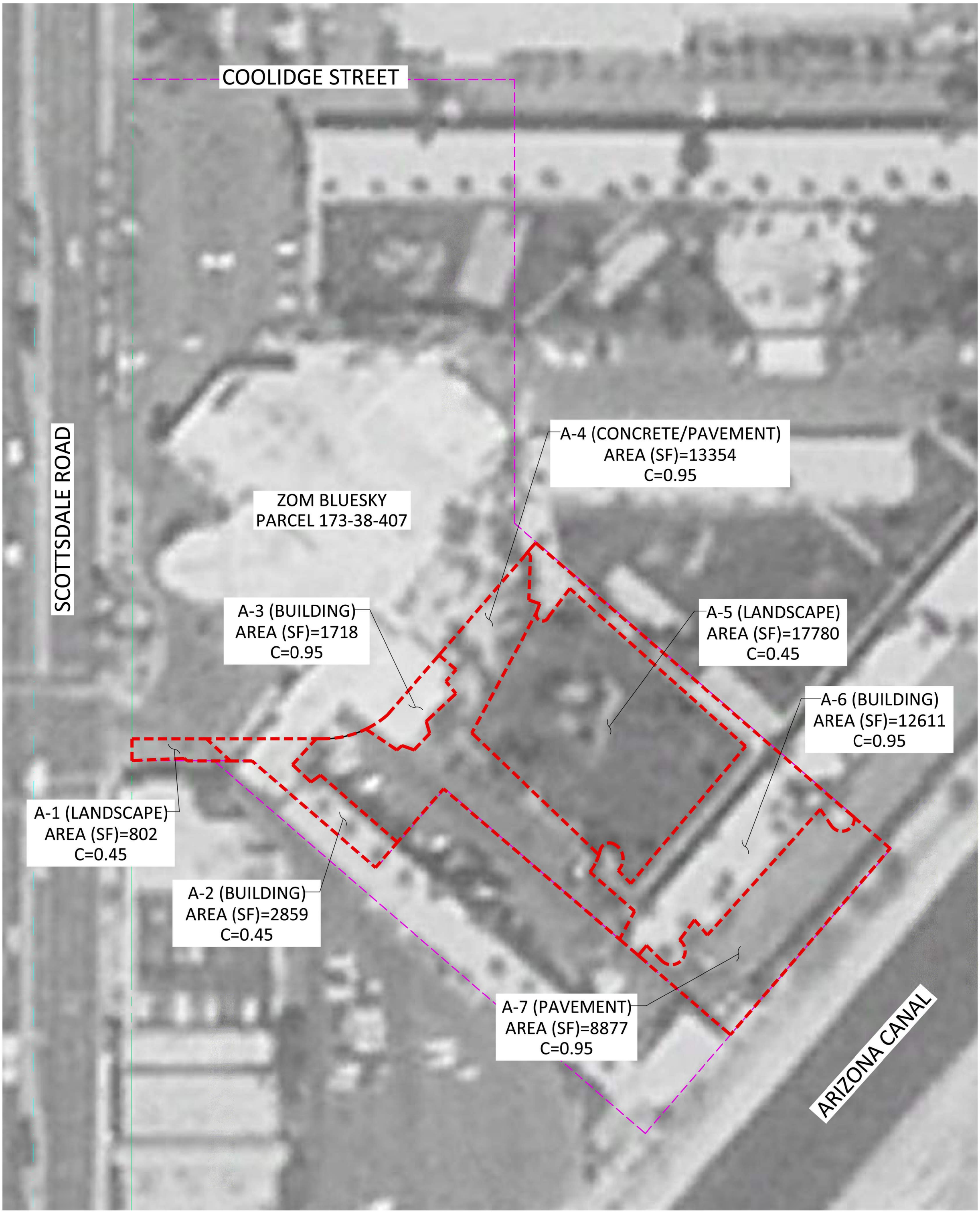
BUILDING A - PRE CONDITIONS RUNOFF COEFFICIENT CALCULATIONS



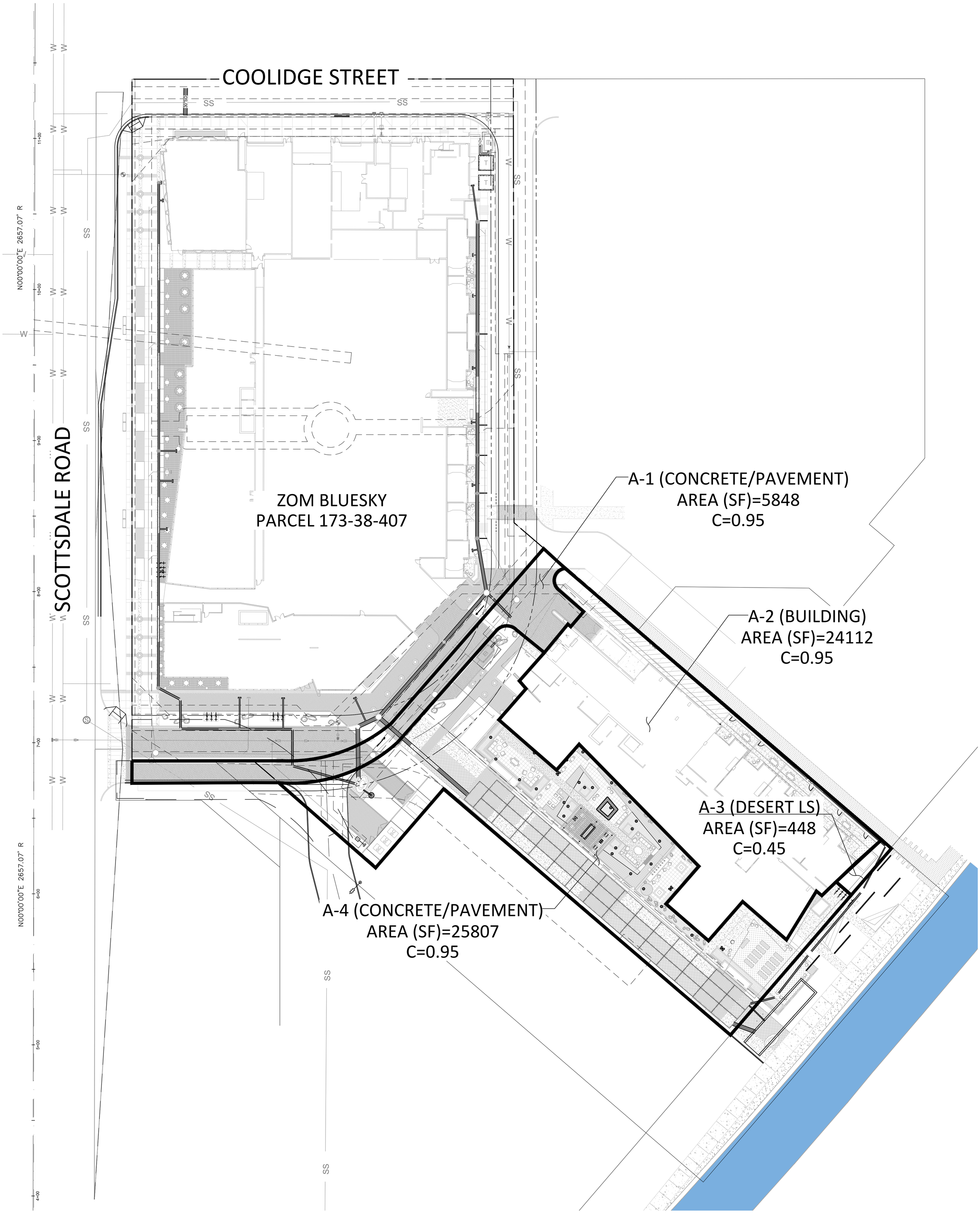
BUILDING A - POST CONDITION RUNOFF COEFFICIENT CALCULATIONS



BUILDING B- PRE CONDITION RUNOFF COEFFICIENT CALCULATIONS.



BUILDING B - POST CONDITION RUNOFF COEFFICIENT CALCULATIONS



APPENDIX D
HYDRAULIC CALCULATIONS AND DATA SHEETS

Rational Method

Project Name: ATWELL Project Number: 21000702
Prepared By: NPC
Date: 3/24/2022

Sub Basin Area									Storm event: 10 yr				
Basin Area Labels	Area (ac)	Length (ft)	High Point Elevation	Low Point Elevation	Slope (ft/ft)	Kb	Type	m	b	CW	Tc (mins)	I (in/hr)	Peak Flow (cfs)
A1	0.43	250	80	78.4	0.0064	0.0423	A	-0.00625	0.04	0.95	5.38	4.64	1.92
A3	0.21	275	79.8	78.9	0.0033	0.0442	A	-0.00625	0.04	0.95	7.40	4.18	0.85
B1	0.65	130	79.6	76.7	0.0223	0.0412	A	-0.00625	0.04	0.95	2.58	4.73	2.94
B3	0.21	135	79.5	78.6	0.0067	0.0443	A	-0.00625	0.04	0.95	3.97	4.73	0.94
B4	0.03	25	79.9	79.8	0.0040	0.0495	A	-0.00625	0.04	0.95	2.12	4.73	0.14
B5	0.12	110	79.8	79.0	0.0073	0.0459	A	-0.00625	0.04	0.95	3.56	4.73	0.52
B6	0.05	35	79.5	79.2	0.0086	0.0481	A	-0.00625	0.04	0.95	1.95	4.73	0.23
B7	0.08	58	79.85	79.1	0.0129	0.0469	A	-0.00625	0.04	0.95	2.18	4.73	0.36
A2-1*	0.76	1	1	1	0.0000	0.0407	A	-0.00625	0.04	0.95	5.00	4.73	3.43
A2-2*	0.77	1	1	1	0.0000	0.0407	A	-0.00625	0.04	0.95	5.00	4.73	3.48
EX-1	0.10	54	81	79.4	0.0296	0.0463	A	-0.00625	0.04	0.95	1.62	4.73	0.44

* Subbasins A2-1 and A2-2 are presented for roof drain peak flow calculations, and are not accounted for by surficial storm drain inlets.

Rational Method

Project Name: ATWELL Project Number: 21000702
Prepared By: NPC
Date: 3/24/2022

Sub Basin Area									Storm event: 100 yr				
Basin Area Labels	Area (ac)	Length (ft)	High Point Elevation	Low Point Elevation	Slope (ft/ft)	Kb	Type	m	b	CW	Tc (mins)	I (in/hr)	Peak Flow (cfs)
A1	0.43	250	80	78.4	0.0064	0.0423	A	-0.00625	0.04	0.95	4.49	7.49	3.09
A3	0.21	275	79.8	78.9	0.0033	0.0442	A	-0.00625	0.04	0.95	6.05	7.11	1.45
B1	0.65	130	79.6	76.7	0.0223	0.0412	A	-0.00625	0.04	0.95	2.17	7.49	4.65
B3	0.21	135	79.5	78.6	0.0067	0.0443	A	-0.00625	0.04	0.95	3.34	7.49	1.48
B4	0.03	25	79.9	79.8	0.0040	0.0495	A	-0.00625	0.04	0.95	1.78	7.49	0.22
B5	0.12	110	79.8	79.0	0.0073	0.0459	A	-0.00625	0.04	0.95	2.99	7.49	0.82
B6	0.05	35	79.5	79.2	0.0086	0.0481	A	-0.00625	0.04	0.95	1.64	7.49	0.36
B7	0.08	58	79.85	79.1	0.0129	0.0469	A	-0.00625	0.04	0.95	1.83	7.49	0.56
A2-1*	0.76	1	1	1	0.0000	0.0407	A	-0.00625	0.04	0.95	5.00	7.49	5.43
A2-2*	0.77	1	1	1	0.0000	0.0407	A	-0.00625	0.04	0.95	5.00	7.49	5.51
EX-1	0.10	54	81	79.4	0.0296	0.0463	A	-0.00625	0.04	0.95	1.36	7.49	0.69

* Subbasins A2-1 and A2-2 are presented for roof drain peak flow calculations, and are not accounted for by surficial storm drain inlets.

SUMP INLET STRUCTURE CAPACITY - 100-YEAR

Camelback Residential - "Azure & Hazel"

Drainage Basis of Design Report
3/24/2022

Objective: Calculation of Ponding depth for catch basins and scuppers in Sump Condition
Location: Phoenix
Reference: Drainage Design Manuals for Maricopa County

Equations:

Grate Ponding Depth (Weir Calculation), $d = \left(\frac{Q}{C_W x P x F_{CL}}\right)^{2/3}$

Where: d = Depth of Flow at Curb (Ft) = SEE BELOW
C_W = Weir Coefficient = SEE BELOW
P = Perimeter of grate (Ft) = SEE BELOW
F_{CL} = Clogging factor for Curb Opening = 50%

Curb Opening Ponding Depth (Weir Calculation), $d = \left(\frac{Q}{C_W x (L+1.8W) x F_{CL}}\right)^{2/3}$

Where: d = Depth of Flow at Curb (Ft) = SEE BELOW
C_W = Weir Coefficient = SEE BELOW
L = Curb Opening Length (Ft) = SEE BELOW
W = Gutter Width at Inlet (Ft) = SEE BELOW
F_{CL} = Clogging factor for Curb Opening = 80%

INLET STRUCTURE PARAMETERS

Structure	P (Ft)	L (Ft)	W (Ft)	C_W	F_{cl}
MAG 206, Scupper		Per Structure	1.42	2.3	0.80
MAG 537 Single, No Curb	13.33			3.0	0.50
MAG 537 Single, One Curb	10.00			3.0	0.50
MAG 537 Double, No Curb	17.33			3.0	0.50
Grated Manhole Cover, P=6.8ft	6.80			3.0	0.50
Nyloplast 30" Round	8.34			3.0	0.50
Slotted Trench Drain	Per Structure	Per Structure	0.15	3.0	1.25L

INLET PONDING DEPTH - 100 YEAR STORM

Contributing Sub-Basin	Inlet ID	Full/Half Sub-Basin	Flow at Inlet (cfs)	Catch Basin/Scupper Type and Length (ft)	Depth of Flow (each), d (ft)
EX-1	CB-EX-1	-	0.69	1.75"-Wide Trench Drain, 10 LF	0.09
A3	CB-7	-	1.45	MAG 535, No Curb	0.19
B1	CB-1	-	4.65	MAG 537 Double, No Curb	0.32
B3	CB-6	-	1.48	MAG 535, No Curb	0.19
B4	CB-2	-	0.22	1.75"-Wide Trench Drain, 15 Total LF	0.03
B5	CB-3	-	0.82	Nyloplast 12" Square	0.25
B6	CB-4	-	0.36	Nyloplast 12" Square	0.14
B7	CB-5	-	0.56	Nyloplast 12" Square	0.19

ADS DURASLOT® PIPE SPECIFICATION

Scope

This specification describes 4- through 36-inch (100 to 900 mm) ADS DURASLOT pipe for use in surface drain applications.

Pipe Requirements

DURASLOT pipe, as manufactured and distributed by ADS, Inc., shall have a smooth interior and annular exterior corrugations with an aluminum slot grate frame mounted longitudinally along the length of the pipe to accept the grate while maintaining the original pipe diameter.

- 4- through 10-inch (100 to 250mm) pipe shall meet AASHTO M252, Type S.
- 12- through 36-inch (300 to 900 mm) pipe shall meet AASHTO M294, Type S or ASTM F2306.
- Manning's "n" value for use in design shall be 0.012.

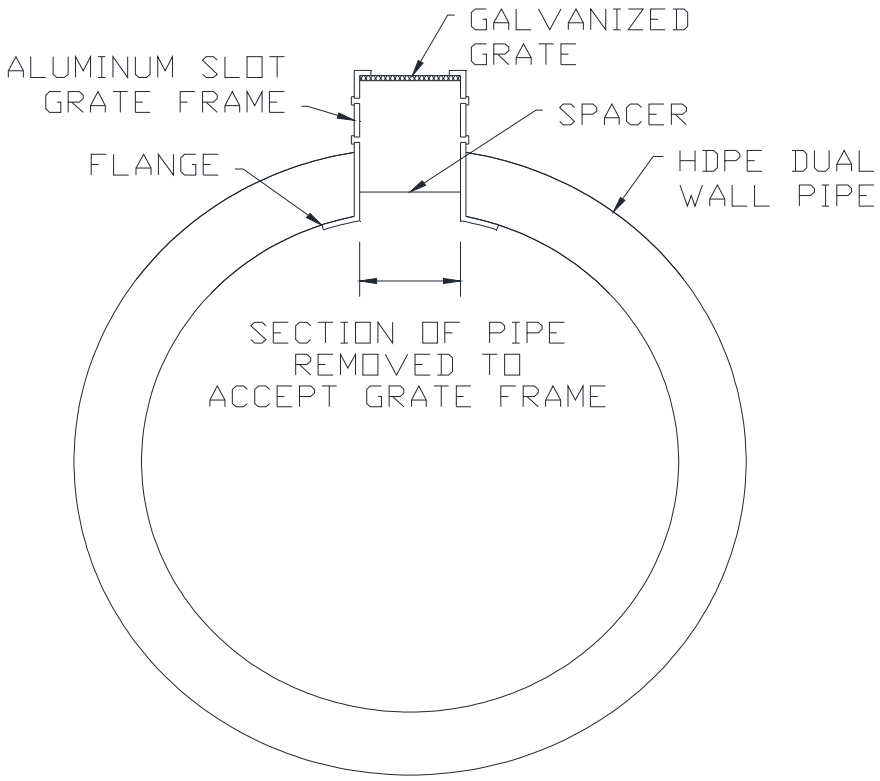
The aluminum slot grate frame shall be manufactured from 0.063" tempered commercial aluminum meeting the requirements of ASTM B209, consisting of two parallel plates separated by spacers spanning the slot on 6" centers. The grate shall be ½ - #13 galvanized steel. The grate shall have a diamond-shaped opening and be ADA compliant. The flange at the bottom of the aluminum slot grate frame shall be riveted to the pipe with a minimum of two rivets per linear foot.

Fittings

DURASLOT fittings shall be modified from fittings which conform to AASHTO M252, AASHTO M294, or ASTM F2306.

Installation

Installation shall be in accordance with ADS recommended installation instructions. Contact your local ADS representative or visit www.ads-pipe.com for a copy of the latest installation guidelines.



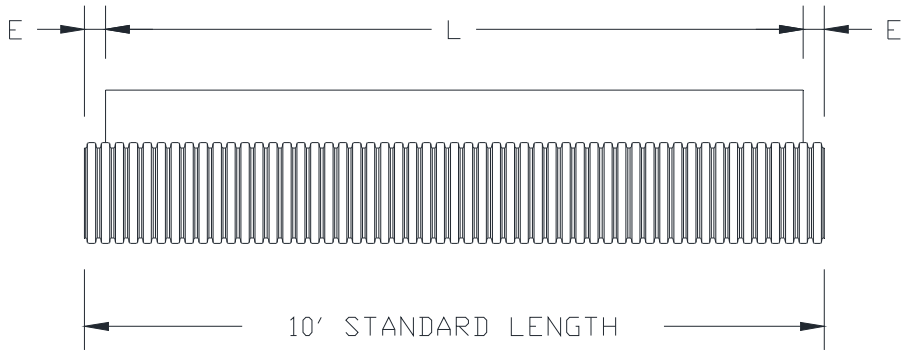
Selected for the Camelback Residential - Azure & Hazel project.

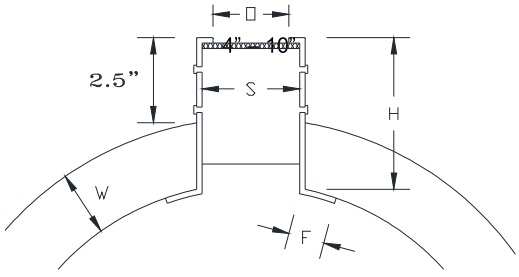
ADS DURASLOT® STANDARD DIMENSIONS

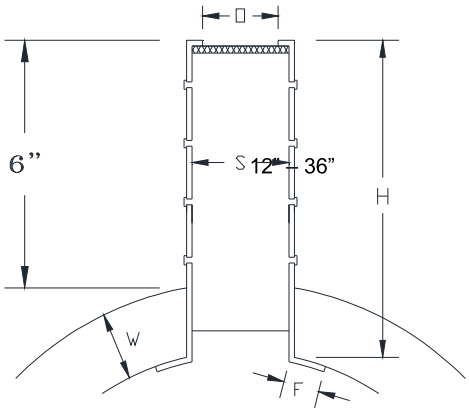
	Nominal Pipe Diameter									
	4”	**6”**	**8”**	**10”**	**12”**	**15”**	**18”**	**24”**	**30”**	**36”**
L (Drain Grate Length)	118”				116”					
E (Pipe End Length)	1”				2”					
H (2.5” slot)	2.75”	3”	3”	3”	3.5”	3.75”	4”	4.75”	5”	5.25”
H (6.0” slot)	6.25”	6.5”	6.5”	6.5”	7”	7”	7”	7.25”	8.25”	8.25”
W (Pipe Width w/ Corrugation)	0.34”	0.46”	0.61”	0.73”	1.15”	1.30”	1.57”	1.86”	2.55”	2.85”
F (Flange Length)	0.5”	0.75”	0.75”	0.75”	0.75”	0.75”	0.75”	1.0”	1.0”	1.0”
0 (Opening Width)	1.25”	1.75”	1.75”	1.75”	1.75”	1.75”	1.75”	1.75”	1.75”	1.75”
S (Slot Width)	1.75”	2.25”	2.25”	2.25”	2.25”	2.25”	2.25”	2.25”	2.25”	2.25”

Note:

1. Variable and custom slot heights upon request. Production of variable and custom slots will require approval by engineering services and fabrication. Signed shop drawings also required from interested party.
2. Other grate material options upon request. Contact local ADS representative for availability of grate material option.



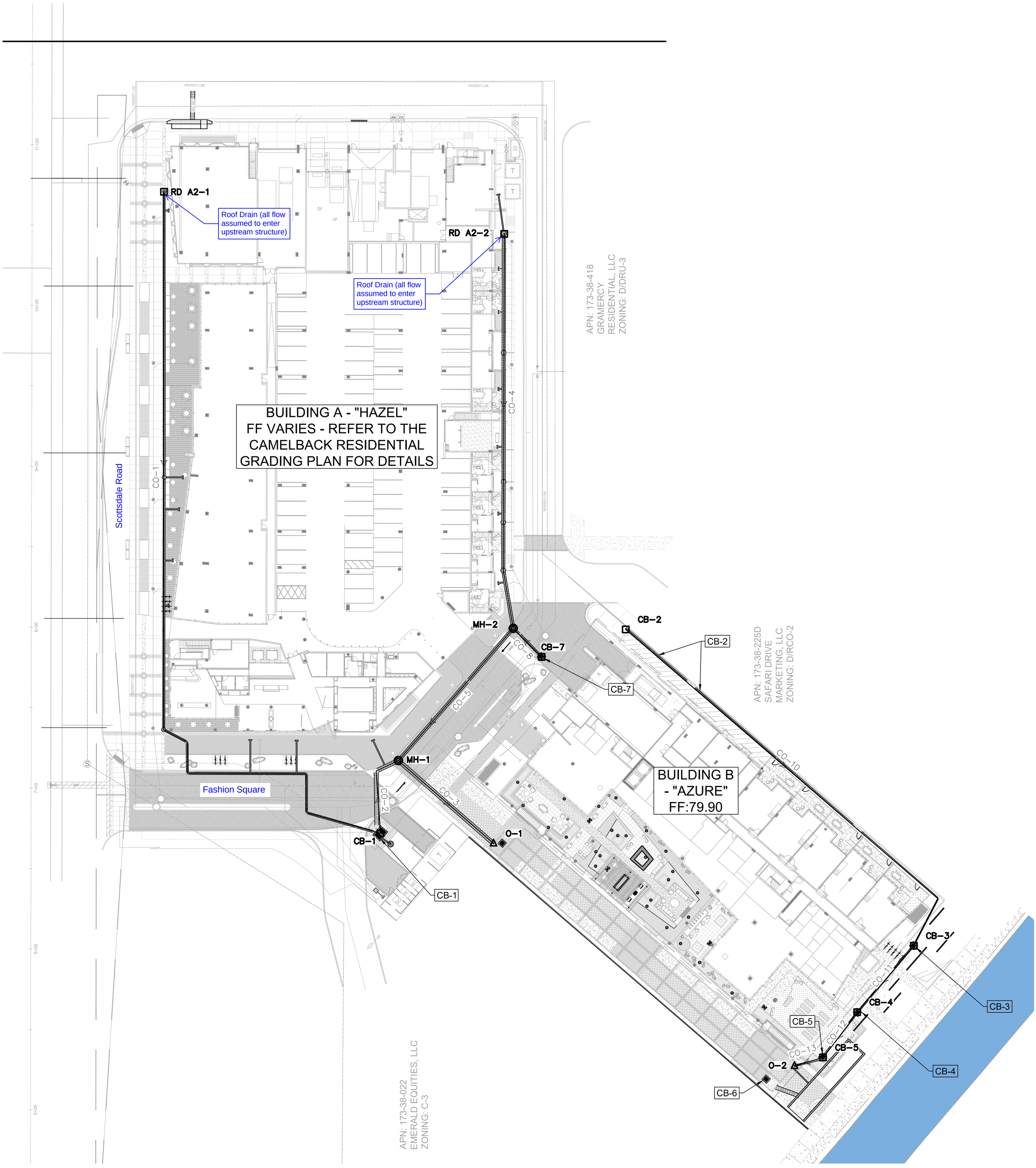




Camelback Residential - "Azure & Hazel"

StormCAD Model Exhibit

Not to Scale



Catch Basin FlexTable: CatchBasin Table

ID	Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Inlet Location	Flow (Additional Subsurface) (cfs)	Headloss Method	Headloss Coefficient (Standard)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
32	CB-1	1,276.70	1,273.50	In Sag	4.65	Standard	1.200	1,275.51	1,275.39
49	CB-2	1,279.85	1,278.53	In Sag	0.22	Standard	0.200	1,278.76	1,278.75
50	CB-3	1,279.00	1,275.05	In Sag	0.82	Standard	1.200	1,275.67	1,275.48
52	CB-4	1,279.20	1,274.51	In Sag	0.36	Standard	1.200	1,275.25	1,275.01
54	CB-5	1,279.10	1,274.08	In Sag	0.56	Standard	1.200	1,274.98	1,274.68
45	CB-7	1,279.08	1,276.00	In Sag	1.45	Standard	0.200	1,276.48	1,276.45
31	RD A2-1	1,280.40	1,276.20	In Sag	5.43	Standard	0.200	1,279.22	1,279.16
38	RD A2-2	1,279.60	1,276.25	In Sag	5.51	Standard	0.200	1,277.28	1,277.22

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA
+1-203-755-1666

FlexTable: Conduit Table

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Depth (Normal) / Rise (%)	Upstream Structure Energy Grade Line (In) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CO-1	RD A2-1	1,276.20	CB-1	1,273.50	516.4	0.005	15.0	0.013	5.43	4.42	4.67	116.3	(N/A)	1,279.53	1,279.16	1,275.51
CO-4	RD A2-2	1,276.25	MH-2	1,275.05	245.7	0.005	18.0	0.013	5.51	4.56	7.34	75.1	64.7	1,277.61	1,277.22	1,276.53
CO-5	MH-2	1,275.05	MH-1	1,273.30	108.9	0.016	24.0	0.013	6.96	7.53	28.68	24.3	33.5	1,276.54	1,275.99	1,275.37
CO-8	CB-7	1,276.00	MH-2	1,275.05	20.4	0.047	18.0	0.013	1.45	7.20	22.67	6.4	17.1	1,276.65	1,276.45	1,276.53
CO-10	CB-2	1,278.53	CB-3	1,275.05	289.2	0.012	8.0	0.013	0.22	2.81	1.33	16.6	27.6	1,278.84	1,278.75	1,275.67
CO-11	CB-3	1,275.05	CB-4	1,274.51	54.3	0.010	12.0	0.013	1.04	3.93	3.55	29.3	37.0	1,275.68	1,275.48	1,275.25
CO-12	CB-4	1,274.51	CB-5	1,274.08	35.3	0.012	12.0	0.013	1.40	4.58	3.93	35.6	41.3	1,275.29	1,275.01	1,274.98
CO-13	CB-5	1,274.08	O-2	1,273.00	18.4	0.059	12.0	0.013	1.96	8.89	8.62	22.7	32.4	1,275.03	1,274.68	1,274.33
CO-2	CB-1	1,273.50	MH-1	1,273.30	54.1	0.004	30.0	0.013	10.08	4.81	24.93	40.4	44.2	1,275.82	1,275.39	1,275.37
CO-3	MH-1	1,273.30	O-1	1,273.00	78.4	0.004	30.0	0.013	17.04	5.54	25.36	67.2	60.0	1,275.45	1,274.80	1,274.40

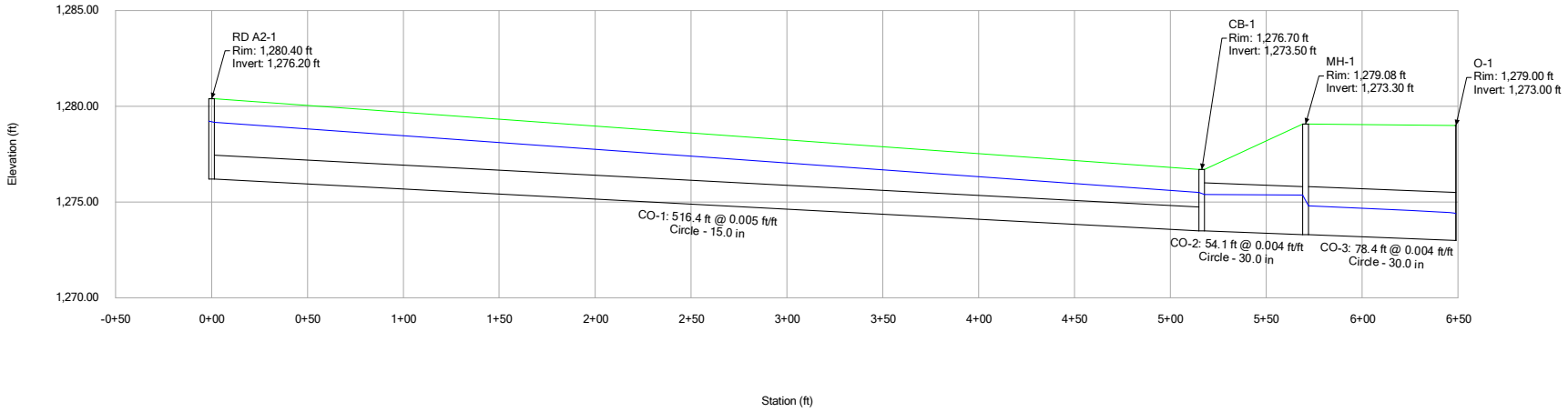
FlexTable: Manhole Table

ID	Label	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Method	Headloss Coefficient (Standard)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)
39	MH-2	1,279.67	True	1,279.67	1,275.05	Standard	1.500	6.96	0.94	1,275.99	1,276.53
42	MH-1	1,279.08	True	1,279.08	1,273.30	Standard	1.200	17.04	1.50	1,274.80	1,275.37

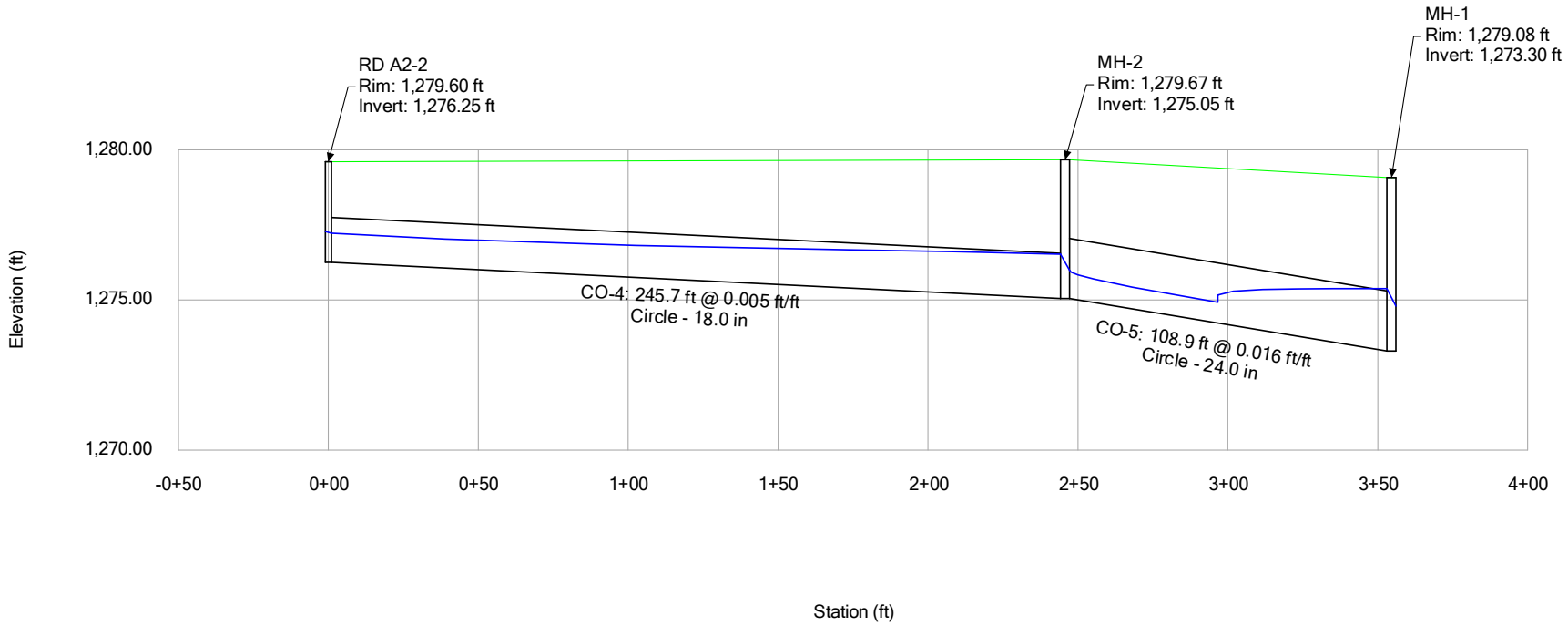
FlexTable: Outfall Table

ID	Label	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
36	O-1	1,279.00	True	1,273.00	User Defined Tailwater	1,274.33	1,274.40	17.04
56	O-2	1,278.90	True	1,273.00	User Defined Tailwater	1,274.33	1,274.33	1.96

Profile Report
Engineering Profile - RD A2-1 to O-1 (21000702 - StormCAD Model.stsw)

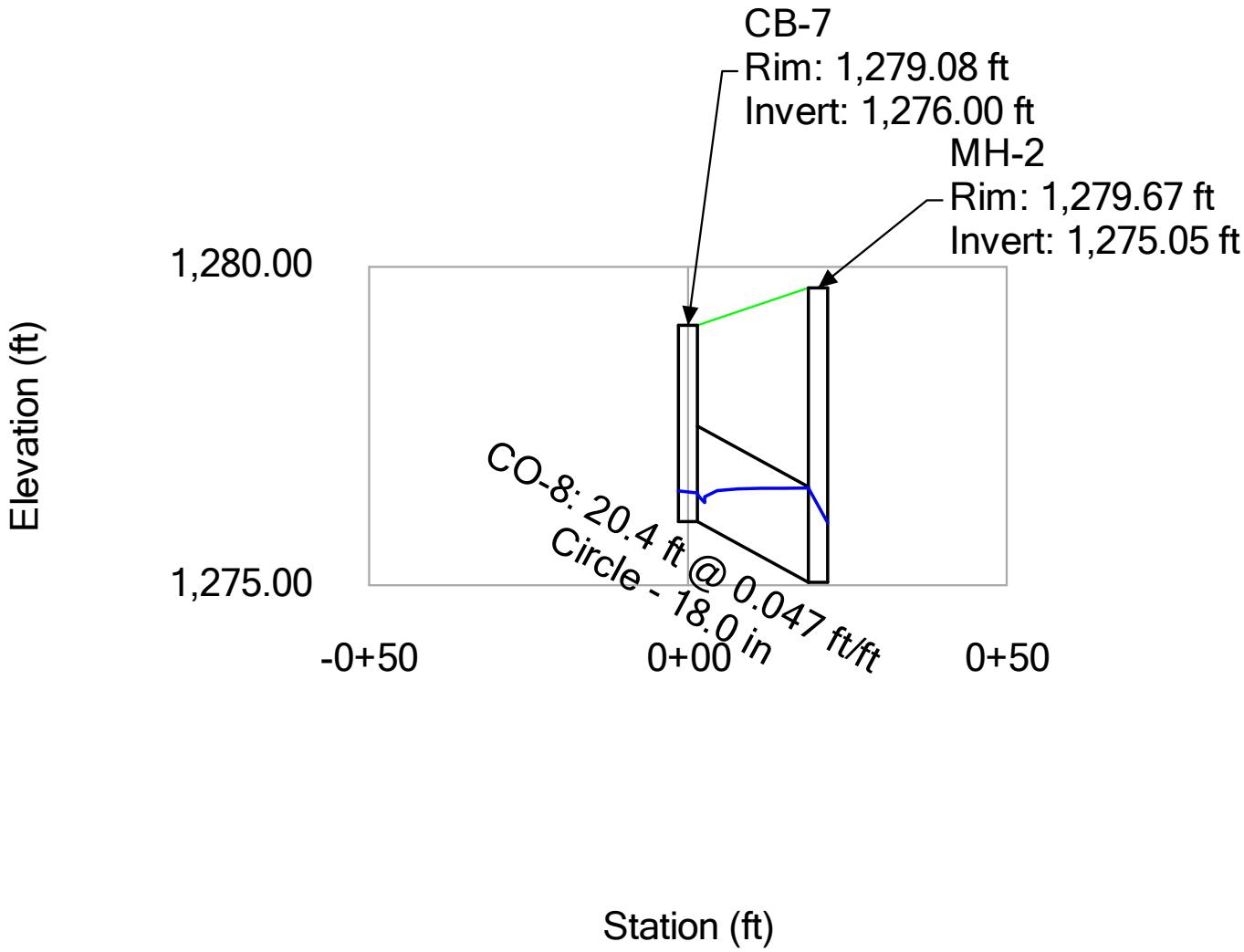


Profile Report
Engineering Profile - RD A2-2 to MH-1 (21000702 - StormCAD Model.stsw)

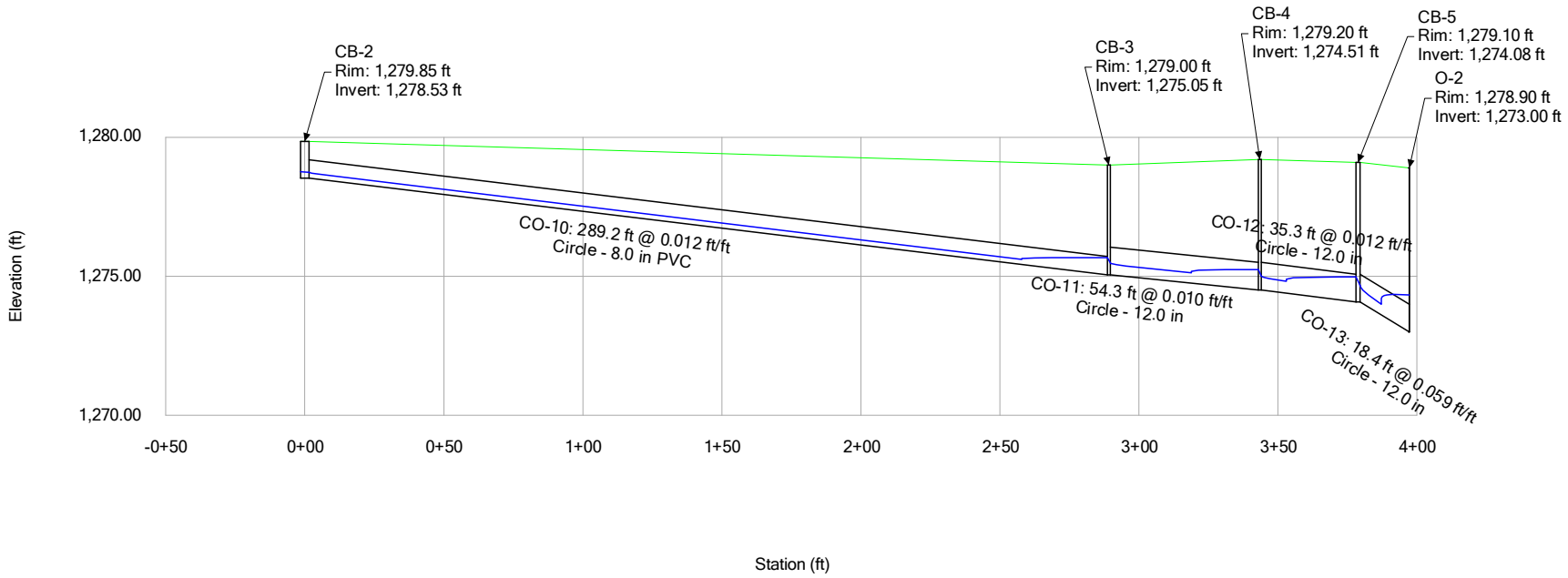


Profile Report

Engineering Profile - CB-7 to MH-2 (21000702 - StormCAD Model.stsw)



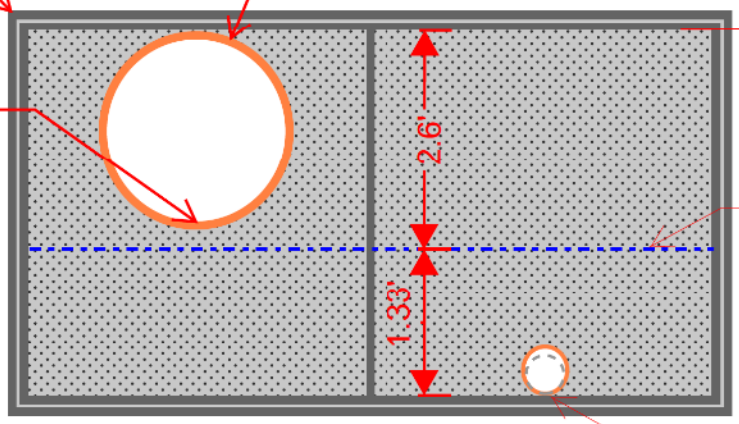
Profile Report
Engineering Profile - CB-2 to O-2 (21000702 - StormCAD Model.stsw)



Underground Retention System Bleed-off Exhibit

7'x15'x4' Oldcastle StormCapture system per plan

30" pipe for compensatory flood volume to enter and leave the system as the flood depth rises/decreases over time.



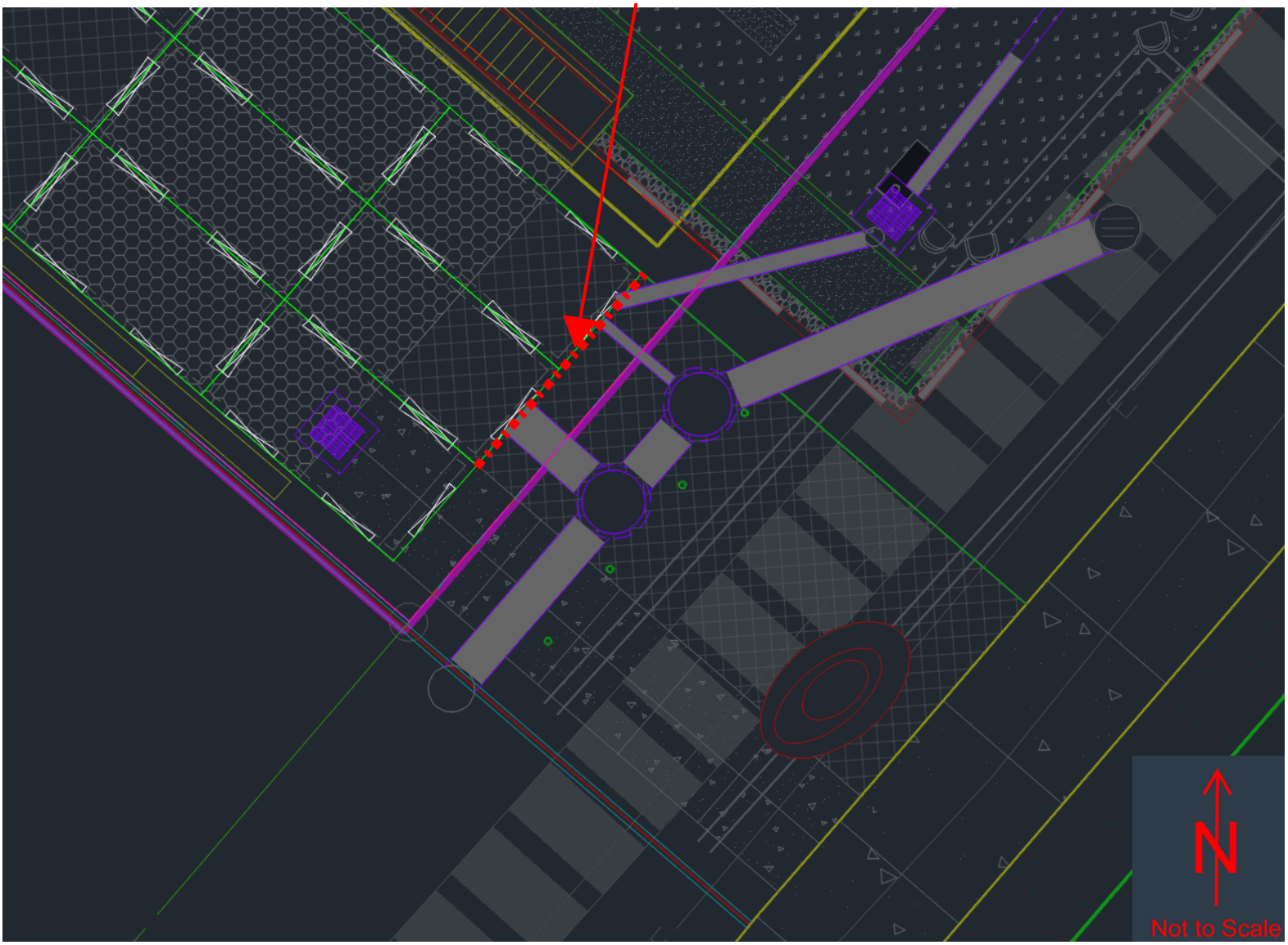
Top=1277.00

1.33' of depth within storage system for first flush required volume. The volume above the blue dashed line and below the 30 inch is for additional volume" in the system. The overall volume above the blue line is compensatory Volume

30" pipe
Invert = 1274.50

6" orifice & 8" bleed-off pipeInvert = 1273.00

View looking northwest from the Arizona Canal
(not to scale)



Worksheet for 6" Orifice Bleed Off HWE @ 30" Invert

Project Description	
Solve For	Discharge

Input Data	
Headwater Elevation	1,174.50 ft
Centroid Elevation	1,173.25 ft
Tailwater Elevation	1,173.00 ft
Discharge Coefficient	0.670
Diameter	6.0 in

Results	
Discharge	1.18 cfs
Headwater Height Above Centroid	1.25 ft
Tailwater Height Above Centroid	-0.25 ft
Flow Area	0.2 ft²
Velocity	6.01 ft/s

Worksheet for 6" Orifice Bleed Off HWE @ Crown of Orifice

Project Description	
Solve For	Discharge

Input Data	
Headwater Elevation	1,173.50 ft
Centroid Elevation	1,173.25 ft
Tailwater Elevation	1,173.00 ft
Discharge Coefficient	0.670
Diameter	6.0 in

Results	
Discharge	0.53 cfs
Headwater Height Above Centroid	0.25 ft
Tailwater Height Above Centroid	-0.25 ft
Flow Area	0.2 ft^2
Velocity	2.69 ft/s

Worksheet for 6" Orifice Bleed Off HWE near Invert

Project Description	
Solve For	Discharge

Input Data	
Headwater Elevation	1,173.26 ft
Centroid Elevation	1,173.25 ft
Tailwater Elevation	1,173.00 ft
Discharge Coefficient	0.670
Diameter	6.0 in

Results	
Discharge	0.11 cfs
Headwater Height Above Centroid	0.01 ft
Tailwater Height Above Centroid	-0.25 ft
Flow Area	0.2 ft²
Velocity	0.54 ft/s

3 Data Points
Invert of 30" pipe Q=1.18cfs
Crown of 6" orifice , Q=0.53cfs 0.01ft from Invert of Orifice, Q=0.11cfs Average of Flows: **0.6cfs**

Volume to drain (below 30" pipe): 7,087 cf

7,087 cf / 0.6cfs * 3,600 sec/hr = **3.28 hrs**

APPENDIX E

CAMELBACK RESIDENTIAL
GRADING AND DRAINAGE PLAN

APPROXIMATE DRIVEWAY CENTERLINE

N. SCOTTSDALE RD.

EX. STREET LIGHT & SIGNAL MAST ARM PROTECT IN PLACE
EX. WATER METER AND A.R.V. PROTECT IN PLACE
MATCH EXISTING PAVEMENT
EX. CATCH BASIN
EX. FIBER OPTIC
EXISTING TURNING LANE TO BE DEMOLISHED AND REBUILT
EX. 7' ELECTRICAL EASEMENT
EXISTING SANITARY SEWER MANHOLE. ADJUST TO GRADE AND PROTECT IN PLACE
RELOCATE EX. CURB RAMP
PROPOSED CURB & GUTTER
RELOCATE EX. FIRE HYDRANT TO 2' BEHIND SIDEWALK
EXISTING SANITARY SEWER MANHOLE
RELOCATE EX. 20' CURB OPENING CATCH BASIN AND 30" SD PIPE TO NEW CURB FACE
PROPOSED RAMP
PROPOSED CONCRETE PATIO & SIDEWALK
PROPOSED ROOF DRAIN CONNECTION (TYPICAL)
PROPOSED CONCRETE PATIO
PROPOSED STORM DRAIN
PROPOSED CONCRETE SIDEWALK
PROPOSED ROOF DRAIN CONNECTION (TYPICAL)
PNMAE TO BE REMOVED
EST. FF= 1279.00
EST. FF= 1279.50
EST. FF= 1280.00
EST. FF= 1280.67
EST. FF= 1281.00
EXISTING DRIVEWAY TO BE RELOCATED
PROPOSED 6" SINGLE CURB
PROPOSED STORM DRAIN
PROPOSED ACCESS ESMT.
ROOF DRAIN CONNECTION (TYPICAL)
PROPOSED CONCRETE SIDEWALK
PROPOSED CONCRETE PATIO
PROPOSED CONCRETE SIDEWALK
EX. 25' SDE
EX. 15' PTE
PROP. 10' PTE
PROPOSED 4" TO 6" MOUNTABLE CURB
EX. 48" HDPE S.D.
50.00' INGRESS, EGRESS, AND FIRE ACCESS ESMT.
EXISTING ACCESS ESMT.
VALLEY GUTTER
REMOVABLE BOLLARDS (TYPICAL)
2 DOUBLE M.A.G. 537 CATCH BASINS
FG=1276.70
RIM=1277.20
INV=1273.50
PONDING DEPTH = 0.6'
DRYWELL
REMOVABLE BOLLARDS (TYPICAL)
TRANSITION 6" CURB EXPOSURE TO 0" AT TOP OF RAMP
ROOF DRAIN CONNECTION (TYPICAL)
STORM DRAIN MANHOLE
PROPOSED 30" STORM DRAIN PIPE
PROPOSED 24" STORM DRAIN PIPE
RAMP TO UNDERGROUND PARKING GARAGE
EX. 7' ELECTRICAL EASEMENT TO BE REMOVED
REMOVE EX. CURB OPENING CATCH BASIN. REPLACE WITH 8" WIDE TRENCH DRAIN & 2" WIDE INLET. MATCH EXISTING PIPE INVERT. L=10'
PROPOSED 2" MOUNTABLE CURB
BUILDING A - "HAZEL" FF VARIES
10' P.N.M.A.E. TO BE REMOVED
DOG PARK PER ARCHITECTURAL PLANS
EX. 5' PUE
EX. 38' IEE, UE, & LE
EX. 25' ESVAE
EX. 33.06' STORM DRAIN EASEMENT
EX. FIBER OPTIC
EX. GAS LINE
EX. WATER LINE
EX. 20' WAT/SEW ESMT.
EX. 5' RETAINING WALL
EX. 8" DIP WAT.
EX. 8" PVC SEW.
EX. 8" SEW. ESMT.
EX. 12' WAT & SEW EASEMENT
EX. 30' INGRESS/ EGRESS AND FIRE ACCESS ESMT.
EXISTING SANITARY SEWER MANHOLE
EXISTING CURB OPENING CATCH BASIN
PROPOSED CROSSWALK WITH PAVERS & RAMP
EXISTING SANITARY SEWER MANHOLE PROTECT IN PLACE & RAISE TO GRADE
EXISTING RAMP TO UNDERGROUND PARKING GARAGE FOR EXISTING
PROPOSED TRENCH DRAIN & 8" HDPE PIPE
PROPOSED CATCH BASIN
6' PNMAE TO BE REMOVED
PROPOSED CATCH BASIN & STORM DRAIN
PROPOSED 24' FIRE LANE
PROPOSED CONCRETE SIDEWALK
COURTYARD GRADING BY FLOOR ASSOCIATES
EXISTING EFFECTIVE FLOOD ZONE AH PER FEMA FIRM 04013C1770L
BUILDING B - "AZURE" FF=79.90
RETAIL PARKING ACCESS
FASHION SQUARE
E. COOLIDGE STREET
MATCHLINE SHT 04
MATCHLINE SHT 04

APN: 173-38-418
GRAMERCY RESIDENTIAL, LLC
ZONING: D/DRU-3

THIS SHEET

KEY MAP
N.T.S.
E CHAPARRAL RD
N 66TH ST
ARIZONA CANAL
N MILLER RD
E CAMELBACK RD
N SCOTTSDALE RD
E INDIAN SCHOOL RD

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR; NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES OR OF ANY OTHER PERSONS.

ATWELL
866.850.4200 www.atwell-group.com

PRELIM. GRADING AND DRAINAGE PLAN

PRELIMINARY IMPROVEMENT PLAN

CAMELBACK RESIDENTIAL

SCOTTSDALE, ARIZONA

Know what's below. Call before you dig.

REVISIONS:

PM.	BH
DR.	TLC
JOB NO.	21000702
FILE NO.	2100702-CS01

SHEET NO.
03 OF 06

GRAPHIC SCALE
1" = 20'

s:\21000702 - bluesky project\dwg\plan sets\site-preliminary\21000702-cs01.dwg Plotdate:6/9/2022

ATWELL
866.850.4200 www.atwell-group.com

PRELIM. GRADING AND DRAINAGE PLAN

PRELIMINARY IMPROVEMENT PLAN

CAMELBACK RESIDENTIAL

SCOTTSDALE, ARIZONA

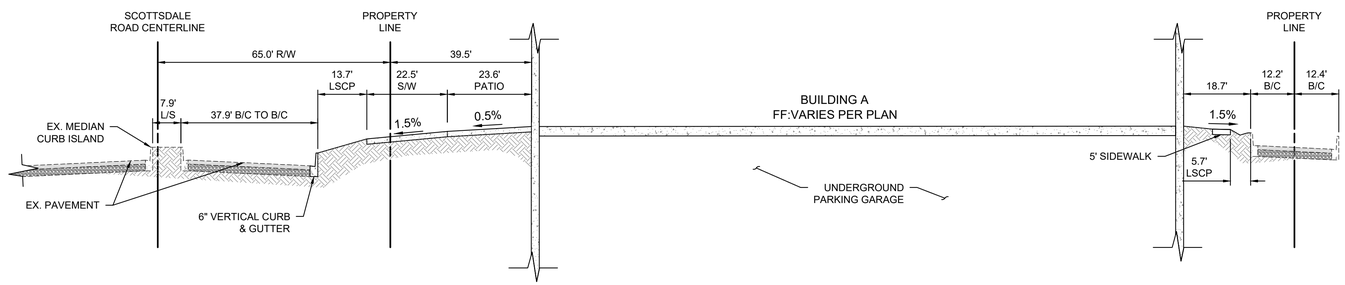
REVISIONS:

PM.	BH
DR.	TLC
JOB NO.	21000702
FILE NO.	21000702-CS01

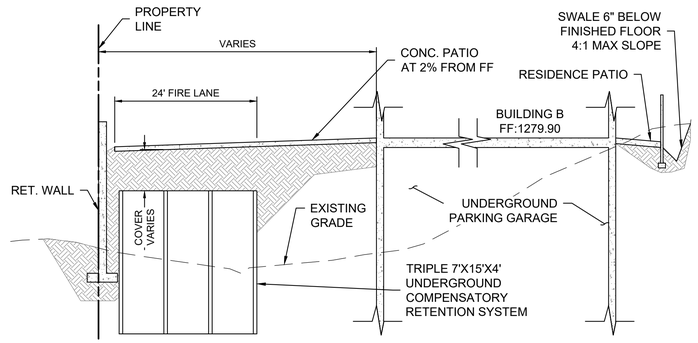
SHEET NO.
04 OF 06

C.O.S. PRE-APP NO.: 44-PA-2016 C.O.S. PLAN NO.:

MATCHLINE SHT 03



SECTION A
NOT TO SCALE



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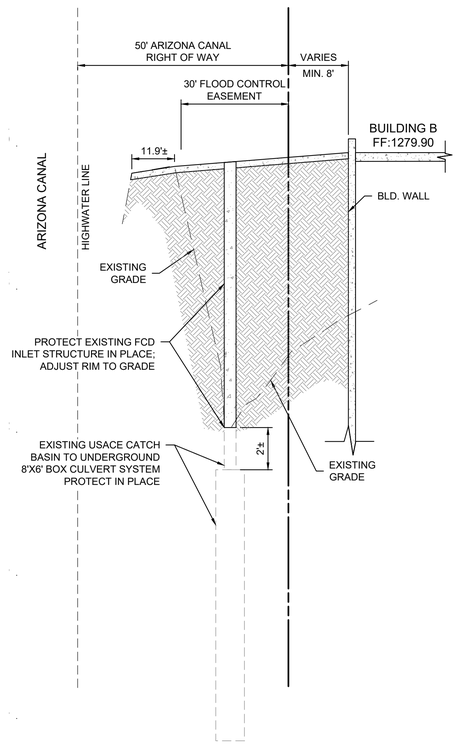

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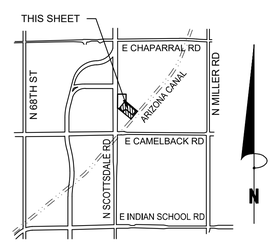
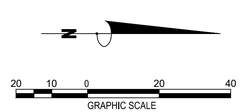


KEY MAP
N.T.S.



APPENDIX F
UNDERGROUND STORAGE SYSTEM DETAILS AND INFORMATION

WEATHER the Storm

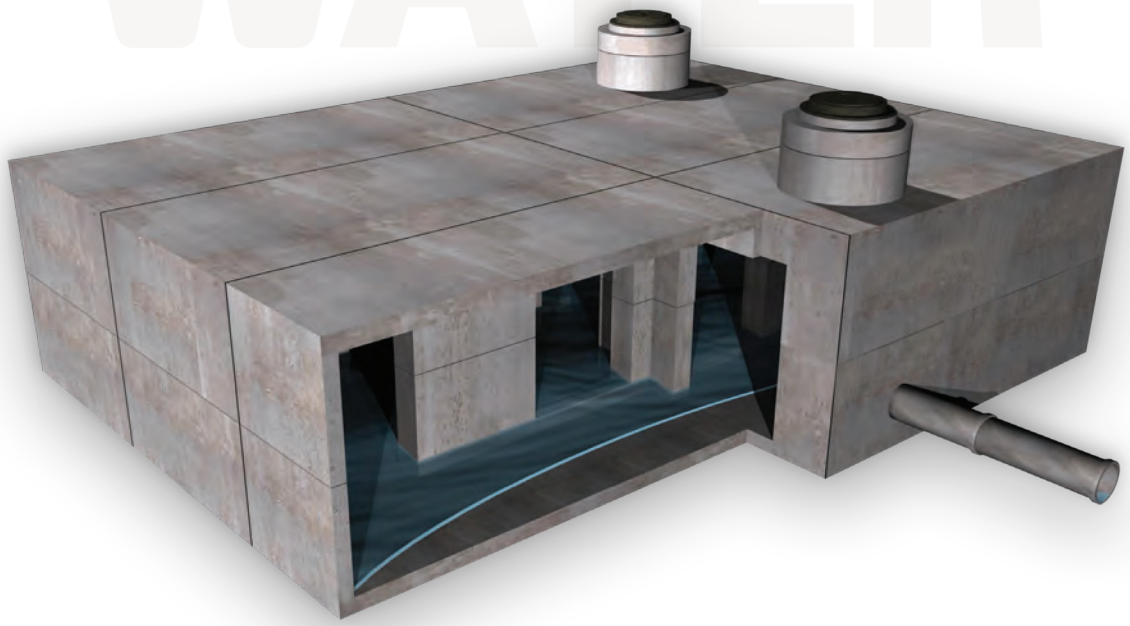
StormCapture® System

Oldcastle Infrastructure™
A CRH COMPANY

Oldcastle Infrastructure™
A CRH COMPANY

STORMCAPTURE®

Modular Stormwater Management System for Infiltration, Detention, Retention, Treatment and Harvesting



StormCapture® System

Backfill Requirements–Modules are typically backfilled with existing site materials.

Custom Sizes–Available in internal heights from 2' to 14' to best-fit site needs.

Design Assistance–Let our professionals customize for your specific needs.

Easy to Install–Fast installation with minimal handling.

Large Storage Capacity–Smaller system footprint for greater design flexibility.

Modular Design–Precast concrete modules measure 8' wide by 16' long OD, (7' x 15' ID), with customizable heights.

Traffic Loading–Only requires 6" of cover.

Treatment Train–Available with pre-treatment, post-treatment, or both.

StormCapture Advantages

Same-day staging and installation of StormCapture project.

StormCapture offers fast installation with minimal handling.

StormCapture modules are designed for HS20 traffic loading.

StormCapture detention system installed beneath office parking lot.

Fast Service – Get help from our national engineering team with layouts and specifications to meet your project's requirements.

Cost Savings – Highly competitive installation and maintenance costs.

Codes – Designed to the latest codes for HS-20-44 (full truckload plus impact).

Sustainability – The system is maintainable for long-term sustainability.

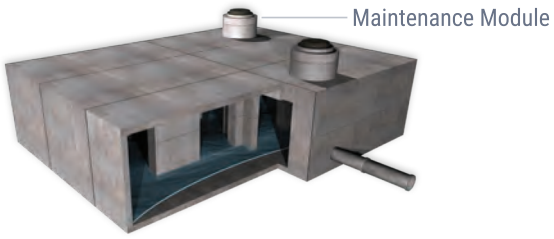
LID – Ideal for Low-Impact Development (LID).

LEED – Manufactured locally with recycled material for potential LEED credits. LEED 2009 for New Construction & Major Renovation, U.S. Green Building Council: Sustainable Sites (5.1, 5.2, 6.1, 6.2), Materials & Resources (4.1, 4.2, 5.1, 5.2), Water Efficiency (1.1, 1.2, 3.1, 3.2).

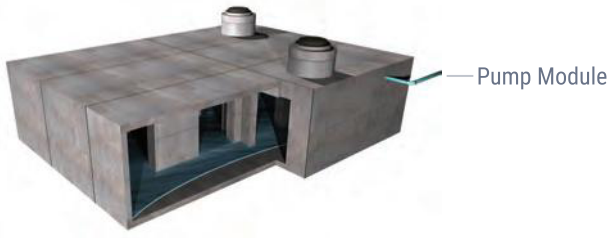
Oldcastle Infrastructure™
A CRH COMPANY

Applications

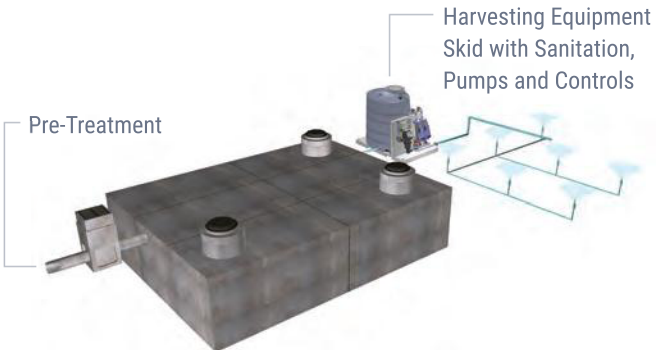
StormCapture offers numerous options for infiltration, detention, retention, treatment and harvesting to solve your stormwater management needs. Let us show you how we can design and customize a solution for you.



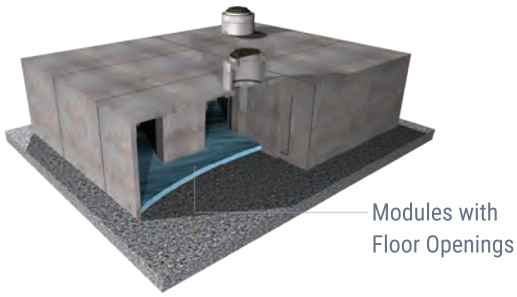
DETENTION



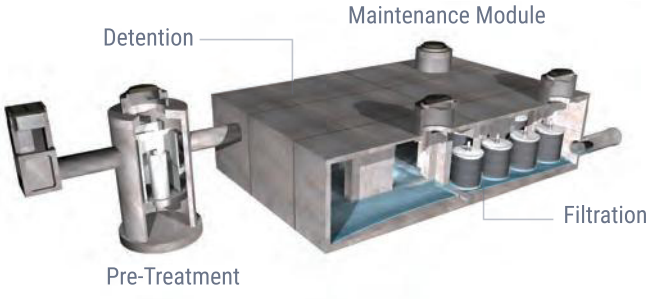
RETENTION



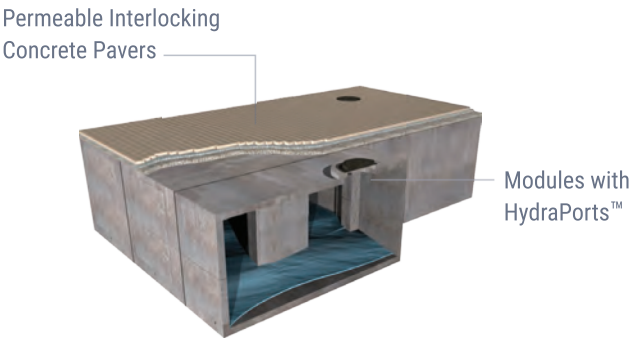
HARVESTING



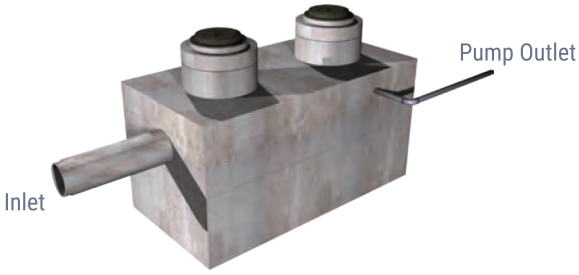
INFILTRATION



TREATMENT



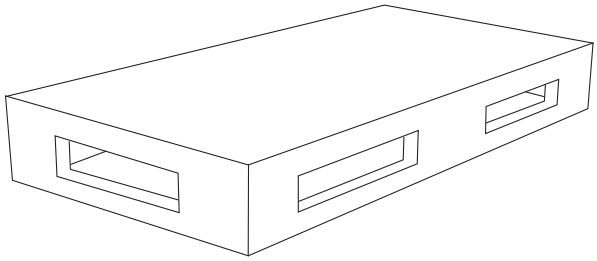
PERMECAPTURE



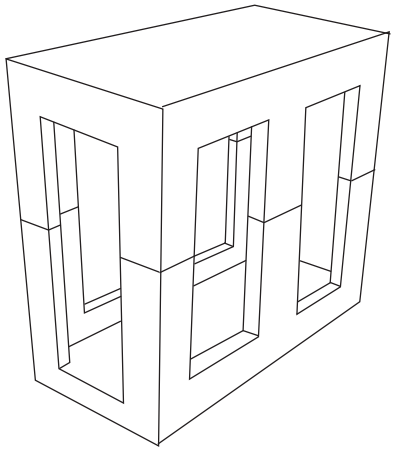
CISTERNS

INSTALLED IN JUST ONE DAY

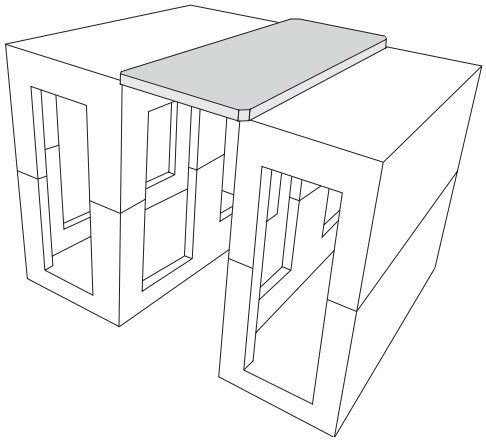
StormCapture Modules



SC1 - Single piece modules can be used for applications from 2' to 7' tall. Appropriate for cisterns, infiltration, detention and retention systems. SC1 modules are typically installed on minimally compacted gravel base, depending on specific project requirements.



SC2 - Two piece modules can be used for applications from 7' to 14' tall for maximum storage capacity in a condensed footprint. Appropriate for cisterns, infiltration, detention and retention systems. SC2 modules are typically installed on compacted native subgrade.



Link Slab - Unique design allows for significant reduction in the quantity of modules and associated costs, while providing maximum storage capacity.

Module Sizes & Capacities

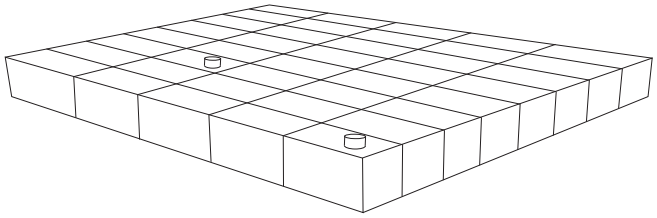
Modules are 8'x16' outside dimensions.
Capacity varies by configuration of openings.

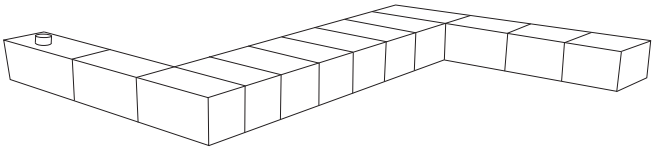
7x15x4 module system selected for the Camelback Residential "Azure & Hazel" project.

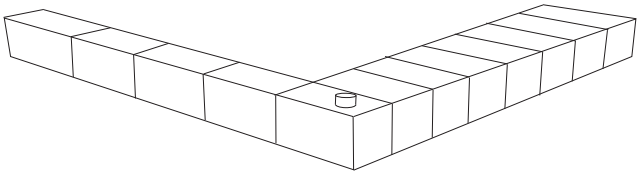
INSIDE DIMENSIONS (FT)	CAPACITY RANGE (FT^3)
7x15x2	210-212
7x15x3	315-325
7x15x4	420-442
7x15x5	525-559
7x15x6	630-678
7x15x7	735-793
7x15x8	840-910

INSIDE DIMENSIONS (FT)	CAPACITY RANGE (FT^3)
7x15x9	945-1,027
7x15x10	1,050-1,140
7x15x11	1,155 - 1,257
7x15x12	1,260 - 1,374
7x15x13	1,365 -1,491
7x15x14	1,470 - 1,608

Endless Configurations



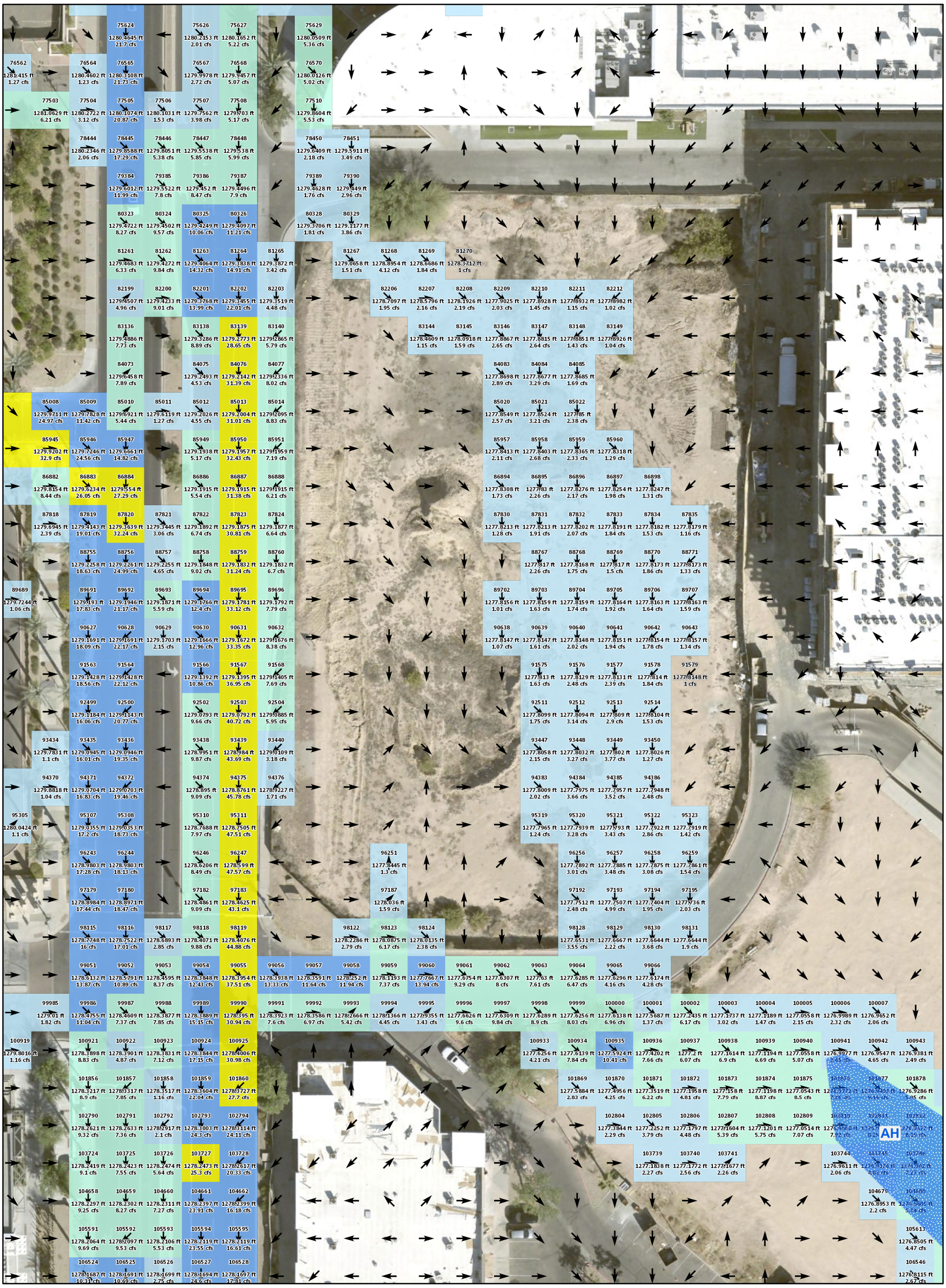




Contact us today to start designing your system!

APPENDIX G
LOWER INDIAN BEND WASH FLO-2D RESULTS

679_LIBW - South 100YR6HR



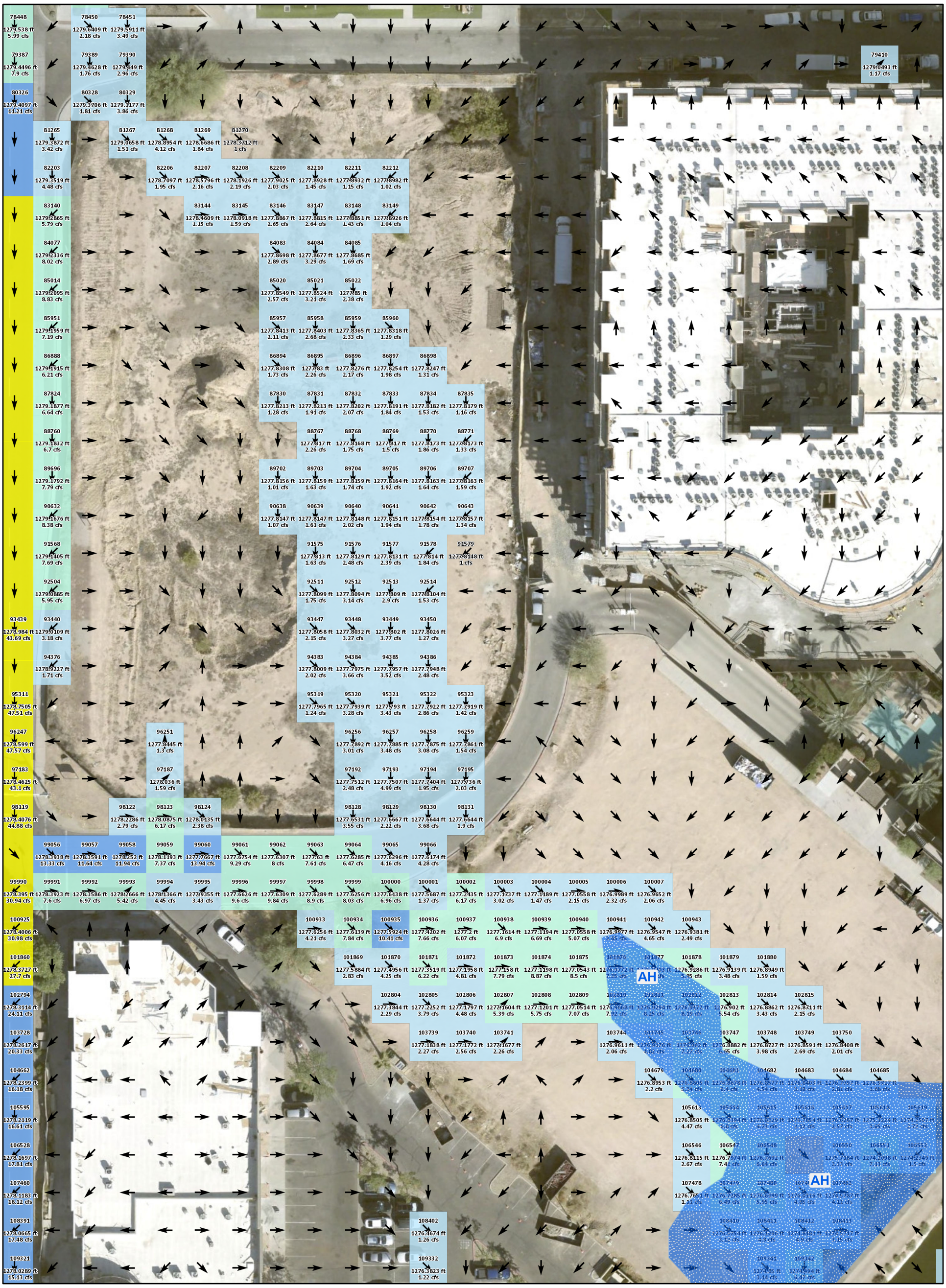
July 26, 2022

1:600

0 35 70 140 ft

0 10 20 40 m

679_LIBW - South 100YR6HR



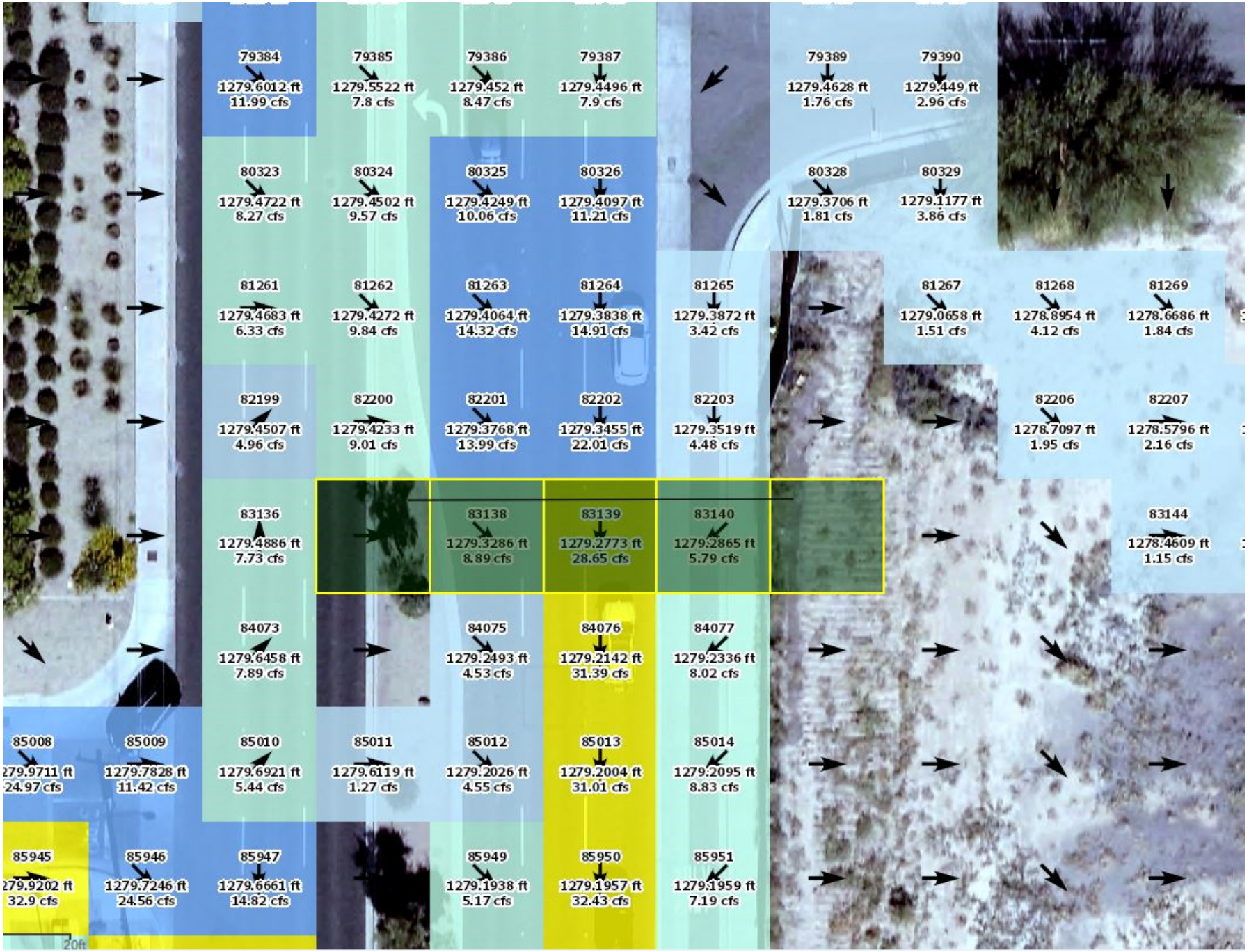
July 26, 2022

1:600

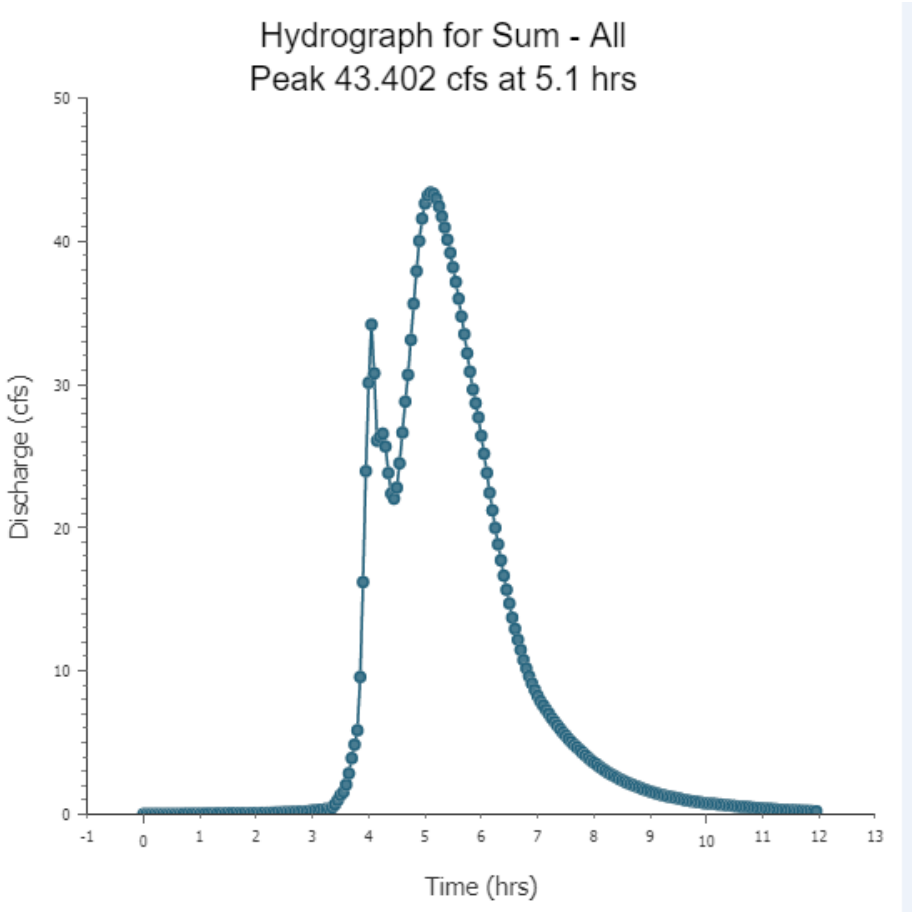
0 35 70 140 ft

0 10 20 40 m

Lower Indian Bend Wash Area Drainage Master Study -
FLO-2D Analysis Results for the Intersection of Scottsdale Road and Coolidge Street



Hydrograph for Peak Flow at Scottsdale Rd. and Coolidge Street



Scottsdale WSE at Coolidge

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.003	ft/ft
Discharge	43.40	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	1,280.73
0+01	1,280.29
0+46	1,279.30
0+47	1,279.78
0+89	1,280.31
0+89	1,280.80
0+92	1,280.80

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 1,280.73)	(0+92, 1,280.80)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	9.0	in
Roughness Coefficient	0.013	
Elevation	1,280.05	ft
Elevation Range	1,279.3 to 1,280.8	ft
Flow Area	16.1	ft²
Wetted Perimeter	56.8	ft
Hydraulic Radius	3.4	in
Top Width	56.62	ft
Normal Depth	9.0	in
Critical Depth	8.7	in
Critical Slope	0.004	ft/ft
Velocity	2.70	ft/s
Velocity Head	0.11	ft
Specific Energy	0.86	ft

Results	
Froude Number	0.893
Flow Type	Subcritical

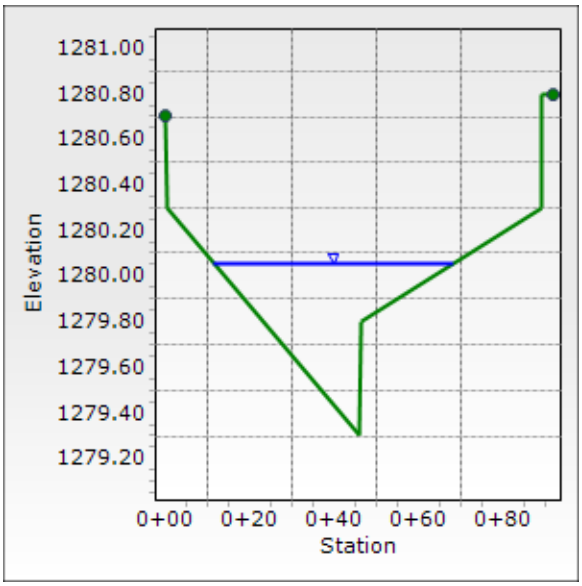
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	9.0 in
Critical Depth	8.7 in
Channel Slope	0.003 ft/ft
Critical Slope	0.004 ft/ft

Cross Section for Scottsdale WSE at Coolidge

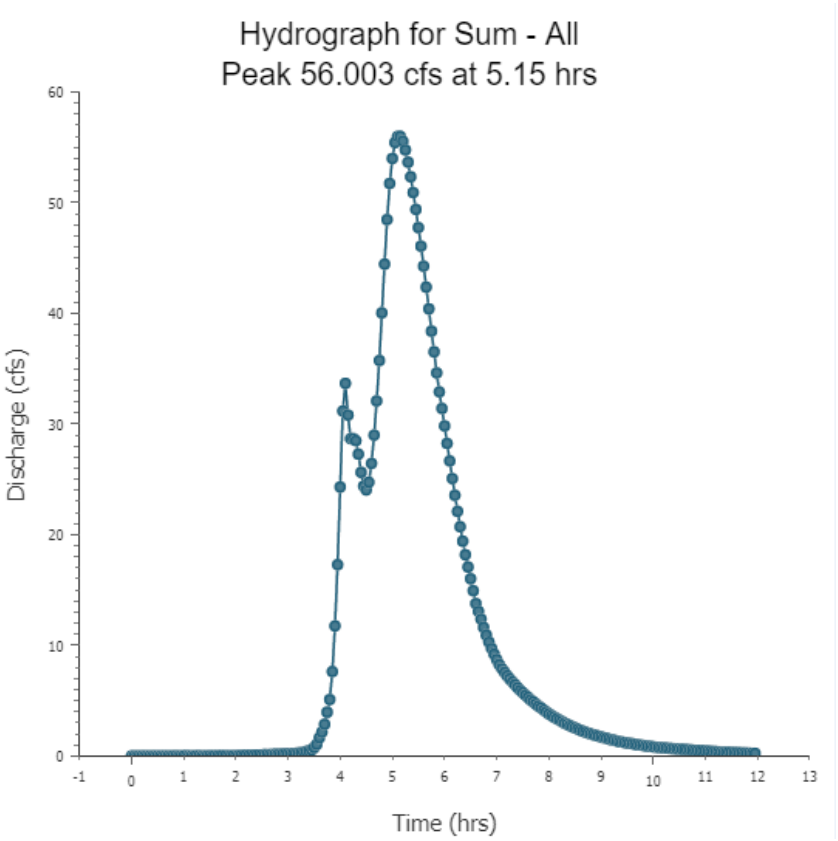
Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.003 ft/ft
Normal Depth	9.0 in
Discharge	43.40 cfs



Lower Indian Bend Wash Area Drainage Master Study -
FLO-2D Analysis Results for the Intersection of Scottsdale Road and Fashion Square

Hydrograph for Peak Flow at Scottsdale Rd. and Fashion Square



Worksheet for Scottsdale WSE at Fashion Square

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.004 ft/ft
Discharge	56.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	1,279.07
0+00	1,278.53
0+02	1,278.54
0+38	1,277.77
0+39	1,278.22
0+79	1,278.79
0+79	1,278.90
0+81	1,278.90

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 1,279.07)	(0+81, 1,278.90)	0.013

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	9.1 in
Roughness Coefficient	0.013
Elevation	1,278.53 ft
Elevation Range	1,277.8 to 1,279.1 ft
Flow Area	17.4 ft²
Wetted Perimeter	58.6 ft
Hydraulic Radius	3.6 in
Top Width	58.44 ft
Normal Depth	9.1 in
Critical Depth	9.3 in
Critical Slope	0.004 ft/ft
Velocity	3.22 ft/s
Velocity Head	0.16 ft

Worksheet for Scottsdale WSE at Fashion Square

Results	
Specific Energy	0.92 ft
Froude Number	1.039
Flow Type	Supercritical

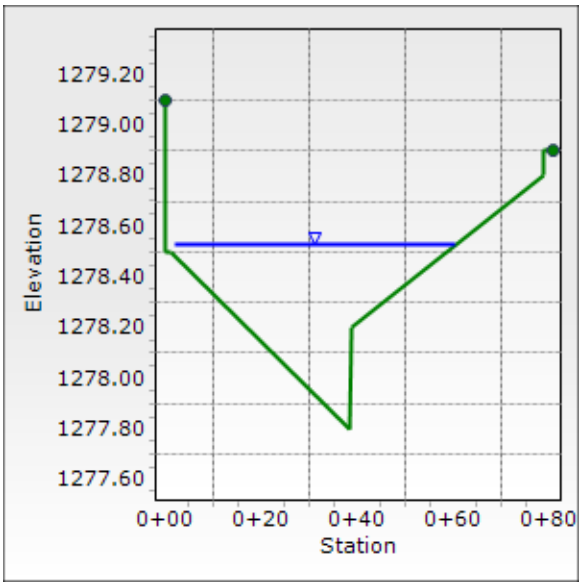
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	9.1 in
Critical Depth	9.3 in
Channel Slope	0.004 ft/ft
Critical Slope	0.004 ft/ft

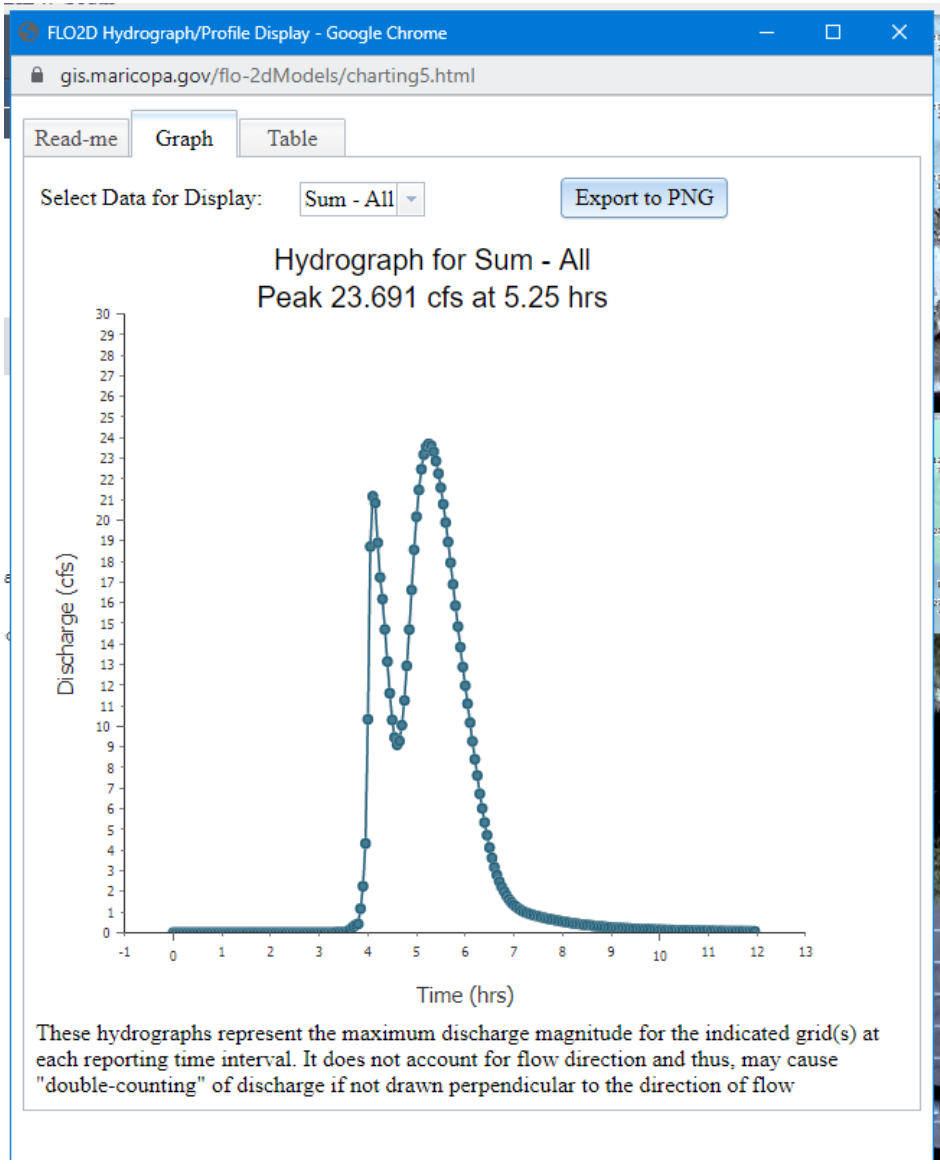
Cross Section for Scottsdale WSE at Fashion Square

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

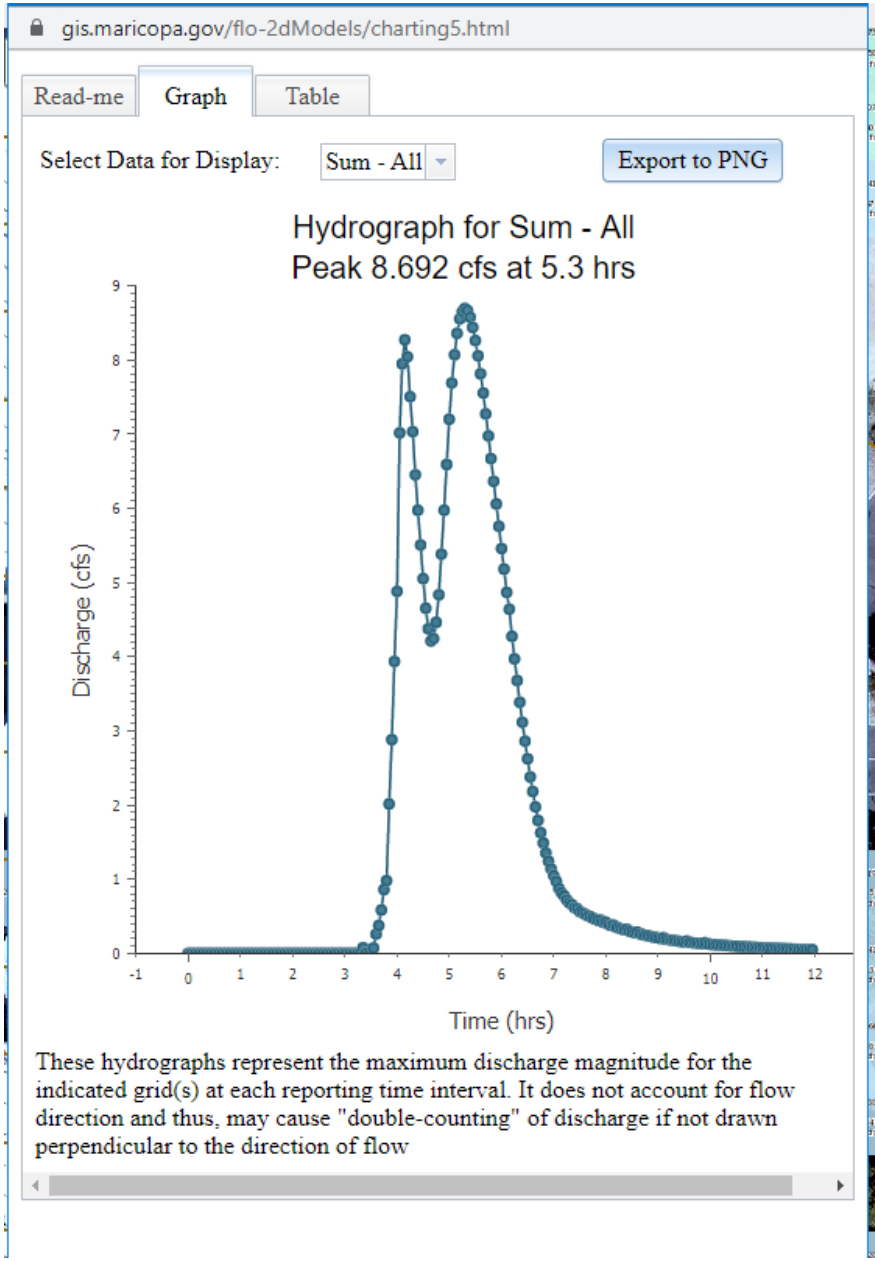
Input Data	
Channel Slope	0.004 ft/ft
Normal Depth	9.1 in
Discharge	56.00 cfs

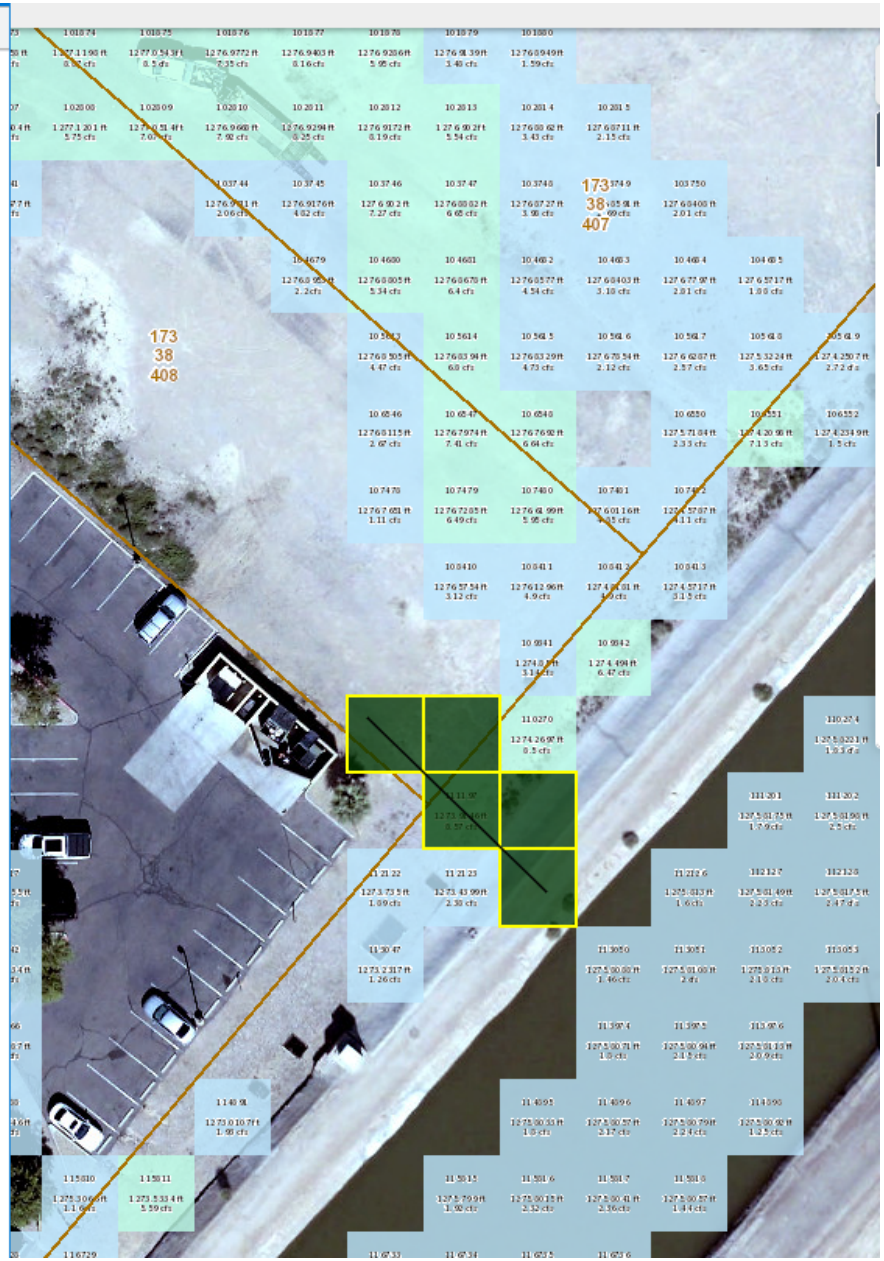


FLOW ENTERING THE SITE
PER THE
LOWER INDIAN BEND WASH STUDY FLO-2D RESULTS
6.25.2021



FLOW EXITING THE SITE
PER THE
LOWER INDIAN BEND WASH STUDY FLO-2D RESULTS
6.25.2021





APPENDIX H
Camelback Residential CLOMR Letter

Federal Emergency Management Agency

Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT

COMMUNITY INFORMATION		PROPOSED PROJECT DESCRIPTION	BASIS OF CONDITIONAL REQUEST
COMMUNITY	City of Scottsdale Maricopa County Arizona	RETENTION BASIN FILL	HYDROLOGIC ANALYSIS UPDATED TOPOGRAPHIC DATA
	COMMUNITY NO.: 045012		
IDENTIFIER	ZOM BLUESKY	APPROXIMATE LATITUDE & LONGITUDE: 33.504, -111.925 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

AFFECTED MAP PANELS	
TYPE: FIRM* NO.: 04013C1770M DATE: September 18, 2020	* FIRM - Flood Insurance Rate Map

FLOODING SOURCE(S) AND REACH DESCRIPTION

Unnamed Shallow Flooding – Approximately 660 feet northeast of the intersection of North Scottsdale Road and East Camelback Road, approximately 930 feet southeast of the intersection of North Scottsdale Road and East Chaparral Road, and bounded by Arizona Canal Diversion Channel to the southeast.

PROPOSED PROJECT DESCRIPTION

Flooding Source	Proposed Project	Location of Proposed Project
Unnamed Shallow Flooding	New Retention Basin	Approximately 660 feet northeast of the intersection of North Scottsdale Road and East Camelback Road, approximately 930 feet southeast of the intersection of North Scottsdale Road and East Chaparral Road, and bounded by Arizona Canal Diversion Channel to the southeast.

SUMMARY OF IMPACTS TO FLOOD HAZARD DATA

Flooding Source	Effective Flooding	Proposed Flooding	Increases	Decreases
Unnamed Shallow Flooding	Zone AH	Zone X (shaded)	None	Yes
	BFEs*	No BFEs	None	Yes

* BFEs - Base (1-percent-annual-chance) Flood Elevations

COMMENT

This document provides the Federal Emergency Management Agency's (FEMA's) comment regarding a request for a CLOMR for the project described above. This document is not a final determination; it only provides our comment on the proposed project in relation to the flood hazard information shown on the effective National Flood Insurance Program (NFIP) map. We reviewed the submitted data and the data used to prepare the effective flood hazard information for your community and determined that the proposed project meets the minimum floodplain management criteria of the NFIP. Your community is responsible for approving all floodplain development and for ensuring that all permits required by Federal or State/Commonwealth law have been received. State/Commonwealth, county, and community officials, based on their knowledge of local conditions and in the interest of safety, may set higher standards for construction in the Special Flood Hazard Area (SFHA), the area subject to inundation by the base flood). If the State/Commonwealth, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on the FEMA website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

To determine the changes in flood hazards that will be caused by the proposed project, we compared the hydraulic modeling reflecting the proposed project (referred to as the proposed conditions model) to the hydraulic modeling used to prepare the Flood Insurance Study (FIS) (referred to as the effective model). If the effective model does not provide enough detail to evaluate the effects of the proposed project, an existing conditions model must be developed to provide this detail. This existing conditions model is then compared to the effective model and the proposed conditions model to differentiate the increases or decreases in flood hazards caused by more detailed modeling from the increases or decreases in flood hazards that will be caused by the proposed project.

The table below shows the changes in the BFEs:

BFE Comparison Table

Flooding Source: Unnamed Shallow Flooding		BFE Change (feet)	Location of maximum change
Existing vs. Effective	Maximum increase	None	Not Applicable.
	Maximum decrease	None	Not Applicable.
Proposed vs. Existing	Maximum increase	None	Not Applicable.
	Maximum decrease	3.0	Approximately 660 feet northeast of the intersection of North Scottsdale Road and East Camelback Road.
Proposed vs. Effective	Maximum increase	None	Not Applicable.
	Maximum decrease	3.0	Approximately 660 feet northeast of the intersection of North Scottsdale Road and East Camelback Road.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on the FEMA website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

DATA REQUIRED FOR FOLLOW-UP LOMR

Upon completion of the project, your community must submit the data listed below and request that we make a final determination on revising the effective FIRM. If the project is built as proposed and the data below are received, a revision to the FIRM would be warranted.

• Form 1, entitled "Overview & Concurrence Form". Detailed application and certification forms must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1 must be included. If as-built conditions differ from the proposed plans, please submit new forms, which may be accessed at https://www.fema.gov/flood-maps/change-your-flood-zone/paper-application-forms#mt-2, or annotated copies of the previously submitted forms showing the revised information.

• Form 2, entitled "Riverine Hydrology & Hydraulics Form"

• Form 3, entitled "Riverine Structures Form"

• Hydrologic analyses, for as-built conditions of the base flood, together with a topographic work map showing the revised floodplain boundaries. Please ensure that the revised information ties in with the current effective information at the downstream and upstream ends of the revised reach.

• An annotated copy of the FIRM, at the scale of the effective FIRM, that shows the revised floodplain boundary delineations shown on the submitted work map and how they tie into the floodplain boundary delineations shown on the current effective FIRM at the downstream and upstream ends of the revised reach.

• As-built plans, certified by a registered professional engineer, of all proposed project elements.

• Documentation of the individual legal notices sent to property owners who will be affected by any widening/shifting of the base floodplain and/or any BFE increases along Unnamed Shallow Flooding.

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CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

• An officially adopted maintenance and operation plan for the underground retention basin system. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished.

• FEMA's fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps may be accessed at https://www.fema.gov/flood-maps/change-your-flood-zone/status/flood-map-related-fees. The fee at the time of the map revision submittal must be received before we can begin processing the request. Payment of this fee can be made through a check or money order, made payable in U.S. funds to the National Flood Insurance Program, or by credit card (Visa or MasterCard only). Please forward the payment, along with the revision application, to the following address:

LOMC Clearinghouse
3601 Eisenhower Avenue, Suite 500
Alexandria, VA 22304-6426

After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM. Because the flood hazard information (i.e., base flood elevations, base flood depths, SFHAs, zone designations, and/or regulatory floodways) will change as a result of the project, a 90-day appeal period will be initiated for the revision, during which community officials and interested persons may appeal the revised flood hazard information based on scientific or technical data.

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CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

COMMUNITY REMINDERS

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Kathryn Lipiecki
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607-4052
(510) 627-7211

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