Drainage Reports

Abbreveated Water & Sewer Need Reports

Water Study

Wastewater Study

Stormwater Waiver Application

PRELIMINARY DRAINAGE REPORT

Wolff Legacy Scottsdale

Assisted Living Facility
8890 Legacy Blvd.
Scottsdale, AZ 85255

Plan # _____
Case # 14-DR-2018
Q-S # _____
☑ Accepted
☐ Corrections
N. Baroros 9-18-18
Reviewed By Date

Prepared For:

THE WOLFF COMPANY
Since 1949

Prepared by:

SEG

Registered Professional Engineer (Civil)
CERTIFICATE NO.
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ALI SAMIH
FAKIH
Date Signed 08-29-2018
ARIZONA, U.S.A.
EXPIRES 12-31-19

Sustainability Engineering Group
8280 E. Gelding Drive, Suite 101
Scottsdale, AZ 85260
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Project Number: 170726
Submittal Date: November 20, 2017 (Zoning)
Resubmittal Date: February 20, 2018 (Zoning)
Revision Date: April 2018 (Zoning)
Revision Date: May 2, 2018 (DRB)
Revision Date, July 16, 2018 (DRB)
Revision Date, August 29, 2018 (DRB)
Case No.: 23-ZN-2017; 7-GP-2017 Plan Check No.: TBD

14-DR-2018
08/29/18

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EXPIRES 12-31-19

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1. INTRODUCTION

This report represents the storm water analysis for a proposed assisted living project with 151 apartment type units within the north and south larger buildings, a communal area with a theater, salon, and 6,000 sf restaurant in the central building, and 22 cottage units. The purpose of this report is to provide the hydrologic and hydraulic analyses, required by the City of Scottsdale, to support the proposed site plan for said development. This report includes discussions and calculations defining the storm water management concepts for collection, conveyance, and detention systems necessary to comply with the drainage requirements of the City of Scottsdale and Maricopa County. Preparation of this report has been done in accordance with the requirements of the City of Scottsdale Design Standards & Policies Manual (DS&PM) 2018 [1], and the Drainage Design Manuals for Maricopa County, Arizona, Volumes I[2] and Volume II[3].

2. LOCATION AND PROJECT DESCRIPTION

2.1 LOCATION:

The project property consists of a parcel of land located in a portion of the SW ¼ of Section 30 and the NW ¼ of Section 31, Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The parcel ID number is 215-07-238. Refer to **FIGURE 1 - Vicinity Map** for the project's location with respect to major cross streets.

2.2 EXISTING AND PROPOSED DEVELOPMENTS SURROUNDING THE SITE:

Existing site context related to surrounding developments is as follows:

- North: To the north is the La Curvata development zoned I-1 ESL (HD)
- West: The west side is bound by 88th St and a City of Scottsdale property zoned OS.
- South: The south is Legacy Boulevard and directly across is an undeveloped parcel zoned I-1 PCD ESL (HD)
- East: Pima Road runs along the east side of the property and directly across the Ironwood Village parcel 4 residential development zoned R1-5 ESL (HD)
- Southeast: Directly adjacent to the subject project at the NWC of Legacy Blvd. and Pima Road is a parcel zoned C-2 ESL HD proposed to be a Chase Bank site (not part of this subject project).

2.3 EXISTING SITE DESCRIPTION:

Land ownership, as defined on the Final Plat by AW Land Surveying, LLC includes 526,167.7 square feet, 12.079 +/- acres (net) of commercially zoned land. City of Scottsdale zoning map designates this parcel as I-1 ESL HD and C-2 ESL HD. The C.O.S. conceptual land use map designates this parcel for commercial use. Rezoning to CO ESL HD is proposed.

This site is an undeveloped parcel lot. The topography generally slopes from the northeast (elevation 1660+/-) to the southwest (elevation 1638 +/-) at approximately 2% with a change in elevation of approximately thirty-eight (38) feet. The site consists of grass, brush, rock, and typical desert landscape.

Refer to **FIGURE 2** for an aerial of the overall project existing conditions.

2.4 PROPOSED SITE DEVELOPMENT:

The property is proposed to be developed into an assisted living project with 151 apartment type units in the north and south larger buildings, a communal area with a theater, salon, and 6,000 sf restaurant in a centrally located building, and 22 cottage units.
Refer to **APPENDIX III** for Grading and Drainage Plans.

2.5 FLOOD HAZARD ZONE:

As defined by the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona, and incorporated areas, Community number 045012, Panel number 1320 of 4425, as shown on Map Number 04013C1320L dated October 16, 2013, this site is designated as **Special Flood Hazard Area (SFHA) Zone AO** and is typically defined as flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined. This site is in an area noted as having a flood depth of 1' at a velocity of 4 to 5 fps.
Refer to **FIGURE 3** – FIRM.

3. EXISTING DRAINGE CONDITIONS

3.1 OFF-SITE DRAINAGE:

This site is bound as follows:

- By Pima Road to the east. This road has curb and gutter conveying runoff south where it is collected in a curb opening catch basin near the Pima Road and Legacy Blvd intersection.
- By Legacy Boulevard to the south. This road has curb and gutter conveying runoff west to Historical Outlet 1 where it joins with the wash runoff and flows downstream over land.
- By a wash to the north and west that passes under Pima Road through a bridge. This wash has a flow of 817 CFS per the Pinnacle Peak West ADMS- 100year 24-hour worse case results. Please see Appendix II for printout of Pinnacle Peak West FLO2D flows. The Pinnacle Peak West ADMS was conducted by Flood Control District of Maricopa County and City of Scottsdale. SEG acknowledged the FLO2D Data as the best available data, understand it, and accept the FLO-2D Results.

3.2 ON-SITE DRAINAGE:

Each existing drainage area has been calculated using the Rational Equations for time of concentration as follows:

Drainage Area 1 (P-DA1) to Historical Outlet 1 (HO-1):

The westerly edge of the site (P-DA1) is mainly the existing wash section to the top of its easterly bank. **Q_{10}Exist. =3.1 cfs; Q_{100} Exist. = 6.5 cfs**

Drainage Area 2 (P-DA2) to Historical Outlet 2 (HO-2):

Historical Outlet 2 is an existing 18" culvert crossing under Legacy Blvd. located approximately 720 feet west of the intersection of Pima Road. **Q_{10}Exist. =7.5 cfs; Q_{100} Exist. = 15.1 cfs**

Drainage Area 3 (P-DA3) to Historical Outlet 3 (HO-3):

Historical Outlet 3 is an existing 18" culvert crossing under Legacy Blvd. located approximately 390 feet west of the intersection of Pima Road. **Q_{10}Exist. =7.2 cfs; Q_{100} Exist. = 14.6 cfs**

Drainage Area 4 (P-DA4) to Historical Outlet 4 (HO-4):

Historical Outlet 4 is an existing 18" culvert crossing under Legacy Blvd. located approximately 180 feet west of the intersection of Pima Road. **Q_{10}Exist. =5.7 cfs; Q_{100} Exist. = 11.5 cfs**

Please see **Appendix II** for Summary of Rational Method calculations.

4. PROPOSED STORM WATER MANAGEMENT

4.1 Offsite Drainage

HECRAS Analysis was conducted on the wash to the north and the west of the site to determine the 100-year Water Surface Elevations. The buildings are elevated to be at least 1 foot above the 100-year water surface elevations. The channel cross-sections are confined except for cross sections 20 and 100 where the westerly bank allows the flow to disperse to the west. The calculation is run assuming a vertical confinement to provide a conservative high-water elevation for the site design.

SEG completed erosion setback and scour calculations summarized as follows:

- Erosion setback from top of bank for straight channel: 29'
- Erosion setback from top of bank for Curved Channel: 71'
- Scour depth: 3.2'

Because the proposed improvements encroach into the wash erosion setback, scour walls are provided that extend below the scour depth.
See **Appendix II** for existing and proposed HECRAS result printouts, n value selection, set back and scour calculations.

4.2 On-site DESIGN INTENT:

On-site drainage will be handled within paved areas through curb openings, underground storm systems, or onsite channels where necessary. This parcel is in ESL; Pre vs. Post analysis is used to keep the discharge at the historical outlets less than or equal to existing condition outflows.

On-site detention will be provided in an underground detention system on the low end of the site. Total discharge of the storm water detention will be within thirty-six hours with historical outlets HO-2 and HO-3 being used. The ultimate outfall for the project is at the southwest corner of the site along Legacy Boulevard at an elevation of 1238.24.

The area onsite that falls within the drainage area of the wash (P-DA1) will be largely untouched and developed runoff rate will be ensured to be less than or equal to the predevelopment discharge.

Refer to Section 5 below for a discussion on proposed finished floor elevations. Refer to **Appendix III** for the Preliminary Grading & Drainage Plan.

4.3 DESIGN STORM REQUIREMENTS:

In accordance with City of Scottsdale DS & PM Section 4-1.201, C, 1, c. requirements for land within an ESL area, stormwater storage should be designed base on 100-year/2-hour stormwater or adequately sized to attenuate post-development peak discharge rates to pre-development levels for the 10- and 100- year flood events. Design detention volume will be based on historical outflow rates per Section 3.2 and as calculated in Section 4.5 below.

4.4 CHARACTERISTICS OF BASINS:

The proposed basins are a combination of undisturbed NAOS areas or new commercial development. Based on Table 6.4 of the DS&PM, runoff coefficients for the 100-year and 10-year storm event used are as follows:

- C_{100}=0.45 for undisturbed natural desert and desert landscaping
- C_{100}=0.95 for asphalt pavement, concrete, and roof areas
- C_{10}=0.37 for undisturbed natural desert and desert landscaping
- C_{10}=0.90 for asphalt pavement, concrete, and roof areas.

HYDROLOGIC ANALYSIS: Hydrologic analysis is determined using the procedures in the City of Scottsdale Design Standards & Policies Manual and the Drainage Design Manual for Maricopa County, Arizona, Volume I. The Rational Method was utilized to compute the on-site peak discharges. The following is the established Rational Method equation and the basic input data required:

$Q=C_wiA$

Where: C_{wt} = The runoff coefficient relating runoff to rainfall
i = Average rainfall intensity in inches/hour, lasting for Tc
Tc = The time of concentration (minutes)
$Tc = 11.4L^{0.5}K_b^{0.52}S^{-0.31}i^{-0.38}$ (Equation 3.2, Papadakis and kazan equation, 1987)
A = The contributing drainage area in acres

Tc and i are calculated by iteration using the equation above and NOAA atlas 14 data as described in the *Drainage Design Manual for Maricopa County, hydrology (ref. 2).*

4.5 STORMWATER DETENTION:

4.5.1 REQUIRED STORAGE:

The capacity of the existing historical outlets will be studied and storage will be provided as required to maintain outflows at or below existing flow rates and drainage-way capacities. Historic outfalls will be utilized, and detention provided as follows:

Post-Development DA-1 (wash) contributes only to the wash and will not be developed. Therefore, it will not be included in the detention requirements. This outlets to HO-1. (1.60 Ac). In addition, DA-12

outlets directly to Legacy Blvd. the proposed flow (DA1+DA12 = 5.8 cfs) is less than the pre-development flow of (P-DA1 = 6.5 cfs). Refer to Drainage Area Calculations, **Appendix II**.

Post-Development OSDA is the corner commercial site and is a stand-alone parcel that will have its own future detention and outlet to HO-4 culvert. (1.69 Ac). The post development flow of 6 cfs is less than the pre-development flow of 11.5 cfs.

Historical Outlets 2 and 3 have the small drainage areas DA-11 and DA-13 draining directly to the culverts respectively, therefore the runoff from these areas will be accounted for in the release calculations.

The anticipated outlet for the developed assisted living site will be the existing 18" culverts at DA-11 and DA-13 with allowable release rates as determined in Section 3.2 above. Please refer to Appendix II for calculations of the combined hydrograph.

For this iteration, total allowable outflows based on pre-development runoff rates for DA-11 and DA-13 calculated in Section 3.2 above are as follows:

- 100-yr event: 15.1 cfs + 14.6 cfs = 29.7 cfs
  - Deduction for the direct runoff from DA-11 and DA-13
    - DA-11- Q_{100} = 1.2 cfs
    - DA-12- Q_{100} = 0.90 cfs
  - 29.7 cfs – 1.2 cfs – 0.9 cfs = **27.6 cfs**
  - 13.95 CFS to HO-2
  - 13.65 CFS to HO-3

- 10-yr event: 7.5 cfs + 7.2 cfs = 14.7 cfs
  - Deduction for the direct runoff from DA-11 and DA-13
    - DA-11- Q_{10} = 0.6 cfs
    - DA-12- Q_{10} = 0.5 cfs
  - 14.7 cfs – 0.6 cfs – 0.5 cfs = **13.6 cfs**
  - 6.9 CFS to HO-2
  - 6.7 CFS to HO-3

Detention calculations were based on the combined hydrograph as inflow to the underground detention basin with outflow limited to a maximum of 27.6 cfs. Please refer to **Appendix II** for detention design.

4.5.2 DETENTION BASIN SUMMARY:

- Required storage is 9,770 cf. (See Appendix II)
- Proposed storage volume = 396 lf; 6' Dia pipe @ 28.27 cf/ft = 11,195 cf

During Final Design restricted outlet plate(s) and emergency overflow structure will be designed for the underground detention basin, and detention basin design will be provided based on the final improvements elevations. The underground detention basin will be designed to bleed off in less than

36 hours through the restrictor plates during final design. Emergency overflow via standpipes /CB's will be provided with erosion protection in the event of two consecutive storm events.

During final design, a Stormceptor environmental structure will be designed and provided on the final construction plans to provide first flush storm water quality treatment.

Final design will ensure surface drainage will not pond more than 6-inches prior to grade break overflow in event of detention system being at capacity and occurrence of secondary storm.

In accordance with COS requirements, an easement is provided for maintenance and required signage will be indicated on the improvements plans.

5. FLOOD SAFETY FOR DWELLINGS

5.1 FINISHED FLOOR ELEVATIONS

This site is in an "AO" zone and per COS requirements Finished floor elevations are a minimum of 2' higher than the highest natural adjacent grade (HAG)under the building pad.

6. CONCLUSIONS

6.1 OVERALL PROJECT:

1. Off-site storm water will be conveyed to match existing conditions.
2. The finish floor elevations will be designed a minimum of 2' above existing adjacent ground elevations.

6.2 PROJECT PHASING:

This development is anticipated to be constructed in a single phase.

7. WARNING AND DISCLAIMER OF LIABILITY

Re: following page.

8. REFERENCES

1. *Design Standards & Policies Manual, City of Scottsdale – 2018*
2. *Drainage Design Manual for Maricopa County, Arizona, Volume I, Hydrology, Flood Control District of Maricopa County, Fourth Edition, November 18, 2009 amended through February 10, 2011*
3. *Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics, Flood Control District of Maricopa County, January 28, 1996*


E Havasupai Dr
E Diamond Rim Dr
E Rimrock Dr
E Hualapai Dr
N 84th St
N 84th Pl
N Grayhawk Dr
N 97th St
N 88th Way
N 88th Pl
E Maple Dr
N 90th St
N 91st Way
N 92nd Way
N 92nd Pl
E Palm Tree Dr
E Topeka Dr
N 95th Pl
N 98th Pl
E Kemper Way
E Legacy Ln
N 98th St
N 95th Way
88th St
PROJECT LOCATION
Legacy Blvd
E Princess Dr
N Pima Rd
E Trailside View
E Desert View
E Desert Park Dr
E Canyon View
E Via De Vaquero Dr
N 93rd Pl
N 94th Pl
N 94th Way
N 94th St
E Piedra Dr
N 96th Way
E Puerta Del Viento
N 98th Way
N 99th St
101
Pima Fwy
E Union Hills Dr
E Mayo Blvd
E Theresa Dr
N 85th St
N Hayden

FIGURE 1


E-Downing-Gilson-Dr
E-Rosemonte-Dr
N-91st-St
PROJECT
LOCATION
N-Hayden-Rd
E-Rockwood-Dr
N-90th-Way
E-Nittany-Dr
88th-St
E-Union-Hills-Dr
E-Princess-Dr
Legacy-Blvd

FIGURE 2

NOTES TO USERS

This map is for use in administering the Nation Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Arizona State Plane Central zone (FIPSZONE 0202). The **horizontal datum** was NAD 83 HARN, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988 (NAVD 88). These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. Map users wishing to obtain flood elevations referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29) may use the following Maricopa County website application: http://www.fcd.maricopa.gov/Maps/gismaps/apps/gdacs/application/index.cfm

This web tool allows users to obtain point-specific datum conversion values by zooming in and hovering over a VERTCON checkbox on the layers menu on the left side of the screen. The VERTCON grid referenced in this web application was also used to convert existing flood elevations from NGVD 29 to NAVD 88.

To obtain current elevation, description, and/or location information for National Geodetic Survey bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov. To obtain information about Geodetic Densification and Cadastral Survey bench marks produced by the Maricopa County Department of Transportation, please visit the Flood Control District of Maricopa County website at:
http://www.fcd.maricopa.gov/Maps/gismaps/apps/gdacs/application/index.cfm

Base map information shown on this FIRM was derived from multiple sources. Aerial imagery was provided in digital format by the Maricopa County Department of Public Works, Flood Control District. The imagery is dated October 2008 to November 2009. Additional National Agricultural Imagery Program (NAIP) imagery was provided by the Arizona State Land Department (ALRIS) and is dated 2007. The coordinate system used for the production of the digital FIRM is State Plane Arizona Central NAD83 HARN, International Feet.

The **profile base line** depicted on this map represents the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the profile base line, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community, as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM, visit the **FEMA Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX) at 1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, A99, AR, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A — No Base Flood Elevations determined.
- ZONE AE — Base Flood Elevations determined.
- ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X — 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.

OTHER AREAS

- ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000m N — 1000-meter Universal Transverse Mercator grid ticks, zone 12
- 6000000 M — 5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 0202), Transverse Mercator
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
April 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
December 3, 1993 September 30, 1990 July 19, 2001 September 30, 2005
October 16, 2013 - to add base flood elevations, to add special flood hazard areas, to incorporate previously issued letters of map revision, to add roads and road names, to update corporate limits, to change floodway, to advance suffix, to change base flood elevations, and to add floodway.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in 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.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

PANEL 1320L

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1320 OF 4425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1320	L
PHOENIX, CITY OF	040051	1320	L
SCOTTSDALE, CITY OF	045012	1320	L

FIGURE 3

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C1320L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

APPENDIX I

Rainfall Data

NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, USA*
Latitude: 33.6579°, Longitude: -111.8901°
Elevation: 1661.07 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	2.40 (1.99-2.95)	3.14 (2.62-3.85)	4.24 (3.50-5.18)	5.08 (4.18-6.19)	6.20 (5.02-7.54)	7.06 (5.65-8.52)	7.94 (6.24-9.56)	8.82 (6.83-10.6)	10.0 (7.54-12.0)	10.9 (8.05-13.2)
10-min	1.83 (1.52-2.25)	2.39 (2.00-2.93)	3.22 (2.66-3.94)	3.86 (3.17-4.71)	4.72 (3.82-5.73)	5.38 (4.30-6.48)	6.04 (4.75-7.27)	6.71 (5.19-8.07)	7.61 (5.74-9.16)	8.30 (6.13-10.0)
15-min	1.51 (1.26-1.86)	1.98 (1.65-2.42)	2.66 (2.20-3.26)	3.19 (2.62-3.89)	3.90 (3.16-4.74)	4.44 (3.55-5.36)	5.00 (3.92-6.01)	5.55 (4.29-6.67)	6.29 (4.74-7.57)	6.86 (5.06-8.27)
30-min	1.02 (0.846-1.25)	1.33 (1.11-1.63)	1.79 (1.48-2.19)	2.15 (1.77-2.62)	2.63 (2.13-3.19)	2.99 (2.39-3.61)	3.36 (2.64-4.05)	3.73 (2.89-4.49)	4.24 (3.19-5.10)	4.62 (3.41-5.57)
60-min	0.630 (0.523-0.773)	0.823 (0.687-1.01)	1.11 (0.918-1.36)	1.33 (1.09-1.62)	1.63 (1.31-1.97)	1.85 (1.48-2.23)	2.08 (1.64-2.50)	2.31 (1.79-2.78)	2.62 (1.98-3.15)	2.86 (2.11-3.45)
2-hr	0.368 (0.310-0.442)	0.476 (0.402-0.574)	0.634 (0.531-0.759)	0.754 (0.626-0.902)	0.918 (0.754-1.09)	1.04 (0.844-1.24)	1.17 (0.931-1.38)	1.30 (1.02-1.53)	1.47 (1.13-1.74)	1.60 (1.20-1.91)
3-hr	0.269 (0.226-0.330)	0.345 (0.291-0.424)	0.451 (0.378-0.551)	0.534 (0.444-0.650)	0.651 (0.532-0.787)	0.744 (0.600-0.894)	0.840 (0.666-1.01)	0.941 (0.733-1.13)	1.08 (0.816-1.29)	1.19 (0.878-1.43)
6-hr	0.162 (0.139-0.193)	0.205 (0.176-0.244)	0.261 (0.223-0.309)	0.306 (0.259-0.361)	0.368 (0.307-0.432)	0.415 (0.342-0.486)	0.465 (0.377-0.543)	0.516 (0.411-0.603)	0.584 (0.453-0.683)	0.638 (0.484-0.746)
12-hr	0.092 (0.080-0.108)	0.116 (0.100-0.136)	0.146 (0.126-0.171)	0.170 (0.145-0.199)	0.203 (0.171-0.236)	0.227 (0.189-0.264)	0.253 (0.208-0.293)	0.278 (0.226-0.323)	0.313 (0.247-0.364)	0.339 (0.263-0.397)
24-hr	0.054 (0.048-0.063)	0.069 (0.061-0.080)	0.089 (0.078-0.103)	0.106 (0.092-0.122)	0.128 (0.111-0.148)	0.146 (0.125-0.168)	0.165 (0.140-0.190)	0.185 (0.155-0.213)	0.212 (0.175-0.245)	0.234 (0.190-0.272)
2-day	0.030 (0.026-0.034)	0.038 (0.033-0.044)	0.050 (0.043-0.057)	0.059 (0.051-0.068)	0.073 (0.062-0.083)	0.083 (0.071-0.095)	0.094 (0.080-0.109)	0.106 (0.089-0.123)	0.123 (0.101-0.142)	0.136 (0.110-0.158)
3-day	0.021 (0.019-0.024)	0.027 (0.024-0.031)	0.036 (0.032-0.041)	0.043 (0.038-0.049)	0.053 (0.046-0.061)	0.061 (0.053-0.070)	0.070 (0.059-0.080)	0.079 (0.067-0.091)	0.092 (0.076-0.106)	0.103 (0.084-0.119)
4-day	0.017 (0.015-0.020)	0.022 (0.019-0.025)	0.029 (0.026-0.033)	0.035 (0.031-0.040)	0.043 (0.038-0.049)	0.050 (0.044-0.057)	0.058 (0.049-0.066)	0.066 (0.056-0.075)	0.077 (0.064-0.088)	0.086 (0.071-0.099)
7-day	0.011 (0.010-0.013)	0.014 (0.012-0.016)	0.019 (0.017-0.022)	0.023 (0.020-0.026)	0.028 (0.025-0.032)	0.033 (0.028-0.037)	0.038 (0.032-0.043)	0.043 (0.036-0.049)	0.050 (0.042-0.058)	0.056 (0.046-0.065)
10-day	0.008 (0.007-0.010)	0.011 (0.010-0.012)	0.014 (0.013-0.016)	0.017 (0.015-0.020)	0.021 (0.019-0.024)	0.025 (0.021-0.028)	0.028 (0.024-0.032)	0.032 (0.027-0.037)	0.038 (0.031-0.043)	0.042 (0.035-0.049)
20-day	0.005 (0.005-0.006)	0.007 (0.006-0.008)	0.009 (0.008-0.010)	0.011 (0.009-0.012)	0.013 (0.011-0.015)	0.015 (0.013-0.017)	0.017 (0.014-0.019)	0.019 (0.016-0.021)	0.021 (0.018-0.024)	0.023 (0.019-0.027)
30-day	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.010 (0.009-0.012)	0.012 (0.010-0.013)	0.013 (0.011-0.015)	0.014 (0.012-0.016)	0.016 (0.014-0.019)	0.018 (0.015-0.021)
45-day	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.006-0.007)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.009-0.011)	0.011 (0.010-0.013)	0.013 (0.011-0.014)	0.014 (0.012-0.016)
60-day	0.003 (0.002-0.003)	0.004 (0.003-0.004)	0.005 (0.004-0.005)	0.005 (0.005-0.006)	0.007 (0.006-0.007)	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.009-0.012)	0.011 (0.009-0.013)

[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.

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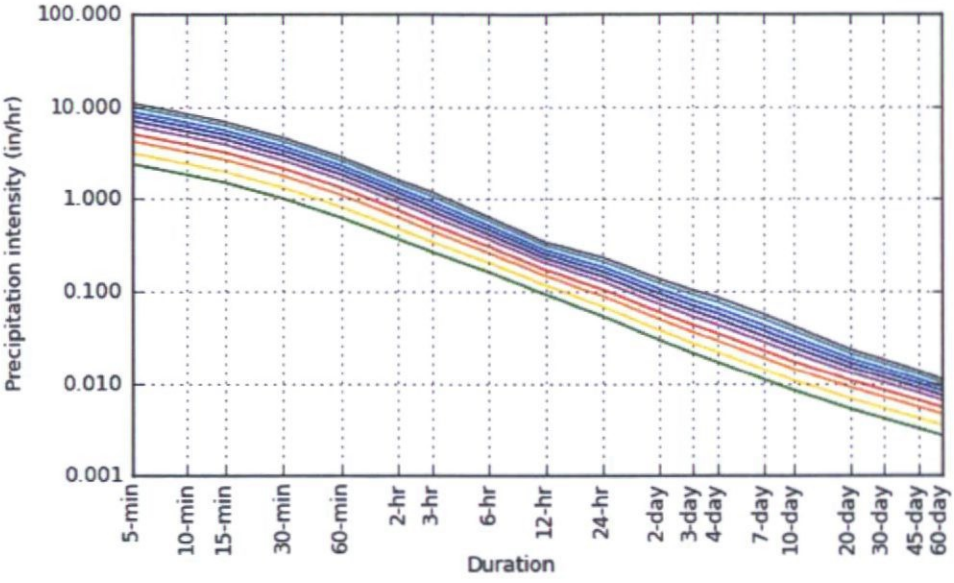
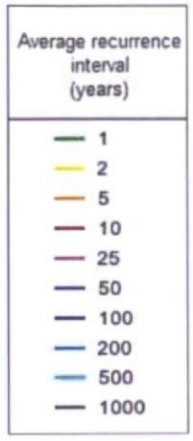
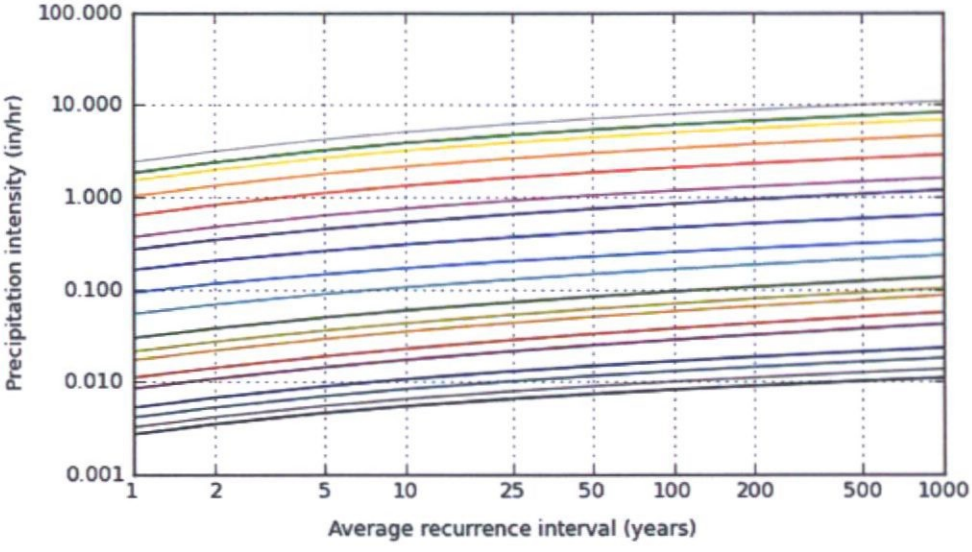
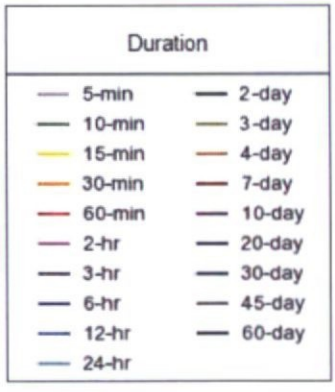
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 33.6579°, Longitude: -111.8901°









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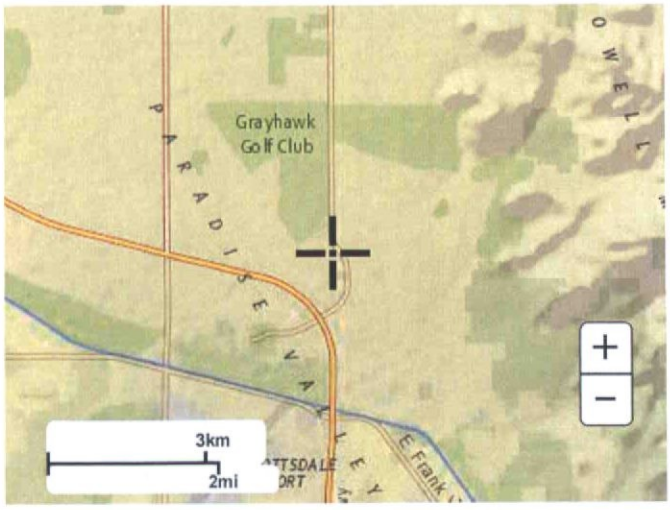
Small scale terrain



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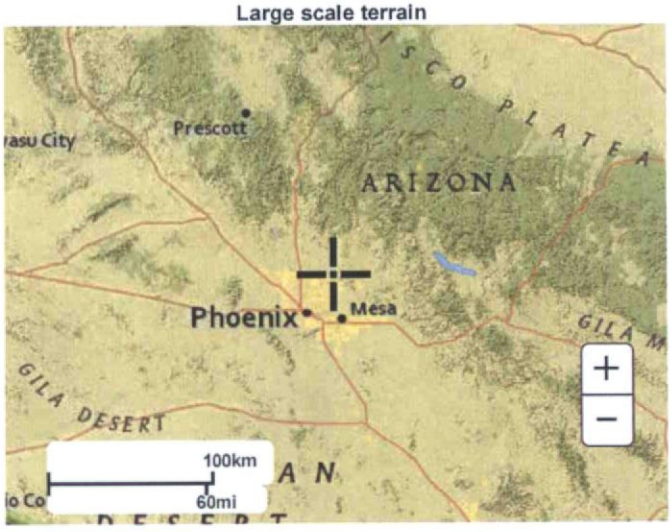

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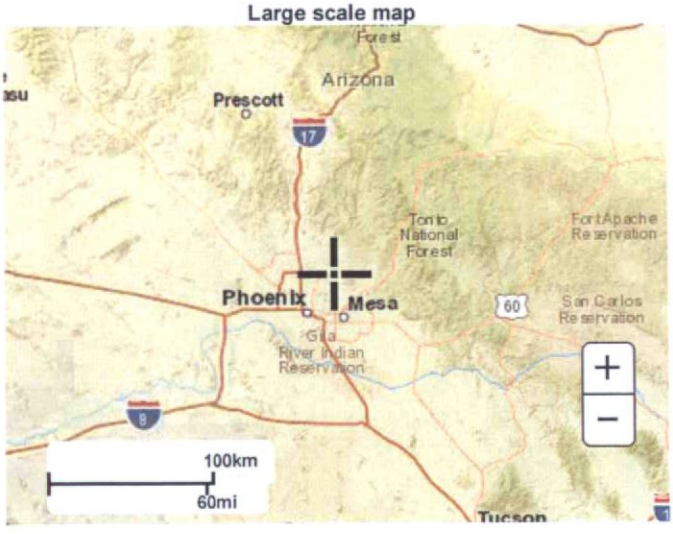
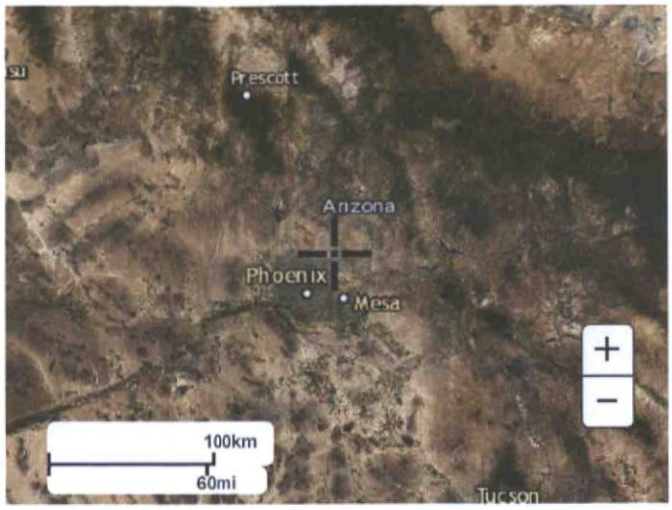


Large scale aerial



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Silver Spring, MD 20910
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NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, USA*
Latitude: 33.6579°, Longitude: -111.8901°
Elevation: 1661.07 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	0.200 (0.166-0.246)	0.262 (0.218-0.321)	0.353 (0.292-0.432)	0.423 (0.348-0.516)	0.517 (0.418-0.628)	0.588 (0.471-0.710)	0.662 (0.520-0.797)	0.735 (0.569-0.884)	0.833 (0.628-1.00)	0.909 (0.671-1.10)
10-min	0.305 (0.253-0.375)	0.398 (0.333-0.489)	0.537 (0.444-0.657)	0.644 (0.529-0.785)	0.787 (0.636-0.955)	0.896 (0.716-1.08)	1.01 (0.791-1.21)	1.12 (0.865-1.34)	1.27 (0.956-1.53)	1.38 (1.02-1.67)
15-min	0.378 (0.314-0.464)	0.494 (0.412-0.606)	0.666 (0.551-0.815)	0.798 (0.656-0.973)	0.975 (0.789-1.18)	1.11 (0.888-1.34)	1.25 (0.981-1.50)	1.39 (1.07-1.67)	1.57 (1.19-1.89)	1.71 (1.27-2.07)
30-min	0.509 (0.423-0.625)	0.665 (0.555-0.816)	0.897 (0.741-1.10)	1.07 (0.884-1.31)	1.31 (1.06-1.59)	1.50 (1.20-1.80)	1.68 (1.32-2.02)	1.87 (1.44-2.25)	2.12 (1.60-2.55)	2.31 (1.71-2.78)
60-min	0.630 (0.523-0.773)	0.823 (0.687-1.01)	1.11 (0.918-1.36)	1.33 (1.09-1.62)	1.63 (1.31-1.97)	1.85 (1.48-2.23)	2.08 (1.64-2.50)	2.31 (1.79-2.78)	2.62 (1.98-3.15)	2.86 (2.11-3.45)
2-hr	0.736 (0.619-0.884)	0.952 (0.803-1.15)	1.27 (1.06-1.52)	1.51 (1.25-1.80)	1.84 (1.51-2.19)	2.08 (1.69-2.47)	2.34 (1.86-2.77)	2.59 (2.03-3.07)	2.94 (2.25-3.48)	3.20 (2.40-3.81)
3-hr	0.808 (0.680-0.990)	1.04 (0.874-1.27)	1.35 (1.14-1.66)	1.60 (1.33-1.95)	1.96 (1.60-2.36)	2.23 (1.80-2.69)	2.52 (2.00-3.03)	2.83 (2.20-3.39)	3.24 (2.45-3.88)	3.57 (2.64-4.29)
6-hr	0.972 (0.835-1.16)	1.23 (1.05-1.46)	1.56 (1.34-1.85)	1.83 (1.55-2.16)	2.20 (1.84-2.58)	2.49 (2.05-2.91)	2.79 (2.26-3.25)	3.09 (2.46-3.61)	3.50 (2.71-4.09)	3.82 (2.90-4.47)
12-hr	1.11 (0.958-1.30)	1.40 (1.21-1.64)	1.76 (1.51-2.06)	2.05 (1.75-2.39)	2.44 (2.06-2.84)	2.74 (2.28-3.18)	3.05 (2.50-3.53)	3.35 (2.72-3.89)	3.77 (2.98-4.39)	4.08 (3.17-4.79)
24-hr	1.31 (1.14-1.51)	1.66 (1.46-1.92)	2.15 (1.88-2.48)	2.54 (2.21-2.92)	3.08 (2.66-3.54)	3.51 (3.00-4.03)	3.97 (3.36-4.56)	4.44 (3.71-5.11)	5.09 (4.19-5.88)	5.62 (4.56-6.52)
2-day	1.43 (1.25-1.65)	1.82 (1.59-2.10)	2.39 (2.08-2.75)	2.85 (2.47-3.27)	3.49 (3.00-4.00)	4.00 (3.40-4.58)	4.53 (3.82-5.22)	5.10 (4.26-5.88)	5.88 (4.83-6.82)	6.51 (5.27-7.59)
3-day	1.54 (1.35-1.76)	1.97 (1.73-2.25)	2.60 (2.27-2.97)	3.11 (2.71-3.55)	3.83 (3.31-4.37)	4.41 (3.79-5.04)	5.04 (4.28-5.76)	5.69 (4.79-6.54)	6.63 (5.49-7.64)	7.38 (6.03-8.56)
4-day	1.64 (1.45-1.88)	2.11 (1.86-2.40)	2.80 (2.46-3.19)	3.37 (2.95-3.82)	4.17 (3.63-4.74)	4.83 (4.18-5.49)	5.54 (4.74-6.31)	6.29 (5.33-7.20)	7.37 (6.15-8.46)	8.25 (6.79-9.53)
7-day	1.86 (1.64-2.14)	2.39 (2.10-2.73)	3.18 (2.79-3.64)	3.83 (3.34-4.37)	4.75 (4.12-5.42)	5.51 (4.74-6.29)	6.32 (5.39-7.23)	7.19 (6.07-8.27)	8.44 (7.00-9.74)	9.46 (7.75-11.0)
10-day	2.03 (1.79-2.32)	2.61 (2.29-2.98)	3.46 (3.04-3.95)	4.16 (3.63-4.73)	5.14 (4.47-5.84)	5.95 (5.13-6.76)	6.81 (5.81-7.75)	7.72 (6.53-8.83)	9.02 (7.51-10.4)	10.1 (8.28-11.6)
20-day	2.53 (2.23-2.88)	3.26 (2.88-3.71)	4.32 (3.80-4.90)	5.14 (4.50-5.82)	6.25 (5.45-7.08)	7.11 (6.17-8.06)	8.01 (6.90-9.11)	8.92 (7.63-10.2)	10.2 (8.61-11.7)	11.2 (9.34-12.9)
30-day	2.98 (2.62-3.38)	3.84 (3.38-4.36)	5.08 (4.47-5.75)	6.03 (5.30-6.82)	7.33 (6.39-8.29)	8.33 (7.23-9.43)	9.37 (8.09-10.6)	10.4 (8.94-11.8)	11.9 (10.1-13.6)	13.0 (10.9-14.9)
45-day	3.50 (3.10-3.96)	4.52 (4.00-5.12)	5.98 (5.28-6.76)	7.08 (6.23-8.00)	8.55 (7.49-9.67)	9.67 (8.43-11.0)	10.8 (9.37-12.3)	12.0 (10.3-13.7)	13.6 (11.6-15.6)	14.8 (12.5-17.1)
60-day	3.90 (3.46-4.41)	5.05 (4.48-5.70)	6.67 (5.90-7.52)	7.87 (6.94-8.87)	9.44 (8.29-10.7)	10.6 (9.28-12.0)	11.8 (10.3-13.4)	13.0 (11.3-14.8)	14.6 (12.5-16.7)	15.9 (13.5-18.3)

[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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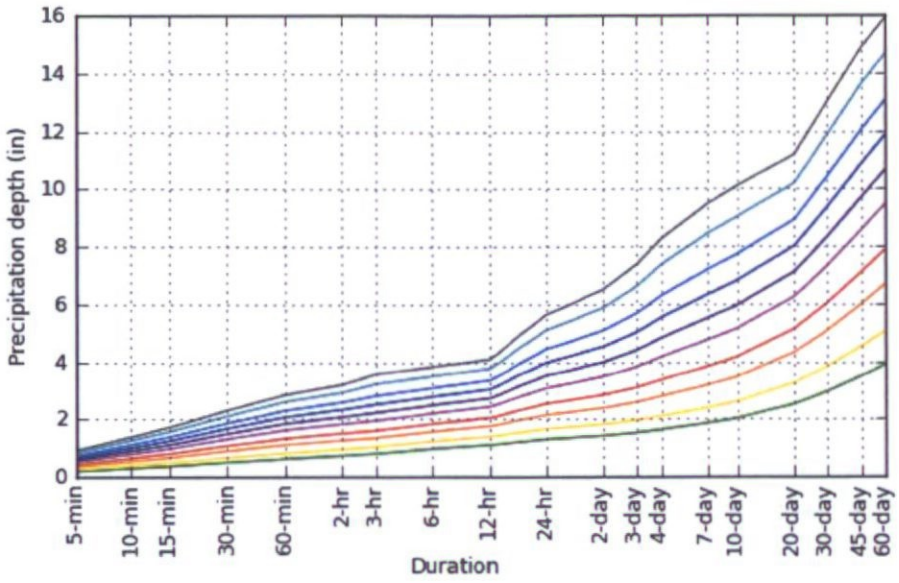
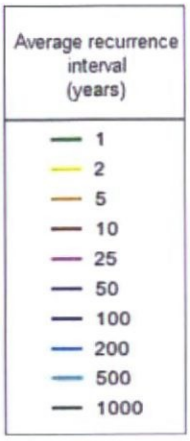
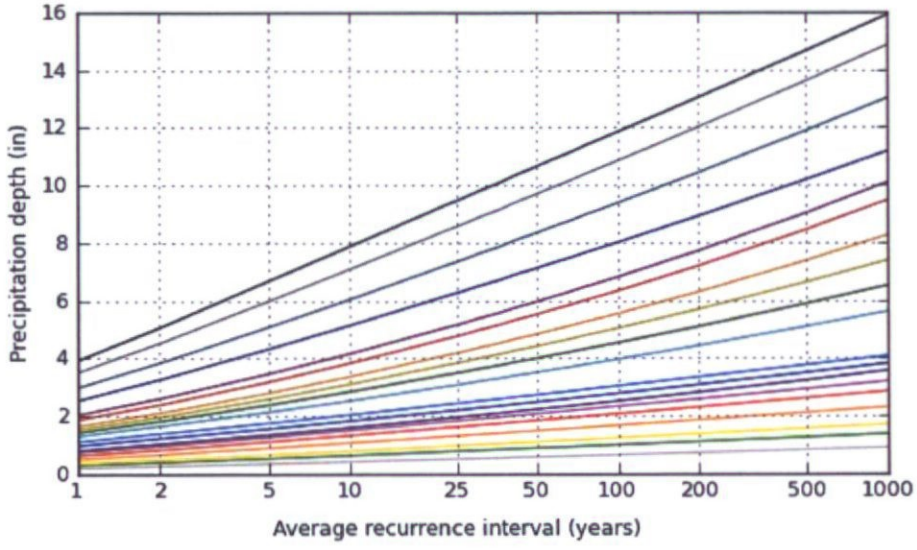
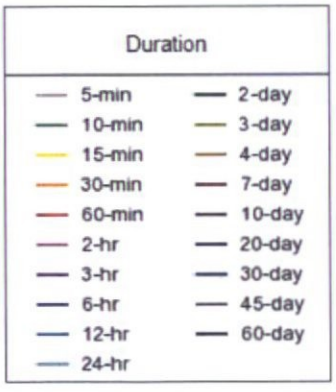
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 33.6579°, Longitude: -111.8901°









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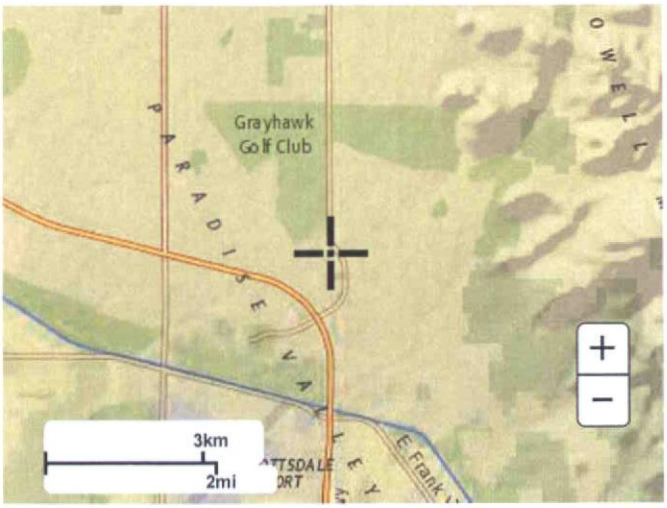
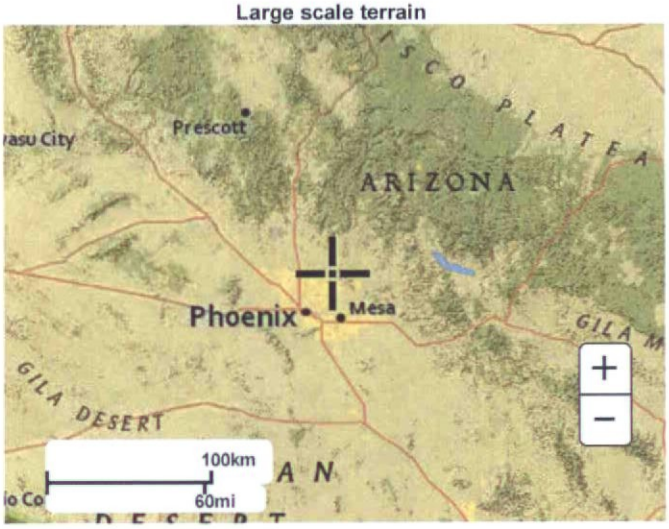
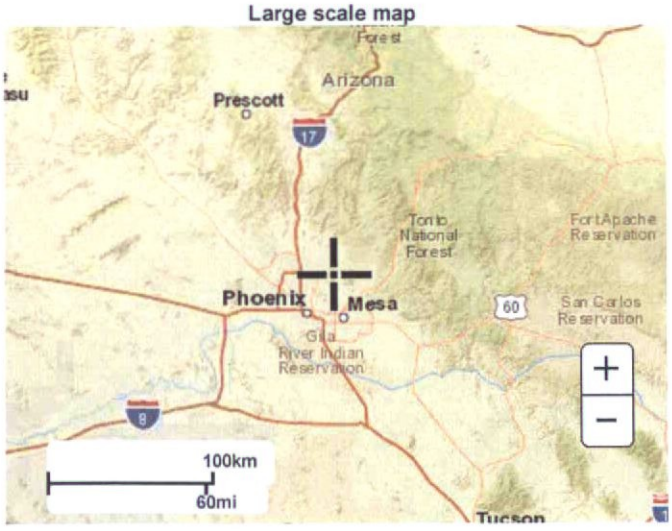


Large scale terrain



Large scale map



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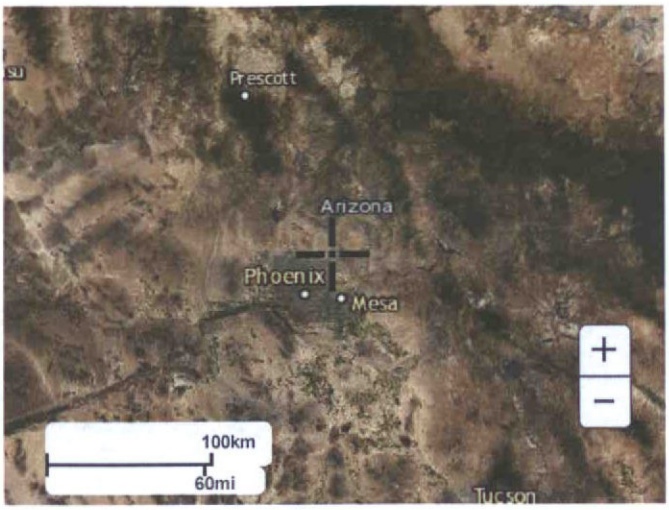

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1325 East West Highway
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Questions?: HDSC.Questions@noaa.gov

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APPENDIX II

Calculations

2. Time of Concentration

Time of concentration "**Tc**" is the total time of travel from the most hydraulically remote part of the watershed to the concentration point of interest. The calculation of "Tc" must follow FCDMC Hydrology Manual procedures.

***Note:** **Do not add a standard set amount of time to the estimated "Tc" for lot runoff delay (such as 5 or 10 minutes).** Natural land slopes are too variable in Scottsdale to add a set amount of time for lot runoff.

3. Runoff Coefficients

Use Figure 4.1-4 or equivalent to obtain the runoff coefficients or "**C**" values. Composite "**C**" values for the appropriate zoning category or weighted average values calculated for the specific site are both acceptable approaches.

RUNOFF COEFFICIENTS - "C" VALUE			
Land Use	Storm Frequency		
Composite Area-wide Values	2-25 Year	50 Year	100 Year
Commercial & Industrial Areas	0.80	0.83	0.86
Residential Areas-Single Family (average lot size)			
R1-1-1901	0.33	0.50	0.53
R1-130	0.35	0.51	0.59
R1-70	0.37	0.52	0.60
R1-43	0.38	0.55	0.61
R1-35 (35,000 square feet/lot)	0.40	0.56	0.62
R1-18 (18,000 square feet/lot)	0.43	0.58	0.64
R1-10 (10,000 square feet/lot)	0.47	0.62	0.67
R1-7 (7,000 square feet/lot)	0.51	0.64	0.94
Townhouses (R-2, R-4)	0.63	0.74	0.94
Apartments & Condominiums (R-3, R-5)	0.76	0.83	0.94
Specific Surface Type Values			
Paved streets, parking lots (concrete or asphalt), roofs, drive-ways, etc.	0.90	0.93	0.95
Lawns, golf courses, & parks (grassed areas)	0.20	0.25	0.30
Undisturbed natural desert or desert landscaping (no impervious weed barrier)	0.37	0.42	045
Desert landscaping (with impervious weed barrier)	0.63	0.73	0.83
Mountain terrain – slopes greater than 10%	0.60	0.70	0.80
Agricultural areas (flood-irrigated fields)	0.16	0.18	0.20

FIGURE 4.1-4 RUNOFF COEFFICIENTS FOR USE WITH RATIONAL METHOD

Drainage Area Calculations

	DA	Area(ac)	Desert Landscape Cwt = 0.45	Concrete/Asphalt/ Roof Cwt = 0.95	Cw
To HO-1	1	1.60	1.60	0.00	0.45
	12	0.12	0.00	0.12	0.95
	Total	1.72	1.60	0.12	0.48
To HO-4	OSDA	1.69	1.69	0.00	0.45
To Ret. Basin	2	0.49	0.49	0.00	0.45
	3	0.76	0.76	0.00	0.45
	4	1.53	0.70	0.83	0.72
	5	0.32	0.07	0.25	0.84
	6	1.88	1.29	0.58	0.61
	7	0.47	0.47	0.00	0.45
	8	0.74	0.18	0.56	0.83
	9	1.14	0.47	0.67	0.75
	10	1.07	0.26	0.81	0.83
	RD-1	0.52	0.00	0.52	0.95
	RD-2	0.42	0.00	0.42	0.95
	RD-3	0.56	0.00	0.56	0.95
	Total	9.90	4.68	5.22	0.71
To HO-2	11	0.34	0.34	0.00	0.45
To HO-3	13	0.24	0.24	0.00	0.45

100-year 24 hour PPW base no wall flow at xsec 118

THE MAXIMUM DISCHARGE FROM CROSS SECTION 118 IS: 360.51 CFS AT TIME: 12.49 HOURS

THE MAXIMUM DISCHARGE FROM NODE	673057 IS:	11.50 CFS AT TIME	12.10 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.28 FEET	AND A MAXIMUM VOLUME OF:	1.67 AF
THE MAXIMUM DISCHARGE FROM NODE	673684 IS:	41.16 CFS AT TIME	12.22 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.25 FEET	AND A MAXIMUM VOLUME OF:	6.47 AF
THE MAXIMUM DISCHARGE FROM NODE	674311 IS:	315.28 CFS AT TIME	12.50 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	2.31 FEET	AND A MAXIMUM VOLUME OF:	77.40 AF
THE MAXIMUM DISCHARGE FROM NODE	674939 IS:	0.04 CFS AT TIME	11.91 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.03 FEET	AND A MAXIMUM VOLUME OF:	0.00 AF
THE MAXIMUM DISCHARGE FROM NODE	675567 IS:	0.08 CFS AT TIME	11.91 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.02 FEET	AND A MAXIMUM VOLUME OF:	0.00 AF

100-year 24 hour PPW base with wall flow at cross section 118

THE MAXIMUM DISCHARGE FROM CROSS SECTION 118 IS: 360.51 CFS AT TIME: 12.49 HOURS

THE MAXIMUM DISCHARGE FROM NODE	673057 IS:	11.50 CFS AT TIME	12.10 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.28 FEET	AND A MAXIMUM VOLUME OF:	1.67 AF
THE MAXIMUM DISCHARGE FROM NODE	673684 IS:	41.16 CFS AT TIME	12.22 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.25 FEET	AND A MAXIMUM VOLUME OF:	6.47 AF
THE MAXIMUM DISCHARGE FROM NODE	674311 IS:	315.28 CFS AT TIME	12.50 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	2.31 FEET	AND A MAXIMUM VOLUME OF:	77.40 AF
THE MAXIMUM DISCHARGE FROM NODE	674939 IS:	0.04 CFS AT TIME	11.91 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.03 FEET	AND A MAXIMUM VOLUME OF:	0.00 AF
THE MAXIMUM DISCHARGE FROM NODE	675567 IS:	0.08 CFS AT TIME	11.91 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.02 FEET	AND A MAXIMUM VOLUME OF:	0.00 AF

100-year 24 hour PPW south levee no wall flow at cross section 118

THE MAXIMUM DISCHARGE FROM CROSS SECTION 118 IS: 603.77 CFS AT TIME: 13.53 HOURS

THE MAXIMUM DISCHARGE FROM NODE	673057 IS:	11.70 CFS AT TIME	12.04 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.28 FEET	AND A MAXIMUM VOLUME OF:	1.33 AF
THE MAXIMUM DISCHARGE FROM NODE	673684 IS:	78.04 CFS AT TIME	13.53 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.31 FEET	AND A MAXIMUM VOLUME OF:	8.29 AF
THE MAXIMUM DISCHARGE FROM NODE	674311 IS:	520.27 CFS AT TIME	13.53 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	2.95 FEET	AND A MAXIMUM VOLUME OF:	88.87 AF
THE MAXIMUM DISCHARGE FROM NODE	674939 IS:	3.91 CFS AT TIME	13.54 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.25 FEET	AND A MAXIMUM VOLUME OF:	0.08 AF
THE MAXIMUM DISCHARGE FROM NODE	675567 IS:	0.08 CFS AT TIME	11.91 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.02 FEET	AND A MAXIMUM VOLUME OF:	0.00 AF

100-year 24 hour PPW south levee with wall flow at cross section 118

THE MAXIMUM DISCHARGE FROM CROSS SECTION 118 IS: 817.52 CFS AT TIME: 13.45 HOURS

THE MAXIMUM DISCHARGE FROM NODE	673057 IS:	11.54 CFS AT TIME	12.10 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.28 FEET	AND A MAXIMUM VOLUME OF:	1.43 AF
THE MAXIMUM DISCHARGE FROM NODE	673684 IS:	123.68 CFS AT TIME	13.45 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.71 FEET	AND A MAXIMUM VOLUME OF:	10.54 AF
THE MAXIMUM DISCHARGE FROM NODE	674311 IS:	678.01 CFS AT TIME	13.45 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	3.43 FEET	AND A MAXIMUM VOLUME OF:	99.38 AF
THE MAXIMUM DISCHARGE FROM NODE	674939 IS:	14.00 CFS AT TIME	13.45 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.69 FEET	AND A MAXIMUM VOLUME OF:	0.35 AF
THE MAXIMUM DISCHARGE FROM NODE	675567 IS:	0.08 CFS AT TIME	11.91 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF:	0.02 FEET	AND A MAXIMUM VOLUME OF:	0.00 AF

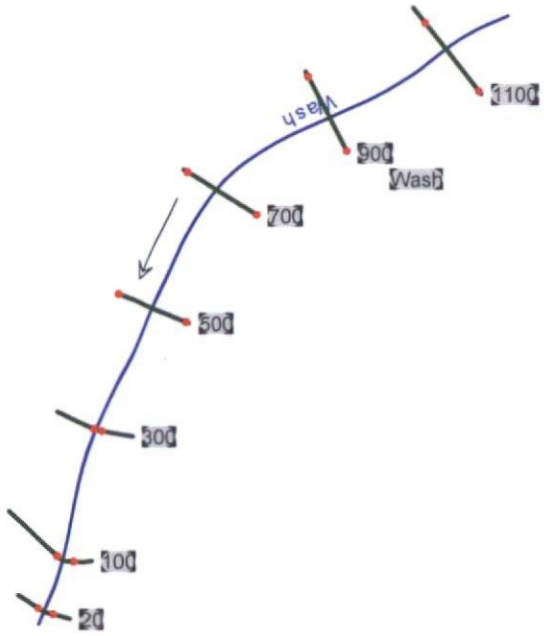
SUMMARY OF RATIONAL METHOD PEAK FLOW HYDROLOGY
n value Selection

Channel n value:

n_0 =	0.03	Ref. Table 7.3 - Firm Earth
n_1 =	0.001	Ref. Table 7.4 - Degree of irregularity - Minor
n_2 =	0.002	Ref. Table 7.4 - Variation in channel cross section - Alternating occasionally
n_3 =	0	Ref. Table 7.4 -Effects of obstructions - Negligible
n_4 =	0.025	Ref. Table 7.4 - Amount of vegetation - Medium
m =	1	Ref. Table 7.4 - Degree of meandering- Minor

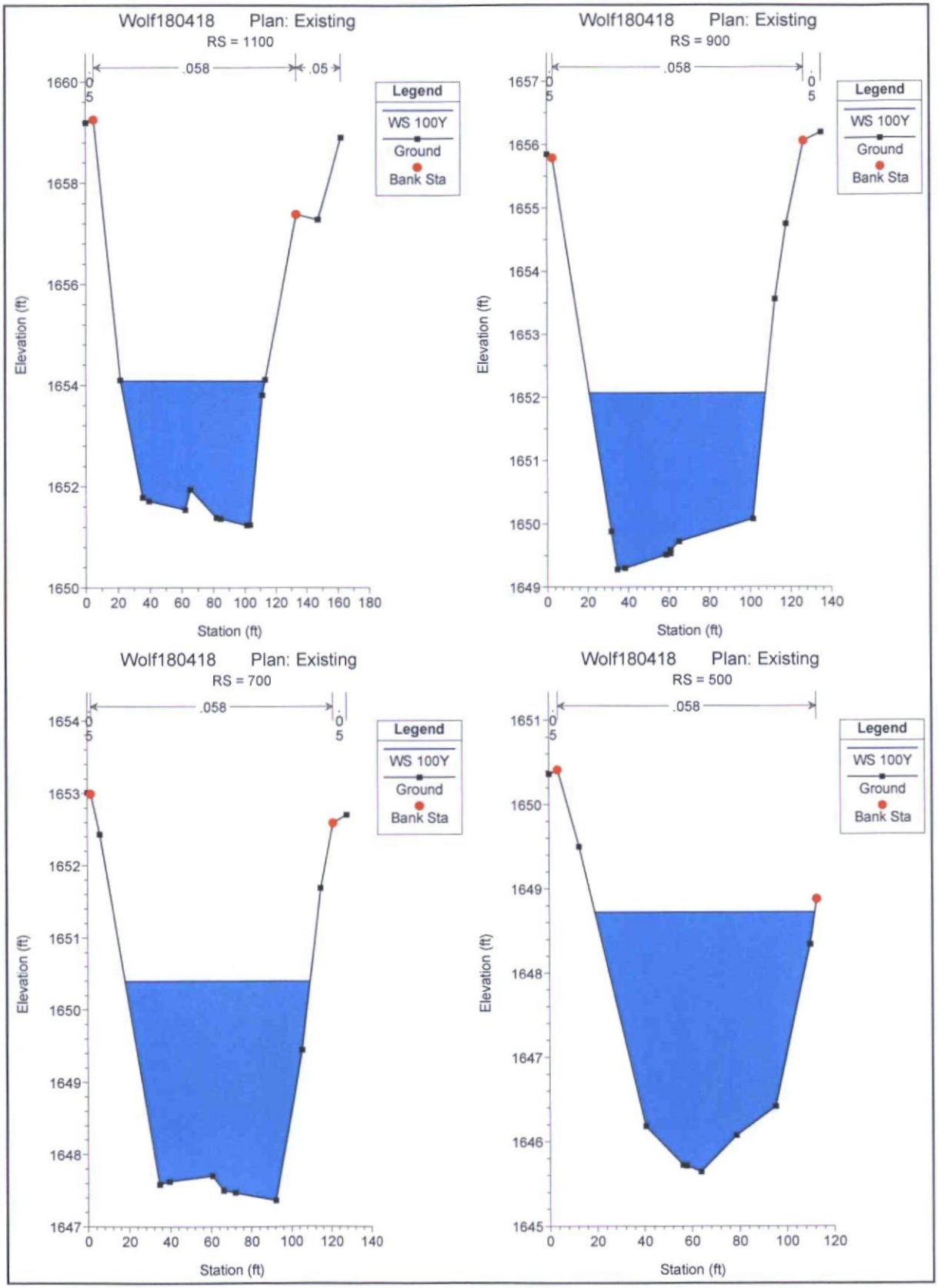
$n = (n_0+n_1+n_2+n_3+n_4)m$ Ref. Equation 7.5 of 2. Drainage Design Manual for Maricopa County, Arizona, Volume
$= 0.058$

Overbank n value = 0.05 - Scatter Shrubs - Ref. Drainage Design Manual for Maricopa County, Arizona, Volume I


Wash
110
90
Wash
70
50
30
10
2

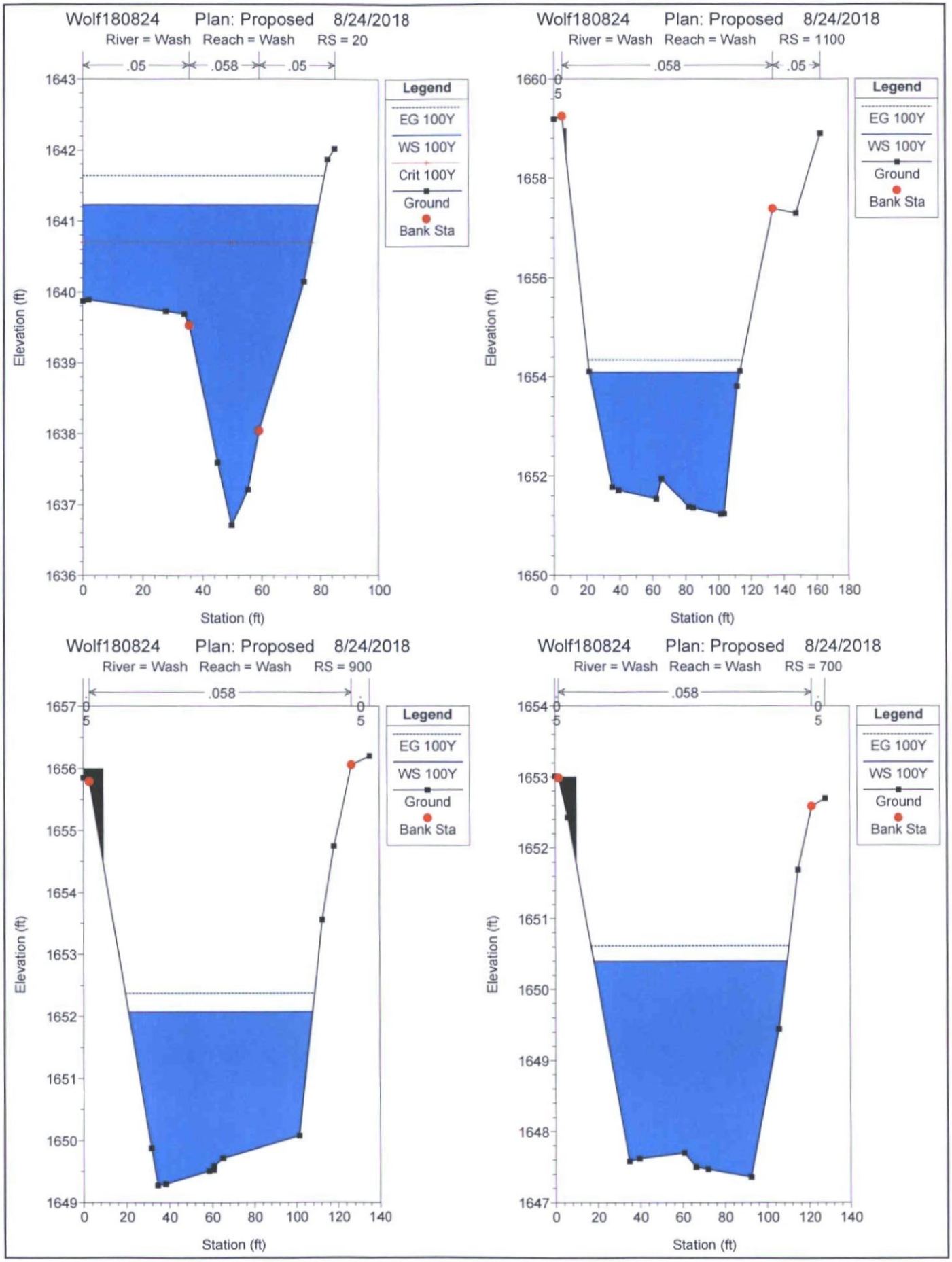
HEC-RAS Plan: EX River: Wash Reach: Wash Profile: 100Y

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Wash	1100	100Y	817.00	1651.23	1654.09		1654.34	0.008771	4.05	201.93	91.56	0.48
Wash	900	100Y	817.00	1649.28	1652.07		1652.37	0.011025	4.43	184.55	86.81	0.54
Wash	700	100Y	817.00	1647.36	1650.39		1650.61	0.007031	3.79	215.54	91.45	0.44
Wash	500	100Y	817.00	1645.64	1648.72		1648.99	0.009588	4.14	197.35	92.77	0.50
Wash	300	100Y	817.00	1640.34	1645.69	1645.69	1646.37	0.018167	8.15	144.91	99.92	0.71
Wash	100	100Y	817.00	1638.12	1642.28	1642.28	1642.80	0.015376	6.63	169.62	147.59	0.66
Wash	20	100Y	817.00	1636.71	1641.23	1640.70	1641.64	0.010004	5.82	168.57	79.48	0.55

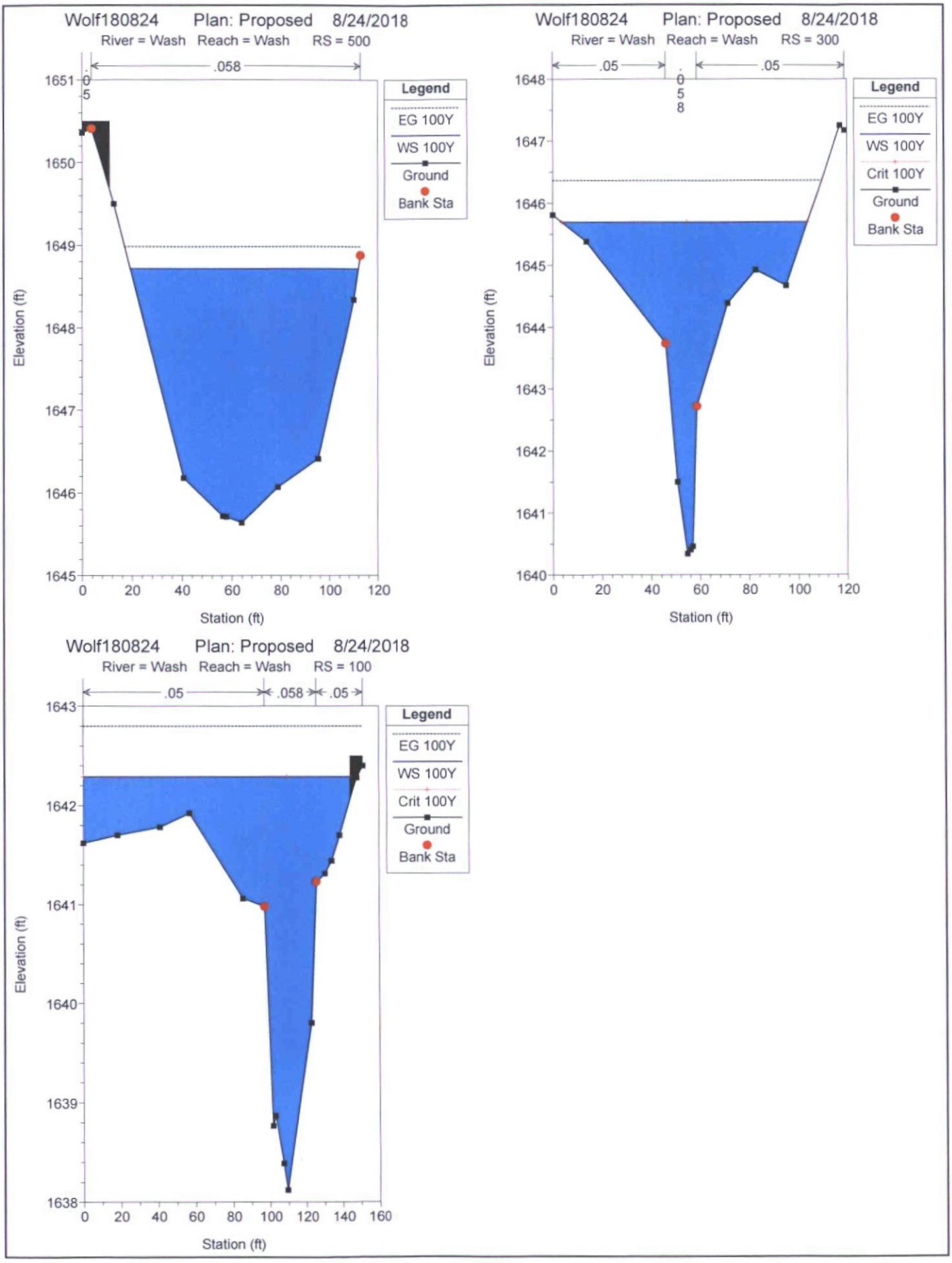

Wolf180418 Plan: Existing
RS = 1100
.058
.05
.05
Legend
WS 100Y
Ground
Bank Sta
Elevation (ft)
Station (ft)
Wolf180418 Plan: Existing
RS = 900
.058
.05
.05
Legend
WS 100Y
Ground
Bank Sta
Elevation (ft)
Station (ft)
Wolf180418 Plan: Existing
RS = 700
.058
.05
.05
Legend
WS 100Y
Ground
Bank Sta
Elevation (ft)
Station (ft)
Wolf180418 Plan: Existing
RS = 500
.058
.05
.05
Legend
WS 100Y
Ground
Bank Sta
Elevation (ft)
Station (ft)

HEC-RAS Plan: Proposed River: Wash Reach: Wash Profile: 100Y

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Wash	1100	100Y	817.00	1651.23	1654.09		1654.34	0.008770	4.05	201.94	91.56	0.48
Wash	900	100Y	817.00	1649.28	1652.07		1652.37	0.011027	4.43	184.54	86.81	0.54
Wash	700	100Y	817.00	1647.36	1650.39		1650.62	0.007029	3.79	215.57	91.45	0.44
Wash	500	100Y	817.00	1645.64	1648.72		1648.98	0.009604	4.14	197.24	92.75	0.50
Wash	300	100Y	817.00	1640.34	1645.69	1645.69	1646.37	0.018124	8.15	145.06	99.98	0.71
Wash	100	100Y	817.00	1638.12	1642.29	1642.29	1642.80	0.014913	6.55	170.94	144.08	0.65
Wash	20	100Y	817.00	1636.71	1641.23	1640.70	1641.64	0.010003	5.82	168.58	79.48	0.55


Wolf180824 Plan: Proposed 8/24/2018
River = Wash Reach = Wash RS = 20
.05
.058
.05
Legend
EG 100Y
WS 100Y
Crit 100Y
Ground
Bank Sta
Elevation (ft)
Station (ft)
Wolf180824 Plan: Proposed 8/24/2018
River = Wash Reach = Wash RS = 1100
.058
.05
Legend
EG 100Y
WS 100Y
Ground
Bank Sta
Elevation (ft)
Station (ft)
Wolf180824 Plan: Proposed 8/24/2018
River = Wash Reach = Wash RS = 900
.058
Legend
EG 100Y
WS 100Y
Ground
Bank Sta
Elevation (ft)
Station (ft)
Wolf180824 Plan: Proposed 8/24/2018
River = Wash Reach = Wash RS = 700
.058
Legend
EG 100Y
WS 100Y
Ground
Bank Sta
Elevation (ft)
Station (ft)

LOJ - Retaining Wall
-Scour



Wolff Legacy Scottsdale
Erosion Setback

Location	100-year flow Q100 (ft3/s)	Calculated Erosion Setback for straight channels (ft)	Calculated Erosion Setback for Channels with Obvious Curvature (ft)
Wolf Property	817	29	71

Reference: State Standard for Watercourse System Sediment Balance SSA 5-96

Setback = 1.0 $(Q_{100})^{0.5}$ for straight channels
Setback = 2.5 $(Q_{100})^{0.5}$ for channels with obvious curvature

Wolff Legacy Scottsdale
Scour Depth Calculations

Location	100-year flow Q100 (ft3/s)	General Degradation		Degradation	Total Scour Depth	
		Straight Channels dgs (ft)	Curved Channels dgs (ft)	dlts (ft)	Straight Channels ds (ft)	Curved Channels ds (ft)
Wolf Properties	817	2.30	3.20	1.12	3.4	4.3

(Level I Scour depth per Arizona State Standard SSA 5-96)

$d_s = d_{gs} + d_{lts}$

$d_{gs} = 0.157 * (Q_{100})0.4$ for Straight Channels

$d_{gs} = 0.219 * (Q_{100})0.4$ for Curved Channels

$d_{lts} = 0.02 * (Q_{100})0.6$

For Level I, the minimum total scour depth, d_s shall be 3 feet.

Where:

d_s = Total scour depth, ft.

d_{gs} = General degradation, ft

d_{lts} = Long term degradation, ft

Q_{100} = 100-year flow, cfs.

SUMMARY OF RATIONAL METHOD PEAK FLOW HYDROLOGY
Wolff Legacy Scottsdale

CP Concentration Point	Sub- basin Area (ac)	Water Course Length ft	High Elevation ft	Low Elevation ft	Roughness, Kb	C Weighted Runoff Coefficient		i Intensity (in/hr)		Tc Time of Concentration (min)		Q Peak Flow Rate (cfs)	
						Return Period		Return Period		Return Period		Return Period	
						10-Year	100-Year	10-Year	100-Year	10-Year	100-Year	10-Year	100-Year
P-DA1	2.10	1194	1652.79	1638.3	0.038 (A)	0.37	0.45	3.9	6.9	9.7	7.9	3.1	6.5
P-DA2	4.32	989	1659	1636.6	0.036 (A)	0.37	0.45	4.7	7.8	6.6	5.5	7.5	15.1
P-DA3	4.18	920	1659.4	1641.4	0.0361 (A)	0.37	0.45	4.7	7.7	6.7	5.5	7.2	14.6
P-DA4	3.30	891	1660.2	1642.9	0.0368 (A)	0.37	0.45	4.7	7.8	6.7	5.5	5.7	11.5
DA-1	1.60	1223	1652.9	1638.5	0.0387 (A)	0.37	0.45	3.8	6.8	10.1	8.2	2.3	4.9
DA-2	0.49	252	1659	1655	0.0419 (A)	0.37	0.45	5.1	7.9	5	5	0.9	1.8
DA-3	0.76	340	1654.31	1650	0.0407 (A)	0.37	0.45	5.1	7.9	5	5	1.4	2.7
DA-4	1.53	422	1659.63	1655.2	0.0388 (A)	0.37	0.72	4.9	7.9	5.6	5	2.8	8.8
DA-5	0.32	155	1659.2	1654.31	0.0431 (A)	0.37	0.84	5.1	7.9	5	5	0.6	2.1
DA-6	1.88	355	1655	1649	0.0383 (A)	0.37	0.61	5.1	7.9	5	5	3.5	9.1
DA-7	0.47	187	1649	1647	0.042 (A)	0.37	0.45	5.1	7.9	5	5	0.9	1.7
DA-8	0.74	284	1648.73	1642.8	0.0408 (A)	0.37	0.83	5.1	7.9	5	5	1.4	4.9
DA-9	1.14	311	1648.45	1645	0.0396 (A)	0.37	0.75	5.1	7.9	5	5	2.1	6.8
DA-10	1.07	172	1656.8	1648.3	0.0398 (A)	0.37	0.83	5.1	7.9	5	5	2	7.1
DA-11	0.34	125	1641.4	1639.4	0.0429 (A)	0.37	0.45	5.1	7.9	5	5	0.6	1.2
DA-12	0.12	121	1647.24	1639.3	0.0458 (A)	0.37	0.95	5.1	7.9	5	5	0.2	0.9
DA-13	0.24	176	1647.24	1641.2	0.0439 (A)	0.37	0.45	5.1	7.9	5	5	0.5	0.9
RD-1	0.52	10	10	0	0.0418 (A)	0.37	0.95	5.1	7.9	5	5	1	3.9
RD-2	0.42	10	10	0	0.0424 (A)	0.37	0.95	5.1	7.9	5	5	0.8	3.2
RD-3	0.56	10	10	0	0.0416 (A)	0.37	0.95	5.1	7.9	5	5	1.1	4.2
OSDA	1.69	285	1650	1642.7	0.0386 (A)	0.37	0.45	5.1	7.9	5	5	3.2	6

Reference: Drainage Design Manual for Maricopa County, Hydrology, August 15, 2013

Notes:
T_c = Time of concentration = $11.4L^{0.5}K_b^{0.52}S^{-0.31}I^{-0.38}$ (Equation 3.2, Papadakis and kazan equation, 1987)
L = Length of the longest flow path, miles.
S = Watercourse slope, feet/mile.
K_b = Watershed resistance coefficient = $m\log_{10}A + b$, where A= drainage area in acres, m and b values from (Table 3.1).
Q = Peak discharge = C*I*A, cfs. (Equation 3.1)
i = Average rainfall intensity, in in/hr, lasting for a T_c. Determined using the I-D-F curve from the NOAA Atlas 14 PRECIPITATION FREQUENCY ESTIMATES
C = Runoff coefficient per Land use category

Wolff Legacy Scottsdale
Detention Design

DA-2		DA-3		DA-4		DA-5		DA-6		DA-7		DA-8		DA-9		DA-10		RD-1		RD-2		RD-3		Combined	Inflow	Outflow	Cumulative Volume
Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min)	Q (cfs)	[cf]	[cf]
0.1	0.036	0.1	0.054	0.1	0.176	0.1	0.042	0.1	0.182	0.1	0.034	0.1	0.098	0.1	0.136	0.1	0.142	0.1	0.078	0.1	0.064	0.1	0.084	0.1	1.13	1.13	0.00
0.2	0.072	0.2	0.108	0.2	0.352	0.2	0.084	0.2	0.364	0.2	0.068	0.2	0.196	0.2	0.272	0.2	0.284	0.2	0.156	0.2	0.128	0.2	0.168	0.2	2.25	2.25	0.00
0.3	0.108	0.3	0.162	0.3	0.528	0.3	0.126	0.3	0.546	0.3	0.102	0.3	0.294	0.3	0.408	0.3	0.426	0.3	0.234	0.3	0.192	0.3	0.252	0.3	3.38	3.38	0.00
0.4	0.144	0.4	0.216	0.4	0.704	0.4	0.168	0.4	0.728	0.4	0.136	0.4	0.392	0.4	0.544	0.4	0.568	0.4	0.312	0.4	0.256	0.4	0.336	0.4	4.50	4.50	0.00
0.5	0.18	0.5	0.27	0.5	0.88	0.5	0.21	0.5	0.91	0.5	0.17	0.5	0.49	0.5	0.68	0.5	0.71	0.5	0.39	0.5	0.32	0.5	0.42	0.5	5.63	5.63	0.00
0.6	0.216	0.6	0.324	0.6	1.056	0.6	0.252	0.6	1.092	0.6	0.204	0.6	0.588	0.6	0.816	0.6	0.852	0.6	0.468	0.6	0.384	0.6	0.504	0.6	6.76	6.76	0.00
0.7	0.252	0.7	0.378	0.7	1.232	0.7	0.294	0.7	1.274	0.7	0.238	0.7	0.686	0.7	0.952	0.7	0.994	0.7	0.546	0.7	0.448	0.7	0.588	0.7	7.88	7.88	0.00
0.8	0.288	0.8	0.432	0.8	1.408	0.8	0.336	0.8	1.456	0.8	0.272	0.8	0.784	0.8	1.088	0.8	1.136	0.8	0.624	0.8	0.512	0.8	0.672	0.8	9.01	9.01	0.00
0.9	0.324	0.9	0.486	0.9	1.584	0.9	0.378	0.9	1.638	0.9	0.306	0.9	0.882	0.9	1.224	0.9	1.278	0.9	0.702	0.9	0.576	0.9	0.756	0.9	10.13	10.13	0.00
1	0.36	1	0.54	1	1.76	1	0.42	1	1.82	1	0.34	1	0.98	1	1.36	1	1.42	1	0.78	1	0.64	1	0.84	1	11.26	11.26	0.00
1.1	0.396	1.1	0.594	1.1	1.936	1.1	0.462	1.1	2.002	1.1	0.374	1.1	1.078	1.1	1.496	1.1	1.562	1.1	0.858	1.1	0.704	1.1	0.924	1.1	12.39	12.39	0.00
1.2	0.432	1.2	0.648	1.2	2.112	1.2	0.504	1.2	2.184	1.2	0.408	1.2	1.176	1.2	1.632	1.2	1.704	1.2	0.936	1.2	0.768	1.2	1.008	1.2	13.51	13.51	0.00
1.3	0.468	1.3	0.702	1.3	2.288	1.3	0.546	1.3	2.366	1.3	0.442	1.3	1.274	1.3	1.768	1.3	1.846	1.3	1.014	1.3	0.832	1.3	1.092	1.3	14.64	14.64	0.00
1.4	0.504	1.4	0.756	1.4	2.464	1.4	0.588	1.4	2.548	1.4	0.476	1.4	1.372	1.4	1.904	1.4	1.988	1.4	1.092	1.4	0.896	1.4	1.176	1.4	15.76	15.76	0.00
1.5	0.54	1.5	0.81	1.5	2.64	1.5	0.63	1.5	2.73	1.5	0.51	1.5	1.47	1.5	2.04	1.5	2.13	1.5	1.17	1.5	0.96	1.5	1.26	1.5	16.89	16.89	0.00
1.6	0.576	1.6	0.864	1.6	2.816	1.6	0.672	1.6	2.912	1.6	0.544	1.6	1.568	1.6	2.176	1.6	2.272	1.6	1.248	1.6	1.024	1.6	1.344	1.6	18.02	18.02	0.00
1.7	0.612	1.7	0.918	1.7	2.992	1.7	0.714	1.7	3.094	1.7	0.578	1.7	1.666	1.7	2.312	1.7	2.414	1.7	1.326	1.7	1.088	1.7	1.428	1.7	19.14	19.14	0.00
1.8	0.648	1.8	0.972	1.8	3.168	1.8	0.756	1.8	3.276	1.8	0.612	1.8	1.764	1.8	2.448	1.8	2.556	1.8	1.404	1.8	1.152	1.8	1.512	1.8	20.27	20.27	0.00
1.9	0.684	1.9	1.026	1.9	3.344	1.9	0.798	1.9	3.458	1.9	0.646	1.9	1.862	1.9	2.584	1.9	2.698	1.9	1.482	1.9	1.216	1.9	1.596	1.9	21.39	21.39	0.00
2	0.72	2	1.08	2	3.52	2	0.84	2	3.64	2	0.68	2	1.96	2	2.72	2	2.84	2	1.56	2	1.28	2	1.68	2	22.52	22.52	0.00
2.1	0.756	2.1	1.134	2.1	3.696	2.1	0.882	2.1	3.822	2.1	0.714	2.1	2.058	2.1	2.856	2.1	2.982	2.1	1.638	2.1	1.344	2.1	1.764	2.1	23.65	23.65	0.00
2.2	0.792	2.2	1.188	2.2	3.872	2.2	0.924	2.2	4.004	2.2	0.748	2.2	2.156	2.2	2.992	2.2	3.124	2.2	1.716	2.2	1.408	2.2	1.848	2.2	24.77	24.77	0.00
2.3	0.828	2.3	1.242	2.3	4.048	2.3	0.966	2.3	4.186	2.3	0.782	2.3	2.254	2.3	3.128	2.3	3.266	2.3	1.794	2.3	1.472	2.3	1.932	2.3	25.90	25.90	0.00
2.4	0.864	2.4	1.296	2.4	4.224	2.4	1.008	2.4	4.368	2.4	0.816	2.4	2.352	2.4	3.264	2.4	3.408	2.4	1.872	2.4	1.536	2.4	2.016	2.4	27.02	27.02	0.00
2.5	0.9	2.5	1.35	2.5	4.4	2.5	1.05	2.5	4.55	2.5	0.85	2.5	2.45	2.5	3.4	2.5	3.55	2.5	1.95	2.5	1.6	2.5	2.1	2.5	28.15	0.55	82.80
2.6	0.936	2.6	1.404	2.6	4.576	2.6	1.092	2.6	4.732	2.6	0.884	2.6	2.548	2.6	3.536	2.6	3.692	2.6	2.028	2.6	1.664	2.6	2.184	2.6	29.28	1.68	248.40
2.7	0.972	2.7	1.458	2.7	4.752	2.7	1.134	2.7	4.914	2.7	0.918	2.7	2.646	2.7	3.672	2.7	3.834	2.7	2.106	2.7	1.728	2.7	2.268	2.7	30.40	2.80	414.00
2.8	1.008	2.8	1.512	2.8	4.928	2.8	1.176	2.8	5.096	2.8	0.952	2.8	2.744	2.8	3.808	2.8	3.976	2.8	2.184	2.8	1.792	2.8	2.352	2.8	31.53	3.93	579.60
2.9	1.044	2.9	1.566	2.9	5.104	2.9	1.218	2.9	5.278	2.9	0.986	2.9	2.842	2.9	3.944	2.9	4.118	2.9	2.262	2.9	1.856	2.9	2.436	2.9	32.65	5.05	745.20
3	1.08	3	1.62	3	5.28	3	1.26	3	5.46	3	1.02	3	2.94	3	4.08	3	4.26	3	2.34	3	1.92	3	2.52	3	33.78	6.18	910.80
3.1	1.116	3.1	1.674	3.1	5.456	3.1	1.302	3.1	5.642	3.1	1.054	3.1	3.038	3.1	4.216	3.1	4.402	3.1	2.418	3.1	1.984	3.1	2.604	3.1	34.91	7.31	1076.40
3.2	1.152	3.2	1.728	3.2	5.632	3.2	1.344	3.2	5.824	3.2	1.088	3.2	3.136	3.2	4.352	3.2	4.544	3.2	2.496	3.2	2.048	3.2	2.688	3.2	36.03	8.43	1242.00
3.3	1.188	3.3	1.782	3.3	5.808	3.3	1.386	3.3	6.006	3.3	1.122	3.3	3.234	3.3	4.488	3.3	4.686	3.3	2.574	3.3	2.112	3.3	2.772	3.3	37.16	9.56	1407.60
3.4	1.224	3.4	1.836	3.4	5.984	3.4	1.428	3.4	6.188	3.4	1.156	3.4	3.332	3.4	4.624	3.4	4.828	3.4	2.652	3.4	2.176	3.4	2.856	3.4	38.28	10.68	1573.20
3.5	1.26	3.5	1.89	3.5	6.16	3.5	1.47	3.5	6.37	3.5	1.19	3.5	3.43	3.5	4.76	3.5	4.97	3.5	2.73	3.5	2.24	3.5	2.94	3.5	39.41	11.81	1738.80
3.6	1.296	3.6	1.944	3.6	6.336	3.6	1.512	3.6	6.552	3.6	1.224	3.6	3.528	3.6	4.896	3.6	5.112	3.6	2.808	3.6	2.304	3.6	3.024	3.6	40.54	12.94	1904.40
3.7	1.332	3.7	1.998	3.7	6.512	3.7	1.554	3.7	6.734	3.7	1.258	3.7	3.626	3.7	5.032	3.7	5.254	3.7	2.886	3.7	2.368	3.7	3.108	3.7	41.66	14.06	2070.00
3.8	1.368	3.8	2.052	3.8	6.688	3.8	1.596	3.8	6.916	3.8	1.292	3.8	3.724	3.8	5.168	3.8	5.396	3.8	2.964	3.8	2.432	3.8	3.192	3.8	42.79	15.19	2235.60
3.9	1.404	3.9	2.106	3.9	6.864	3.9	1.638	3.9	7.098	3.9	1.326	3.9	3.822	3.9	5.304	3.9	5.538	3.9	3.042	3.9	2.496	3.9	3.276	3.9	43.91	16.31	2401.20
4	1.44	4	2.16	4	7.04	4	1.68	4	7.28	4	1.36	4	3.92	4	5.44	4	5.68	4	3.12	4	2.56	4	3.36	4	45.04	17.44	2566.80
4.1	1.476	4.1	2.214	4.1	7.216	4.1	1.722	4.1	7.462	4.1	1.394	4.1	4.018	4.1	5.576	4.1	5.822	4.1	3.198	4.1	2.624	4.1	3.444	4.1	46.17	18.57	2732.40
4.2	1.512	4.2	2.268	4.2	7.392	4.2	1.764	4.2	7.644	4.2	1.428	4.2	4.116	4.2	5.712	4.2	5.964	4.2	3.276	4.2	2.688	4.2	3.528	4.2	47.29	19.69	2898.00
4.3	1.548	4.3	2.322	4.3	7.568	4.3	1.806	4.3	7.826	4.3	1.462	4.3	4.214	4.3	5.848	4.3	6.106	4.3	3.354	4.3	2.752	4.3	3.612	4.3	48.42	20.82	3063.60
4.4	1.584	4.4	2.376	4.4	7.744	4.4	1.848	4.4	8.008	4.4	1.496	4.4	4.312	4.4	5.984	4.4	6.248	4.4	3.432	4.4	2.816	4.4	3.696	4.4	49.54	21.94	3229.20
4.5	1.62	4.5	2.43	4.5	7.92	4.5	1.89	4.5	8.19	4.5	1.53	4.5	4.41	4.5	6.12	4.5	6.39	4.5	3.51	4.5	2.88	4.5	3.78	4.5	50.67	23.07	3394.80
4.6	1.656	4.6	2.484	4.6	8.096	4.6	1.932	4.6	8.372	4.6	1.564	4.6	4.508	4.6	6.256	4.6	6.532	4.6	3.588	4.6	2.944	4.6	3.864	4.6	51.80	24.20	3560.40
4.7	1.692	4.7	2.538	4.7	8.272	4.7	1.974	4.7	8.554	4.7	1.598	4.7	4.606	4.7	6.392	4.7	6.674	4.7	3.666	4.7	3.008	4.7	3.948	4.7	52.92	25.32	3726.00
4.8	1.728	4.8	2.592	4.8	8.448	4.8	2.016	4.8	8.736	4.8	1.632	4.8	4.704	4.8	6.528	4.8	6.816	4.8	3.744	4.8	3.072	4.8	4.032	4.8	54.05	26.45	3891.60
4.9	1.764	4.9	2.646	4.9	8.624	4.9	2.058	4.9	8.918	4.9	1.666	4.9	4.802	4.9	6.664	4.9	6.958	4.9	3.822	4.9	3.136	4.9	4.116	4.9	55.17	27.57	4057.20
5	1.8	5	2.7	5	8.8	5	2.1	5	9.1	5	1.7	5	4.9	5	6.8	5	7.1	5	3.9	5	3.2	5	4.2	5	56.30	27.60	4226.10
6	1.584431	6	2.376647	6	7.746108	6	1.848503	6	8.01018	6	1.496407	6	4.313174	6	5.985629	6	6.249701	6	3.432934	6	2.816766	6	3.697006	6	49.56	21.96	4395.00
6.1	1.562874	6.1	2.344311	6.1	7.640719	6.1	1.823353	6.1	7.901198	6.1	1.476048	6.1	4.254491	6.1	5.904192	6.1	6.164671	6.1	3.386228	6.1	2.778443	6.1	3.646707	6.1	48.88	21.28	4560.60
6.2	1.541317	6.2	2.311976	6.2	7.535329	6.2	1.798204	6.2	7.792216	6.2	1.455689	6.2	4.195808	6.2	5.822754	6.2	6.079641	6.2	3.339521	6.2	2.74012	6.2	3.596407	6.2	48.21	20.61	4726.20
6.3	1.51976	6.3	2.279641	6.3	7.42994	6.3	1.773054	6.3	7.683234	6.3	1.435329	6.3	4.137126	6.3	5.741317	6.3	5.994611	6.3	3.292814	6.3	2.701796	6.3	3.546108	6.3	47.53	19.93	4891.80
6.4	1.498204	6.4	2.247305	6.4	7.324551	6.4	1.747904	6.4	7.574251	6.4	1.41497	6.4	4.078443	6.4	5.65988	6.4	5.909581	6.4	3.246108	6.4	2.663473	6.4	3.495808	6.4	46.86	19.26	5057.40
6.5	1.476647	6.5	2.21497	6.5	7.219162	6.5	1.722754	6.5	7.465269	6.5	1.394611	6.5	4.01976	6.5	5.578443	6.5	5.824551	6.5	3.199401	6.5	2.62515	6.5	3.445509	6.5	46.19	18.59	5223.00
6.6	1.45509	6.6	2.182635	6.6	7.113772	6.6	1.697605	6.6	7.356287	6.6	1.374251	6.6	3.961078	6.6	5.497006	6.6	5.739521	6.6	3.152695	6.6	2.586826	6.6	3.39521	6.6	45.51	17.91	5388.60
6.7	1.433533	6.7	2.150299	6.7	7.008383	6.7	1.672455	6.7	7.247305	6.7	1.353892	6.7	3.902395	6.7	5.415569	6.7	5.654491	6.7	3.105988	6.7	2.548503	6.7	3.34491	6.7	44.84	17.24	5554.20
6.8	1.411976	6.8	2.117964	6.8	6.902994	6.8	1.647305	6.8	7.138323	6.8	1.333533	6.8	3.843713	6.8	5.334132	6.8	5.569461	6.8	3.059281	6.8	2.51018	6.8	3.294611	6.8	44.16	16.56	5719.80
6.9	1.390419	6.9	2.085629	6.9	6.797605	6.9	1.622156	6.9	7.029341	6.9	1.313174	6.9	3.78503	6.9	5.252695	6.9	5.484431	6.9	3.012575	6.9	2.471856	6.9	3.244311	6.9	43.49	15.89	5885.40
7	1.368862	7	2.053293	7	6.692216	7	1.597006	7	6.920359	7	1.292814	7	3.726347	7	5.171257	7	5.399401	7	2.965868	7	2.433533	7	3.194012	7	42.81	15.21	6051.00
7.1	1.347305	7.1	2.020958	7.1	6.586826	7.1	1.571856	7.1	6.811377	7.1	1.272455	7.1	3.667665	7.1	5.08982	7.1	5.314371	7.1	2.919162	7.1	2.39521	7.1	3.143713	7.1	42.14	14.54	6216.60
7.2	1.325749	7.2	1.988623	7.2	6.481437	7.2	1.546707	7.2	6.702395	7.2	1.252096	7.2	3.608982	7.2	5.008383	7.2	5.229341	7.2	2.872455	7.2	2.356886	7.2	3.093413	7.2	41.47	13.87	6382.20
7.3	1.304192	7.3	1.956287	7.3	6.376048	7.3	1.521557	7.3	6.593413	7.3	1.231737	7.3	3.550299	7.3	4.926946	7.3	5.144311	7.3	2.825749	7.3	2.318563	7.3	3.043114	7.3	40.79	13.19	6547.80
7.4	1.282635	7.4	1.923952	7.4	6.270659	7.4	1.496407	7.4	6.484431	7.4	1.211377	7.4	3.491617	7.4	4.845509	7.4	5.059281	7.4	2.779042	7.4	2.28024	7.4	2.992814	7.4	40.12	12.52	6713.40
7.5	1.261078	7.5	1.891617	7.5	6.165269	7.5	1.471257	7.5	6.375449	7.5	1.191018	7.5	3.432934	7.5	4.764072	7.5	4.974251	7.5	2.732335	7.5	2.241916	7.5	2.942515	7.5	39.44	11.84	6879.00
7.6	1.239521	7.6	1.859281	7.6	6.05988	7.6	1.446108	7.6	6.266467	7.6	1.170659	7.6	3.374251	7.6	4.682635	7.6	4.889222	7.6	2.685629	7.6	2.203593	7.6	2.892216	7.6	38.77	11.17	7044.60
7.7	1.217964	7.7	1.826946	7.7	5.954491	7.7	1.420958	7.7	6.157485	7.7	1.150299	7.7	3.315569	7.7	4.601198	7.7	4.804192	7.7	2.638922	7.7	2.165269	7.7	2.841916	7.7	38.10	10.50	7210.20
7.8	1.196407	7.8	1.794611	7.8	5.849102	7.8	1.395808	7.8	6.048503	7.8	1.12994	7.8	3.256886	7.8	4.51976	7.8	4.719162	7.8	2.592216	7.8	2.126946	7.8	2.791617	7.8	37.42	9.82	7375.80
7.9	1.17485	7.9	1.762275	7.9	5.743713	7.9	1.370659	7.9	5.939521	7.9	1.109581	7.9	3.198204	7.9	4.438323	7.9	4.634132	7.9	2.545509	7.9	2.088623	7.9	2.741317	7.9	36.75	9.15	7541.40
8	1.153293	8	1.72994	8	5.638323	8	1.345509	8	5.830539	8	1.089222	8	3.139521	8	4.356886	8	4.549102	8	2.498802	8	2.050299	8	2.691018	8	36.07	8.47	7707.00
8.1	1.131737	8.1	1.697605	8.1	5.532934	8.1	1.320359	8.1	5.721557	8.1	1.068862	8.1	3.080838	8.1	4.275449	8.1	4.464072	8.1	2.452096	8.1	2.011976	8.1	2.640719	8.1	35.40	7.80	7872.60
8.2	1.11018	8.2	1.665269	8.2	5.427545	8.2	1.29521	8.2	5.612575	8.2	1.048503	8.2	3.022156	8.2	4.194012	8.2	4.379042	8.2	2.405389	8.2	1.973653	8.2	2.590419	8.2	34.72	7.12	8038.20
8.3	1.088623	8.3	1.632934	8.3	5.322156	8.3	1.27006	8.3	5.503593	8.3	1.028144	8.3	2.963473	8.3	4.112575	8.3	4.294012	8.3	2.358683	8.3	1.935329	8.3	2.54012	8.3	34.05	6.45	8203.80
8.4	1.067066	8.4	1.600599	8.4	5.216766	8.4	1.24491	8.4	5.394611	8.4	1.007784	8.4	2.90479	8.4	4.031138	8.4	4.208982	8.4	2.311976	8.4	1.897006	8.4	2.48982	8.4	33.38	5.78	8369.40

Wolff Legacy Scottsdale
Detention Design

DA-2		DA-3		DA-4		DA-5		DA-6		DA-7		DA-8		DA-9		DA-10		RD-1		RD-2		RD-3		Combined	Inflow	Outflow	Cumulative Volume
Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min	Q (cfs)	Time (min)	Q (cfs)	[cf]	[cf]
8.5	1.045509	8.5	1.568263	8.5	5.111377	8.5	1.21976	8.5	5.285629	8.5	0.987425	8.5	2.846108	8.5	3.949701	8.5	4.123952	8.5	2.265269	8.5	1.858683	8.5	2.439521	**8.5**	**32.70**	**5.10**	**8535.00**
8.6	1.023952	8.6	1.535928	8.6	5.005988	8.6	1.194611	8.6	5.176647	8.6	0.967066	8.6	2.787425	8.6	3.868263	8.6	4.038922	8.6	2.218563	8.6	1.820359	8.6	2.389222	**8.6**	**32.03**	**4.43**	**8700.60**
8.7	1.002395	8.7	1.503593	8.7	4.900599	8.7	1.169461	8.7	5.067665	8.7	0.946707	8.7	2.728743	8.7	3.786826	8.7	3.953892	8.7	2.171856	8.7	1.782036	8.7	2.338922	**8.7**	**31.35**	**3.75**	**8866.20**
8.8	0.980838	8.8	1.471257	8.8	4.79521	8.8	1.144311	8.8	4.958683	8.8	0.926347	8.8	2.67006	8.8	3.705389	8.8	3.868862	8.8	2.12515	8.8	1.743713	8.8	2.288623	**8.8**	**30.68**	**3.08**	**9031.80**
8.9	0.959281	8.9	1.438922	8.9	4.68982	8.9	1.119162	8.9	4.849701	8.9	0.905988	8.9	2.611377	8.9	3.623952	8.9	3.783832	8.9	2.078443	8.9	1.705389	8.9	2.238323	**8.9**	**30.00**	**2.40**	**9197.40**
9	0.937725	9	1.406587	9	4.584431	9	1.094012	9	4.740719	9	0.885629	9	2.552695	9	3.542515	9	3.698802	9	2.031737	9	1.667066	9	2.188024	**9**	**29.33**	**1.73**	**9363.00**
9.1	0.916168	9.1	1.374251	9.1	4.479042	9.1	1.068862	9.1	4.631737	9.1	0.865269	9.1	2.494012	9.1	3.461078	9.1	3.613772	9.1	1.98503	9.1	1.628743	9.1	2.137725	**9.1**	**28.66**	**1.06**	**9528.60**
9.2	0.894611	9.2	1.341916	9.2	4.373653	9.2	1.043713	9.2	4.522754	9.2	0.84491	9.2	2.435329	9.2	3.379641	9.2	3.528743	9.2	1.938323	9.2	1.590419	9.2	2.087425	**9.2**	**27.98**	**0.38**	**9694.20**
9.3	0.873054	9.3	1.309581	9.3	4.268263	9.3	1.018563	9.3	4.413772	9.3	0.824551	9.3	2.376647	9.3	3.298204	9.3	3.443713	9.3	1.891617	9.3	1.552096	9.3	2.037126	**9.3**	**27.31**	**27.31**	**9777.00**
9.4	0.851497	9.4	1.277246	9.4	4.162874	9.4	0.993413	9.4	4.30479	9.4	0.804192	9.4	2.317964	9.4	3.216766	9.4	3.358683	9.4	1.84491	9.4	1.513772	9.4	1.986826	**9.4**	**26.63**	**26.63**	**9777.00**
9.5	0.82994	9.5	1.24491	9.5	4.057485	9.5	0.968263	9.5	4.195808	9.5	0.783832	9.5	2.259281	9.5	3.135329	9.5	3.273653	9.5	1.798204	9.5	1.475449	9.5	1.936527	**9.5**	**25.96**	**25.96**	**9777.00**
9.6	0.808383	9.6	1.212575	9.6	3.952096	9.6	0.943114	9.6	4.086826	9.6	0.763473	9.6	2.200599	9.6	3.053892	9.6	3.188623	9.6	1.751497	9.6	1.437126	9.6	1.886228	**9.6**	**25.28**	**25.28**	**9777.00**
9.7	0.786826	9.7	1.18024	9.7	3.846707	9.7	0.917964	9.7	3.977844	9.7	0.743114	9.7	2.141916	9.7	2.972455	9.7	3.103593	9.7	1.70479	9.7	1.398802	9.7	1.835928	**9.7**	**24.61**	**24.61**	**9777.00**
9.8	0.765269	9.8	1.147904	9.8	3.741317	9.8	0.892814	9.8	3.868862	9.8	0.722754	9.8	2.083234	9.8	2.891018	9.8	3.018563	9.8	1.658084	9.8	1.360479	9.8	1.785629	**9.8**	**23.94**	**23.94**	**9777.00**
9.9	0.743713	9.9	1.115569	9.9	3.635928	9.9	0.867665	9.9	3.75988	9.9	0.702395	9.9	2.024551	9.9	2.809581	9.9	2.933533	9.9	1.611377	9.9	1.322156	9.9	1.735329	**9.9**	**23.26**	**23.26**	**9777.00**
10	0.722156	10	1.083234	10	3.530539	10	0.842515	10	3.650898	10	0.682036	10	1.965868	10	2.728144	10	2.848503	10	1.564671	10	1.283832	10	1.68503	**10**	**22.59**	**22.59**	**9777.00**
10.1	0.700599	10.1	1.050898	10.1	3.42515	10.1	0.817365	10.1	3.541916	10.1	0.661677	10.1	1.907186	10.1	2.646707	10.1	2.763473	10.1	1.517964	10.1	1.245509	10.1	1.634731	**10.1**	**21.91**	**21.91**	**9777.00**
10.2	0.679042	10.2	1.018563	10.2	3.31976	10.2	0.792216	10.2	3.432934	10.2	0.641317	10.2	1.848503	10.2	2.565269	10.2	2.678443	10.2	1.471257	10.2	1.207186	10.2	1.584431	**10.2**	**21.24**	**21.24**	**9777.00**
10.3	0.657485	10.3	0.986228	10.3	3.214371	10.3	0.767066	10.3	3.323952	10.3	0.620958	10.3	1.78982	10.3	2.483832	10.3	2.593413	10.3	1.424551	10.3	1.168862	10.3	1.534132	**10.3**	**20.56**	**20.56**	**9777.00**
10.4	0.635928	10.4	0.953892	10.4	3.108982	10.4	0.741916	10.4	3.21497	10.4	0.600599	10.4	1.731138	10.4	2.402395	10.4	2.508383	10.4	1.377844	10.4	1.130539	10.4	1.483832	**10.4**	**19.89**	**19.89**	**9777.00**
10.5	0.614371	10.5	0.921557	10.5	3.003593	10.5	0.716766	10.5	3.105988	10.5	0.58024	10.5	1.672455	10.5	2.320958	10.5	2.423353	10.5	1.331138	10.5	1.092216	10.5	1.433533	**10.5**	**19.22**	**19.22**	**9777.00**
10.6	0.592814	10.6	0.889222	10.6	2.898204	10.6	0.691617	10.6	2.997006	10.6	0.55988	10.6	1.613772	10.6	2.239521	10.6	2.338323	10.6	1.284431	10.6	1.053892	10.6	1.383234	**10.6**	**18.54**	**18.54**	**9777.00**
10.7	0.571257	10.7	0.856886	10.7	2.792814	10.7	0.666467	10.7	2.888024	10.7	0.539521	10.7	1.55509	10.7	2.158084	10.7	2.253293	10.7	1.237725	10.7	1.015569	10.7	1.332934	**10.7**	**17.87**	**17.87**	**9777.00**
10.8	0.549701	10.8	0.824551	10.8	2.687425	10.8	0.641317	10.8	2.779042	10.8	0.519162	10.8	1.496407	10.8	2.076647	10.8	2.168263	10.8	1.191018	10.8	0.977246	10.8	1.282635	**10.8**	**17.19**	**17.19**	**9777.00**
10.9	0.528144	10.9	0.792216	10.9	2.582036	10.9	0.616168	10.9	2.67006	10.9	0.498802	10.9	1.437725	10.9	1.99521	10.9	2.083234	10.9	1.144311	10.9	0.938922	10.9	1.232335	**10.9**	**16.52**	**16.52**	**9777.00**
11	0.506587	11	0.75988	11	2.476647	11	0.591018	11	2.561078	11	0.478443	11	1.379042	11	1.913772	11	1.996204	11	1.097605	11	0.900599	11	1.182036	**11**	**15.84**	**15.84**	**9777.00**
11.1	0.48503	11.1	0.727545	11.1	2.371257	11.1	0.565868	11.1	2.452096	11.1	0.458084	11.1	1.320359	11.1	1.832335	11.1	1.913174	11.1	1.050898	11.1	0.862275	11.1	1.131737	**11.1**	**15.17**	**15.17**	**9777.00**
11.2	0.463473	11.2	0.69521	11.2	2.265868	11.2	0.540719	11.2	2.343114	11.2	0.437725	11.2	1.261677	11.2	1.750898	11.2	1.828144	11.2	1.004192	11.2	0.823952	11.2	1.081437	**11.2**	**14.50**	**14.50**	**9777.00**
11.3	0.441916	11.3	0.662874	11.3	2.160479	11.3	0.515569	11.3	2.234132	11.3	0.417365	11.3	1.202994	11.3	1.669461	11.3	1.743114	11.3	0.957485	11.3	0.785629	11.3	1.031138	**11.3**	**13.82**	**13.82**	**9777.00**
11.4	0.420359	11.4	0.630539	11.4	2.05509	11.4	0.490419	11.4	2.12515	11.4	0.397006	11.4	1.144311	11.4	1.588024	11.4	1.658084	11.4	0.910778	11.4	0.747305	11.4	0.980838	**11.4**	**13.15**	**13.15**	**9777.00**
11.5	0.398802	11.5	0.598204	11.5	1.949701	11.5	0.465269	11.5	2.016168	11.5	0.376647	11.5	1.085629	11.5	1.506587	11.5	1.573054	11.5	0.864072	11.5	0.708982	11.5	0.930539	**11.5**	**12.47**	**12.47**	**9777.00**
11.6	0.377246	11.6	0.565868	11.6	1.844311	11.6	0.44012	11.6	1.907186	11.6	0.356287	11.6	1.026946	11.6	1.42515	11.6	1.488024	11.6	0.817365	11.6	0.670659	11.6	0.88024	**11.6**	**11.80**	**11.80**	**9777.00**
11.7	0.355689	11.7	0.533533	11.7	1.738922	11.7	0.41497	11.7	1.798204	11.7	0.335928	11.7	0.968263	11.7	1.343713	11.7	1.402994	11.7	0.770659	11.7	0.632335	11.7	0.82994	**11.7**	**11.13**	**11.13**	**9777.00**
11.8	0.334132	11.8	0.501198	11.8	1.633533	11.8	0.38982	11.8	1.689222	11.8	0.315569	11.8	0.909581	11.8	1.262275	11.8	1.317964	11.8	0.723952	11.8	0.594012	11.8	0.779641	**11.8**	**10.45**	**10.45**	**9777.00**
11.9	0.312575	11.9	0.468862	11.9	1.528144	11.9	0.364671	11.9	1.58024	11.9	0.29521	11.9	0.850898	11.9	1.180838	11.9	1.232934	11.9	0.677246	11.9	0.555689	11.9	0.729341	**11.9**	**9.78**	**9.78**	**9777.00**
12	0.291018	12	0.436527	12	1.422754	12	0.339521	12	1.471257	12	0.27485	12	0.792216	12	1.099401	12	1.147904	12	0.630539	12	0.517365	12	0.679042	**12**	**9.10**	**9.10**	**9777.00**
12.1	0.269461	12.1	0.404192	12.1	1.317365	12.1	0.314371	12.1	1.362275	12.1	0.254491	12.1	0.733533	12.1	1.017964	12.1	1.062874	12.1	0.583832	12.1	0.479042	12.1	0.628743	**12.1**	**8.43**	**8.43**	**9777.00**
12.2	0.247904	12.2	0.371856	12.2	1.211976	12.2	0.289222	12.2	1.253293	12.2	0.234132	12.2	0.67485	12.2	0.936527	12.2	0.977844	12.2	0.537126	12.2	0.440719	12.2	0.578443	**12.2**	**7.75**	**7.75**	**9777.00**
12.3	0.226347	12.3	0.339521	12.3	1.106587	12.3	0.264072	12.3	1.144311	12.3	0.213772	12.3	0.616168	12.3	0.85509	12.3	0.892614	12.3	0.490419	12.3	0.402395	12.3	0.528144	**12.3**	**7.08**	**7.08**	**9777.00**
12.4	0.20479	12.4	0.307186	12.4	1.001198	12.4	0.238922	12.4	1.035329	12.4	0.193413	12.4	0.557485	12.4	0.773653	12.4	0.807784	12.4	0.443713	12.4	0.364072	12.4	0.477844	**12.4**	**6.41**	**6.41**	**9777.00**
12.5	0.183234	12.5	0.27485	12.5	0.895808	12.5	0.213772	12.5	0.926347	12.5	0.173054	12.5	0.498802	12.5	0.692216	12.5	0.722754	12.5	0.397006	12.5	0.325749	12.5	0.427545	**12.5**	**5.73**	**5.73**	**9777.00**
12.6	0.161677	12.6	0.242515	12.6	0.790419	12.6	0.188623	12.6	0.817365	12.6	0.152695	12.6	0.44012	12.6	0.610778	12.6	0.637725	12.6	0.350299	12.6	0.287425	12.6	0.377246	**12.6**	**5.06**	**5.06**	**9777.00**
12.7	0.14012	12.7	0.21018	12.7	0.68503	12.7	0.163473	12.7	0.708383	12.7	0.132335	12.7	0.381437	12.7	0.529341	12.7	0.552695	12.7	0.303593	12.7	0.249102	12.7	0.326946	**12.7**	**4.38**	**4.38**	**9777.00**
12.8	0.118563	12.8	0.177844	12.8	0.579641	12.8	0.138323	12.8	0.599401	12.8	0.111976	12.8	0.322754	12.8	0.447904	12.8	0.467665	12.8	0.256886	12.8	0.210778	12.8	0.276647	**12.8**	**3.71**	**3.71**	**9777.00**
12.9	0.097006	12.9	0.145509	12.9	0.474251	12.9	0.113174	12.9	0.490419	12.9	0.091617	12.9	0.264072	12.9	0.366467	12.9	0.382635	12.9	0.21018	12.9	0.172455	12.9	0.226347	**12.9**	**3.03**	**3.03**	**9777.00**
13	0.075449	13	0.113174	13	0.368862	13	0.088024	13	0.381437	13	0.071257	13	0.205389	13	0.28503	13	0.297605	13	0.163473	13	0.134132	13	0.176048	**13**	**2.36**	**2.36**	**9777.00**
13.1	0.053892	13.1	0.080838	13.1	0.263473	13.1	0.062874	13.1	0.272455	13.1	0.050898	13.1	0.146707	13.1	0.203593	13.1	0.212575	13.1	0.116766	13.1	0.095808	13.1	0.125749	**13.1**	**1.69**	**1.69**	**9777.00**
13.2	0.032335	13.2	0.048503	13.2	0.158084	13.2	0.037725	13.2	0.163473	13.2	0.030539	13.2	0.088024	13.2	0.122156	13.2	0.127545	13.2	0.07006	13.2	0.057485	13.2	0.075449	**13.2**	**1.01**	**1.01**	**9777.00**
13.3	0.010778	13.3	0.016168	13.3	0.052695	13.3	0.012575	13.3	0.054491	13.3	0.01018	13.3	0.029341	13.3	0.040719	13.3	0.042515	13.3	0.023353	13.3	0.019162	13.3	0.02515	**13.3**	**0.34**	**0.34**	**9777.00**
13.4	0	13.4	0	13.4	0	13.4	0	13.4	0	13.4	0	13.4	0	13.4	0	13.4	0	13.4	0	13.4	0	13.4	0	**13.4**	**0.00**	**0.00**	**9777.00**

Notes:
hydrograph is generated based on Maricopa County Drainage Hydrology Manual page 3-10
if the inflow is less than 27.6 cfs, all the inflow is assumed to outflow. If greater than 27.6 cfs then the difference is assumed to be detained with maximum of 27.6.
During final design the inflow and outflow routing will be computed based on the head on the restricted orifice plates.

Orifice Plates Design
Wolff Legacy Scottsdale

CP Concentration Point	d	Diameter	Flow
		orifice plate	Qi
	[ft]	[ft]	[cfs]
HO-2	7.36	1.13	14.63
HO-3	6.3	1.11	13.06

Flow is determine using orifice equation: $Qi = CoAg(2gd)^{0.5}$

where:

Co = Orifice coefficient = 0.67
Ag = Clear opening area , sq ft
d = Depth of flow , ft
g = Gravity, 32.2 ft/sec2

Worksheet for Pressure Pipe - HO 4 3.5' H

Project Description

Friction Method	Manning Formula
Solve For	Discharge

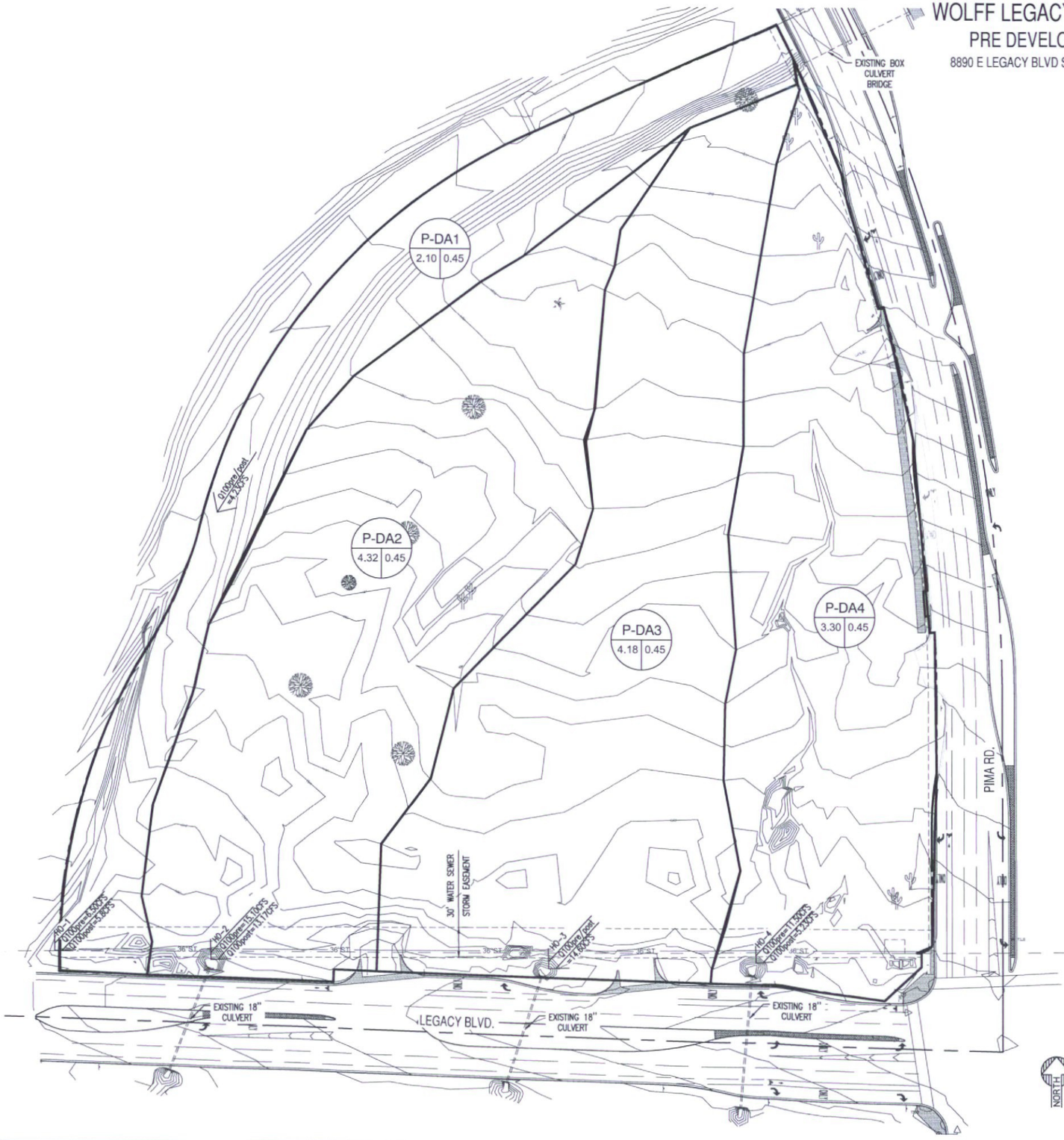
Input Data

Pressure 1	0.00	psi
Pressure 2	0.00	psi
Elevation 1	40.18	ft
Elevation 2	36.22	ft
Length	130.00	ft
Roughness Coefficient	0.013	
Diameter	1.50	ft

Results

Discharge	18.33	ft^3/s
Headloss	3.96	ft
Energy Grade 1	41.85	ft
Energy Grade 2	37.89	ft
Hydraulic Grade 1	40.18	ft
Hydraulic Grade 2	36.22	ft
Flow Area	1.77	ft^2
Wetted Perimeter	4.71	ft
Velocity	10.37	ft/s
Velocity Head	1.67	ft
Friction Slope	0.03046	ft/ft

WOLFF LEGACY SCOTTSDALE
PRE DEVELOPMENT DAM
8890 E LEGACY BLVD SCOTTSDALE, AZ 85255



SEG
8280 E GELDING DR #101 SCOTTSDALE, ARIZONA 85260
WWW.AZSEG.COM TEL. 480.588.7229

THE WOLFF COMPANY
Since 1949

PROJECT: WOLFF LEGACY SCOTTSDALE
LOCATION: 8890 E. LEGACY BLVD. SCOTTSDALE, AZ. 85255

DRAWN	TAPIA
DESIGNED	TAPIA
CHECKED	COUNSELL
PROJ. MGR.	FAKIH

DATE: 02/15/18

ISSUED FOR: REZONING & PLAN AMENDMENT

REVISION NO.	DATE:
1	
2	
3	
4	

JOB NO.: 170726

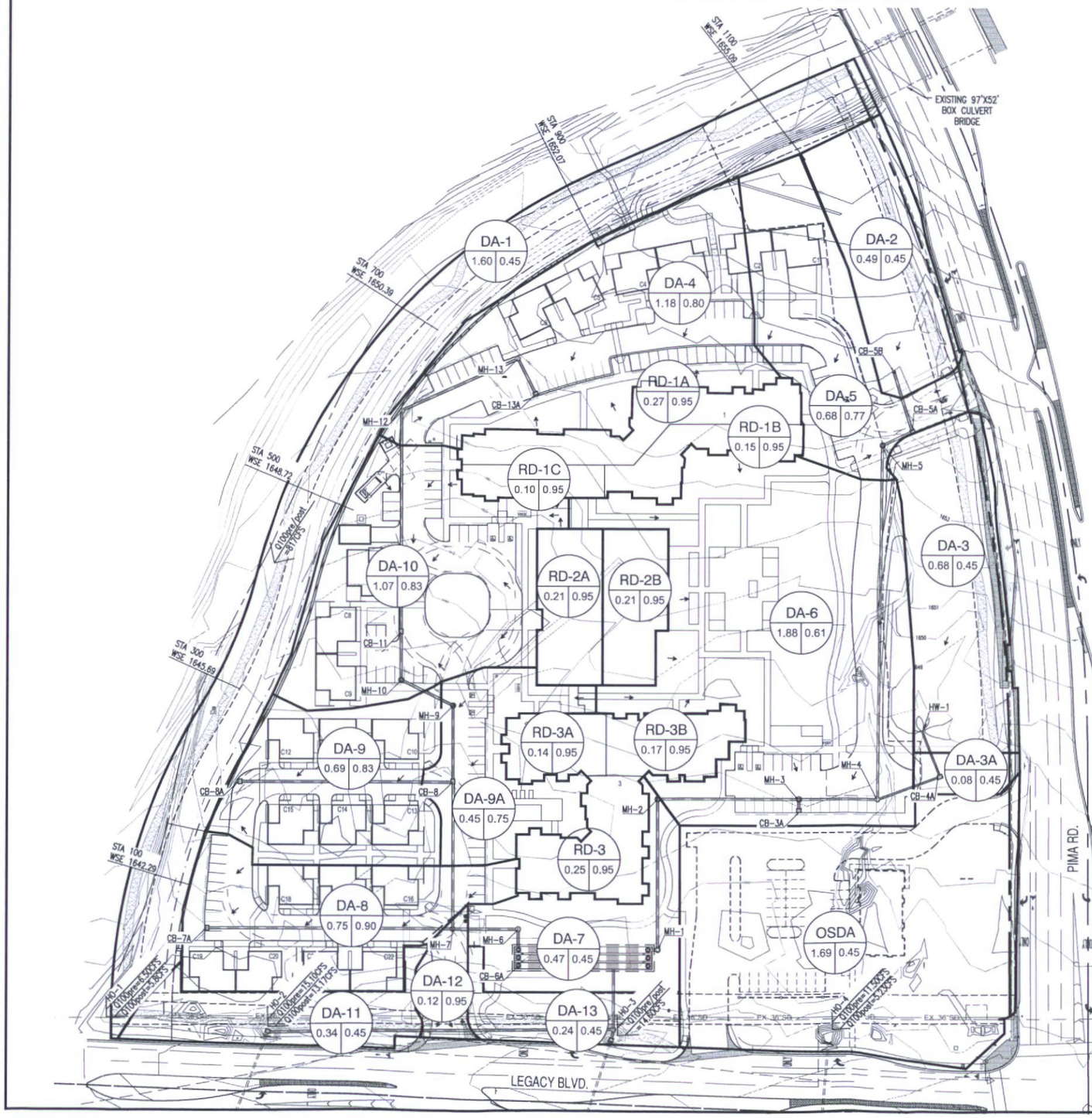
SHEET TITLE: PRE DEVELOPMENT DAM

SHEET NO.:

WOLFF LEGACY SCOTTSDALE

POST DEVELOPMENT DAM

8890 E LEGACY BLVD SCOTTSDALE, AZ 85255



DRAINAGE AREA ID

AREA IN ACRES — RUNOFF COEFFICIENT

DRAINAGE AREA KEY

Call at least two full working days before you begin excavation. ARIZONA 811 Arizona Blue Stake, Inc. Dial 8-1-1 or 1-800-STAKE-IT (782-5348) In Maricopa County (602) 263-1100

NOTE TO CONTRACTOR: THIS SET OF DRAWINGS AND DOCUMENTS IS INTENDED AS A SET OF GUIDELINES FOR THE PROJECT AND ARE INTENDED TO BE USED IN CONJUNCTION WITH A SET OF CONSTRUCTION SPECIFICATIONS TO BE SUPPLIED BY OWNER. THEY MUST BE USED IN CONJUNCTION WITH ALL APPLICABLE CODES AND LAWS OF THE CITY INCLUDING FEDERAL, U.S.A. REQUIREMENTS. THIS SET ASSUMES THAT THERE ARE NO UNUSUAL SOIL CONDITIONS OR WIND LOADS. THE FAILURE OF THIS ASSUMPTION MAY RENDER THIS SET OF PLANS TO BE INADEQUATE. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO CONFORM TO ALL APPLICABLE CODES AND TO INFORM THE OWNER/ARCHITECTS OF ANY QUESTIONS OR CLARIFICATIONS WHICH ARE DESIRED. CONTRACTORS SHALL ALSO VISIT THE SITE BEFORE BIDDING. CONTRACTORS ARE REQUIRED TO KNOW ALL OBSERVABLE CONDITIONS AND APPLICABLE CODES.

SEG

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THE WOLFF COMPANY
Since 1949

PROJECT: WOLFF LEGACY SCOTTSDALE
LOCATION: 8890 E LEGACY BLVD. SCOTTSDALE, AZ 85255

DRAWN	TAPIA
DESIGNED	TAPIA
CHECKED	COUNSELL
PROJ. MGR.	FAKIH

DATE: 04/24/18

ISSUED FOR: DRB

REVISION NO.:	DATE:
1	
2	
3	
4	

JOB NO.: 170726

SHEET TITLE: POST DEVELOPMENT DAM

SHEET NO.:

STORM DESIGN

Project: Wolff Assited Living — 100 Year
Job No: 170726 — 0.011
Date: 05/01/18
Location Scottsdale, AZ

Drainage Area	Runoff Entering Structure	To Downstream Structure	A: Area contributing to structure (ACRES)	C: Impervious ness	(AxC): Equivalent Area	(AxC)t: Accumulative Totals of Equivalent Areas	L: Length of travel in pipe (ft)	t: Time of Concentration (min)	I: Rainfall Intensity 100 Year Storm (in/hr)	Quantity of Rainfall at Grate 100 Year Storm (cfs)	Qt: Cumulative Quantity of Rainfall 100 Year Storm (cfs)	Number of Pipes	D: Standard pipe size needed	V: Volume in pipe (storage - cf)	S: Slope (%) of Individual Gradient	v: Velocity (ft/s)	Tt: Time (min) of Flow to Next M.H.	A: Area (ft^2)	P: Perimeter (ft)	R: hyd rad (ft)	Q: Discharge Capacity (cfs)
DA-2	CB-5B	CB-5A	0.49	0.45	0.22	0.22	61.0	5.00	7.94	1.75	1.75	1	18.0	107.8	0.49%	0.99	1.03	1.77	4.71	0.38	8.73
DA-5	CB-5A	MH-5	0.68	0.77	0.52	0.74	32.0	5.00	7.94	4.16	5.91	1	18.0	56.5	0.47%	3.34	0.16	1.77	4.71	0.38	8.52
	MH-5	MH-4	0.00	0.00	0.00	0.74	340.0	5.16	7.94	0.00	5.91	1	18.0	600.8	0.78%	3.34	1.69	1.77	4.71	0.38	10.99
DA-3	HW-1	CB-4A	0.68	0.45	0.31	0.31	46.0	5.00	7.94	2.43	2.43	1	18.0	81.3	5.43%	1.37	0.56	1.77	4.71	0.38	29.02
DA-3A	CB-4A	MH-4	0.08	0.45	0.04	0.34	63.0	5.56	7.94	0.29	2.72	1	18.0	111.3	0.48%	1.54	0.68	1.77	4.71	0.38	8.59
	MH-4	MH-3	0.00	0.00	0.00	1.09	76.0	6.85	7.94	0.00	8.62	1	24.0	238.8	0.92%	2.74	0.46	3.14	6.28	0.50	25.73
RD-1B	CB-3A	MH-3	0.15	0.95	0.14	0.14	0.0	5.00	7.94	1.13	-	0									
RD-2B	CB-3A	MH-3	0.21	0.95	0.20	0.20	0.0	5.00	7.94	1.58	-	0									
RD-3B	CB-3A	MH-3	0.17	0.95	0.16	0.16	0.0	5.00	7.94	1.28	-	0									
DA-6	CB-3A	MH-3	1.88	0.61	1.15	1.65	13.0	5.00	7.94	13.10	13.10	1	18.0	23.0	3.85%	7.41	0.03	1.77	4.71	0.38	24.41
	MH-3	MH-2	0.00	0.00	0.00	2.74	134.0	5.03	7.94	0.00	21.73	1	36.0	947.2	0.97%	3.07	0.73	7.07	9.42	0.75	77.85
	MH-2	MH-1	0.00	0.00	0.00	2.74	145.0	5.76	7.94	0.00	21.73	1	36.0	1024.9	0.90%	3.07	0.79	7.07	9.42	0.75	74.84
	MH-1	BASIN	0.00	0.00	0.00	2.74	5.0	6.54	7.94	0.00	21.73	1	36.0	35.3	15.00%	3.07	0.03	7.07	9.42	0.75	306.11
RD-1A	CB-13A	MH-13	0.27	0.95	0.26	0.26	0.0	5.00	7.94	2.04	-	0									
DA-4	CB-13A	MH-13	1.18	0.80	0.94	1.20	41.0	5.00	7.94	9.53	9.53	1	18.0	72.5	0.98%	5.39	0.13	1.77	4.71	0.38	12.29
	MH-13	MH-12	0.00	0.00	0.00	1.20	120.0	5.13	7.94	0.00	9.53	1	18.0	212.1	1.00%	5.39	0.37	1.77	4.71	0.38	12.45
	MH-12	CB-11	0.00	0.00	0.00	1.20	216.0	5.00	7.94	0.00	9.53	1	18.0	381.7	1.99%	5.39	0.67	1.77	4.71	0.38	17.56
RD-1C	CB-11	MH-10	0.10	0.95	0.10	0.10	0.0	5.00	7.94	0.75	-	0									
RD-2A	CB-11	MH-10	0.21	0.95	0.20	0.20	0.0	5.00	7.94	1.58	-	0									
DA-10	CB-11	MH-10	1.07	0.83	0.89	2.38	46.0	5.00	7.94	9.39	18.92	1	24.0	144.5	0.87%	6.02	0.13	3.14	6.28	0.50	25.00
	MH-10	MH-9	0.00	0.00	0.00	2.38	55.0	5.13	7.94	0.00	18.92	1	24.0	172.8	0.91%	6.02	0.15	3.14	6.28	0.50	25.56
	MH-9	CB-8	0.00	0.00	0.00	2.38	74.0	5.28	7.94	0.00	18.92	1	24.0	232.5	0.54%	6.02	0.20	3.14	6.28	0.50	19.71
DA-9	CB-8A	CB-8	0.69	0.83	0.57	0.57	192.0	5.00	7.94	4.55	4.55	1	18.0	339.3	0.26%	2.57	1.24	1.77	4.71	0.38	6.35
RD-3A	CB-8	MH-7	0.14	0.95	0.13	0.13	0.0	5.00	7.94	1.06	-	0									
DA-9A	CB-8	MH-7	0.45	0.75	0.34	3.43	141.0	5.00	7.94	3.74	27.20	1	36.0	996.7	1.28%	3.85	0.61	7.07	9.42	0.75	89.30
DA-8	CB-7A	MH-7	0.75	0.90	0.68	0.68	238.0	5.00	7.94	5.36	5.36	1	18.0	420.6	0.63%	3.03	1.31	1.77	4.71	0.38	9.88
	MH-7	MH-6	0.00	0.00	0.00	4.10	63.0	6.31	7.94	0.00	32.56	1	36.0	445.3	1.59%	4.61	0.23	7.07	9.42	0.75	99.58
	MH-6	BASIN	0.00	0.00	0.00	4.10	16.0	5.00	7.94	0.00	32.56	1	36.0	113.1	1.88%	4.61	0.06	7.07	9.42	0.75	108.23
RD-3	CB-6A	BASIN	0.25	0.95	0.24	0.24	0.0	5.00	7.94	1.89	-	0									
DA-7	CB-6A	BASIN	0.47	0.45	0.21	0.45	0.0	5.00	7.94	3.57	3.57	0									

STORM DESIGN

Runoff Entering Structure	To Downstream Structure	IE: INVERT UPSTREAM (ft)	IE: INVERT DOWNSTREAM (ft)	HEADLOSS: DOWNSTREAM JUNCTION MINOR LOSS COEFFICIENT	HEADLOSS: JUNCTION MINOR LOSS (ft) **JUNCTION loss=KJ*(Q^2/A^2*2g)**	HEADLOSS: Friction Loss	HGL: Hydraulic Grade Line Elevation UPSTREAM	HGL: Hydraulic Grade Line Elevation DOWNSTREAM	Rim: Rim Elevation (UPSTREAM)	Cover over Pipe - upstream (feet)	RIM - HGL at upstream Structure (feet)
CB-5B	CB-5A	49.50	49.20	0.80	0.01	0.02	51.27	51.25	54.00	3.00	2.73
CB-5A	MH-5	49.00	48.85	0.80	0.14	0.10	50.45	50.35	54.22	3.72	3.77
MH-5	MH-4	48.65	46.00	0.80	0.14	1.07	48.92	47.85	54.61	4.46	5.69
HW-1	CB-4A	46.00	43.50	0.80	0.02	0.02	48.72	48.69	49.00	1.50	0.28
CB-4A	MH-4	43.30	43.00	0.80	0.03	0.04	47.89	47.85	47.00	2.20	-0.89
MH-4	MH-3	42.80	42.10	0.80	0.09	0.11	47.05	46.94	50.00	5.20	2.95
CB-3A	MH-3	45.00	44.50	0.70	0.60	0.20	47.04	46.84	49.00	2.50	1.96
MH-3	MH-2	44.30	43.00	0.80	0.12	0.14	46.14	46.00	49.09	1.79	2.95
MH-2	MH-1	42.80	41.50	0.80	0.12	0.15	44.65	44.50	50.50	4.70	5.85
MH-1	BASIN	39.00	38.25	0.50	0.07	0.01	42.01	42.00	46.00	4.00	3.99
CB-13A	MH-13	50.50	50.10	0.80	0.36	0.34	52.32	51.98	54.90	2.90	2.58
MH-13	MH-12	49.90	48.70	0.60	0.27	0.98	51.18	50.20	55.55	4.15	4.37
MH-12	CB-11	48.50	44.20	0.50	0.23	1.77	49.31	47.54	56.74	6.74	7.43
CB-11	MH-10										
CB-11	MH-10										
CB-11	MH-10	44.00	43.60	0.60	0.34	0.32	47.04	46.72	48.30	2.30	1.26
MH-10	MH-9	43.40	42.90	0.60	0.34	0.38	46.12	45.74	49.55	4.15	3.43
MH-9	CB-8	42.70	42.30	0.70	0.39	0.51	45.14	44.62	51.11	6.41	5.97
CB-8A	CB-8	41.00	40.50	0.70	0.07	0.36	44.98	44.62	45.00	2.50	0.02
CB-8	MH-7	40.30	38.50	0.70	0.16	0.23	43.92	43.69	46.49	3.19	2.57
CB-7A	MH-7	40.50	39.00	0.70	0.10	0.62	44.30	43.69	44.43	2.43	0.13
MH-7	MH-6	38.30	37.30	0.80	0.26	0.15	42.99	42.84	47.94	6.64	4.95
MH-6	BASIN	37.10	36.80	0.80	0.26	0.04	42.04	42.00	48.00	7.90	5.96

Quantity of Rainfall (Q-100)= **C*I*A (cfs)**
Where: C= Imperviousness
I=Rainfall Intensity (In/hr)
A= Area contributing to Structure (Acres)

Velocity of Stormwater in Pipe (v)= **(1.49/n)*(((3.14*(D/24)^2)/(3.14*D/12))^0.66)*((S)^0.5) (fps)**
Where: D=Pipe diameter (in)
S= Pipe slope (ft/ft)
n= Mannings "n" value

Discharge Capacity (Q)=**(1.49/n)*Ap*(R^0.66)*S^0.5 (cfs)**
Where: Ap= Area of pipe (sq.ft.)
R= Hydraulic Radius (ft) = Ap/P
P=Perimeter of Pipe (ft) = 3.14*D/12
S= Pipe slope (ft/ft)
n= Mannings "n" value

Friction Headloss **(Hf) = $KV^2/2gR^{4/3}L$**
Where: Ap= Area of pipe (sq.ft.)
R= Hydraulic Radius (ft) = Ap/P
P=Perimeter of Pipe (ft) = 3.14*D/12
D=Pipe diameter (in)
L = Pipe Length
K = $2gn^2/2.21$ = 0.0049

Junction Minor Loss = **Kin*(Q^2/A^2*2*g)**
Where: Kin = Bend Loss Coefficient
Q = Cumulative Quantitiy of Rainfall (cfs)
A = Area (ft^2)
g = Acceleration due to gravity, 32.2 ft/s^2

APPENDIX III

Preliminary Grading & Drainage Plan