Preliminary Drainage Report

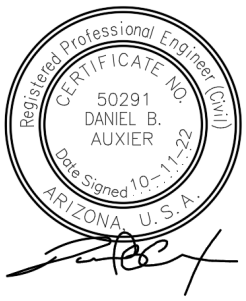
For

Arizona Farms

Pinal County, Arizona

Owner/Developer
El Dorado Arizona Farms, LLC, an
Arizona Limited Liability Company
8501 N. Scottsdale Road Suite 120
Tel: 602-955-2424
Contact: Brad Hinton

Civil Engineer
EPS Group Inc.
1130 N. Alma School Road, Ste. 120
Mesa, AZ 85201
Tel: 480-503-2250
Contact: Daniel Auxier



Project No. 21-0483

Date: October 2022

1130 N. Alma School Road, Suite 120
Mesa, AZ 85201
o: 480.503.2250
f: 480.503.2258

Table of Contents

List of Figures

Appendix List

1.0 Introduction

Arizona Farms, the Project, is a proposed residential development of 3,126 lots on approximately 760 acres. The site is bounded by E Arizona Farms Road to the north, N Felix Road to the East, E Heritage Road to the South, and the Copper Basin Railway to the West. By legal description, the property is located in a portion of land located in both Section 1, Township 4 South, Range 8 East, and Section 6, Township 4 South, Range 9 East of the Gila and Salt River Base Meridian, Pinal County, Arizona, Assessor Parcel Numbers (APN) 200-31-007B,D,E,F,G,K,L, 200-24-001R, and W.

This preliminary report evaluates the drainage characteristics within the Arizona Farms master planned community. Design parameters from Pinal County will be applied to the Project to ensure adherence to regulations.

1.1 National Flood Insurance Program

The Project is located within FEMA Flood Zone Shaded X as shown on FEMA Flood Insurance Rate (FIRM) Map 04021C0875E for Pinal County dated December 4, 2007. See Figure 1: FIRM Map.

Flood Zone Shaded X is defined as:

> Areas of the 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.

2.0 Existing Site Conditions

The Project site is currently used for agricultural purposes. Existing grades historically slope from the northeast of the site to the southwest.

3.0 Offsite Drainage Characteristics and Hydrology

The Magma Dam/FRS is approximately three miles to the east of the site, which exists to provide flood protection from residents and infrastructure in Florence, Arizona.

Offsite flows impacting the development are generated by the area whose outline is called the Magma Flood Control District, by the governing Pinal County Flood Control District (PCFCD).

There are 3 main offsite flows impacting the site. The first enters the site from the north at the intersection of Attaway Rd and Arizona Farms Road. The overtop of Arizona Farms Rd totals 95 cfs entering the site. In the existing condition, this flow is routed toward the west.

The second flow enters the site at the northwest corner of the site, at the intersection of the Copper Basin Railway and Arizona Farms Road. The Copper Basin Railway acts as a berm that directs a flow of 101 cfs through the site along the railway.

The third enters the site near the northeast corner of the site, where irrigation fields overtop Felix Road at a rate of 55 cfs. The 55 cfs combines with a flow of 35 cfs which originates from rainfall in HEC-1 sub-basin 3. These two flows combine for a total of 90 cfs which flows through a swale then south-southeast through agricultural fields in the existing condition.

The flow rates used for the hydrology were obtained from the approved Master Drainage Report for Arizona Farms found in Appendix D.

In order to accommodate the offsite flows impacting the site, it is recommended to reserve space that can be used to construct swales, basins, and minor channels as part of the proposed development. See the Offsite Drainage Report in Appendix C for more information.

4.0 Onsite Drainage Characteristics and Hydrology

The drainage exhibit for the Project is located in Appendix A. The exhibit highlights sub-drainage areas, flow directions, inlet locations, and retention basin locations and capacities. Runoff generated onsite will be routed to the retention basins located within the parcel.

All retention basins have been designed to pond three (3) feet deep with one (1) foot of freeboard, unless noted otherwise, with side slopes of 4:1 and/or 6:1. All retention basins have been adequately sized to retain the 100-year, 2-hour storm event per Pinal County design requirements.

Pinal County design standards require all retention basins to drain within a 36-hour period. Drywells have been used to facilitate percolation of the runoff for any basins deeper than one foot in ponding depth. A percolation test will be required as part of the Final Drainage clearance for the site. Drywell will be installed according to Arizona Department of Environmental Quality (ADEQ) guidelines of installation and will be designed and maintained in accordance with the Town of Queen Creek's Drywell Policy. All drywells will be registered with ADEQ. See section 602.3 & 602.4 of the Drainage Ordinance and sections 3.10.4.2 & 3.10.4.3 in volume I of the Pinal County Drainage Manual.

Onsite basins will retain 100% of the 100-year, 2-hour storm event per Pinal County requirements. All retention basins were designed with a maximum of 4:1 side slopes and ponding depths not to exceed 3 feet with 1 foot of freeboard to the low gutter elevation, making a total depth not to exceed 4 feet.

5.0 Methodology and Criteria

The following section provides an overview of the rational method and time of concentration to be used during final design for sizing of drainage structures.

5.1 Rational Method

The rational method will be used for storm drain peak flows:

$$Q_p = C \times i \times A_d$$

where:

Q_p =Peak flow (cfs)
C = Composite runoff coefficient
i = Intensity corresponding to Tc
A_d = Area in acres

5.2 Time of Concentration

Inlet time estimated, system time established based on summation of travel time in system and initial time of concentration based upon the following equation, with the initial lot T_c being 5 minutes:

$$T_c = 11.4L^{0.5} \times K_b^{0.52} \times S^{-0.31} \times i^{-0.38}$$

where:

T_c = Time of concentration (hrs): minimum of 5 minutes
L = Length of the longest flow path (miles)
K_b = Watershed resistance coefficient – (See Maricopa County Drainage Manual, Hydrology)
S = Watercourse slope (ft/mi)
i = Rainfall intensity (in/hr)

6.0 Drainage Infrastructure

The following section provides an overview of the storm water drainage system that will be designed to collect and dispose of runoff generated during the 100-year, 2-hour storm event.

6.1 Onsite Retention Requirements

The following section outlines the design requirements governing onsite retention basins as outlined in the Pinal County drainage standards.

6.1.1 Required Retention Volume

$$V_{required} = (C \times P \times A)/12$$

where:

$V_{required}$ = Volume Required (cf)
C = Average per FCDMC Hydrology Manual
P = 2.27-inches (100-year, 2-hour design storm)
A = Area (sf)

6.1.2 Provided Retention Volume

Volume provided is calculated using the Conic Approximation Method:

$$V_{provided} = d/3\ (A_{top} + A_{bot} + \sqrt{(A_{top}A_{bot})})$$

where:

$V_{provided}$ = Volume Provided (cf)
d = Depth of basin (ft)
A_{top} = Area of top contour (sf)
A_{bot} = Area of bottom contour (sf)

7.0 Ultimate Outfall

The ultimate outfall for of the site is at the culvert along the southern boundary at an approximate elevation of 980.00 feet. Building finished floors will be designed to be a minimum of 14" above the sub-basin and ultimate outfalls, as well as the lot low outfall.

8.0 Conclusions

This report concluded that:

- This site has sufficient retention capacity to retain, at a minimum, the 100-year, 2-hour event per Pinal County design standards.
- There are 3 areas where offsite flows enter the site. Space has been reserved to construct swales, basins, and minor channels as part of the proposed development to alleviate any adverse drainage impacts or increased drainage problems of offsite flows to the project or adjacent upstream or downstream, properties .
- The project has all weather access per Drainage Ordinance requirements.
- The site will be designed to comply with the Pinal County Drainage Ordinance, the Pinal County Drainage Manual, and the Pina County Floodplain Ordinance.

9.0 References

Pinal County Drainage Manual Volumes 1 & 2: Design Criteria

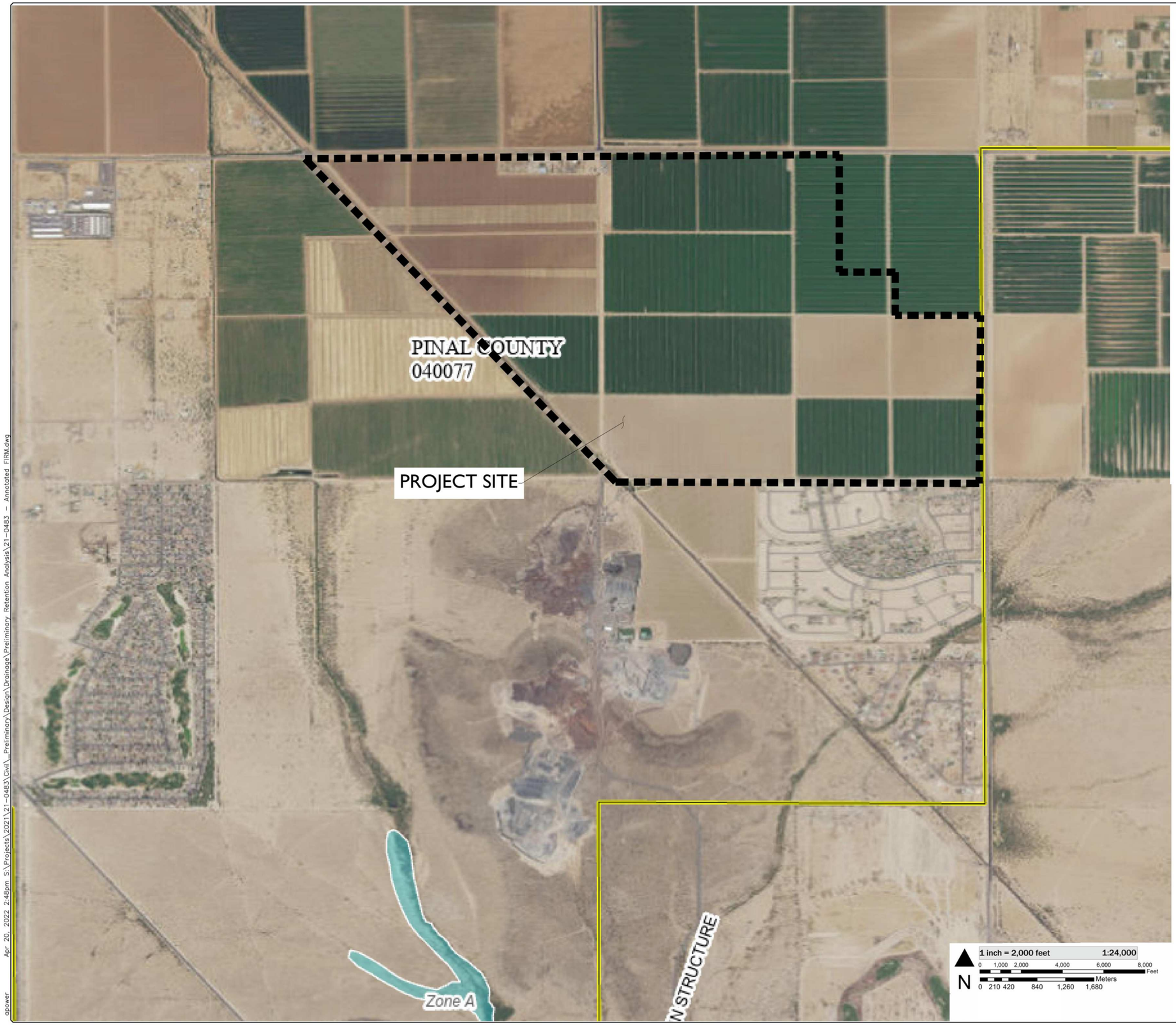
Flood Control District of Maricopa County, 2013 Drainage Design Manual for Maricopa County, AZ. Volume 1, Hydrology & Volume 2, Hydraulics

Flood Control District of Maricopa County, 2016 Drainage Policies and Standards for Maricopa County, AZ.

Appendix A

Figures

21-0483 - Arizona Farms



FLOOD HAZARD INFORMATION

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

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*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

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

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

1 inch = 2,000 feet 1:24,000

N

0 1,000 2,000 4,000 6,000 8,000 Feet

0 210 420 840 1,260 1,680 Meters

FEMA National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

PANEL 875 OF 2575

Panel Contains:

COMMUNITY	NUMBER	PANEL
PINAL COUNTY	040077	0875
FLORENCE	04FED	0875
MILITARY RESERVATION	040084	0875
TOWN OF FLORENCE	040082	0875
CITY OF COOLIDGE		

MAP NUMBER
04021C0875E
EFFECTIVE DATE
December 04, 2007

EPS GROUP
1130 N Alma School Road
Suite 120
Mesa, AZ 85201
T:480.503.2250 | F:480.503.2258
w w w . e p s g r o u p i n c . c o m

Arizona Farms
Pinal County, AZ

Project:

FIGURE I - FEMA FIRM MAP

Revisions:

Call at least two full working days before you begin excavation.
ARIZONA811
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)
In Maricopa County: (602)263-1100

Designer: EPS
Drawn by: EPS

Job No.
21-0483
EX01
Sheet No.
1
of 1

apower Apr 20, 2022 2:48pm S:\Projects\2021\21-0483\Civil_Preliminary\Design\Drainage\Preliminary Retention Analysis\21-0483 - Annotated FIRM.dwg

NOAA Atlas 14, Volume 1, Version 5
Location name: Florence, Arizona, USA*
Latitude: 33.1117°, Longitude: -111.4601°
Elevation: 1532.03 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	0.204 (0.172-0.245)	0.265 (0.227-0.321)	0.360 (0.304-0.432)	0.431 (0.362-0.516)	0.528 (0.438-0.629)	0.603 (0.493-0.715)	0.678 (0.545-0.803)	0.755 (0.596-0.894)	0.857 (0.659-1.02)	0.936 (0.705-1.12)
10-min	0.310 (0.262-0.373)	0.404 (0.345-0.488)	0.547 (0.462-0.658)	0.657 (0.552-0.785)	0.804 (0.666-0.957)	0.917 (0.749-1.09)	1.03 (0.829-1.22)	1.15 (0.908-1.36)	1.30 (1.00-1.55)	1.42 (1.07-1.70)
15-min	0.384 (0.325-0.462)	0.500 (0.428-0.605)	0.679 (0.573-0.815)	0.814 (0.684-0.973)	0.996 (0.825-1.19)	1.14 (0.929-1.35)	1.28 (1.03-1.52)	1.43 (1.13-1.69)	1.62 (1.24-1.92)	1.77 (1.33-2.10)
30-min	0.517 (0.438-0.623)	0.674 (0.575-0.814)	0.914 (0.772-1.10)	1.10 (0.921-1.31)	1.34 (1.11-1.60)	1.53 (1.25-1.82)	1.72 (1.38-2.04)	1.92 (1.52-2.27)	2.18 (1.68-2.58)	2.38 (1.79-2.83)
60-min	0.640 (0.542-0.771)	0.834 (0.712-1.01)	1.13 (0.955-1.36)	1.36 (1.14-1.62)	1.66 (1.38-1.98)	1.90 (1.55-2.25)	2.13 (1.71-2.53)	2.37 (1.88-2.81)	2.70 (2.07-3.20)	2.94 (2.22-3.51)
2-hr	0.733 (0.626-0.872)	0.950 (0.814-1.13)	1.27 (1.08-1.51)	1.51 (1.27-1.79)	1.83 (1.53-2.16)	2.09 (1.72-2.46)	2.35 (1.90-2.76)	2.61 (2.08-3.07)	2.96 (2.30-3.49)	3.24 (2.45-3.83)
3-hr	0.788 (0.671-0.942)	1.01 (0.861-1.21)	1.32 (1.13-1.59)	1.57 (1.33-1.88)	1.92 (1.59-2.28)	2.19 (1.79-2.59)	2.48 (1.99-2.93)	2.78 (2.19-3.28)	3.19 (2.44-3.77)	3.53 (2.64-4.18)
6-hr	0.947 (0.824-1.11)	1.20 (1.04-1.40)	1.53 (1.33-1.79)	1.80 (1.55-2.09)	2.16 (1.83-2.50)	2.44 (2.05-2.82)	2.74 (2.25-3.16)	3.04 (2.46-3.52)	3.46 (2.72-3.99)	3.78 (2.90-4.38)
12-hr	1.09 (0.961-1.25)	1.38 (1.21-1.58)	1.74 (1.53-1.99)	2.03 (1.77-2.31)	2.41 (2.08-2.74)	2.71 (2.31-3.07)	3.01 (2.53-3.42)	3.32 (2.75-3.77)	3.73 (3.02-4.26)	4.06 (3.21-4.66)
24-hr	1.28 (1.17-1.42)	1.63 (1.48-1.81)	2.10 (1.90-2.33)	2.48 (2.24-2.74)	3.00 (2.69-3.30)	3.41 (3.03-3.75)	3.84 (3.38-4.22)	4.28 (3.74-4.71)	4.89 (4.21-5.40)	5.38 (4.57-5.95)
2-day	1.37 (1.24-1.52)	1.75 (1.59-1.94)	2.29 (2.07-2.53)	2.71 (2.45-3.00)	3.31 (2.96-3.65)	3.78 (3.36-4.16)	4.27 (3.77-4.71)	4.79 (4.18-5.30)	5.50 (4.74-6.11)	6.07 (5.16-6.77)
3-day	1.47 (1.33-1.62)	1.87 (1.70-2.07)	2.45 (2.23-2.71)	2.92 (2.64-3.22)	3.58 (3.22-3.93)	4.10 (3.67-4.51)	4.66 (4.13-5.13)	5.25 (4.61-5.78)	6.07 (5.26-6.71)	6.74 (5.77-7.48)
4-day	1.56 (1.43-1.72)	1.99 (1.82-2.19)	2.62 (2.39-2.88)	3.13 (2.84-3.43)	3.85 (3.47-4.22)	4.43 (3.97-4.86)	5.05 (4.50-5.54)	5.71 (5.04-6.27)	6.64 (5.78-7.32)	7.40 (6.37-8.18)
7-day	1.74 (1.59-1.92)	2.22 (2.02-2.44)	2.92 (2.66-3.22)	3.49 (3.17-3.85)	4.30 (3.87-4.72)	4.95 (4.43-5.45)	5.65 (5.02-6.22)	6.39 (5.62-7.04)	7.44 (6.46-8.23)	8.29 (7.12-9.21)
10-day	1.89 (1.73-2.08)	2.42 (2.20-2.66)	3.18 (2.89-3.50)	3.79 (3.44-4.17)	4.65 (4.20-5.11)	5.34 (4.79-5.87)	6.08 (5.41-6.68)	6.86 (6.05-7.55)	7.95 (6.92-8.78)	8.82 (7.61-9.77)
20-day	2.34 (2.13-2.57)	3.01 (2.74-3.30)	3.95 (3.59-4.34)	4.68 (4.24-5.13)	5.65 (5.10-6.19)	6.40 (5.75-7.01)	7.16 (6.41-7.86)	7.94 (7.06-8.73)	8.99 (7.92-9.92)	9.80 (8.57-10.8)
30-day	2.75 (2.52-3.00)	3.53 (3.24-3.84)	4.63 (4.24-5.05)	5.47 (5.00-5.96)	6.61 (6.00-7.19)	7.48 (6.77-8.15)	8.38 (7.54-9.13)	9.29 (8.31-10.2)	10.5 (9.31-11.5)	11.5 (10.1-12.6)
45-day	3.22 (2.94-3.52)	4.14 (3.78-4.53)	5.44 (4.96-5.94)	6.40 (5.83-6.99)	7.66 (6.95-8.36)	8.62 (7.78-9.41)	9.59 (8.62-10.5)	10.6 (9.43-11.6)	11.8 (10.5-13.0)	12.8 (11.3-14.1)
60-day	3.60 (3.30-3.93)	4.64 (4.25-5.07)	6.08 (5.56-6.64)	7.13 (6.50-7.77)	8.49 (7.72-9.25)	9.51 (8.60-10.4)	10.5 (9.47-11.5)	11.5 (10.3-12.6)	12.8 (11.4-14.1)	13.8 (12.2-15.2)

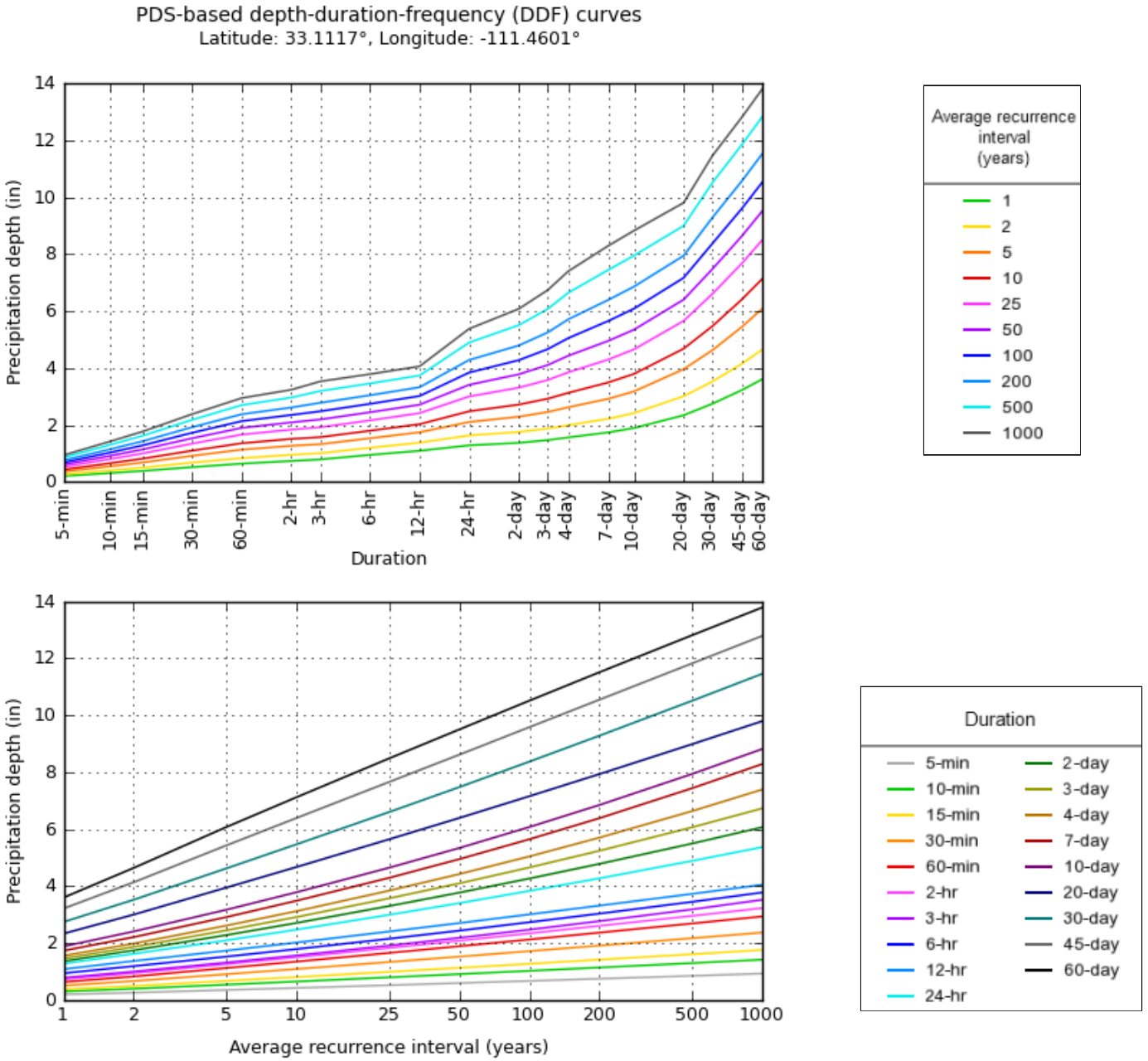
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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.

Back to Top

PF graphical

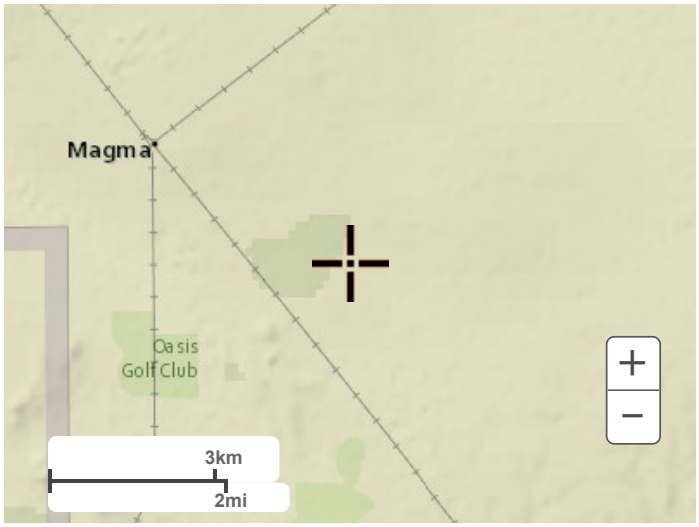


NOAA Atlas 14, Volume 1, Version 5 Created (GMT): Wed Dec 8 17:08:57 2021

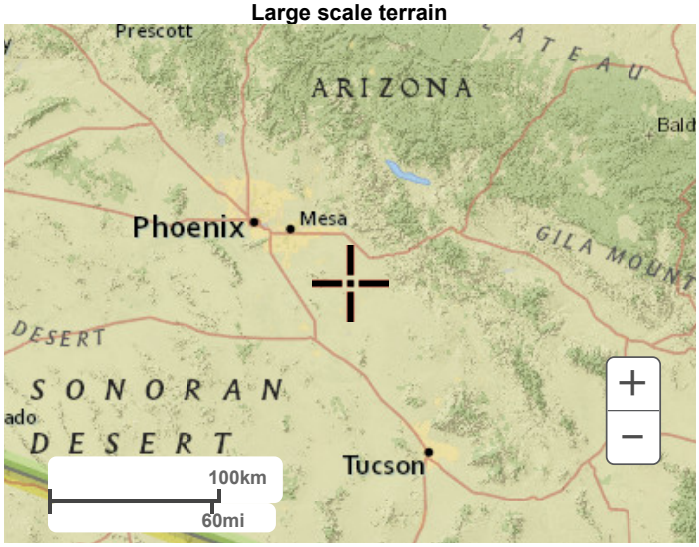
Back to Top

Maps & aerials

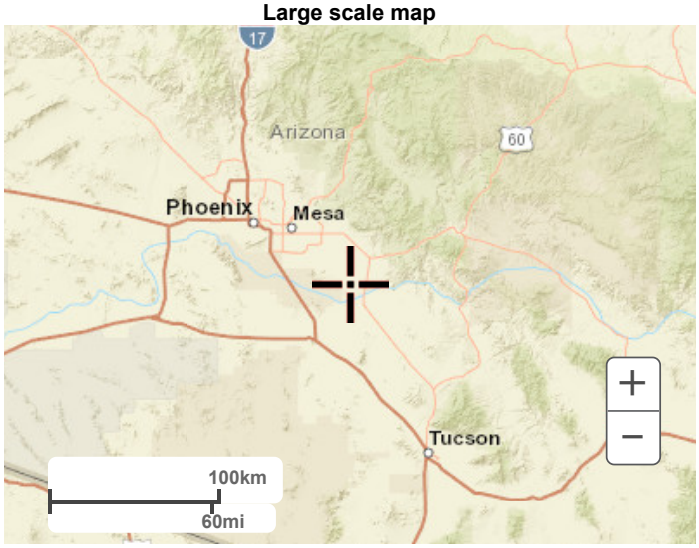
Small scale terrain



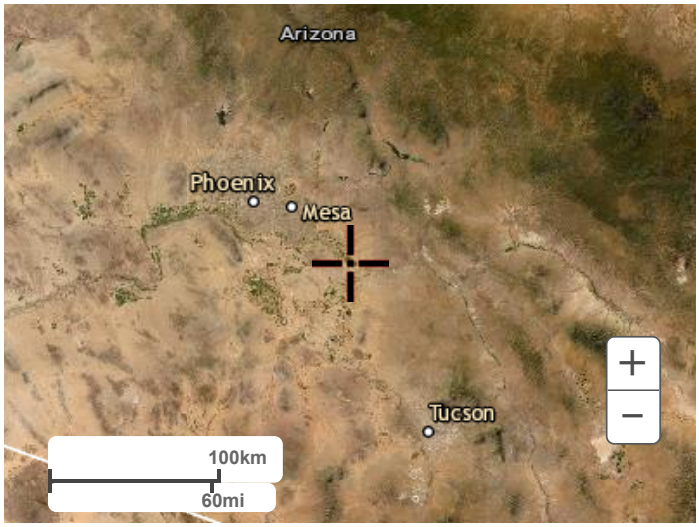
Large scale terrain



Large scale map



Large scale aerial



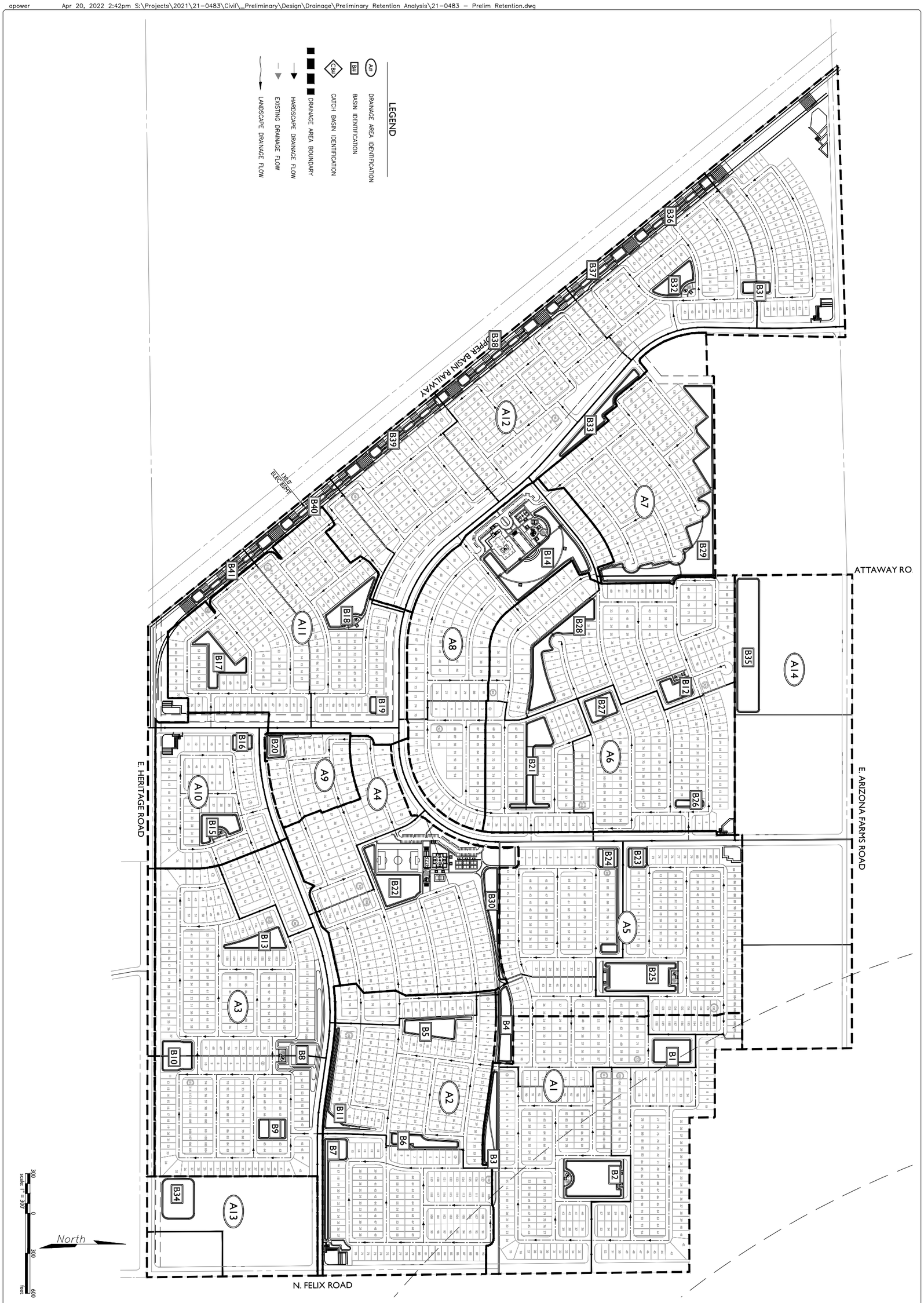
Back to Top

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

21-0483 - Arizona Farms

apower Apr 20, 2022 2:42pm S:\Projects\2021\21-0483\Civil_Preliminary\Design\Drainage\Preliminary Retention Analysis\21-0483 – Prelim Retention.dwg



Job No. 21-0483
Sheet No. EX03
1 of 1

Designer: EPS
Drawn by: AJP

Revisions:

Project: Arizona Farms
Pinal County, AZ

Figure 3 - Preliminary Drainage Exhibit

EPS GROUP
1130 N Alma School Road
Suite 120
Mesa, AZ 85201
T:480.503.2250 | F:480.503.2258
w w w . e p s g r o u p i n c . c o m

Appendix B

Preliminary Drainage Calculations

Retention Calculations

Project: Arizona Farms

Storm Event: 100-yr 2-hr

Prepared by: Alexis Power **Date:** 4/20/2022

V = C * A * P / 12 [1]
Where:
V = Runoff Volume
C = Runoff Coefficient
A = Drainage Area
P = 2.35 in

Surface Retention Basin Volume Calculations

Basin ID	*Elevation*	*Area (ft^2)*	*Incremental Volume (ft^3)*	*Volume Provided, V_p (ft^3)*
B1	1530	41,462		
	1531	44,854	43,158	
	1532	48,347	46,600	
	1533	51,940	50,143	139,902
B2	0	89,066		
	1	94,757	91,912	
	2	100,548	97,652	
	3	106,424	103,486	293,050
B3	1528	38,596		
	1529	44,395	41,495	
	1530	50,294	47,344	
	1531	56,293	53,293	142,133
B4	0	36,457		
	1	41,328	38,892	
	2	46,300	43,814	
	3	51,382	48,841	131,548
B5	0	41,280		
	1	45,124	43,202	
	2	50,564	47,844	
	3	55,689	53,126	144,172
B6	0	24,842		
	1	29,294	27,068	
	2	33,844	31,569	
	3	38,478	36,161	94,799
B7	1525	29,336		
	1526	36,509	32,923	
	1527	50,367	43,438	
	1528	59,684	55,025	131,386

Retention Calculations

Project: Arizona Farms

Storm Event: 100-yr 2-hr

Prepared by: Alexis Power **Date:** 4/20/2022

B8	0	27,439		
	1	34,831	31,135	
	2	61,549	48,190	
	3	90,203	75,876	155,202

B9	0	23,874		
	1	26,455	25,164	
	2	29,163	27,809	
	3	31,931	30,547	83,521

B10	0	41,766		
	1	45,056	43,411	
	2	48,447	46,752	
	3	51,939	50,193	140,356

B11	0	10,416		
	1	18,330	14,373	
	2	26,977	22,653	
	3	35,949	31,463	68,489

B12	0	24,284		
	1	27,115	25,700	
	2	30,046	28,581	
	3	33,078	31,562	85,843

B13	0	32,365		
	1	36,557	34,461	
	2	40,849	38,703	
	3	45,244	43,047	116,211

B14	0	156,309		
	1	167,108	161,708	
	2	178,007	172,557	
	3	189,009	183,508	517,774

B15	0	31,298		
	1	35,126	33,212	
	2	39,054	37,090	
	3	43,083	41,068	111,370

B16	0	12,221		
	1	14,041	13,131	
	2	15,961	15,001	
	3	17,982	16,972	45,103

B17	0	49,347		
	1	55,383	52,365	
	2	61,530	58,457	
	3	67,762	64,646	175,468

Retention Calculations

Project: Arizona Farms

Storm Event: 100-yr 2-hr

Prepared by: Alexis Power **Date:** 4/20/2022

B18	0	45,314		
	1	49,834	47,574	
	2	54,458	52,146	
	3	59,187	56,822	156,542

B19	0	9,552		
	1	11,145	10,349	
	2	12,839	11,992	
	3	14,634	13,737	36,078

B20	0	18,076		
	1	20,266	19,171	
	2	24,847	22,556	
	3	29,939	27,393	69,121

B21	0	49,338		
	1	57,646	53,492	
	2	66,065	61,855	
	3	74,575	70,320	185,667

B22	0	61,558		
	1	67,508	64,533	
	2	73,607	70,557	
	3	79,805	76,706	211,796

B23	0	16,113		
	1	18,154	17,134	
	2	20,293	19,224	
	3	22,533	21,413	57,771

B24	0	17,053		
	1	19,155	18,104	
	2	32,212	25,684	
	3	40,578	36,395	80,183

B25	0	88,575		
	1	94,955	91,765	
	2	101,435	98,195	
	3	107,968	104,702	294,662

B26	0	6,795		
	1	8,638	7,717	
	2	10,582	9,610	
	3	12,627	11,605	28,932

Retention Calculations

Project: Arizona Farms

Storm Event: 100-yr 2-hr

Prepared by: Alexis Power **Date:** 4/20/2022

B27	0	30,182		
	1	33,050	31,616	
	2	36,018	34,534	
	3	39,088	37,553	103,703

B28	0	79,274		
	1	88,802	84,038	
	2	98,429	93,615	
	3	108,158	103,294	280,947

B29	0	137,892		
	1	219,453	178,672	
	2	240,005	229,729	
	3	260,545	250,275	658,676

B30	0	31,825		
	1	39,228	35,526	
	2	46,325	42,776	
	3	53,522	49,924	128,226

B31	0	13,121		
	1	15,224	14,172	
	2	17,428	16,326	
	3	19,732	18,580	49,078

B32	0	31,935		
	1	35,336	33,635	
	2	38,837	37,086	
	3	42,439	40,638	111,359

B33	0	32,736		
	1	39,919	36,328	
	2	47,204	43,561	
	3	54,588	50,896	130,785

B34	0	63,285		
	1	67,184	65,234	
	2	71,184	69,184	
	3	75,285	73,235	207,653

B35	0	149,548		
	1	158,632	154,090	
	2	167,817	163,225	
	3	177,102	172,460	489,775

B36	0	14,555		
	1	22,783	18,669	
	2	29,699	26,241	
	3	36,769	33,234	78,144

Retention Calculations

Project: Arizona Farms

Storm Event: 100-yr 2-hr

Prepared by: Alexis Power **Date:** 4/20/2022

B37	0	12,740		
	1	22,780	17,760	
	2	29,694	26,237	
	3	36,762	33,228	77,225

B38	0	12,750		
	1	22,808	17,779	
	2	29,737	26,273	
	3	36,824	33,281	77,332

B39	0	12,750		
	1	22,783	17,767	
	2	29,699	26,241	
	3	36,769	33,234	77,241

B40	0	14,555		
	1	22,786	18,670	
	2	29,703	26,244	
	3	36,774	33,239	78,153

B41	0	14,555		
	1	22,855	18,705	
	2	29,821	26,338	
	3	36,941	33,381	78,424

Volume Required and Summary

Basin ID	*Sub-Basin ID*	*Sub Basin Area Description*	*Contributing Area (ft^2)*	*C =*	*Volume Required, V_R (ft^3)*	*Volume Provided, V_p (ft^3)*	*Estimated Water Depth (ft)*
B1 - B3	A1	Single-Family Residential	3,051,534	0.80	478,074		
		Total	3,051,534	0.80	478,074	575,084	2.49
B5 - B7, B11	A2	Single-Family Residential	2,622,442	0.80	410,849		
		Total	2,622,442	0.80	410,849	438,846	2.81
B8-10, B13,	A3	Single-Family Residential	3,104,943	0.80	486,441		
		Total	3,104,943	0.80	486,441	495,290	2.95
B22, B30	A4	Single-Family Residential	1,967,471	0.80	308,237		
		Total	1,967,471	0.80	308,237	340,023	2.72
B4, B23-B25	A5	Single-Family Residential	2,691,698	0.80	421,699		
		Total	2,691,698	0.80	421,699	564,164	2.24
B12, B21, B26-B28	A6	Single-Family Residential	3,466,649	0.80	543,108		
		Total	3,466,649	0.80	543,108	685,092	1211.33
B29	A7	Single-Family Residential	1,561,231	0.80	244,593		
		Total	1,561,231	0.80	244,593	658,676	1.11
B14	A8	Single-Family Residential	1,714,978	0.80	268,680		
		Total	1,714,978	0.80	268,680	517,774	1.56

Retention Calculations

Project: Arizona Farms

Storm Event: 100-yr 2-hr

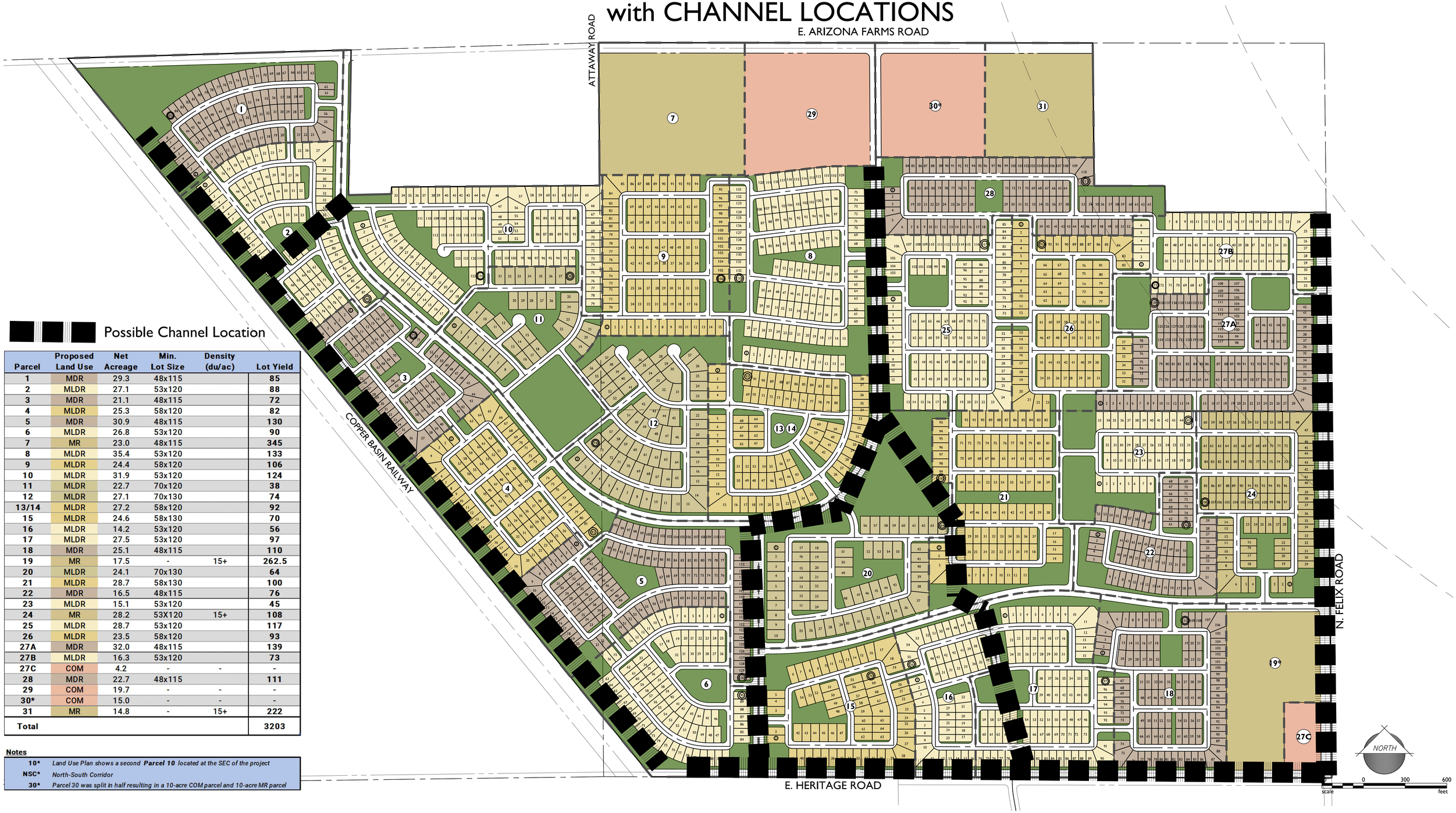
Prepared by: Alexis Power **Date:** 4/20/2022

B20	A9	Single-Family Residential	381,836	0.80	59,821		
		Total	381,836	0.80	59,821	69,121	1.73
B15-B16	A10	Single-Family Residential	971,548	0.80	152,209		
		Total	971,548	0.80	152,209	156,473	1.95
B17-B19	A11	Single-Family Residential	2,096,852	0.80	328,507		
		Total	2,096,852	0.80	328,507	368,088	2.68
B31-B33, B36-B41	A13	Single-Family Residential	5,545,281	0.80	868,761		
		Total	5,545,281	0.80	868,761	870,964	2.99
B34	A14	Commercial	964,994	0.80	151,182		
		Total	964,994	0.80	151,182	207,653	1.46
B35	A15	Commercial	3,113,369	0.80	487,761		
		Total	3,113,369	0.80	487,761	489,775	1.99

Appendix C

Offsite Drainage Report

ARIZONA FARMS
CONCEPTUAL SITE PLAN
with CHANNEL LOCATIONS



Parcel	Proposed Land Use	Net Acreage	Min. Lot Size	Density (du/ac)	Lot Yield
1	MDR	29.3	48x115		85
2	MLDR	27.1	53x120		88
3	MDR	21.1	48x115		72
4	MLDR	25.3	58x120		82
5	MDR	30.9	48x115		130
6	MLDR	26.8	53x120		90
7	MR	23.0	48x115		345
8	MLDR	35.4	53x120		133
9	MLDR	24.4	58x120		106
10	MLDR	31.9	53x120		124
11	MLDR	22.7	70x120		38
12	MLDR	27.1	70x130		74
13/14	MLDR	27.2	58x120		92
15	MLDR	24.6	58x130		70
16	MLDR	14.2	53x120		56
17	MLDR	27.5	53x120		97
18	MDR	25.1	48x115		110
19	MR	17.5	-	15+	262.5
20	MLDR	24.1	70x130		64
21	MLDR	28.7	58x130		100
22	MDR	16.5	48x115		76
23	MLDR	15.1	53x120		45
24	MR	28.2	53X120	15+	108
25	MLDR	28.7	53x120		117
26	MLDR	23.5	58x120		93
27A	MDR	32.0	48x115		139
27B	MLDR	16.3	53x120		73
27C	COM	4.2	-	-	-
28	MDR	22.7	48x115		111
29	COM	19.7	-	-	-
30*	COM	15.0	-	-	-
31	MR	14.8	-	15+	222
Total					3203

Notes

10*	*Land Use Plan shows a second* ***Parcel 10*** *located at the SEC of the project*
NSC*	*North-South Corridor*
30*	*Parcel 30 was split in half resulting in a 10-acre COM parcel and 10-acre MR parcel*

Existing Condition 100-year, 6-hour

HEC-1 Output

```
1*************************************
 *                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JUN   1998           *
 *            VERSION 4.1            *
 *                                   *
 *  RUN DATE   07JUN17  TIME  10:41:04   *
 *                                   *
 *************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS     *
*    HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616       *
*           (916) 756-1104            *
*                                   *
*************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX           XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1           ID        Flood Control District of Pinal County
            2           ID        AZ FARMS EX 100YR6HR - Arizona Farms MDR Existing Condition 100YR, 6HR
            3           ID        100 YEAR
            4           ID        6 Hour  Storm
            5           ID        Unit Hydrograph: Clark
            6           ID        Storm: Multiple
            7           ID        FILE NAME: EX100YR6HR.DAT
            8           ID        BY: WOOD/PATEL JCD
            9           ID        11/03/2016
                        *DIAGRAM
           10           IT       2  1JAN99       0    2000
           11           IO       5
           12           IN      15
                        *
           13           JD    2.74  0.0001
           14           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           15           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           16           PC   0.962   0.972   0.983   0.991   1.000
           17           JD    2.72  0.5000
           18           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           19           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           20           PC   0.962   0.972   0.983   0.991   1.000
           21           JD    2.67     2.8
           22           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
           23           PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
           24           PC   0.950   0.963   0.975   0.988   1.000
           25           JD    2.53    16.0
           26           PC   0.000   0.015   0.020   0.030   0.048   0.063   0.076   0.090   0.105   0.119
           27           PC   0.135   0.152   0.175   0.222   0.304   0.472   0.670   0.796   0.868   0.912
           28           PC   0.946   0.960   0.973   0.987   1.000
                        *

           29           KK   OFF A   BASIN
           30           BA   0.553
           31           LG    0.50    0.00    7.58    0.15       0
           32           UC   3.302   1.934
           33           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           34           UA     100
                        *

           35           KK     DA9  DIVERT
           36           DT    DTA9     0.0     0.0
           37           DI     0.0    66.0   206.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           38           DQ     0.0     9.0    55.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *
                        *

           39           KK     RAB   ROUTE
           40           RS       7    FLOW
           41           RC   0.016   0.025   0.025    5100  0.0025    0.00
           42           RX    0.00    0.00    3.00   15.00   30.00   35.00   39.00   54.00
           43           RY  1538.0 1538.00 1537.00 1536.00 1536.00 1537.00 1538.00 1539.00
                        *
                        *
```



```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           44           KK   OFF B   BASIN
           45           BA   0.584
           46           LG    0.50    0.00    4.87    0.46       0
           47           UC   4.401   3.738
           48           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           49           UA     100
                        *
```

```
   50          KK    CBAB COMBINE
   51          HC       2
               *

   52          KK     ON 1   BASIN
   53          BA    0.023
   54          LG     0.50    0.00    5.05    0.42       3
   55          UC    1.045   1.146
   56          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
   57          UA      100
               *

   58          KK    OFF C   BASIN
   59          BA    0.481
   60          LG     0.50    0.00    7.58    0.15       0
   61          UC    3.874   3.202
   62          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
   63          UA      100
               *

   64          KK      RCF   ROUTE
   65          RS        6    FLOW
   66          RC    0.016   0.025   0.025    2290  0.0022    0.00
   67          RX     0.00    0.00   11.00   15.00   42.00   54.00   65.00   69.00
   68          RY   1536.0 1536.00 1535.00 1534.00 1534.00 1535.00 1535.00 1536.00
               *
               *

   69          KK    OFF D   BASIN
   70          KO
   71          BA    0.887
   72          LG     0.35    0.34    7.00    0.10       0
   73          UC    2.221   1.995
   74          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
   75          UA      100
               *

   76          KK       DD STORAGE
   77          KO
   78          RS        1    STOR
   79          SV            12.00   45.00
   80          SQ             0.00   70.00
   81          SE   1559.6 1561.60 1563.60
               *
               *
```

```
1                                        HEC-1 INPUT                                                PAGE  3

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
   82          KK      RED   ROUTE
   83          RS        4    FLOW
   84          RC    0.025   0.025   0.025    2210  0.0027    0.00
   85          RX     0.00    0.00    0.00    6.00   10.00   16.00   16.00   16.00
   86          RY   1557.0 1557.00 1557.00 1554.00 1554.00 1557.00 1557.00 1557.00
               *
               *

   87          KK    OFF E   BASIN
   88          BA    0.124
   89          LG     0.35    0.36    5.05    0.23       0
   90          UC    0.659   0.432
   91          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
   92          UA      100
               *

   93          KK    CBDE COMBINE
               *        1       2
   94          HC       2
               *

   95          KK      REF   ROUTE
               *       40       2
   96          RS      169    FLOW
   97          RC    0.025   0.016   0.025   10410  0.0019    0.00
   98          RX     0.00    2.00   35.00   49.00   63.00   80.00   88.00   90.00
   99          RY   1542.0 1540.00 1540.00 1540.28 1540.28 1540.00 1540.00 1542.00
               *
               *

  100          KK    OFF F   BASIN
  101          BA    1.187
  102          LG     0.50    0.00    8.36    0.12       0
  103          UC    5.749   4.831
  104          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  105          UA      100
               *

  106          KK    CBEF COMBINE
  107          HC       2
               *

  108          KK     CPF COMBINE
  109          HC       2
               *

  110          KK      DF  DIVERT
  111          DT     DTF     0.0     0.0
  112          DI     0.0   120.0   328.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
  113          DQ     0.0     0.0    79.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               *
```

```
1                                        HEC-1 INPUT                                                PAGE  4

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
114          KK     RFG   ROUTE
115          RS       8    FLOW
116          RC   0.030   0.025   0.050    3665  0.0022    0.00
117          RX    0.00   13.00   18.00   40.00   78.00  100.00  110.00  115.00
118          RY  1523.0 1522.00 1521.00 1520.00 1520.00 1520.00 1520.00 1521.00
             *
             *

119          KK   OFF G   BASIN
120          BA   1.896
121          LG    0.50    0.00    7.27    0.16       0
122          UC   6.830   5.088
123          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
124          UA     100
             *

125          KK    CBGF COMBINE
126          KO
127          HC       2
             *

128          KK     DPG STORAGE
129          KO       0
130          RS       1    STOR
131          SV       0     9.1    62.5   204.8   331.8
132          SQ       0    31.0   122.2   223.4   256.4
133          SE    1514    1516    1518    1520    1521
             *
             *

134          KK      RG   ROUTE
135          RS       3    FLOW
136          RC   0.050   0.050   0.050    1100  0.0045    0.00
137          RX    0.00   28.00   33.00   35.00   40.00   44.00  195.00  200.00
138          RY  1517.0 1516.00 1515.00 1514.00 1514.00 1515.00 1516.00 1517.00
             *
             *

139          KK   OFF H   BASIN
140          BA   0.064
141          LG    0.50    0.00   12.49    0.03       0
142          UC   2.699   6.406
143          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
144          UA     100
             *

145          KK   OFF I   BASIN
146          BA   0.310
147          LG    0.50    0.00   10.22    0.05       0
148          UC   3.800   3.404
149          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
150          UA     100
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

151          KK   OFF J   BASIN
152          BA   0.680
153          LG    0.50    0.00    6.34    0.24       0
154          UC   3.518   2.001
155          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
156          UA     100
             *

157          KK      RJ   ROUTE
158          RS       1    FLOW
159          RC   0.030   0.030   2.720    2720  0.3900    0.00
160          RX    0.00    2.00    5.00    8.00   12.00   15.00   18.00   20.00
161          RY  1518.0 1518.00 1517.00 1516.00 1516.00 1517.00 1518.00 1518.00
             *
             *

162          KK    CPIJ COMBINE
163          HC       2
             *
             *

164          KK   CBFHI COMBINE
165          HC       3
             *

166          KK     RH6   ROUTE
167          KO
168          RS      24    FLOW
169          RC   0.050   0.035   0.050    2550  0.0010    0.00
170          RX    0.00   50.00  950.00  957.00  963.00  967.00  970.00 1040.00
171          RY  1513.0 1512.50 1512.00 1509.00 1509.00 1511.00 1512.00 1513.00
             *
             *

172          KK    ON 6   BASIN
173          BA   0.218
174          LG    0.50    0.00    6.16    0.25       0
175          UC   2.706   1.911
176          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
177          UA     100
             *

178          KK    CB6H COMBINE
179          HC       2
             *
```

```
 180          KK     R67   ROUTE
 181          KO
 182          RS      16    FLOW
 183          RC   0.050   0.035   0.050    1500  0.0010    0.00
 184          RX    0.00    3.00 1261.00 1267.00 1273.00 1278.00 1311.00 1410.00
 185          RY  1511.0 1510.00 1510.00 1508.00 1508.00 1510.00 1510.00 1511.00
              *
              *
1                                        HEC-1 INPUT                                                PAGE  6

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 186          KK    ON 7   BASIN
 187          BA   0.193
 188          LG    0.50    0.01    5.71    0.31       0
 189          UC   3.014   2.840
 190          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 191          UA     100
              *

 192          KK    CB67 COMBINE
 193          HC       2
              *

 194          KK     R78   ROUTE
 195          KO
 196          RS      11    FLOW
 197          RC   0.050   0.035   0.050    1350  0.0015    0.00
 198          RX    0.00    2.00  230.00 1296.00 1305.00 1307.00 1310.00 1315.00
 199          RY  1510.0 1509.00 1508.00 1509.00 1507.00 1507.00 1509.00 1510.00
              *

 200          KK      MR   BASIN
 201          KM           MAGIC RANCH HYDROGRAPH FROM HEC-HMS DRAINAGE REPORT OUTPUT
 202          BA   1.369
 203          QI       0       0       0       0       0       0       0       0       0       0
 204          QI       0       0       0       0       0       0       0       0       0       0
 205          QI       0       0       0       0       0       0       0       0       0       0
 206          QI       0       0       0       0       0       0       0       0       0       0
 207          QI       0       0       0       0       0       0       0       0       0       0
 208          QI       0      20      22      24      27      30      33      34      35      36
 209          QI      36      36      36      36      36      36      36      36      36      36
 210          QI      36      36      36      36      36      36      36      36      36      36
 211          QI      36      36      36      36      36      36      36      36      36      36
 212          QI      36      36      36      36      36      36      36      36      36      36
 213          QI      36      36      36      36      36      36      36      36      36      36
 214          QI      36      36      36      36      36      36      36      36      36      36
 215          QI      36      36      36      36      36      36      36      36      36      36
 216          QI      36      36      36      36      36      36      36      36      36      36
 217          QI      36      36      36      36      36      36      36      36      36      36
 218          QI      36      36      36      36      36      36      36      36      36      36
 219          QI      36      36      36      36      36      36      36      36      36      36
 220          QI      36      36      36      36      36      36      36      36      36      36
 221          QI      36      36      36      36      36      36      36      36      36      36
 222          QI      36      36      36      36      36      36      36      36      36      36
 223          QI      36      36      36      36      36      36      36      36      36      36
 224          QI      36      36      36      36      36      36      36      36      36      36
 225          QI      36      36      36      36      36      36      36      36      36      36
 226          QI      36      36      36      36      36      36      36      36      36      36
 227          QI      36      36      36      36      36      36      36      36      36      36
 228          QI      36      36      36      36      36      36      36      36      36      36
 229          QI      36      36      36      36      36      36      36      36      36      36
 230          QI      36      36      36      36      36      36      36      36      36      36
 231          QI      36      36      36      36      36      36      36      36      36      36
 232          QI      36      36      36      36      36      36      36      36      36      36
 233          QI      36      36      36      36      36      36      36      36      36      36
1                                        HEC-1 INPUT                                                PAGE  7

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 234          QI      36      36      36      36      36      36      36      36      36      36
 235          QI      36      36      36      36      36      36      36      36      36      36
 236          QI      36      36      36      36      36      36      36      36      36      36
 237          QI      36      36      36      36      36      36      36      36      36      36
 238          QI      36      36      36      36      36      36      36      36      36      36
 239          QI      36      36      36      36      36      36      36      36      36      36
 240          QI      36      36      36      36      36      36      36      36      36      36
 241          QI      36      36      36      36      36      36      36      36      36      36
 242          QI      36      36      36      36      36      36      36      36      36      36
 243          QI      36      36      36      36      36      36      36      36      36      36
              *

 244          KK     RMR   ROUTE
 245          KO
 246          RS      71    FLOW
 247          RC   0.050   0.050   0.050    7240  0.0014    0.00
 248          RX    0.00    0.00    0.00    6.00  106.00  112.00  112.00  112.00
 249          RY  1510.0 1510.00 1510.00 1509.00 1509.00 1510.00 1510.00 1510.00
              *
              *

 250          KK   OFF K   BASIN
 251          BA   0.505
 252          LG    0.30    0.23    6.16    0.17       5
 253          UC   1.543   1.047
 254          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 255          UA     100
              *

 256          KK    CB7K COMBINE
 257          HC       3
              *

 258          KK   OFF L   BASIN
```

```
          259          BA   0.052
          260          LG    0.10    0.25    4.03    0.56      13
          261          UC   0.283   0.194
          262          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          263          UA     100
                       *

          264          KK     RL8   ROUTE
          265          RS       4    FLOW
          266          RC   0.025   0.025   0.025    1920  0.0026    0.00
          267          RX    0.00    0.00    4.00   40.00   47.00   49.00   53.00   53.00
          268          RY  1511.5 1511.50 1511.00 1510.00 1510.00 1511.00 1511.50 1511.50
                       *
                       *

          269          KK    ON 8   BASIN
          270          BA   0.229
          271          LG    0.49    0.02    4.96    0.43       1
          272          UC   2.477   1.864
          273          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          274          UA     100
                       *
1                                        HEC-1 INPUT                                          PAGE  8

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          275          KK    CB8L COMBINE
          276          HC       2
                       *

          277          KK     CP8 COMBINE
          278          HC       2
                       *

          279          KK    DET8 STORAGE
          280          KO
          281          RS       1    STOR
          282          SV       0     1.5    3.65   13.57   47.16
          283          SE  1505.0  1506.0  1507.0  1508.0  1509.0
          284          SQ       0      10      34      62    2322
                       *
                       *

          285          KK      DFRETRIEVE
          286          DR     DTF
                       *
                       *

          287          KK      RF   ROUTE
          288          RS      19    FLOW
          289          RC   0.050   0.050   0.050    2309  0.0026    0.00
          290          RX    0.00    0.00    0.00    3.00  403.00  406.00  406.00  406.00
          291          RY  1523.0 1523.00 1523.00 1522.00 1522.00 1523.00 1523.00 1523.00
                       *
                       *

          292          KK   OFF M   BASIN
          293          BA   0.068
          294          LG    0.45    0.07    5.14    0.37       1
          295          UC   1.757   1.652
          296          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          297          UA     100
                       *

          298          KK    CPFM COMBINE
          299          HC       2
                       *
                       *

          300          KK     RFM   ROUTE
          301          RS       7    FLOW
          302          RC   0.050   0.050   0.050     995  0.0032    0.00
          303          RX    0.00    0.00    0.00    3.00  403.00  406.00  406.00  406.00
          304          RY  1523.0 1523.00 1523.00 1522.00 1522.00 1523.00 1523.00 1523.00
                       *
                       *
1                                        HEC-1 INPUT                                          PAGE  9

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          305          KK    ON 3   BASIN
          306          BA   0.096
          307          LG    0.50    0.00    5.14    0.40       0
          308          UC   2.156   1.996
          309          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          310          UA     100
                       *

          311          KK    CPM3 COMBINE
          312          HC       2
                       *

          313          KK     D23 STORAGE
          314          KO
          315          RS       1    STOR
          316          SV       0    0.48    3.29   13.88   36.46
          317          SE  1517.0  1518.0 1519.00 1520.00 1521.00
          318          SS  1520.0   45.00    2.60    1.50
                       *
                       *

          319          KK     R24   ROUTE
          320          RS      10    FLOW
```

```
 321          RC   0.050   0.025   0.025    2600  0.0010    0.00
 322          RX    0.00   20.00  260.00  268.00  310.00  318.00  320.00  320.00
 323          RY  1520.0 1519.00 1519.00 1518.00 1518.00 1519.00 1520.00 1520.00
              *
              *

 324          KK     DA9RETRIEVE
 325          DR    DTA9
              *

 326          KK     RA4   ROUTE
 327          RS      20    FLOW
 328          RC   0.025   0.025   0.050    5193  0.0027    0.00
 329          RX    0.00    3.00   10.00   22.00   29.00   36.00   62.00   71.00
 330          RY  1522.0 1521.00 1521.00 1520.00 1520.00 1521.00 1521.00 1522.00
              *

 331          KK   OFF N   BASIN
 332          BA   0.071
 333          LG    0.50    0.00    5.05    0.42       0
 334          UC   1.362   0.957
 335          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 336          UA     100
              *

 337          KK      RN   ROUTE
 338          RS      16    FLOW
 339          RC   0.025   0.025   0.050    3922  0.0025    0.00
 340          RX    0.00    3.00   10.00   22.00   29.00   36.00   62.00   71.00
 341          RY  1522.0 1521.00 1521.00 1520.00 1520.00 1521.00 1521.00 1522.00
              *
1                                        HEC-1 INPUT                                          PAGE 10

          LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 342          KK    CP4N COMBINE
 343          HC       2
              *

 344          KK    RA4N   ROUTE
 345          RS      13    FLOW
 346          RC   0.025   0.025   0.050    3986  0.0032    0.00
 347          RX    0.00    3.00   10.00   22.00   29.00   36.00   62.00   71.00
 348          RY  1522.0 1521.00 1521.00 1520.00 1520.00 1521.00 1521.00 1522.00
              *

 349          KK    ON 4   BASIN
 350          BA   0.847
 351          LG    0.50    0.00    5.05    0.42       0
 352          UC   5.048   4.081
 353          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 354          UA     100
              *

 355          KK    CP24 COMBINE
 356          HC       3
              *
              *

 357          KK    ON 5   BASIN
 358          BA   0.240
 359          LG    0.50    0.00    5.05    0.42       3
 360          UC   3.407   3.553
 361          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 362          UA     100
              *

 363          KK    CB45 COMBINE
 364          HC       2
              *

 365          KK    RET4 STORAGE
 366          KO
 367          RS       1    STOR
 368          SA     0.2     0.3     0.4     0.5     0.6     1.1     3.6    25.4
 369          SE  1511.0 1512.00 1513.00 1514.00 1515.00 1516.00 1517.00 1518.00
 370          SS  1517.0  475.00    2.60    1.50
              *
              *
 371          ZZ
```

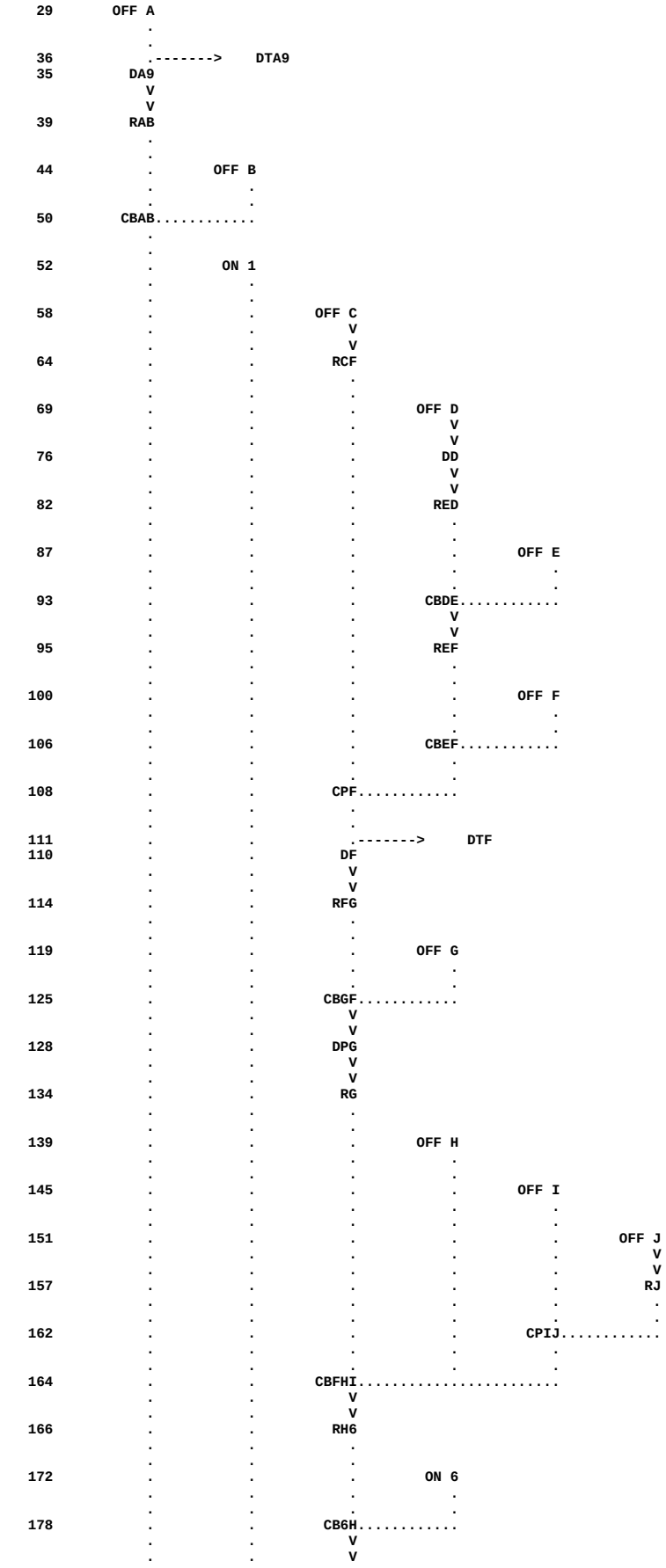
1

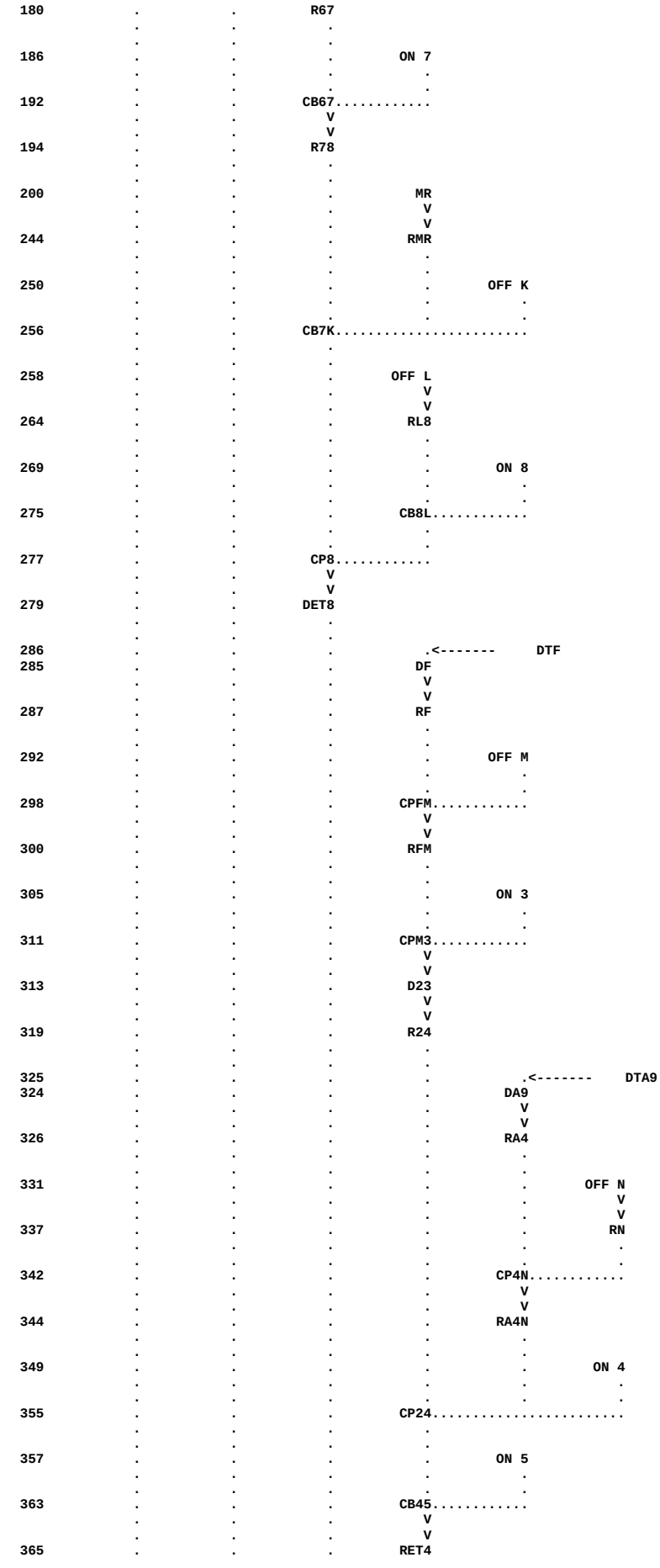
SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

(V) ROUTING (---->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW





(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************                    *****************************************
*                                       *                    *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *    U.S. ARMY CORPS OF ENGINEERS       *
*              JUN   1998               *                    *    HYDROLOGIC ENGINEERING CENTER      *
*            VERSION 4.1                *                    *          609 SECOND STREET            *
*                                       *                    *       DAVIS, CALIFORNIA 95616         *
*  RUN DATE   07JUN17  TIME  10:41:04   *                    *           (916) 756-1104              *
*                                       *                    *                                       *
*****************************************                    *****************************************
```

Flood Control District of Pinal County
AZ FARMS EX 100YR6HR - Arizona Farms MDR Existing Condition 100YR, 6HR
100 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Multiple
FILE NAME: EX100YR6HR.DAT
BY: WOOD/PATEL JCD
11/03/2016

```
  11 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                       NMIN           2  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1JAN99  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      3JAN99  ENDING DATE
                      NDTIME        1838  ENDING TIME
                      ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     .03 HOURS
                       TOTAL TIME BASE   66.63 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT

  13 JD          INDEX STORM NO. 1
                       STRM        2.74  PRECIPITATION DEPTH
                       TRDA         .00  TRANSPOSITION DRAINAGE AREA

  14 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                   .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                   .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                   .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  17 JD          INDEX STORM NO. 2
                       STRM        2.72  PRECIPITATION DEPTH
                       TRDA         .50  TRANSPOSITION DRAINAGE AREA

  18 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                   .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                   .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                   .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  21 JD          INDEX STORM NO. 3
                       STRM        2.67  PRECIPITATION DEPTH
                       TRDA        2.80  TRANSPOSITION DRAINAGE AREA

  22 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                    .03       .03       .03       .03       .03       .03       .03       .03       .03       .03
                    .02       .02       .02       .02       .02       .02       .02       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

 25 JD          INDEX STORM NO. 4
                     STRM       2.53  PRECIPITATION DEPTH
                     TRDA      16.00  TRANSPOSITION DRAINAGE AREA

 26 PI           PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                    .02       .02       .02       .03       .03       .03       .03       .03       .03       .03
                    .02       .02       .02       .02       .02       .02       .02       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
 69 KK     *     OFF D  *        BASIN
           *            *
           **************

 70 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
 76 KK     *        DD  *      STORAGE
           *            *
           **************

 77 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
125 KK     *      CBGF  *      COMBINE
           *            *
           **************

126 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
128 KK     *       DPG  *      STORAGE
           *            *
           **************

129 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
166 KK    *       RH6  *        ROUTE
          *            *
          **************

167 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
180 KK    *       R67  *        ROUTE
          *            *
          **************

181 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
194 KK    *       R78  *        ROUTE
          *            *
          **************

195 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
244 KK    *       RMR  *        ROUTE
          *            *
          **************

245 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
279 KK    *      DET8  *      STORAGE
          *            *
          **************

280 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
313 KK    *       D23  *      STORAGE
          *            *
          **************

314 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
365 KK    *      RET4  *      STORAGE
          *            *
```

```
          **************

366 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            5  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE
```

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	OFF A	208.	6.53	101.	27.	10.	.55		
+	DIVERSION TO	DTA9	56.	6.53	22.	6.	2.	.55		
+	HYDROGRAPH AT	DA9	152.	6.53	79.	22.	8.	.55		
+	ROUTED TO	RAB	151.	6.77	78.	22.	8.	.55		
+	HYDROGRAPH AT	OFF B	108.	7.47	72.	21.	8.	.58		
+	2 COMBINED AT	CBAB	238.	7.10	144.	41.	15.	1.14		
+	HYDROGRAPH AT	ON 1	15.	4.80	4.	1.	0.	.02		
+	HYDROGRAPH AT	OFF C	123.	7.03	76.	22.	8.	.48		
+	ROUTED TO	RCF	123.	7.23	76.	22.	8.	.48		
+	HYDROGRAPH AT	OFF D	265.	5.77	119.	32.	12.	.89		
+	ROUTED TO	DD	63.	8.87	56.	25.	9.	.89		
+	ROUTED TO	RED	63.	9.00	56.	25.	9.	.89		
+	HYDROGRAPH AT	OFF E	124.	4.43	16.	4.	1.	.12		
+	2 COMBINED AT	CBDE	108.	4.43	56.	29.	11.	1.01		
+	ROUTED TO	REF	72.	5.73	55.	28.	10.	1.01		
+	HYDROGRAPH AT	OFF F	203.	8.63	153.	44.	16.	1.19		
+	2 COMBINED AT	CBEF	250.	8.93	196.	69.	25.	2.20		
+	2 COMBINED AT	CPF	335.	8.50	258.	89.	33.	2.68		
+	DIVERSION TO	DTF	82.	8.50	53.	14.	5.	2.68		
+	HYDROGRAPH AT	DF	253.	8.50	206.	75.	28.	2.68		
+	ROUTED TO	RFG	253.	8.80	206.	75.	28.	2.68		
+	HYDROGRAPH AT	OFF G	284.	9.43	220.	62.	22.	1.90		
+	2 COMBINED AT	CBGF	510.	9.30	409.	132.	48.	4.57		
+	ROUTED TO	DPG	188.	13.90	178.	123.	48.	4.57		
+	ROUTED TO	RG	188.	14.00	178.	123.	48.	4.57		
+	HYDROGRAPH AT	OFF H	11.	6.53	8.	3.	1.	.06		
+	HYDROGRAPH AT	OFF I	82.	7.07	53.	16.	6.	.31		
+	HYDROGRAPH AT	OFF J	230.	6.67	115.	31.	11.	.68		
+	ROUTED TO	RJ	230.	6.70	115.	31.	11.	.68		
+	2 COMBINED AT	CPIJ	301.	6.80	165.	46.	17.	.99		
+	3 COMBINED AT	CBFHI	311.	7.03	253.	163.	64.	5.63		
+	ROUTED TO	RH6	308.	7.83	251.	163.	64.	5.63		

+	HYDROGRAPH AT	ON 6	83.	6.07	38.	10.	4.	.22
+	2 COMBINED AT	CB6H	343.	7.77	265.	171.	67.	5.85
+	ROUTED TO	R67	340.	8.30	264.	171.	67.	5.85
+	HYDROGRAPH AT	ON 7	49.	6.37	28.	8.	3.	.19
+	2 COMBINED AT	CB67	362.	8.30	276.	176.	69.	6.04
+	ROUTED TO	R78	360.	8.67	275.	176.	69.	6.04
+	HYDROGRAPH AT	MR	36.	14.77	36.	36.	29.	1.37
+	ROUTED TO	RMR	36.	17.17	36.	36.	27.	1.37
+	HYDROGRAPH AT	OFF K	278.	5.13	79.	20.	7.	.50
+	3 COMBINED AT	CB7K	364.	8.67	275.	204.	101.	7.91
+	HYDROGRAPH AT	OFF L	89.	4.17	7.	2.	1.	.05
+	ROUTED TO	RL8	78.	4.30	7.	2.	1.	.05
+	HYDROGRAPH AT	ON 8	76.	5.90	33.	9.	3.	.23
+	2 COMBINED AT	CB8L	83.	4.30	40.	11.	4.	.28
+	2 COMBINED AT	CP8	374.	8.67	280.	209.	103.	8.19
+	ROUTED TO	DET8	364.	8.90	280.	205.	102.	8.19
+	HYDROGRAPH AT	DF	82.	8.50	53.	14.	5.	2.68
+	ROUTED TO	RF	81.	9.17	52.	14.	5.	2.68
+	HYDROGRAPH AT	OFF M	25.	5.37	9.	2.	1.	.07
+	2 COMBINED AT	CPFM	95.	8.93	61.	19.	7.	.07
+	ROUTED TO	RFM	94.	9.17	61.	19.	7.	.07
+	HYDROGRAPH AT	ON 3	35.	5.67	16.	4.	2.	.10
+	2 COMBINED AT	CPM3	101.	9.10	64.	23.	8.	.16
+	ROUTED TO	D23	52.	11.97	42.	15.	6.	.16
+	ROUTED TO	R24	52.	12.30	42.	15.	6.	.16
+	HYDROGRAPH AT	DA9	56.	6.53	22.	6.	2.	.55
+	ROUTED TO	RA4	55.	7.20	22.	6.	2.	.55
+	HYDROGRAPH AT	OFF N	47.	5.00	12.	3.	1.	.07
+	ROUTED TO	RN	45.	5.53	12.	3.	1.	.07
+	2 COMBINED AT	CP4N	65.	7.07	34.	9.	3.	.07
+	ROUTED TO	RA4N	65.	7.50	34.	9.	3.	.07
+	HYDROGRAPH AT	ON 4	141.	7.97	98.	29.	10.	.85
+	3 COMBINED AT	CP24	196.	7.83	137.	50.	18.	1.08
+	HYDROGRAPH AT	ON 5	52.	6.70	32.	10.	3.	.24
+	2 COMBINED AT	CB45	232.	7.77	162.	58.	21.	1.32

```
          ROUTED TO
+                         RET4       232.    7.87         161.         56.         20.       1.32

 *** NORMAL END OF HEC-1 ***
```

Existing Condition 100-year, 24-hour

HEC-1 Output

```
1*************************************
 *                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JUN   1998           *
 *            VERSION 4.1            *
 *                                   *
 *  RUN DATE   07JUN17  TIME  10:41:12   *
 *                                   *
 *************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS     *
*    HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616       *
*           (916) 756-1104            *
*                                   *
*************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX           XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1           ID        Flood Control District of Pinal County
            2           ID        AZ FARMS EX 100YR24HR - Arizona Farms MDR Existing Condition 100YR, 24HR
            3           ID        100 YEAR
            4           ID        24 Hour  Storm
            5           ID        Unit Hydrograph: Clark
            6           ID        Storm: Multiple
            7           ID        FILE NAME: EX100YR24HR.DAT
            8           ID        BY: WOOD/PATEL JCD
            9           ID        11/03/2016
                        *DIAGRAM
           10           IT       2  1JAN99       0    2000
           11           IO       5
           12           IN      15
                        *
           13           JD    3.84  0.0001
           14           PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
           15           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
           16           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
           17           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
           18           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
           19           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
           20           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
           21           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
           22           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
           23           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
           24           JD   3.648    10.0
                        *

           25           KK   OFF A   BASIN
           26           BA   0.553
           27           LG    0.50    0.00    7.58    0.15       0
           28           UC   3.302   1.934
           29           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           30           UA     100
                        *

           31           KK     DA9  DIVERT
           32           DT    DTA9     0.0     0.0
           33           DI     0.0    66.0   206.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           34           DQ     0.0     9.0    55.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *
                        *

           35           KK     RAB   ROUTE
           36           RS       9    FLOW
           37           RC   0.016   0.025   0.025    5100  0.0025    0.00
           38           RX    0.00    0.00    3.00   15.00   30.00   35.00   39.00   54.00
           39           RY  1538.0 1538.00 1537.00 1536.00 1536.00 1537.00 1538.00 1539.00
                        *
                        *
```



```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           40           KK   OFF B   BASIN
           41           BA   0.584
           42           LG    0.50    0.00    4.87    0.46       0
           43           UC   4.401   3.738
           44           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           45           UA     100
                        *

           46           KK    CBAB COMBINE
           47           HC       2
                        *
```

```
  48          KK    ON 1   BASIN
  49          BA   0.023
  50          LG    0.50    0.00    5.05    0.42       3
  51          UC   1.045   1.146
  52          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  53          UA     100
              *

  54          KK   OFF C   BASIN
  55          BA   0.481
  56          LG    0.50    0.00    7.58    0.15       0
  57          UC   3.874   3.202
  58          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  59          UA     100
              *

  60          KK     RCF   ROUTE
  61          RS       6    FLOW
  62          RC   0.016   0.025   0.025    2290  0.0022    0.00
  63          RX    0.00    0.00   11.00   15.00   42.00   54.00   65.00   69.00
  64          RY  1536.0 1536.00 1535.00 1534.00 1534.00 1535.00 1535.00 1536.00
              *
              *

  65          KK   OFF D   BASIN
  66          KO
  67          BA   0.887
  68          LG    0.35    0.34    7.00    0.10       0
  69          UC   2.221   1.995
  70          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  71          UA     100
              *

  72          KK      DD STORAGE
  73          KO
  74          RS       1    STOR
  75          SV           12.00   45.00
  76          SQ            0.00   70.00
  77          SE  1559.6 1561.60 1563.60
              *
              *
```

```
1                                        HEC-1 INPUT                                        PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
  78          KK     RED   ROUTE
  79          RS       4    FLOW
  80          RC   0.025   0.025   0.025    2210  0.0027    0.00
  81          RX    0.00    0.00    0.00    6.00   10.00   16.00   16.00   16.00
  82          RY  1557.0 1557.00 1557.00 1554.00 1554.00 1557.00 1557.00 1557.00
              *
              *

  83          KK   OFF E   BASIN
  84          BA   0.124
  85          LG    0.35    0.36    5.05    0.23       0
  86          UC   0.659   0.432
  87          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  88          UA     100
              *

  89          KK    CBDE COMBINE
              *        1       2
  90          HC       2
              *

  91          KK     REF   ROUTE
              *     40       2
  92          RS      36    FLOW
  93          RC   0.025   0.016   0.025   10410  0.0019    0.00
  94          RX    0.00    2.00   35.00   49.00   63.00   80.00   88.00   90.00
  95          RY  1542.0 1540.00 1540.00 1540.28 1540.28 1540.00 1540.00 1542.00
              *
              *

  96          KK   OFF F   BASIN
  97          BA   1.187
  98          LG    0.50    0.00    8.36    0.12       0
  99          UC   5.749   4.831
 100          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 101          UA     100
              *

 102          KK    CBEF COMBINE
 103          HC       2
              *

 104          KK     CPF COMBINE
 105          HC       2
              *

 106          KK      DF  DIVERT
 107          DT     DTF     0.0     0.0
 108          DI     0.0   120.0   328.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 109          DQ     0.0     0.0    79.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
```

```
1                                        HEC-1 INPUT                                        PAGE  4

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
 110          KK     RFG   ROUTE
 111          RS       7    FLOW
 112          RC   0.030   0.025   0.050    3665  0.0022    0.00
```

```
113          RX    0.00   13.00   18.00   40.00   78.00  100.00  110.00  115.00
114          RY  1523.0 1522.00 1521.00 1520.00 1520.00 1520.00 1520.00 1521.00
             *
             *

115          KK   OFF G   BASIN
116          BA   1.896
117          LG    0.50    0.00    7.27    0.16       0
118          UC   6.830   5.088
119          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
120          UA     100
             *

121          KK    CBGF COMBINE
122          KO
123          HC       2
             *

124          KK     DPG STORAGE
125          KO       0
126          RS       1    STOR
127          SV       0     9.1    62.5   204.8   331.8
128          SQ       0    31.0   122.2   223.4   256.4
129          SE    1514    1516    1518    1520    1521
             *
             *

130          KK      RG   ROUTE
131          RS       4    FLOW
132          RC   0.050   0.050   0.050    1100  0.0045    0.00
133          RX    0.00   28.00   33.00   35.00   40.00   44.00  195.00  200.00
134          RY  1517.0 1516.00 1515.00 1514.00 1514.00 1515.00 1516.00 1517.00
             *
             *

135          KK   OFF H   BASIN
136          BA   0.064
137          LG    0.50    0.00   12.49    0.03       0
138          UC   2.699   6.406
139          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
140          UA     100
             *

141          KK   OFF I   BASIN
142          BA   0.310
143          LG    0.50    0.00   10.22    0.05       0
144          UC   3.800   3.404
145          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
146          UA     100
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

147          KK   OFF J   BASIN
148          BA   0.680
149          LG    0.50    0.00    6.34    0.24       0
150          UC   3.518   2.001
151          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
152          UA     100
             *

153          KK      RJ   ROUTE
154          RS       1    FLOW
155          RC   0.030   0.030   2.720    2720  0.3900    0.00
156          RX    0.00    2.00    5.00    8.00   12.00   15.00   18.00   20.00
157          RY  1518.0 1518.00 1517.00 1516.00 1516.00 1517.00 1518.00 1518.00
             *
             *

158          KK    CPIJ COMBINE
159          HC       2
             *
             *

160          KK   CBFHI COMBINE
161          HC       3
             *

162          KK     RH6   ROUTE
163          KO
164          RS      25    FLOW
165          RC   0.050   0.035   0.050    2550  0.0010    0.00
166          RX    0.00   50.00  950.00  957.00  963.00  967.00  970.00 1040.00
167          RY  1513.0 1512.50 1512.00 1509.00 1509.00 1511.00 1512.00 1513.00
             *
             *

168          KK    ON 6   BASIN
169          BA   0.218
170          LG    0.50    0.00    6.16    0.25       0
171          UC   2.706   1.911
172          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
173          UA     100
             *

174          KK    CB6H COMBINE
175          HC       2
             *

176          KK     R67   ROUTE
177          KO
178          RS      16    FLOW
179          RC   0.050   0.035   0.050    1500  0.0010    0.00
```

```
 180          RX    0.00    3.00 1261.00 1267.00 1273.00 1278.00 1311.00 1410.00
 181          RY  1511.0 1510.00 1510.00 1508.00 1508.00 1510.00 1510.00 1511.00
              *
              *
1                                      HEC-1 INPUT                                                 PAGE  6

            LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 182          KK    ON 7   BASIN
 183          BA   0.193
 184          LG    0.50    0.01    5.71    0.31       0
 185          UC   3.014   2.840
 186          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 187          UA     100
              *

 188          KK    CB67 COMBINE
 189          HC       2
              *

 190          KK     R78   ROUTE
 191          KO
 192          RS      11    FLOW
 193          RC   0.050   0.035   0.050    1350  0.0015    0.00
 194          RX    0.00    2.00  230.00 1296.00 1305.00 1307.00 1310.00 1315.00
 195          RY  1510.0 1509.00 1508.00 1509.00 1507.00 1507.00 1509.00 1510.00
              *

 196          KK      MR   BASIN
 197          KM           MAGIC RANCH HYDROGRAPH FROM HEC-HMS DRAINAGE REPORT OUTPUT
 198          BA   1.369
 199          QI       0       0       0       0       0       0       0       0       0       0
 200          QI       0       0       0       0       0       0       0       0       0       0
 201          QI       0       0       0       0       0       0       0       0       0       0
 202          QI       0       0       0       0       0       0       0       0       0       0
 203          QI       0       0       0       0       0       0       0       0       0       0
 204          QI       0      20      22      24      27      30      33      34      35      36
 205          QI      36      36      36      36      36      36      36      36      36      36
 206          QI      36      36      36      36      36      36      36      36      36      36
 207          QI      36      36      36      36      36      36      36      36      36      36
 208          QI      36      36      36      36      36      36      36      36      36      36
 209          QI      36      36      36      36      36      36      36      36      36      36
 210          QI      36      36      36      36      36      36      36      36      36      36
 211          QI      36      36      36      36      36      36      36      36      36      36
 212          QI      36      36      36      36      36      36      36      36      36      36
 213          QI      36      36      36      36      36      36      36      36      36      36
 214          QI      36      36      36      36      36      36      36      36      36      36
 215          QI      36      36      36      36      36      36      36      36      36      36
 216          QI      36      36      36      36      36      36      36      36      36      36
 217          QI      36      36      36      36      36      36      36      36      36      36
 218          QI      36      36      36      36      36      36      36      36      36      36
 219          QI      36      36      36      36      36      36      36      36      36      36
 220          QI      36      36      36      36      36      36      36      36      36      36
 221          QI      36      36      36      36      36      36      36      36      36      36
 222          QI      36      36      36      36      36      36      36      36      36      36
 223          QI      36      36      36      36      36      36      36      36      36      36
 224          QI      36      36      36      36      36      36      36      36      36      36
 225          QI      36      36      36      36      36      36      36      36      36      36
 226          QI      36      36      36      36      36      36      36      36      36      36
 227          QI      36      36      36      36      36      36      36      36      36      36
 228          QI      36      36      36      36      36      36      36      36      36      36
 229          QI      36      36      36      36      36      36      36      36      36      36
1                                      HEC-1 INPUT                                                 PAGE  7

            LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 230          QI      36      36      36      36      36      36      36      36      36      36
 231          QI      36      36      36      36      36      36      36      36      36      36
 232          QI      36      36      36      36      36      36      36      36      36      36
 233          QI      36      36      36      36      36      36      36      36      36      36
 234          QI      36      36      36      36      36      36      36      36      36      36
 235          QI      36      36      36      36      36      36      36      36      36      36
 236          QI      36      36      36      36      36      36      36      36      36      36
 237          QI      36      36      36      36      36      36      36      36      36      36
 238          QI      36      36      36      36      36      36      36      36      36      36
 239          QI      36      36      36      36      36      36      36      36      36      36
              *

 240          KK     RMR   ROUTE
 241          KO
 242          RS      71    FLOW
 243          RC   0.050   0.050   0.050    7240  0.0014    0.00
 244          RX    0.00    0.00    0.00    6.00  106.00  112.00  112.00  112.00
 245          RY  1510.0 1510.00 1510.00 1509.00 1509.00 1510.00 1510.00 1510.00
              *
              *

 246          KK   OFF K   BASIN
 247          BA   0.505
 248          LG    0.30    0.23    6.16    0.17       5
 249          UC   1.543   1.047
 250          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 251          UA     100
              *

 252          KK    CB7K COMBINE
 253          HC       3
              *

 254          KK   OFF L   BASIN
 255          BA   0.052
 256          LG    0.10    0.25    4.03    0.56      13
 257          UC   0.283   0.194
 258          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
```

```
 259          UA     100
              *

 260          KK     RL8   ROUTE
 261          RS       4    FLOW
 262          RC   0.025   0.025   0.025    1920  0.0026    0.00
 263          RX    0.00    0.00    4.00   40.00   47.00   49.00   53.00   53.00
 264          RY  1511.5 1511.50 1511.00 1510.00 1510.00 1511.00 1511.50 1511.50
              *
              *

 265          KK    ON 8   BASIN
 266          BA   0.229
 267          LG    0.49    0.02    4.96    0.43       1
 268          UC   2.477   1.864
 269          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 270          UA     100
              *
1                                      HEC-1 INPUT                                          PAGE  8

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 271          KK    CB8L COMBINE
 272          HC       2
              *

 273          KK     CP8 COMBINE
 274          HC       2
              *

 275          KK    DET8 STORAGE
 276          KO
 277          RS       1    STOR
 278          SV       0     1.5    3.65   13.57   47.16
 279          SE  1505.0  1506.0  1507.0  1508.0  1509.0
 280          SQ       0      10      34      62    2322
              *
              *

 281          KK      DFRETRIEVE
 282          DR     DTF
              *
              *

 283          KK      RF   ROUTE
 284          RS      18    FLOW
 285          RC   0.050   0.050   0.050    2309  0.0026    0.00
 286          RX    0.00    0.00    0.00    3.00  403.00  406.00  406.00  406.00
 287          RY  1523.0 1523.00 1523.00 1522.00 1522.00 1523.00 1523.00 1523.00
              *
              *

 288          KK   OFF M   BASIN
 289          BA   0.068
 290          LG    0.45    0.07    5.14    0.37       1
 291          UC   1.757   1.652
 292          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 293          UA     100
              *

 294          KK    CPFM COMBINE
 295          HC       2
              *
              *

 296          KK     RFM   ROUTE
 297          RS       8    FLOW
 298          RC   0.050   0.050   0.050     995  0.0032    0.00
 299          RX    0.00    0.00    0.00    3.00  403.00  406.00  406.00  406.00
 300          RY  1523.0 1523.00 1523.00 1522.00 1522.00 1523.00 1523.00 1523.00
              *
              *
1                                      HEC-1 INPUT                                          PAGE  9

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 301          KK    ON 3   BASIN
 302          BA   0.096
 303          LG    0.50    0.00    5.14    0.40       0
 304          UC   2.156   1.996
 305          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 306          UA     100
              *

 307          KK    CPM3 COMBINE
 308          HC       2
              *

 309          KK     D23 STORAGE
 310          KO
 311          RS       1    STOR
 312          SV       0    0.48    3.29   13.88   36.46
 313          SE  1517.0  1518.0 1519.00 1520.00 1521.00
 314          SS  1520.0   45.00    2.60    1.50
              *
              *

 315          KK     R24   ROUTE
 316          RS      12    FLOW
 317          RC   0.050   0.025   0.050    3100  0.0010    0.00
 318          RX    0.00   20.00  260.00  268.00  310.00  318.00  320.00  320.00
 319          RY  1520.0 1519.00 1519.00 1518.00 1518.00 1519.00 1520.00 1520.00
              *
```

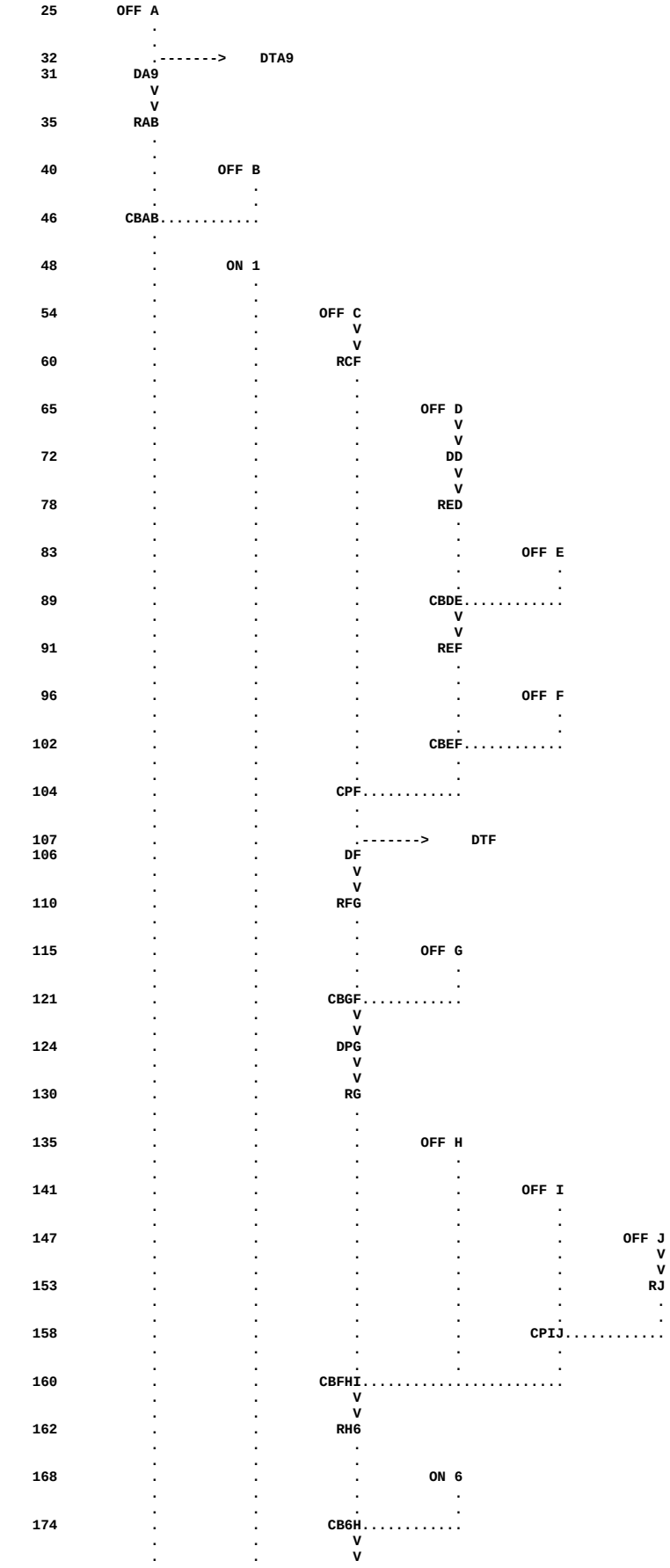
```
                  *
             320  KK     DA9RETRIEVE
             321  DR    DTA9
                  *
             322  KK     RA4   ROUTE
             323  RS      21    FLOW
             324  RC   0.025   0.025   0.050    5193  0.0027    0.00
             325  RX    0.00    3.00   10.00   22.00   29.00   36.00   62.00   71.00
             326  RY  1522.0 1521.00 1521.00 1520.00 1520.00 1521.00 1521.00 1522.00
                  *
             327  KK   OFF N   BASIN
             328  BA   0.071
             329  LG    0.50    0.00    5.05    0.42       0
             330  UC   1.362   0.957
             331  UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
             332  UA     100
                  *
             333  KK      RN   ROUTE
             334  RS      15    FLOW
             335  RC   0.025   0.025   0.050    3922  0.0025    0.00
             336  RX    0.00    3.00   10.00   22.00   29.00   36.00   62.00   71.00
             337  RY  1522.0 1521.00 1521.00 1520.00 1520.00 1521.00 1521.00 1522.00
                  *
1                                        HEC-1 INPUT                                        PAGE 10

            LINE  ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

             338  KK    CP4N COMBINE
             339  HC       2
                  *
             340  KK    RA4N   ROUTE
             341  RS      19    FLOW
             342  RC   0.025   0.025   0.050    4912  0.0022    0.00
             343  RX    0.00    3.00   10.00   22.00   29.00   36.00   62.00   71.00
             344  RY  1522.0 1521.00 1521.00 1520.00 1520.00 1521.00 1521.00 1522.00
                  *
             345  KK    ON 4   BASIN
             346  BA   0.847
             347  LG    0.50    0.00    5.05    0.42       0
             348  UC   5.048   4.081
             349  UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
             350  UA     100
                  *
             351  KK    CP24 COMBINE
             352  HC       3
                  *
                  *
             353  KK    ON 5   BASIN
             354  BA   0.240
             355  LG    0.50    0.00    5.05    0.42       3
             356  UC   3.407   3.553
             357  UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
             358  UA     100
                  *
             359  KK    CB45 COMBINE
             360  HC       2
                  *
             361  KK    RET4 STORAGE
             362  KO
             363  RS       1    STOR
             364  SA     0.2     0.3     0.4     0.5     0.6     1.1     3.6    25.4
             365  SE  1511.0 1512.00 1513.00 1514.00 1515.00 1516.00 1517.00 1518.00
             366  SS  1517.0  475.00    2.60    1.50
                  *
                  *
             367  ZZ
```

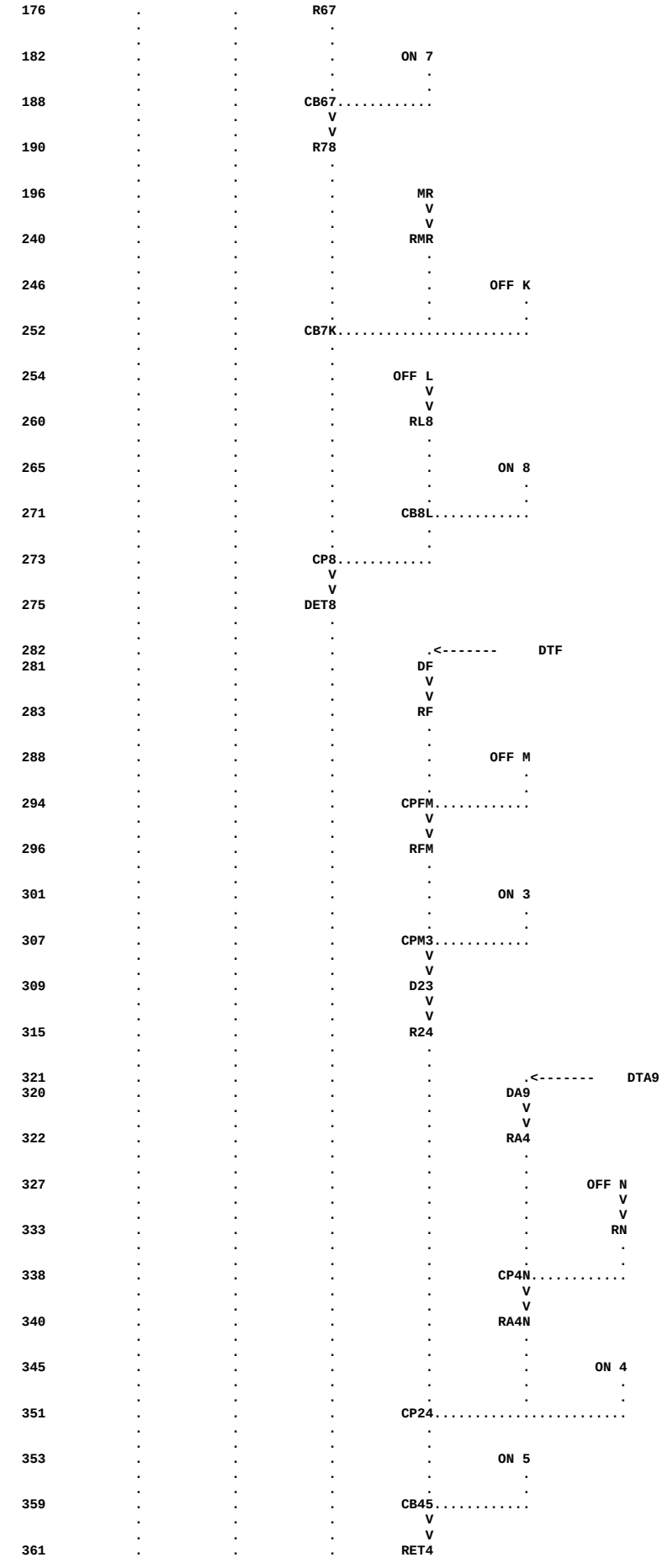
1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

(V) ROUTING (.) CONNECTOR (---->) DIVERSION OR PUMP FLOW (<----) RETURN OF DIVERTED OR PUMPED FLOW





(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************                                                   ***************************************
 *                                       *                                                   *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *   U.S. ARMY CORPS OF ENGINEERS      *
 *            JUN   1998                 *                                                   *   HYDROLOGIC ENGINEERING CENTER     *
 *          VERSION 4.1                  *                                                   *         609 SECOND STREET           *
 *                                       *                                                   *      DAVIS, CALIFORNIA 95616        *
 * RUN DATE   07JUN17  TIME  10:41:12    *                                                   *          (916) 756-1104             *
 *                                       *                                                   *                                     *
*****************************************                                                   ***************************************



                                  Flood Control District of Pinal County
                                  AZ FARMS EX 100YR24HR - Arizona Farms MDR Existing Condition 100YR, 24HR
                                  100 YEAR
                                  24 Hour  Storm
                                  Unit Hydrograph: Clark
                                  Storm: Multiple
                                  FILE NAME: EX100YR24HR.DAT
                                  BY: WOOD/PATEL JCD
                                  11/03/2016

   11 IO         OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

      IT         HYDROGRAPH TIME DATA
                        NMIN          2  MINUTES IN COMPUTATION INTERVAL
                       IDATE     1JAN99  STARTING DATE
                       ITIME       0000  STARTING TIME
                          NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE     3JAN99  ENDING DATE
                      NDTIME       1838  ENDING TIME
                      ICENT          19  CENTURY MARK

                   COMPUTATION INTERVAL     .03 HOURS
                        TOTAL TIME BASE   66.63 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT

   13 JD         INDEX STORM NO. 1
                        STRM       3.84  PRECIPITATION DEPTH
                        TRDA        .00  TRANSPOSITION DRAINAGE AREA

   14 PI           PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                       .01       .01       .03       .04       .04       .04       .04       .04       .04       .04
                       .01       .01       .01       .01       .01       .01       .01       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

24 JD INDEX STORM NO. 2

STRM 3.65 PRECIPITATION DEPTH

TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.01	.01	.03	.04	.04	.04	.04	.04	.04	.04
.01	.01	.01	.01	.01	.01	.01	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

*** ***

```
          **************
          *            *
 65 KK    *     OFF D  *        BASIN
          *            *
          **************

 66 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 72 KK    *        DD  *      STORAGE
          *            *
          **************

 73 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
121 KK    *      CBGF  *      COMBINE
          *            *
          **************

122 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
124 KK    *       DPG  *      STORAGE
          *            *
          **************

125 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
162 KK    *       RH6  *        ROUTE
          *            *
          **************

163 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
176 KK    *       R67  *        ROUTE
          *            *
          **************

177 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
190 KK    *       R78  *        ROUTE
          *            *
          **************

191 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
```

```
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
240 KK    *       RMR  *        ROUTE
          *            *
          **************

241 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
275 KK    *      DET8  *      STORAGE
          *            *
          **************

276 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
309 KK    *       D23  *      STORAGE
          *            *
          **************

310 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
361 KK    *      RET4  *      STORAGE
          *            *
          **************

362 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE
```

1

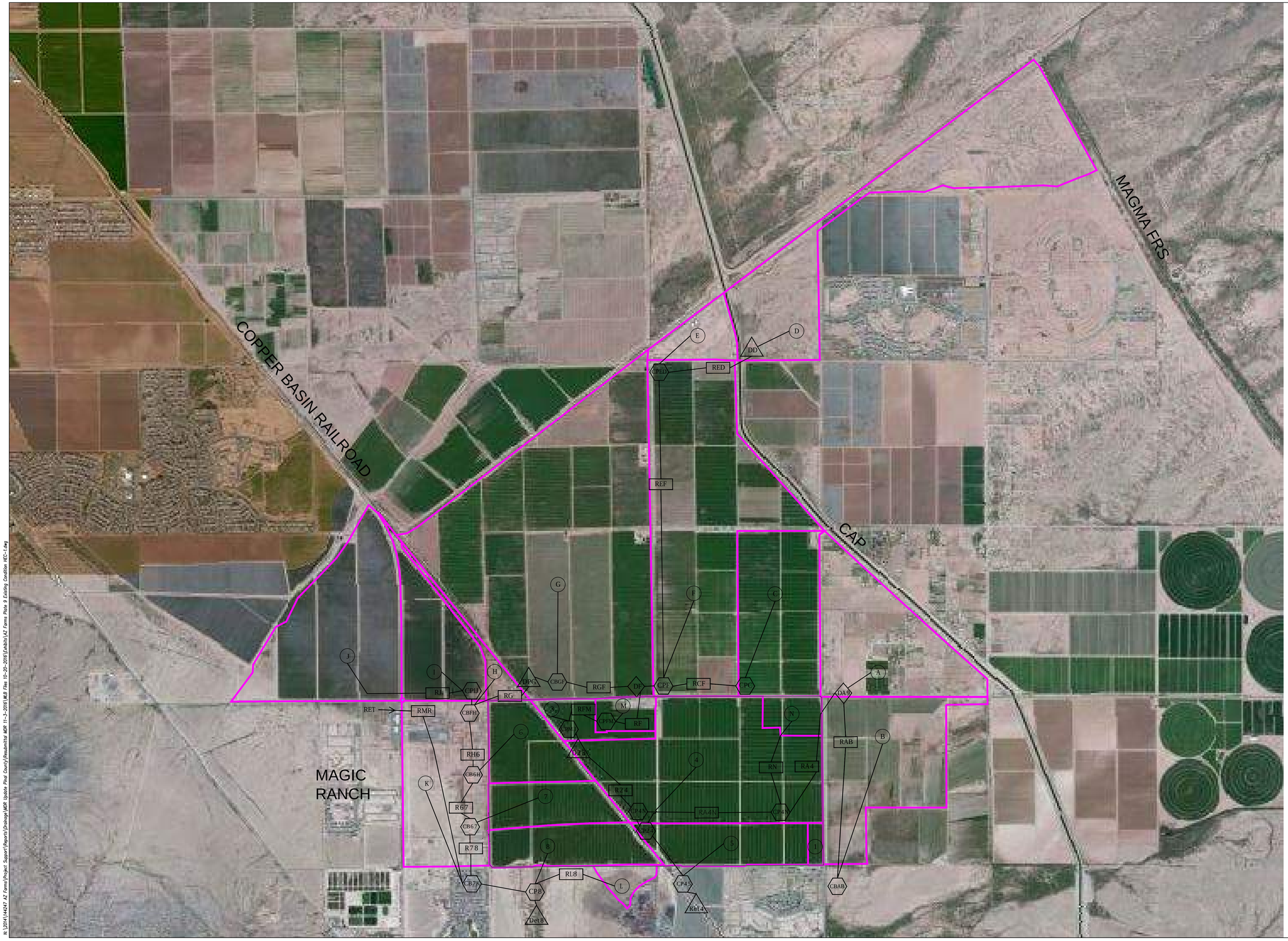
RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	OFF A	187.	14.53	95.	26.	9.	.55		
+	DIVERSION TO	DTA9	49.	14.53	20.	5.	2.	.55		
+	HYDROGRAPH AT	DA9	138.	14.53	75.	21.	7.	.55		
+	ROUTED TO	RAB	137.	14.83	75.	21.	7.	.55		
+	HYDROGRAPH AT	OFF B	85.	15.47	56.	16.	6.	.58		
+	2 COMBINED AT	CBAB	213.	15.10	129.	37.	13.	1.14		
+	HYDROGRAPH AT	ON 1	12.	12.80	3.	1.	0.	.02		
+	HYDROGRAPH AT	OFF C	112.	15.10	72.	21.	8.	.48		
+	ROUTED TO	RCF	112.	15.30	72.	21.	8.	.48		
+	HYDROGRAPH AT	OFF D	254.	13.73	114.	31.	11.	.89		
+	ROUTED TO	DD	60.	16.87	53.	24.	9.	.89		
+	ROUTED TO	RED	60.	17.00	53.	24.	9.	.89		
+	HYDROGRAPH AT	OFF E	111.	12.43	14.	4.	1.	.12		
+	2 COMBINED AT	CBDE	109.	12.43	53.	27.	10.	1.01		
+	ROUTED TO	REF	67.	13.63	53.	27.	10.	1.01		
+	HYDROGRAPH AT	OFF F	199.	16.70	152.	45.	16.	1.19		
+	2 COMBINED AT	CBEF	252.	17.00	200.	71.	26.	2.20		
+	2 COMBINED AT	CPF	337.	16.53	263.	92.	33.	2.68		
+	DIVERSION TO	DTF	82.	16.53	54.	14.	5.	2.68		
+	HYDROGRAPH AT	DF	254.	16.53	208.	77.	28.	2.68		
+	ROUTED TO	RFG	254.	16.77	208.	77.	28.	2.68		
+	HYDROGRAPH AT	OFF G	273.	17.43	212.	60.	22.	1.90		
+	2 COMBINED AT	CBGF	518.	17.30	416.	136.	50.	4.57		
+	ROUTED TO	DPG	191.	21.87	181.	127.	50.	4.57		
+	ROUTED TO	RG	191.	22.00	181.	127.	50.	4.57		
+	HYDROGRAPH AT	OFF H	12.	14.63	10.	3.	1.	.06		
+	HYDROGRAPH AT	OFF I	83.	15.20	58.	18.	7.	.31		
+	HYDROGRAPH AT	OFF J	197.	14.70	99.	27.	10.	.68		
+	ROUTED TO	RJ	197.	14.70	99.	27.	10.	.68		
+	2 COMBINED AT	CPIJ	275.	14.80	156.	45.	16.	.99		
+	3 COMBINED AT	CBFHI	316.	14.90	262.	170.	67.	5.63		
+	ROUTED TO	RH6	314.	15.73	260.	170.	67.	5.63		

	HYDROGRAPH AT							
+		ON 6	70.	14.10	32.	9.	3.	.22
	2 COMBINED AT							
+		CB6H	350.	15.63	274.	178.	70.	5.85
	ROUTED TO							
+		R67	348.	16.17	273.	178.	70.	5.85
	HYDROGRAPH AT							
+		ON 7	41.	14.37	23.	7.	2.	.19
	2 COMBINED AT							
+		CB67	372.	16.13	285.	183.	72.	6.04
	ROUTED TO							
+		R78	370.	16.53	284.	183.	72.	6.04
	HYDROGRAPH AT							
+		MR	36.	14.77	36.	36.	29.	1.37
	ROUTED TO							
+		RMR	36.	17.17	36.	36.	27.	1.37
	HYDROGRAPH AT							
+		OFF K	244.	13.13	71.	19.	7.	.50
	3 COMBINED AT							
+		CB7K	418.	16.50	324.	227.	106.	7.91
	HYDROGRAPH AT							
+		OFF L	74.	12.17	6.	2.	1.	.05
	ROUTED TO							
+		RL8	63.	12.30	6.	2.	1.	.05
	HYDROGRAPH AT							
+		ON 8	63.	13.90	28.	7.	3.	.23
	2 COMBINED AT							
+		CB8L	67.	12.30	34.	9.	3.	.28
	2 COMBINED AT							
+		CP8	436.	16.50	331.	235.	109.	8.19
	ROUTED TO							
+		DET8	423.	16.77	331.	232.	109.	8.19
	HYDROGRAPH AT							
+		DF	82.	16.53	54.	14.	5.	2.68
	ROUTED TO							
+		RF	82.	17.13	53.	14.	5.	2.68
	HYDROGRAPH AT							
+		OFF M	22.	13.33	8.	2.	1.	.07
	2 COMBINED AT							
+		CPFM	87.	17.07	57.	17.	6.	.07
	ROUTED TO							
+		RFM	87.	17.33	57.	17.	6.	.07
	HYDROGRAPH AT							
+		ON 3	28.	13.67	12.	3.	1.	.10
	2 COMBINED AT							
+		CPM3	91.	17.27	59.	20.	7.	.16
	ROUTED TO							
+		D23	44.	20.40	35.	13.	5.	.16
	ROUTED TO							
+		R24	44.	20.80	35.	13.	5.	.16
	HYDROGRAPH AT							
+		DA9	49.	14.53	20.	5.	2.	.55
	ROUTED TO							
+		RA4	48.	15.23	20.	5.	2.	.55
	HYDROGRAPH AT							
+		OFF N	37.	13.00	10.	2.	1.	.07
	ROUTED TO							
+		RN	36.	13.50	10.	2.	1.	.07
	2 COMBINED AT							
+		CP4N	57.	15.10	30.	8.	3.	.07
	ROUTED TO							
+		RA4N	56.	15.73	29.	8.	3.	.07
	HYDROGRAPH AT							
+		ON 4	114.	15.97	79.	23.	8.	.85
	3 COMBINED AT							
+		CP24	168.	15.87	115.	43.	16.	1.08
	HYDROGRAPH AT							
+		ON 5	40.	14.70	26.	8.	3.	.24
	2 COMBINED AT							
+		CB45	200.	15.80	137.	50.	18.	1.32

	ROUTED TO							
+		RET4	199.	15.90	137.	48.	18.	1.32

*** NORMAL END OF HEC-1 ***



LEGEND

- A — HEC-1 SUB BASIN
- RAB — HEC-1 ROUTING PATH
- CPG1 — HEC-1 COMBINATION POINT
- DPG — HEC-1 STORAGE
- DF — HEC-1 DIVERSION
- DRAINAGE AREAS

1400 0 700 1400

1 inch = 1400 ft.

WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS

2051 W. Northern Ave
Phoenix, AZ 85021

(602) 335-8500
www.woodpatel.com

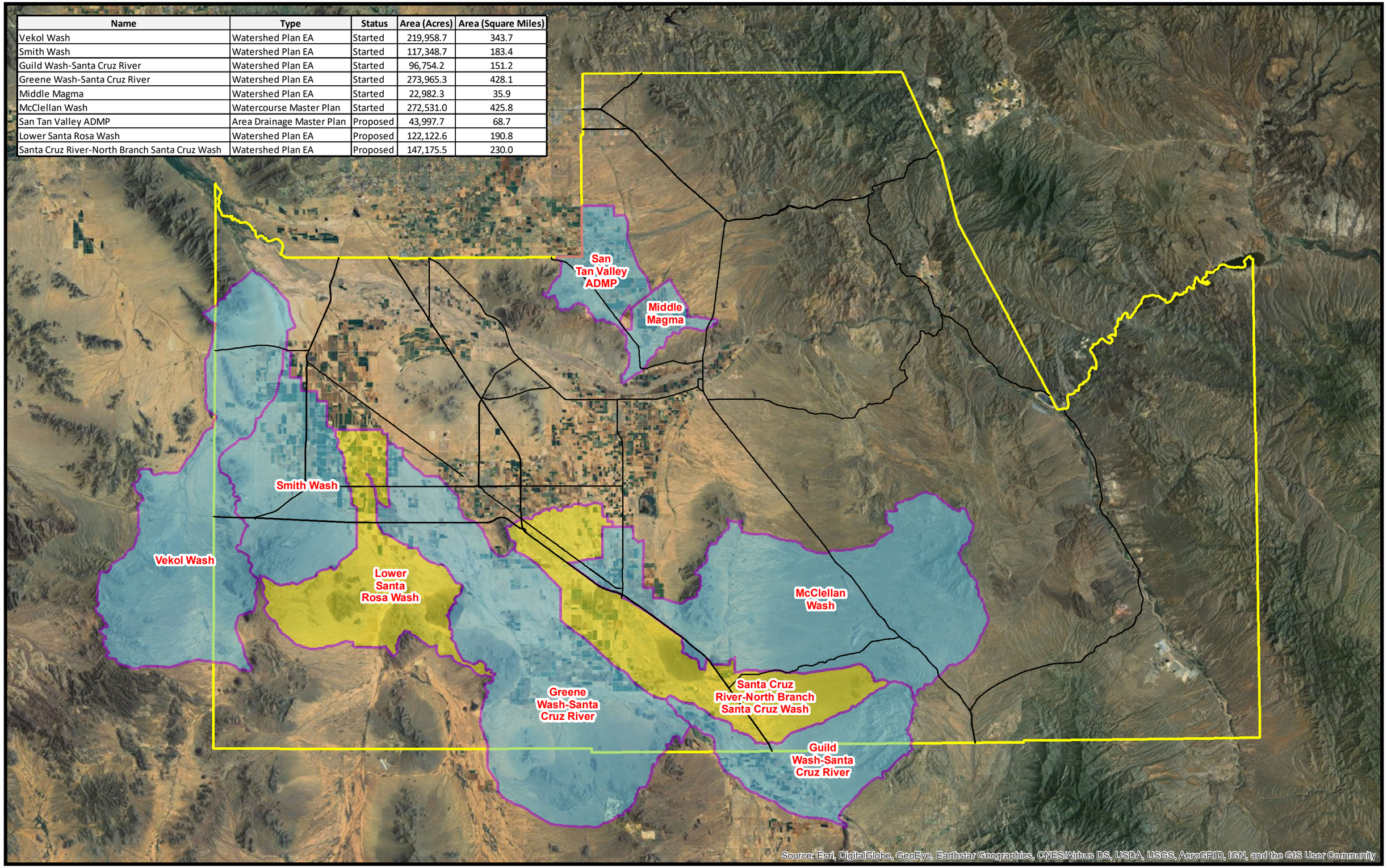
PHOENIX • MESA

PLATE 9 ARIZONA FARMS EXISTING CONDITION HEC-1 SCHEMATIC MAP

DATE	SCALE	SHEET
11/03/2016	1" = 1400'	1 OF 1
JOB NO. 144247	DESIGN JCD	CHECK MY
	DRAWN JCD	FILE PLATE 9

N:\2016\144247 AZ Farms\Project Support\Reports\Drainage\MDR Update Pinal County\Wastewater MDR 11-3-2016\MLB Plan 10-20-2016\Exhibits\AZ Farms Plate 9 Existing Condition HEC-1.dwg

Name	Type	Status	Area (Acres)	Area (Square Miles)
Vekol Wash	Watershed Plan EA	Started	219,958.7	343.7
Smith Wash	Watershed Plan EA	Started	117,348.7	183.4
Guild Wash-Santa Cruz River	Watershed Plan EA	Started	96,754.2	151.2
Greene Wash-Santa Cruz River	Watershed Plan EA	Started	273,965.3	428.1
Middle Magma	Watershed Plan EA	Started	22,982.3	35.9
McClellan Wash	Watercourse Master Plan	Started	272,531.0	425.8
San Tan Valley ADMP	Area Drainage Master Plan	Proposed	43,997.7	68.7
Lower Santa Rosa Wash	Watershed Plan EA	Proposed	122,122.6	190.8
Santa Cruz River-North Branch Santa Cruz Wash	Watershed Plan EA	Proposed	147,175.5	230.0



Appendix D

Offsite Drainage Analysis

Appendix D.1
Master Drainage Report for Arizona Farms

MASTER DRAINAGE REPORT
FOR
ARIZONA FARMS

Revised June 7, 2017
December 22, 2016
WP# 144247

DRAINAGE
CLEARANCE
1998 DRAINAGE ORDINANCE
Scott E [illegible] 7/17/2017
COUNTY ENGINEER DATE

Prepared for:

El Dorado Holdings
426 North 44th Street
Suite 100
Phoenix, Arizona 85008
Phone: (602) 955-2424
Contact: Linda Cheney

Submitted to:

Pinal County Flood Control District
31 N. Pinal Street
Building F,
Florence, Arizona 85132
Phone: (520) 509-3555
Fax: (520) 866-6511

Prepared By:

Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8500

Registered Professional Engineer (Civil)
CERTIFICATE NO.
34573
JOSEPH C.
DACONTA
Date Signed 6-7-17
ARIZONA, U.S.A.
EXP 3-31-2018

WOOD/PATEL
MISSION: CLIENT SERVICE®

TABLE OF CONTENTS

APPENDICES

APPENDIX A — Existing Condition Data and Hydrology

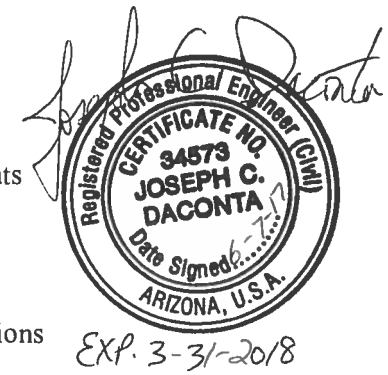
- NOAA Atlas 14 Precipitation Values, Soil, Sub Basin, and Land Use Data
- Existing Tc and Clark Variables
- Routing Data
- Railroad Detention Basin
- Existing Condition HEC-1 Output
    - 100-year, 25-year, 10-year and 2-year, 6hr and 24hr storm events

APPENDIX B — Post-Development Condition Data and Hydrology

- NOAA Atlas 14 Precipitation Values, Soil, Sub Basin, and Land Use Data
- Proposed Tc and Clark Variables
- Routing Data
- Post-Development Condition HEC-1 Output Historical Locations
    - 100-year, 25-year, 10-year and 2-year, 6hr and 24hr storm events
- Post-Development Condition HEC-1 Output with Promontory Downstream
    - 100-year, 25-year, 10-year and 2-year, 6hr and 24hr storm events
- Pre- versus Post-Development Flow Summary
- Post-Development Required Retention Volume & Drywell Calculations

APPENDIX C — Hydraulics

- Railroad Embankment Analysis
- Split Flow Calculations
- Post-Development Condition Channel Hydraulic Outputs
- Culvert Hydraulic Calculations
- Retention Basin Drywell Calculations for RET4
- Quail Run Lane Existing Condition Hydraulic Calculations



APPENDIX D — Supporting Documentation

- Letter from the Magma Flood Control District dated March 4, 2014
- Salt-Gila Aqueduct Reach 3 Protective Works Sheets 1 through 5 of 5
- Letter from U.S. Corps of Engineers dated January 28, 2008
- Promontory at Magic Ranch Grading & Drainage Plan Sheet 4 of 19
- NRCS Soil Survey

APPENDIX E	Electronic Digital Files

- DDMSW Existing & Post-Development ZIP files
- Existing & Post-Development HEC-1 Files for both the 6 hour and 24 hour durations
- FlowMaster & CulvertMaster Files
- PDF of Drainage Report

PLATES

PLATE 1	Vicinity Map
PLATE 2	Aerial Map
PLATE 3	FEMA Flood Insurance Rate Map
PLATE 4	Existing Condition Soils Map
PLATE 5	Post-Development Soils Map
PLATE 6	CAP Salt-Gila Aqueduct Map
PLATE 7	Existing Condition Land Use Map
PLATE 8	Post-Development Condition Land Use Map
PLATE 9	Existing Condition HEC-1 Schematic Map
PLATE 10A	Post-Development Condition HEC-1 Schematic Map
PLATE 10B	Post-Development Condition HEC-1 Schematic Map with Promontory Downstream
PLATE 11	Existing Condition Hydraulic Map
PLATE 12A	Post-Development Condition Hydraulic Map
PLATE 12B	Post-Development Condition Hydraulic Map with Promontory Downstream
PLATE 13A	Development Phasing Map
PLATE 13B	Development Phasing Map with Promontory Downstream

zg
Y:\WP\Reports\Residential\144247 AZ Farms Master Drainage Report.docx

1.0 EXECUTIVE SUMMARY & INTRODUCTION

1.1 Executive Summary

This Master Drainage Report is being revised due to the following:

1. Update to the Arizona Farms' land use plan west of Copper Basin Railroad;
2. Inclusion of Quail Run Lane along the west boundary of the Site.
3. The inclusion of a Post-Development 100-year, 25-year, 10-year, 2-year, 24hr & 6hr hydrology analysis that considers the Site's outflow condition for the west portion of Arizona Farms to be located at the historical Heritage Road outfall location, approximately ¼ mile east of the intersection of Quail Run Lane and Heritage Road.

The following are the revisions to this report:

Appendix B - Post-Development Condition Data & Hydrology:

- Proposed Tc & Clark Variables - Updated
- Routing Data - Updated
- Post-Development Condition HEC-1 Output 100-yr, 25-yr, 10-yr & 2-yr, 6hr and 24hr storm events with the historical outflow location along Heritage Road (without Promontory) - New
- Post-Development Condition HEC-1 Output 100-yr, 25-yr, 10-yr & 2-yr, 6hr and 24hr storm events with Promontory downstream of Heritage Road - Updated
- Pre vs Post-Development Flow Summary -Updated
- Post-Development Required Retention Volume & Drywell Calculations - Updated

Appendix C – Hydraulics:

- Post-Development Condition Channel Hydraulic Outputs -Updated
- Culvert Hydraulic Calculations - Updated

Appendix D – Supporting Documentation

- Promontory at Magic Ranch Grading & Drainage Plan Sheet 4 of 19 - New

Appendix E – Electronic Digital Files:

- DDMSW 2-Post-Development ZIP files for with/without Promontory – New
- 2-Post-Deveopment HEC-1 files for with/without Promontory – New
- FlowMaster & CulvertMaster Files – Updated
- PDF of Drainage Report – Revised

Plates:

- Plate 5 – Post-Development Soils Map - Updated
- Plate 8 – Post-Development Condition Land Use Map - Updated
- Plate 10A – Post-Development Condition HEC-1 Schematic Map - with the outfall at the historical location along Heritage Road - New
- Plate 10B – Post-Development Condition HEC-1 Schematic Map - with Promontory at Magic Ranch downstream of Heritage Road - Updated
- Plate 12A – Post-Development Condition Hydraulic Map - with the outfall at the historical location along Heritage Road - New
- Plate 12B – Post-Development Condition Hydraulic Map - with Promontory at Magic Ranch downstream of Heritage Road - Updated
- Plate 13A – Development Phasing Map - Updated
- Plate 13B – Development Phasing Map with Promontory Downstream - New

1.2 Introduction

Arizona Farms is a proposed mixed use (residential, commercial, and open space) development located in Pinal County, Arizona. The Arizona Farms development (herein referred to as the "Site") consists of approximately 1153 acres and is located north of Heritage Road, south of Arizona Farms Road, west of Felix Road, and east of the Quail Run Lane alignment. The property is located within Section 1, Township 4 South, Range 8 East, and Section 6, Township 4 South, Range 9 East, of the Gila and Salt River Meridian (refer to Plate 1 – *Vicinity Map*).

This Master Drainage Report addresses both the pre- and post-development Site conditions and provides a conceptual master drainage plan for the proposed development. The report describes the off-site and on-site drainage, and establishes preliminary minimum parameters for the design of drainage improvements. As such, this report presents the results of the conceptual drainage design for the post-development. The purpose of the proposed drainage facilities within the Site is to provide a minimum 100-year flood protection for the project infrastructure and the phasing of the parcels that satisfies the drainage standards and regulations of Pinal County, while ensuring that the downstream and upstream drainage conditions are not adversely impacted and/or altered by the development of this project. The results of the study will be used as a guideline for final design of the project infrastructure and phased parcel improvements. To the best of

our knowledge, the report has been prepared in accordance with Wood, Patel & Associates, Inc.'s (Wood/Patel's) understanding of Pinal County's drainage design standards and regulation requirements.

The Site is planned to include both residential and commercial parcels, open space, and potentially an elementary school. This report addresses both the off-site and on-site hydrology and hydraulics entering and leaving the Site. In addition, it considers an on-site drainage condition for storm water retention of the 100-year, 2-hour runoff volume and a pre- vs. post-peak flow analysis of the 100-year, 25-year, 10-year and 2-year storm frequencies and the 6-hour and 24-hour rainfall duration events. The results substantiate the post-development peak flows leaving the Site do not exceed pre-developed peak flows and that the downstream properties experience similar or reduced flows for each storm event.

2.0 DESCRIPTION OF STUDY AREA

2.1 Existing Site Conditions

The Site lies within the Pinal County Area Drainage Master Plan (ADMP) Gila River North Watershed. The majority of the Site drains from the northeast to the southwest at an approximate 0.35 percent slope. Elevations range from 1,540 in the northeast, to 1,510 feet in the southwest. In the late 1930's these two sections of land were graded for agricultural production and the land use presently is agricultural. The agricultural fields within these two sections are typically graded into $1/16^{th}$ or $1/8^{th}$ sections and are bordered by irrigation delivery or tailwater ditches. Wash remnants from historic on-site natural drainage channels are not recognizable since the Site has been regraded for agriculture. To the west and south the Site is fronted by abandoned agricultural fields and undeveloped desert, respectively. There is an existing subdivision to the southeast called Crestfield Manor. The remainder of the Site is bound to the north and east by agricultural fields. The Copper Basin Railroad (formerly Southern Pacific Railroad) bisects the property diagonally and acts as a drainage divide; with approximately 389 acres west and 763 acres east of the railroad.

2.2 Watershed Soils

Based on the NRCS Eastern Maricopa, Northern Pinal, Eastern Pinal and Southern Gila, and Pinal Western Part Counties Area Arizona Soils Survey (included within Appendix D – *Supporting Documentation*), the off-site watersheds and Site are primarily made up of a two (2) soil types. The first is classified as a clay loam soil (Soils Co and 9) and is hydrologic Soil Group C. The Contine series consists of very deep well drained soils formed in alluvium from mixed sources. Contine soils are on fan terraces and basin floors, hydrologic Soil Group C is classified as soils having very slow infiltration rates when thoroughly wetted (refer to Plate 4 – *Existing Condition Soils Map* and Plate 5 – *Post-Development Soils Map*). The second soil type is classified as a loam soil (Soils Mv, 24, 28, 31) and is also a hydrologic soil group C, except soil 31 which is a hydrologic Soil Group B. Hydrologic Soil Group B is classified as soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well-drained soils with moderately fine to moderately coarse textures.

2.3 Rainfall Seasons

In general, there are two (2) separate rainfall seasons. The first occurs during the winter months from November to March when the area is subjected to occasional storms from the Pacific Ocean. While this is classified as a rainfall season, there can be periods of a month or more in this or any other season when practically no precipitation occurs. The second rainfall season occurs during July and August when Arizona is subjected to widespread thunderstorm activity where moisture supply originates both in the Gulf of Mexico and along Mexico's west coast. These thunderstorms are extremely variable in intensity and location.

2.4 Flood Insurance Rate Map (FIRM)

The FEMA Flood Insurance Rate Maps (FIRM) for Pinal County, Arizona and Incorporated Areas, Map Number 04021C0875E, dated December 4, 2007, indicates the Site is within Zone "X".

Zone "X" is defined by FEMA as follows:

"*Areas determined to be outside the 0.2% annual chance floodplain.*"

The location of the Site relative to the FIRM panel is illustrated on Plate 3 – *FEMA Flood Insurance Rate Map*.

2.5 Major Drainage Courses

There are no major washes with an anticipated 100-year peak flow equal to or greater than 500 cfs that traverses, or originates from, the Site. Significant water courses that traverse through the Site have been identified as washes with a 100-year flow greater than 200 cfs. Only one significant wash has been identified that enters the northwest corner of the property from two (2) 10-foot by 5-foot concrete box culverts and travels along the western property boundary (Quail Run Lane alignment) until it turns east along the Heritage Road alignment before exiting south approximately ¼ mile from the southwest corner of the property. The 100-year floodplain for this significant wash has been delineated for the existing and post-development condition. In the existing condition, one other significant wash exists downstream of the Site when the 100-year peak flow leaves along Heritage Road, immediately east of Copper Basin Railroad. At this location, flows combine from the north and east and leave the Site with a peak discharge that exceeds 200 cfs. The Site is all agricultural fields that have been graded west, south, and

southwest and has north-south and east-west field roads with access to irrigation delivery ditches.

2.6 Section 404 Jurisdictional Washes

Based on the letter received from the U.S Army Corps of Engineers, there are no washes subject to jurisdiction of Section 404 requirements on-site. This letter can be found in Appendix D – *Supporting Documentation.*

3.0 EXISTING DRAINAGE CONDITIONS

3.1 Off-Site Watershed Impacts

It was determined that there are five (5) locations that off-site drainage enters the Site. Off-site runoff entering the Site originates from the northeast. As can be seen on Plate 9 – *Existing Condition HEC-1 Schematic Map*, in the upper watersheds, east of the Magma Flood Retarding Structure (FRS), off-site watersheds generally have steep to moderately-steep topography with well-defined natural washes. The Magma Flood Retarding Structure (FRS), which was constructed in the early 1960's, effectively eliminated approximately 78 square miles of contributing watershed from impacting the Arizona Farms property. However, because the Dam was originally built as a Class B Agricultural Dam, significant improvements were necessary to bring the Dam in compliance with the design safety requirements associated with protecting increased populations and improvements. Throughout the subsequent 50 years, funds have been acquired from various sources and repairs to the Dam that would bring it up to code were supposed to be completed in 2015 (see Appendix D – *Supporting Documentation* for the *Letter from the Magma Flood Control District dated March 4, 2014*). After review of the Magma Flood Control District (AZMFCD) board meeting minutes and further discussion with Mr. Kent Pace, General Manager of the AZMFCD, the Dam repairs were completed in March of 2016. The AZMFCD has completed the necessary documentation and submitted to the Arizona Department of Water Resources (ADWR) where it is anticipated that the Magma Dam FRS "unsafe" classification will be changed to "safe".

There was a period of time that downstream of the Magma FRS, the watershed had moderately steep slopes with fairly well defined washes. In the early- to mid-1980's the Central Arizona Project Aqueduct (CAP) was constructed west of the Magma FRS and effectively redirected off-site flows from the contributing upstream watersheds between the FRS and the CAP. Construction of the CAP periodically provided aqueduct overchutes to pass upstream flows. As can be seen from Plate 6 – *CAP Salt-Gila Aqueduct Map*, the only overchute (2-42" CMPs) that impacts the Arizona Farms property is located just north of Judd Road.

As detailed within the *Middle Magma Channel Hydrologic & Hydraulic Analyses Technical Report* (2014) prepared by JE Fuller Hydrology & Geomorphology, Inc.,

although the CAP canal was not designed to be a flood control structure, other than the overchute north of Judd Road, the CAP blocks all flow east of the canal from impacting the Site with no locations upstream of the Site with peak flows overtopping the CAP canal. The likelihood of the CAP canal failure is assumed to be negligible.

As detailed within Appendix D – *Supporting Documentation*, the 100-year outflow was determined by the *Salt-Gila Aqueduct Reach 3 Protective Works* to be 60 cfs. The outflow was routed through the Arizona Public Service site and westward along Judd Road to Attaway Road. A split flow occurs at the intersection of Attaway Road and Arizona Farms Road where flow crosses over Arizona Farms Road and enters onto the land south of the roadway. Currently there are two (2) sets of culverts that exist at this intersection; 2-30" CMPs that run south along the west side of Attaway Road and 3-30" CMPs along the north side of Arizona Farms Road that cross west under Attaway Road. A preliminary split flow evaluation was performed at the intersection to determine how much flow continues to the west on the north side of Arizona Farms Road and how much crosses over the roadway and impacts the property located south of Arizona Farms Road and west of the Attaway Road alignment (see Appendix C – *Hydraulics* for the split flow results). It was determined that approximately 82 cfs during the 100-year, 6-hour event crosses onto the land south of Arizona Farms Road. The split flow then enters the off-site property agricultural fields (DA Off-M), combines with the off-site property flow of 25 cfs and continues to the south where a combined flow of 95 cfs enters the Site (which is greater than the 24-hour duration flow).

The second location where flow enters the Site is located immediately downstream of the Felix Road and Arizona Farms Road intersection. Currently there are four (4) 42-inch CMPs that pass the peak 100-year, 6-hour flow under Arizona Farms Road. However, approximately 100-feet downstream there are three (3) 24-inch concrete pipe culverts that can only pass approximately 42 cfs, while the rest weirs over the top of a dirt irrigation access road. A preliminary split flow analysis was performed at this location and it was determined that approximately 55 cfs of the peak Q100 of 208 cfs will weir across Felix Road and enter the roadway swale that currently exists along the west side of Felix Road for approximately ½ mile before it enters the Site. The remainder of the flow will continue south along the roadway swale located along the east side of Felix Road, with approximately 35 cfs entering the irrigation fields east of Felix Road (see Appendix C –

Hydraulics for the split flow results).

The third location is at the northeast corner of the Site. The drainage area is called Off-N and consists of approximately 45-acres of agricultural fields that drain onto the Site. The 100-year, 6 hour flow was determined to be 47 cfs (which is greater than the 24-hour duration flow).

The fourth location is at the existing two (2) 10-foot by 5-foot concrete box culverts located immediately upstream of the intersection of the Quail Run Lane alignment and Arizona Farms Road. At the northeast corner of the intersection of the Copper Basin Railroad and Arizona Farms Road, the railroad currently acts as a retarding structure with several existing culverts that drain the water under the railroad prior to the discharge collecting at the existing two (2) 10-foot by 5-foot concrete box culverts. Survey information of the existing ponding area east of the railroad within the agriculture fields was obtained to determine the volume of ponding and specific relevant culvert information in order to perform a routing of the flow through the storage basin. As a result of this storage, the peak 100-year, 24-hour flow was reduced from 518 cfs to 191 cfs. This flow then combines with additional off-site drainage areas and the flow passing through the box culverts was determined to be approximately 316 cfs.

The fifth location that flow enters the property is located at the southwest corner of the Site where off-site flow from the abandoned agricultural fields located west of the Quail Run Lane alignment enters an existing drainage channel. Although beyond the scope of this report, there appears to be a split flow that occurs at this location where significant flow may continue to the south; however, for the purpose of this report, the flow was conservatively considered to completely enter the Site and was determined to be approximately 278 cfs for the 100-year, 6-hour storm event.

As can be seen on Plate 11 – *Existing Condition Hydraulic Map*, the results of the field investigations identified the existing locations along Arizona Farms Road and Felix Road where currently culverts exist. Most of the culverts have existing conditions that are partially filled with sediment. It was assumed within the hydrology/hydraulic analyses that these culverts would be maintained by the appropriate ownerships and were assumed to be fully effective for the results presented within this report.

3.2 Adjacent Properties' Existing Drainage Studies & Plans

A number of adjacent properties' existing drainage studies and plans were reviewed that analyzed drainage in the general vicinity of the Site. A short description of each report/plans has been provided below. Please refer to Plate 2 – *Aerial Map* for the location of each of the adjacent properties.

1. Crestfield Manor (4/2004) drainage report prepared by Sunrise Engineering is located immediately south along the southeast boundary of the Site. The report indicated that there were no off-site flows from the Site that impact the subdivision. As a result of the on-site topography, there is minimal flow from some of the agricultural fields that does impact Felix Road and ultimately enters the Crestfield Manor. As a result, this flow in the post-development conditions will be routed to the west in order to prevent any adverse impact to the drainage system of Crestfield Manor.

2. *Wild Horse Estates (5/1999)* drainage report prepared by WLB Group is located south of Crestfield Manor. This report was prepared prior to Crestfield Manor and indicated that there are upstream watershed areas from the Site that did impact the Wild Horse Estates subdivision which was contradictory to the Crestfield Manor drainage report. This supports the results that were determined within the on-site watershed delineations and the fact that in the existing condition some drainage does impact Crestfield Manor from the Site.

3. *Felix Farms (3/2005)* drainage report prepared by Sunrise Engineering was to be located east of Felix Road and immediately north of the intersection of Felix Road and Heritage Road. Although this subdivision was not constructed, the drainage report indicated that there were no off-site flows impacting the subdivision. As a result of the topography that was obtained for the Site and the additional field survey information, it was determined that there is at least off-site flow along the east side of Felix Road within a roadside drainage swale that would impact the Felix Farms subdivision. This information was provided to both Pinal County and the Town of Florence in order to inform the agencies of this situation and that future development would be required to adhere to existing historical flow patterns east of Felix Road. The Town of Florence Director of Community Development Department, Mr. Mark Eckhoff, has acknowledged this and stated that the existing plans for Felix Farms are no longer valid.

4. *Magic Ranch (2/2004) & Magic Ranch Unit 2 (9/2005)* prepared by JMI & Associates, Inc. is located approximately a ½ to ¾ of a mile west of the Site along Surrey Lane and south of Arizona Farms Road. These drainage reports determined that there was an existing natural storage basin occurring southwest of the intersection of the Union Pacific Railroad (that runs west of Surrey Lane) and Arizona Farms Road. The results indicated that there was approximately 220 acre-feet of volume that reduced the peak 100-year flow from 858 cfs to 36 cfs as it passes under the railroad through two (2) 24" CMPs. As previously discussed, this flow was determined to continue southeast and ultimately impact the Site along the southwest corner of the property.

5. *Magma Ranch III Unit 1 – Grading & Drainage Plans* (5/2006) prepared by Premier Engineering Company is located west of Felix Road and north of Judd Road (approximately 2 miles north of the Site). These plans indicate that there is no peak flow from Magma Ranch located east of Felix Road that continues to the west and north of Judd Road.

6. *Magma Ranch Master Drainage Report (July 2004) was prepared by Premier Engineering Company* and is located east of Felix Road and north of Judd Road. The results indicate that there was an existing condition HEC-1 100-year, 6 hour peak flow of 1209 cfs and post-development of 1189 cfs. This flow continues to the south remaining east of the CAP and therefore doesn't impact the Site.

7. *Magma Ranch Phase 1 thru 8* drainage reports were prepared by Premier Engineering Company. All on-site drainage reports address only the on-site requirements for development. The subdivision phases were included within the Magma Ranch *Master Drainage Report* and appear to adhere to the drainage requirements and therefore do not impact the Site.

8. *Central Arizona Project (CAP) Salt-Gila Division – Arizona Salt-Gila Aqueduct* R*each 3 Protective Works* prepared by the United States Department of the Interior Bureau of Reclamation. The drainage information details the CAP Salt-Gila Aqueduct overchute locations and flows discharging from the CAP located to the east of the Site. As shown on Plate 6 – *CAP Salt-Gila Aqueduct Map*, at location 500+00

there is a detention basin that exists east of the CAP with a pipe overchute of two (2) 42" RCPs. The upstream drainage area equaled 0.93 square miles and hydrology indicated that a Q100 (in) of 160 cfs entered the basin and a Q100 (out) of 60 cfs exits the basin. The storage volume was 1559.6 = 0 AF, 1561.6 = 12 AF and 1563.5 = 45 AF. This information was incorporated into the off-site hydrology analysis.

9. *Promontory at Magic Ranch Grading & Drainage Plans* prepared by OTAK Incorporated. The approximate 240-acre property is located immediately southwest of the Site. As can be seen on the Sheet 4 of 19, provided within Appendix D – *Supporting Documentation*, the Promontory property has been designed to accept off-site flow at the northwest corner of their development at the intersection of Heritage Road and Quail Run Lane. As such, the Site's post-development condition outflow location along the west side of the property will correspond with the location of the anticipated off-site inflow location of the Promontory at Magic Ranch.

10. *Middle Magma Channel Hydrologic & Hydraulic Analyses Technical Report* (June 2014) prepared by JE Fuller addressed the hydrologic and hydraulic conditions of the Middle Magma Channel (MMC) and evaluate potential alternatives to provide contiguous, safe passage of floodwaters from the Magma FRS to the Gila River. The report results indicate that the runoff generated from the watersheds east of the CAP Canal is routed through the CAP Canal at three locations east of the Site and that there are no locations upstream of the Site where overtopping occurs along the canal. The only location downstream of the CAP Canal where the routed flow impacts the Site is from the overchute located north of Judd Road. The technical report hydrologic methodology is consistent with the hydrology drainage analyses within this report. In addition, the report's assessment of the CAP Salt-Gila Division – Arizona Salt-Gila Aqueduct Reach 3 Protective Works outflows impacting Arizona Farms is consistent with the results determined within this report.

3.3 Existing On-site Drainage

The Site is entirely agricultural in use. The existing drainage conditions are controlled by delivery and tailwater diches bounding the fields as well as berms at field edges and crop stage. Common practice is to use lower runoff coefficients in agricultural areas. Depending on how each field has been disked and graded, irrigation will flow east to west or north to south. However in a significant flooding event such as the 100-year, 6

hour storm, flooding will follow the aggregate topography of the Site; from east to west and southwesterly.

As previously mentioned, a manmade drainage divide exists as a result of the Copper Basin Railroad bisecting the Site. The railroad embankment was analyzed to determine the possibility of failure since this is not a flood control structure. As can be seen within Appendix C – *Hydraulics*, existing ground cross sections were analyzed at several locations along the railroad embankment and the results indicate that the 100-year peak flow is always less than two feet deep. As a result it was concluded that the existing condition railroad embankment is considered stable and failure is not expected. In the post-development condition, any drainage conveyance corridors adjacent to the railroad embankment shall be designed below grade and outside of the Railroad right-of-way rather than against the embankment and therefore no post-development condition failure along the railroad embankment is anticipated.

As can be seen on Plate 9 – *Existing Condition HEC-1 Schematic Map*, there are three locations that flow leaves the Site, all of which occur along the Heritage Road alignment at the southern boundary of the property. The first is at the northwest corner of the intersection of Felix Road and Heritage Road where a small portion of the on-site agricultural fields drain onto Heritage Road. This is a roadway sump location that drained south into Crestfield Manor storage basins. The second location is east of the Copper Basin Railroad where it intersects the Heritage Road alignment. There currently is a stormwater ponding condition that occurs on-site due to the basin outlet condition being controlled by an existing irrigation canal located immediately downstream and south of the Heritage Road alignment. It was determined that due to this irrigation canal; there is currently an approximate 760-foot wide weir flow outlet condition. The third location is west of the Copper Basin Railroad, approximately ¼ mile east of the intersection of the Quail Run Lane and Heritage Road alignments. The existing drainage channel that accepts flow from the two (2) 10'x5' box culverts (located at the intersection of Arizona Farms Road and Quail Run Lane) runs south along the Quail Run Lane alignment where it turns east and continues approximately ¼ of a mile until it enters two (2) 30" HDPE pipes and continues to the south, leaving the Site. These pipes are inadequate to pass the 100-year existing condition flow and subsequently water backs up onto the Site and then sheetflows over an approximate 850-foot wide weir to the south.

3.4 Existing Condition Hydrology

Existing condition hydrology has been modeled utilizing *DDMSW Version 4.8.0*, obtained from the Flood Control District of Maricopa County (FCDMC), and the U.S. Army Corps of Engineers' *HEC-1*, *Flood Hydrograph Package*, *Version 4.1*, (June 1998) to determine off-site and on-site peak flows prior to the development of the Site for the 100-year, 25-year, 10-year, and 2-year, 6-hour and 24-hour storm events. It was determined that the 100-year, 6-hour storm duration had a higher peak discharge than the 100-year, 24-hour duration for the flow leaving along Heritage Road east of the railroad and the 100-year, 24-hour duration peak flow was greater than the 100-year, 6-hour duration flow for the discharge leaving along Heritage Road west of the railroad. As a result, both storm durations were considered within the report. Refer to Appendix A – *Existing Condition Data & Hydrology* for the DDMSW and HEC-1 output. Off-site watersheds were delineated using USGS quadrangle maps, the Pinal County Area Drainage Master Plan (ADMP) Gila River North Watershed GIS drainage maps, and site visit field investigations. On-site watersheds were delineated using one (1) foot topographic contour mapping obtained from El Dorado Holdings and supplemental Wood Patel survey information.

The results of the existing condition hydrology and the ponding limits of existing storage basins are shown on Plate 9 - *Existing Condition HEC-1 Schematic Map* and detail the calculated 100-year, 6-hour and 24-hour peak flows entering and leaving the Site.

3.5 Existing Condition Hydraulics

Existing condition wash hydraulics have been modeled utilizing normal depth calculations determined by Bentley FlowMaster (Ver. 8i, 2010). This was performed on the one wash located along Quail Run Lane that exceeded a 100-year peak flow of 200 cfs. Eight (8) cross sections were obtained along the wash and the resulting washes' water surface elevations were used to delineate the 100-year floodplain. The washes' hydraulic results have been included within Appendix C – *Hydraulics* and the results of the 100-year floodplain are shown on Plate 11 – *Existing Condition Hydraulics Map*. As can be seen by the results, the existing drainage channel does not have the capacity to contain the 100-year flow and the discharge exceeds the top of banks, spreading out onto the Site's agriculture fields and onto the land west of the wash.

4.0 POST-DEVELOPMENT DRAINAGE CONDITIONS

4.1 Drainage Design Criteria

The drainage design criteria of the Pinal County Drainage Manual Volume 1 & Volume 2 (2004), Drainage Ordinance (1998) and Floodplain Management Ordinance (2006) was used to design the drainage system for the Site. In conjunction with these standards and regulations, the ADOT *Highway Drainage Design Manual Hydrology* (2014) was used where appropriate.

Key drainage design criteria are presented below:

- Off-site flows shall enter and discharge from the Site such that historical drainage patterns are maintained. Drainage easements shall be provided over drainage ways that convey flows of 200 cfs or more during the 100-year storm event. The drainage easements shall encompass the 100-year floodplain. These easements shall be dedicated upon final platting of the planning units. All off-site flow passing through the Site shall be placed in permanent public drainage easements. All retention basins collecting runoff from public right-of-ways shall also be put in a drainage easement.

- Each parcel shall have at least one all-weather road access with a maximum flow of 8-inches in depth over the culvert or overflow roadway section during the 25-year peak flow with no adverse backwater effect during the 100-year peak flow event.

- Culverts for collector and arterial streets are to be designed to convey at least the 50-year peak discharge with no flow crossing over the roadway.

- Stormwater conveyance within streets are to be designed with the 10-year runoff carried within the curbs and the 100-year runoff carried within the right-of-way provided that flow depths do not exceed 6-inches above the roadway centerline. Flows that cause these limits to be exceeded shall be picked up by storm drain systems and/or diverted to drainage ways specifically designed for this purpose. Street capacity calculations will be done for main roadways for 4-in and 6-in curbs. Drainage flowing along streets may not encroach more than the width of a lane from either side.

- All inlets and outlets for drainage structures shall be protected from erosion.

- Pipes or roadside channels may be provided if the runoff exceeds the street capacity. A storm drain system may be provided if the 10-year and/or 100-year runoff would inundate the adjacent finished floors. Catch basins, scuppers, etc. will be provided to remove water so as not to exceed maximum depth of 8-inches within the street.

- Typical lot grading for the various lot configurations will provide flow lines around the building pad and from the back yard to the street (unless split lot grading is acceptable to Pinal County) with typical slopes noted in the plans. Typical lot grading diagrams will be provided in the individual parcel grading plans.

- Retention basins shall be designed as multi-purpose facilities where possible. Regional and/or local subdivision retention basins shall be designed with 4:1 side slopes and a maximum of 3-feet of ponding during the 100-year, 2-hour storm. All basins shall be designed with 1-foot of freeboard. Drainage easements shall be provided over all parcel retention basins and these easements shall be dedicated upon final platting of the planning units. Storage basins shall have an emergency spillway to safely direct overflow into a recognized watercourse.

- Future stormwater storage basins shall provide for dissipation of the entire 100-year, 2-hour storage volume within 36-hours following the storm event using infiltration and/or drywells.

- Basin inlets and outlets shall be designed to avoid erosion within the basin, head cutting or deposition near the inlet. Trash racks and access barriers shall be provided for culverts 18-inches or larger.

- Off-site flows shall not be routed through on-site stormwater storage basins but shall be routed through the Site and released at the natural point of outfall.

- Finish floor elevations shall be a minimum of 1-foot above the emergency overflow elevation of any adjacent retention/detention basins and/or the highest adjacent 100-year water surface elevation.

- All channels shall be designed to include adequate freeboard and shall have at a minimum 1-foot in subcritical channels and 2-foot in supercritical channels.

Under the circumstance that drainage policies and/or standards are not addressed within this report, the Pinal County drainage design criteria and standards shall be used during the development of the Site.

4.2 Post-Development On-Site Drainage

The overall drainage concept is to route off-site flows through the Site to historic discharge locations, resembling existing drainage patterns. Since there are no natural washes through the Site, the development plan will make provisions to collect and convey off-site flow to existing conditions discharge locations. Post-development retention basins provide 100-year, 2-hour stormwater storage for the developed portions of the Site. To substantiate that post-development peak flows leaving the Site do not exceed pre-developed peak flows, a post-development HEC-1 model was developed for the 100-year, 25-year, 10-year, and 2-year 6-hour and 24-hour storm events. The model reflects post-development land use, including storage and resulting attenuation for post-development retention basins.

On-site flows may be conveyed through streets, storm drain systems, drainage swales, roadside ditches, and/or channels to proposed retention basins. Retention basins will be sized for the 100-year, 2-hour storm event. On-site runoff from storm events exceeding the 100-year, 2-hour flow will pass through emergency overflow spillways to safely discharge stormwater to a conveyance channel, street, or other positive drainage away from the basin. Retained runoff will be dissipated from the basins by utilizing stormwater storage infiltration, and/or drywells. The developer will provide Pinal County with certified as-built dimensions of the basins, and the actual volume of storage provided during development of the Site.

In all locations, lowest floor elevations shall be set a minimum of 1-foot above the emergency overflow elevation, or the highest adjacent 100-year water surface elevation, whichever is greater.

4.3 Post-Development Hydrology

A post-development HEC-1 model was generated by utilizing the post-development land use plan (see Plate 8 – *Post-Development Land Use Map*). The proposed online retention basins were included within the HEC-1 model. Resulting peak flows can be found within *Section 6.0 – Pre- vs. Post-Development Peak Flow Analysis*, and on Plate 10 – *Post-*

Development Condition HEC-1 Schematic Map. DDMSW and Post-development HEC-1 output calculations are located within Appendix B – *Post-Development Condition Data and Hydrology*.

4.4 Erosion and Sediment Control

The development will include on-site retention basins which retain the on-site 100-year, 2-hour runoff volume and ultimately reduce peak flows to pre-development levels prior to leaving the Site. The off-site flows are to be conveyed through the designated drainage corridors, which shall be designed to mimic the existing conditions sediment transport equilibrium slope and therefore sediment aggradation/degradation is not anticipated to be an issue. Scour protection will be provided both at the upstream and downstream ends of culverts and within drainage swales/channels as necessary.

4.5 Post-Development Hydraulics

4.5.1 Drainage Swale/Channel Hydraulics

Preliminary grading conditions similar to existing ground slopes were used to route off-site flows entering the Site, and on-site post-development flows to the appropriate historical outfall locations. Post-development drainage swales and channels have been modeled utilizing normal depth calculations determined by Bentley FlowMaster (V8i, 2010). The primary channel locations include Felix Road from the mid-section line south to Heritage Road then west to the Copper Basin Railroad; Heritage Road from Quail Run Lane to approximately a ½ mile east of Quail Run Lane; and Quail Run Lane from Arizona Farms Road to Heritage Road. Hydraulic output is located in Appendix C – *Hydraulics* and the 100-year floodplain limits are anticipated to be contained within the drainage swale/channel corridors (refer to Plate 12 – *Post-Development Condition Hydraulic Map* for drainage swale/channel locations).

Per the Pinal County drainage design requirements any post-development channels that have a 100-year flow of 200cfs or greater (i.e. the future Quail Run Lane channel) shall be designed using a standard step backwater hydraulic model. As development progresses, subsequent Phase 1 and/or Parcel 1 drainage reports will be required to address the drainage

design of any channel conveying a 100-year flow of 200cfs or greater using a standard step backwater hydraulic model.

4.5.2 Culvert Hydraulics

Culvert sizes to convey flows through the Site were estimated used a culvert hydraulic computer program. The preliminary culverts proposed for the Site's 100-year stormwater management system can be seen on Plate 12 – *Post-Development Hydraulic Map*. The procedures used follow the Federal Highway Administration, Hydraulic Design Series Number 5 Hydraulic Design of Highway Culverts (USDOT, FHWA, HDS-5, 1985). The culverts' headwater elevations were calculated for inlet and outlet control and the higher of the two was designated as the controlling headwater elevation. The culverts' headwater elevation was determined using Bentley's CulvertMaster (Version 3.3) which computes the headwater using the HDS-5 methodology. The corresponding calculations are located within Appendix C - *Hydraulics*.

For arterial/major collector and/or minor collector/local roadways, a combination of a cross road culvert and a drainage dip section may be designed to convey a portion of the larger, less frequent 100-year peak storm flow over the roadway. Under no circumstance shall the over-topping roadway flow exceed a 0.8 feet maximum depth during the 100-year storm event.

Culverts may be corrugated metal pipes (CMP) with a Manning's "n" value of 0.024, cast-in-place pipe (CIPP), or reinforced concrete pipes (RCP) with a Manning's "n" value of 0.013. For significant flows, considerations may be made for reinforced concrete box culverts (per ADOT standards).

4.5.3 Street Conveyance

Stormwater conveyance within streets are to be designed with the 10-year runoff carried within the curbs and the 100-year runoff carried within the right-of-way provided that flow depths do not exceed 6-inches above the roadway centerline. Flows that cause these limits to be exceeded shall be picked up by storm drain systems and/or diverted to drainage ways specifically designed for this purpose. Street capacity calculations will be done for main roadways for 4-in and 6-in

curbs. Drainage flowing along streets may not encroach more than the width of a lane from either side. A Manning's "n" value of 0.015 will be used for the standard street cross-section. All continuous grade curb openings (scuppers and catch basins) will be designed assuming a 1.25 x Length clogging factor and sump conditions will apply a 2.0 x Length clogging factor.

4.5.4 Storm Drain Design

Storm drains may be used to enhance the drainage conveyance in critical project locations. More specifically, the storm drains will supplement the drainage conveyance where street conveyance is found inadequate to handle the runoff within the street cross-section.

Storm drains will either be CMP or reinforced concrete pipes (RCP) with a Manning's "n" value of 0.024 or 0.013, respectively. Storm drain systems will be sized to maintain the hydraulic grade line (HGL) at least 6-inches below the gutter line in a 10-year flood. The 100-year HGL cannot be higher than 12-inches lower than the adjacent homes' finished floor elevations. In addition, the 100-year HGL cannot be higher than the elevation of the ground at the edge of the right-of-way or drainage easement.

For hydraulic storm drain design, StormCAD software by Haestad Methods and/or Hydraflow Storm Sewer for AutoCAD Civil 3D may be used to model the proposed storm drain systems. The software utilizes the hydraulic design guidelines and parameters from the Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22 by Federal Highway Administration, November 1996 (3rd Edition Revised 2013).

4.6 Retention Basin Storage

Pinal County requires that runoff from the 100-year, 2-hour storm event be retained on-site. Basins should be designed with the proposed landscaping scheme in mind. Per the County regulations, all basins will be designed with ponding depths of three (3) feet or less during the 100-year, 2-hour storm with varying side slopes not exceeding the required 4:1 (H:V) slope. Underground stormwater storage may be used in commercial

properties only and shall adhere to the County's regulations and standards if implemented within future commercial development.

As the development of individual parcels occur within the Site, interim retention/detention basins may be utilized to store and/or attenuate the 100-year peak storm runoff from undeveloped areas surrounding the developed parcel(s). Regional retention basins may be considered as an option for this Site to obtain effective peak flow attenuation and multiple land use benefits for the drainage system. Temporary drainage easements shall be required if temporary stormwater storage basins are used outside of the area being platted at the time of parcel development. The easement must be recorded prior to plat approval but may be abandoned with the platting of the future phased parcels.

Within the Site, the 100-year, 2-hour required retention volumes were determined for each on-site post-development parcel drainage area. In order to simulate an on-line retention basin, a diversion card was used in the HEC-1 and the 100-year, 2-hour required retention volume was removed from the inflow hydrograph. The remaining hydrograph runoff was then routed downstream.

As the Site development occurs, on-site storm water will be routed through basins and storage routing will be performed using an updated HEC-1 model. The surface area of a proposed retention basin will be measured at representative elevations within the basin boundary. This information will be directly entered into the HEC-1 model on the SE and SA records. As an alternate, this information can be converted to a volume and entered into the model using the SE and SV records. The data will be utilized by the HEC-1 model for reservoir routing of a specified inflow hydrograph.

All storage basins used for retention to meet the 100-year, 2-hour stormwater storage requirements shall use infiltration, and/or drywells to drain the basins within 36 hours.

Basin locations, layout, and sizes, along with details for inlet and outlet structures will be determined as development occurs within the Site.

Basins shall be designed with emergency overflows. Required retention volumes were calculated using the following equation:

V=C*(P/12)*A

Where:

C = Runoff Coefficient

P = Precipitation Depth in inches

A = Drainage Area in acres

The final grading and post-development weighted runoff coefficient and drainage area parameters will be determined during parcel development of the Site. The 100-year, 2-hour precipitation depth for use in Pinal County was obtained from NOAA Atlas 14 isopluvial precipitation maps. Refer to Appendix B - *Post-Development Condition Data and Hydrology* for detailed retention required calculations.

4.7 First Flush Volume

AZPDES has established a minimum level of control for new development at which stormwater pollution prevention practices must be put in place. This minimum standard is "First Flush" and consists of retaining or treating the first 0.5 inches of direct runoff from a storm event. Normally this minimum level of control is met by following the Pinal County retention requirements. The required first flush retention volumes are determined using the Rational Method. The Rational Method determines the required storage volume (V) using a point rainfall depth (P), a runoff coefficient (C), and the sub-basin area (A). These parameters are used in the following equation to determine the required volume:

$$V = C\frac{P}{12}A$$

In the first flush event, a C value of 1, is used, with a rainfall depth of 0.50-inches, this generates the required one half (½) inch of runoff.

4.8 Post-Development Drainage Along Heritage Road

As a result of modeling the post-development on-site drainage system's retention basins, the peak 100-year flows that exit the Site at the three locations along Heritage Road have been reduced below existing condition peak flows. The three locations are: Heritage Road east of the Copper Basin Railroad (HEC-1 RET4), the post-development 100-year,

6-hour peak flow was determined to be 114 cfs, which has been reduced from the existing condition 100-year peak flow of 232 cfs. The second location at the northwest corner of the intersection of Felix Road has no outflow during any storm event and therefore is in conformance with the Crestfield Manor drainage report.

The third location is west of Copper Basin Railroad and two post-development outflow locations along Heritage Road were analyzed: the first location was the current existing condition outflow located approximately ¼ mile east of the intersection of the Quail Run Lane and Heritage Road alignments. As was previously determine in the existing condition the more frequent storm event flows enter two (2) 30" HDPE pipes and continues to the south, leaving the Site. These pipes are inadequate to pass the 100-year flow and subsequently water backs up onto the Site and then sheetflows over an approximate 850-foot wide weir to the south. In order to re-establish the existing broad weir outflow condition it may be necessary to design an outflow structure that allows for the flow to discharge out of a controlled weir structure so as to mimic the existing drainage outflow conditions. However, this type of outlet condition, although matching the existing condition, does not lend itself to a favorable development condition downstream. As a result, the second outfall location was analyzed which is located at the northeast corner of the intersection of Quail Run Lane and Heritage Road (located at the southwest corner of the Site). As can be seen on Promontory at Magic Ranch Grading and Drainage Plans, Sheet 4 of 19 (received from OTAK on 5/31/2017 and located in Appendix D – Supporting Documentation), accommodations for the 100-year flow within the Quail Run Lane drainage channel has been provided by including a double barrel 12-ft x 4-ft box culvert to pass the discharge underneath Heritage Road. As detailed within the hydrology analyses for these two locations, (HEC-1 CQ2), the post-development 100-year, 24-hour peak flow is 371 cfs down from the existing condition 100-year, 24-hour peak flow of 423 cfs.

4.9 Development Phasing East & West of the Copper Basin Railroad

Although the exact timing and phasing of the development and the major infrastructure is unknown at this time, the following are recommendations for logical phasing based on either the land east of the railroad or west of the railroad being developed together. As can be seen on Plate 13A – *Development Phasing Map* and Plate 13B – *Development Phasing Map with Promontory Downstream*, when east of the railroad is developed the

property may be developed in three (3) phases. Since the existing agricultural fields drains east to west, Phase 1 could start along the northeast parcels and adjacent to Felix Road and continue south including Parcels X, Y, Z, CC and EE. As a result, this would include the channel drainage infrastructure along Felix Road and Heritage Road. Phase 2 would include the central part of the eastern property and therefore would include a channel along the east side of the Attaway roadway and include Parcels N through W, AA, BB and DD. Phase 3 would be the remainder of the parcels adjacent to the railroad: Parcels A, B and F through M. Phase 3 would also include the channel and retention basin east of and adjacent to the railroad.

West of the railroad can also be developed logically in three phases. Considering that the existing agricultural fields also drain east to west, the first phase may be along Arizona Farms Road and include Parcels A through D and Parcel Q and R. The drainage infrastructure would consist of the Quail Run Lane channel to collect flow from Parcels A, R and Q and drainage swales to convey flow from Parcels B through D to the Heritage Road Channel. Without Promontory to the south, a Phase 1 Weir would also be required in order to re-establish the existing drainage flow conditions downstream of Heritage Road. The second phase could include Parcels E, F, G, N, O and P and would use the drainage swales from Phase 1 and the channel along Heritage Road. Phase 3 would include the remainder of the Parcels, Parcel H through M, and the remaining channel along Heritage Road.

As the development progresses, internal drainage infrastructure will be better understood and updates to this recommended phasing approach that addresses the undeveloped land and drainage will have to be considered within the individual parcel development final drainage reports.

5.0 DATA ANALYSIS METHODS

5.1 Hydrologic Procedures, Parameter Selection and Assumptions

Off-site watersheds were delineated using USGS quadrangle maps, Pinal County Area Drainage Master Plan (ADMP) Gila River North Watershed GIS drainage maps, and site visit field investigations. On-site watersheds were delineated using one foot topographic contour mapping obtained from El Dorado Holdings and supplemental Wood Patel survey information. Post-development land use planning was used for on-site contributing watersheds. The U.S. Army Corps of Engineers' HEC-1 software was used to develop peak flows at concentration points entering and exiting the Site for both the existing and post-development conditions.

- Rainfall was determined using the NOAA Atlas 14 data. The 100-year, 6-hour precipitation depth utilized in the model was 2.74 inches and the 100-year, 24-hour depth used within the model was 3.84 inches. DDMSW was utilized to perform an aerial reduction of the 100-year precipitation depths.
- Infiltration losses were determined using the Green and Ampt method, soil data obtained by the NRCS Web Soil Survey, and the Maricopa County DDMSW software.
- DTHETA and PSIF values were assigned based on the computed bare ground XKSAT values using the look up tables in the DDMSW software for Maricopa County. Most drainage areas or modeling sub-basins were composed of several subareas containing soils of different textures. Therefore, a composite value for the Green and Ampt parameters that are to be applied to the drainage areas for modeling sub-basins needed to be determined. The procedure for determining the composite value is to average the area-weighted logarithms of the XKSAT values and to select the PSIF and DTHETA values from a graph. The XKSAT value (and naturally occurring rock outcrop percentage) for each map unit has been identified by the National Resources Conservation Service (NRCS). The values for XKSAT are weighted based on the percentage of each unique soil texture present in the map unit. The weighted values take into consideration the horizon depth of the soil textures in regard to the expected depth of infiltration during the design storm duration. The bare ground XKSAT values were then adjusted based on average subbasin vegetation cover.

- DDMSW was used to generate sub-basin hydrographs based on the Clark method. Unit hydrographs to convert rainfall excess into runoff hydrographs were computed using the methods outlined in the ADOT Hydrology Manual. The ADOT Manual recommends the use of the Clark Unit hydrograph which requires two inputs – time of concentration (Tc) and a storage coefficient (R).

  The ADOT time of concentration equation for desert/mountain areas is:

  $Tc = 2.4\ A^{0.1}\ L^{0.25}\ Lca^{0.25}\ S^{-0.2}$

  Where,

  A = drainage area in square miles

  L = flow path length in miles

  Lca = length along flow path to point opposite the basin centroid in miles

  S = flow path slope in feet per mile

  Tc = time of concentration in hours

  The ADOT time of concentration equation for agricultural areas is:

  $Tc = 7.2\ A^{0.1}\ L^{0.25}\ Lca^{0.25}\ S^{-0.2}$

  The ADOT storage coefficient equation is a function of Tc, L, and A:

  $R = 0.37\ Tc^{1.11}\ L^{0.8}\ A^{-0.57}$

  Where,

  Tc = time of concentration in hours

  L = flow path length in miles

  A = drainage area in square miles

  R = storage coefficient in hours

  Existing condition and post-development condition land uses were input into DDMSW, as well as watershed characteristics such as high elevation, low elevation, and watercourse length to generate the runoff hydrographs.

- The time of concentrations for the 25-year, 10-year and 2-year storm events were calculated based on the ratios determined between these storm events' time of concentrations by Maricopa County.

- The values of the synthetic dimensionless time-area relations for the Clark Unit Hydrograph were obtained from the Maricopa County urban and natural watersheds time-area relations.
- Runoff hydrographs were routed using the Normal Depth Storage Routing Method.

Resulting existing and post-development peak flows exiting the Site is discussed within Section 6.0 - *Pre- vs. Post-Development Peak Flow Analysis.*

5.2 Hydraulic Procedures, Methods, Parameter Selection, and Assumptions

Floodplain delineations, culvert sizing, and other detailed hydraulic calculations were performed at a preliminary post-development level within this drainage report. Where applicable (where runoff volume exceeds available basin storage volume), retention basins outlet weirs were tentatively designed to pass the 100-year peak outflow. Stormwater storage basin drywell calculations can be found within Appendix B & Appendix C for RET 4.

5.3 Stormwater Storage Calculation Methods and Assumptions

On-site retention basins will be provided for each parcel and may include surface and/or underground storage facilities (for commercial properties only) and use infiltration, and/or dry wells to evacuate the facilities, as deemed necessary. Required stormwater storage calculations were performed using the Rational Method. The equations used to calculate the required and provided retention volumes are presented below.

$$V_{REQUIRED} = C * \left(\frac{P}{12}\right) * A$$

Where:

- V is the required retention volume in acre-feet
- C is the weighted "C" coefficient
- P is the precipitation in inches for the 100-year, 2-hour rainfall, 2.35-inches for the proposed site.
- A is the drainage area in acres

As parcel development occurs, provided retention basin volumes shall be calculated using the Conic Approximation Method as such:

$$V = \frac{a}{3}(A_{Top} + A_{Bot} + \sqrt{A_{Top}A_{Bot}})$$

Where:

a = distance between the areas

A_{Top} *= Area of the top of basin*

A_{Bot} *= Area of the bottom of basin*

The ultimate provided retention volume calculations will be based on the disturbed final graded and post-development areas. The ultimate runoff coefficients utilized will be based on the Pinal County Drainage Manual Volume 2 Table 2-1.

Please see Appendix B *–Post-Development Condition Data and Hydrology* for detailed required retention volume calculations.

6.0 PRE VERSUS POST-DEVELOPMENT PEAK FLOW ANALYSIS

Refer to the tables within Appendix B for the comparative peak discharge rates for the pre- versus post-development 6-hour and 24-hour storm duration conditions at the concentration points along the project's southern boundary where flow leaves, or may leave (for the Promontory box culvert location), the Site along Heritage Road. During the 100-year, 6-hour and 24-hour storm events, the modeling results indicate post-development flows leaving the Site are below the pre-development peak flows at the three (3) historical outfall locations and for the post-development Promontory at Magic Ranch box culvert outfall location. Additionally, during the 25-year, 10-year and 2-year, 6-hour and 24-hour storm events, the post-development flows leaving the Site were also at or below the pre-development peak flows at all historical outfall locations and at the post-development Promontory at Magic Ranch box culvert outfall location. The results are summarized in the Pre Versus Post-Development Flow Tables located within Appendix B – *Post-Development Condition Data and Hydrology*.

7.0 OPERATION, MAINTENANCE & LIABILITY

The proposed drainage system shall be operated and maintained in accordance with Pinal County Design Standards and Policies. Ongoing maintenance of the designed or recommended drainage system is required to preserve the design integrity and purpose of the drainage system. Failure to provide maintenance can prevent the drainage system from performing to its intended design purpose and can result in reduced performance. Maintenance within the public right-of-way is the responsibility of the governing municipality. However, it is the responsibility of land owner for facilities on private property. Prior to ultimate condition build-out upstream of drainage structures, additional maintenance may be required due to an increase in sedimentation build-up. A regular maintenance program is required to have drainage systems perform to the level of protection or services as presented in this report.

A maintenance program shall at a minimum (but not limited to) include scheduled and unscheduled operations such as:

- Inspections of the drainage system improvements shall be performed and documented on an annual basis;
- Unscheduled additional inspections performed during and after major storm events;
- Removal of debris and excessive sediment build-up within channels and/or culverts/storm drain systems;
- Scheduled mowing, debris removal, graffiti removal and/or rock replacements;
- Repair or replacement of damaged erosion protection and/or channel overbanks;
- Maintenance vehicle access ramps to be provided for all channel segments as necessary;
- Sedimentation staff gauges within stormwater storage basins as necessary;
- Installation of additional erosion control measures as needed.

8.0 CONCLUSIONS

Based on the results of the study, the following can be concluded:

- The *Master Drainage Report for Arizona Farms* is prepared in accordance with our understanding of Pinal County drainage requirements and standards.
- Ultimately, a detailed drainage system composed of streets, scuppers, catch basins, storm drains, culverts, open channels, and retention basins will be designed for all parcels within the Site.
- Based on the HEC-1 computer modeling, resulting peak flows for the post-development condition 100-year, 25-year, 10-year and 2-year, 6-hour and 24-hour storm flows exiting the Site do not exceed pre-development condition levels, as summarized within this report.
- As development progresses, on-site retention basins will be designed to store the 100-year, 2-hour storm event for disturbed areas.
- Stormwater storage infiltration, and/or drywells shall evacuate retained runoff from basins within the 36-hour requirement.
- Drainage infrastructure has been designed in accordance with the appropriate criteria defined in this report. For situations not covered in this report, the drainage design criteria of the Pinal County Drainage Manual Volume 1 & Volume 2 (2004), Drainage Ordinance (1998) and Floodplain Management Ordinance (2006) and the ADOT *Highway Drainage Design Manual Hydrology* (2014) requirements shall be used for drainage facility design.
- Additional drainage reports substantiating the conformance to the master drainage system design will be required for each individual parcel. These reports are to address both the on-site drainage for the individual parcel as well as how the upstream and downstream drainage is being handled around the parcel.
- All finished floor elevations are to be designed at least 1-foot above the highest adjacent 100-year water surface elevations.
- The Site must provide all-weather access per the Drainage Ordinance requirements.
- The Site's proposed drainage design is in compliance with the Pinal County Drainage Ordinance (2007) and the Pinal County Drainage Manual (2004). As the development proceeds the Site must continue to be in compliance with the Pinal County Drainage Ordinance (2007) and the Pinal County Drainage Manual (2004).

- The Site shall not cause any adverse impacts or increased drainage problems for adjacent properties upstream and/or downstream.
- Ongoing maintenance is required for the drainage systems in order to assure design performance. Maintenance is the responsibility of ownership.

9.0 REFERENCES

1. *Drainage Manual Volume 1 & Volume 2*; Pinal County (2004).
2. *Drainage Ordinance,* Pinal County (1998).
3. *Floodplain Management Ordinance,* Pinal County (2006).
4. *Highway Drainage Design Manual Hydrology,* ADOT (2014).
5. *Drainage Design Manual for Maricopa, County, Arizona*, *4th Edition, Hydrology*, Flood Control District of Maricopa County, August 15, 2013.
6. *Drainage Design Manual for Maricopa, County, Arizona*, *Hydraulics*, Flood Control District of Maricopa County, August 15, 2013.
7. National *Flood Insurance Program, Flood Insurance Rate Map, Panel Numbers 04021C0875E* Federal Emergency Management Agency (FEMA), dated December 04, 2007.
8. *HEC-1 Flood Hydrograph Package*, US Army Corps of Engineers, June 1998.
9. *Bentley FlowMaster V8i*, Haestad Methods Solution Center, November 2013.
10. *Bentley CulvertMaster V3.3*, Haestad Methods Solution Center, November 2016.
11. *Highway Drainage Design Manual Volume 2 Hydrology* Second Edition, ADOT, 2014.

Existing Condition 100-year, 6-hour

HEC-1 Output

```
1*************************************
 *                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JUN   1998           *
 *            VERSION 4.1            *
 *                                   *
 *  RUN DATE   07JUN17  TIME  10:41:04   *
 *                                   *
 *************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS     *
*    HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616       *
*           (916) 756-1104            *
*                                   *
*************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX           XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1           ID        Flood Control District of Pinal County
            2           ID        AZ FARMS EX 100YR6HR - Arizona Farms MDR Existing Condition 100YR, 6HR
            3           ID        100 YEAR
            4           ID        6 Hour  Storm
            5           ID        Unit Hydrograph: Clark
            6           ID        Storm: Multiple
            7           ID        FILE NAME: EX100YR6HR.DAT
            8           ID        BY: WOOD/PATEL JCD
            9           ID        11/03/2016
                        *DIAGRAM
           10           IT       2  1JAN99       0    2000
           11           IO       5
           12           IN      15
                        *
           13           JD    2.74  0.0001
           14           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           15           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           16           PC   0.962   0.972   0.983   0.991   1.000
           17           JD    2.72  0.5000
           18           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           19           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           20           PC   0.962   0.972   0.983   0.991   1.000
           21           JD    2.67     2.8
           22           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
           23           PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
           24           PC   0.950   0.963   0.975   0.988   1.000
           25           JD    2.53    16.0
           26           PC   0.000   0.015   0.020   0.030   0.048   0.063   0.076   0.090   0.105   0.119
           27           PC   0.135   0.152   0.175   0.222   0.304   0.472   0.670   0.796   0.868   0.912
           28           PC   0.946   0.960   0.973   0.987   1.000
                        *

           29           KK   OFF A   BASIN
           30           BA   0.553
           31           LG    0.50    0.00    7.58    0.15       0
           32           UC   3.302   1.934
           33           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           34           UA     100
                        *

           35           KK     DA9  DIVERT
           36           DT    DTA9     0.0     0.0
           37           DI     0.0    66.0   206.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
           38           DQ     0.0     9.0    55.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *
                        *

           39           KK     RAB   ROUTE
           40           RS       7    FLOW
           41           RC   0.016   0.025   0.025    5100  0.0025    0.00
           42           RX    0.00    0.00    3.00   15.00   30.00   35.00   39.00   54.00
           43           RY  1538.0 1538.00 1537.00 1536.00 1536.00 1537.00 1538.00 1539.00
                        *
                        *
```



```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           44           KK   OFF B   BASIN
           45           BA   0.584
           46           LG    0.50    0.00    4.87    0.46       0
           47           UC   4.401   3.738
           48           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           49           UA     100
                        *
```

```
   50          KK    CBAB COMBINE
   51          HC       2
               *

   52          KK     ON 1   BASIN
   53          BA    0.023
   54          LG     0.50    0.00    5.05    0.42       3
   55          UC    1.045   1.146
   56          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
   57          UA      100
               *

   58          KK    OFF C   BASIN
   59          BA    0.481
   60          LG     0.50    0.00    7.58    0.15       0
   61          UC    3.874   3.202
   62          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
   63          UA      100
               *

   64          KK      RCF   ROUTE
   65          RS        6    FLOW
   66          RC    0.016   0.025   0.025    2290  0.0022    0.00
   67          RX     0.00    0.00   11.00   15.00   42.00   54.00   65.00   69.00
   68          RY   1536.0 1536.00 1535.00 1534.00 1534.00 1535.00 1535.00 1536.00
               *
               *

   69          KK    OFF D   BASIN
   70          KO
   71          BA    0.887
   72          LG     0.35    0.34    7.00    0.10       0
   73          UC    2.221   1.995
   74          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
   75          UA      100
               *

   76          KK       DD STORAGE
   77          KO
   78          RS        1    STOR
   79          SV            12.00   45.00
   80          SQ             0.00   70.00
   81          SE   1559.6 1561.60 1563.60
               *
               *
```

```
1                                        HEC-1 INPUT                                                PAGE  3

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
   82          KK      RED   ROUTE
   83          RS        4    FLOW
   84          RC    0.025   0.025   0.025    2210  0.0027    0.00
   85          RX     0.00    0.00    0.00    6.00   10.00   16.00   16.00   16.00
   86          RY   1557.0 1557.00 1557.00 1554.00 1554.00 1557.00 1557.00 1557.00
               *
               *

   87          KK    OFF E   BASIN
   88          BA    0.124
   89          LG     0.35    0.36    5.05    0.23       0
   90          UC    0.659   0.432
   91          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
   92          UA      100
               *

   93          KK    CBDE COMBINE
               *        1       2
   94          HC       2
               *

   95          KK      REF   ROUTE
               *       40       2
   96          RS      169    FLOW
   97          RC    0.025   0.016   0.025   10410  0.0019    0.00
   98          RX     0.00    2.00   35.00   49.00   63.00   80.00   88.00   90.00
   99          RY   1542.0 1540.00 1540.00 1540.28 1540.28 1540.00 1540.00 1542.00
               *
               *

  100          KK    OFF F   BASIN
  101          BA    1.187
  102          LG     0.50    0.00    8.36    0.12       0
  103          UC    5.749   4.831
  104          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  105          UA      100
               *

  106          KK    CBEF COMBINE
  107          HC       2
               *

  108          KK     CPF COMBINE
  109          HC       2
               *

  110          KK      DF  DIVERT
  111          DT     DTF     0.0     0.0
  112          DI     0.0   120.0   328.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
  113          DQ     0.0     0.0    79.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               *
```

```
1                                        HEC-1 INPUT                                                PAGE  4

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
114          KK     RFG   ROUTE
115          RS       8    FLOW
116          RC   0.030   0.025   0.050    3665  0.0022    0.00
117          RX    0.00   13.00   18.00   40.00   78.00  100.00  110.00  115.00
118          RY  1523.0 1522.00 1521.00 1520.00 1520.00 1520.00 1520.00 1521.00
             *
             *

119          KK   OFF G   BASIN
120          BA   1.896
121          LG    0.50    0.00    7.27    0.16       0
122          UC   6.830   5.088
123          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
124          UA     100
             *

125          KK    CBGF COMBINE
126          KO
127          HC       2
             *

128          KK     DPG STORAGE
129          KO       0
130          RS       1    STOR
131          SV       0     9.1    62.5   204.8   331.8
132          SQ       0    31.0   122.2   223.4   256.4
133          SE    1514    1516    1518    1520    1521
             *
             *

134          KK      RG   ROUTE
135          RS       3    FLOW
136          RC   0.050   0.050   0.050    1100  0.0045    0.00
137          RX    0.00   28.00   33.00   35.00   40.00   44.00  195.00  200.00
138          RY  1517.0 1516.00 1515.00 1514.00 1514.00 1515.00 1516.00 1517.00
             *
             *

139          KK   OFF H   BASIN
140          BA   0.064
141          LG    0.50    0.00   12.49    0.03       0
142          UC   2.699   6.406
143          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
144          UA     100
             *

145          KK   OFF I   BASIN
146          BA   0.310
147          LG    0.50    0.00   10.22    0.05       0
148          UC   3.800   3.404
149          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
150          UA     100
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

151          KK   OFF J   BASIN
152          BA   0.680
153          LG    0.50    0.00    6.34    0.24       0
154          UC   3.518   2.001
155          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
156          UA     100
             *

157          KK      RJ   ROUTE
158          RS       1    FLOW
159          RC   0.030   0.030   2.720    2720  0.3900    0.00
160          RX    0.00    2.00    5.00    8.00   12.00   15.00   18.00   20.00
161          RY  1518.0 1518.00 1517.00 1516.00 1516.00 1517.00 1518.00 1518.00
             *
             *

162          KK    CPIJ COMBINE
163          HC       2
             *
             *

164          KK   CBFHI COMBINE
165          HC       3
             *

166          KK     RH6   ROUTE
167          KO
168          RS      24    FLOW
169          RC   0.050   0.035   0.050    2550  0.0010    0.00
170          RX    0.00   50.00  950.00  957.00  963.00  967.00  970.00 1040.00
171          RY  1513.0 1512.50 1512.00 1509.00 1509.00 1511.00 1512.00 1513.00
             *
             *

172          KK    ON 6   BASIN
173          BA   0.218
174          LG    0.50    0.00    6.16    0.25       0
175          UC   2.706   1.911
176          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
177          UA     100
             *

178          KK    CB6H COMBINE
179          HC       2
             *
```

```
 180          KK     R67   ROUTE
 181          KO
 182          RS      16    FLOW
 183          RC   0.050   0.035   0.050    1500  0.0010    0.00
 184          RX    0.00    3.00 1261.00 1267.00 1273.00 1278.00 1311.00 1410.00
 185          RY  1511.0 1510.00 1510.00 1508.00 1508.00 1510.00 1510.00 1511.00
              *
              *
1                                        HEC-1 INPUT                                                PAGE  6

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 186          KK    ON 7   BASIN
 187          BA   0.193
 188          LG    0.50    0.01    5.71    0.31       0
 189          UC   3.014   2.840
 190          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 191          UA     100
              *

 192          KK    CB67 COMBINE
 193          HC       2
              *

 194          KK     R78   ROUTE
 195          KO
 196          RS      11    FLOW
 197          RC   0.050   0.035   0.050    1350  0.0015    0.00
 198          RX    0.00    2.00  230.00 1296.00 1305.00 1307.00 1310.00 1315.00
 199          RY  1510.0 1509.00 1508.00 1509.00 1507.00 1507.00 1509.00 1510.00
              *

 200          KK      MR   BASIN
 201          KM           MAGIC RANCH HYDROGRAPH FROM HEC-HMS DRAINAGE REPORT OUTPUT
 202          BA   1.369
 203          QI       0       0       0       0       0       0       0       0       0       0
 204          QI       0       0       0       0       0       0       0       0       0       0
 205          QI       0       0       0       0       0       0       0       0       0       0
 206          QI       0       0       0       0       0       0       0       0       0       0
 207          QI       0       0       0       0       0       0       0       0       0       0
 208          QI       0      20      22      24      27      30      33      34      35      36
 209          QI      36      36      36      36      36      36      36      36      36      36
 210          QI      36      36      36      36      36      36      36      36      36      36
 211          QI      36      36      36      36      36      36      36      36      36      36
 212          QI      36      36      36      36      36      36      36      36      36      36
 213          QI      36      36      36      36      36      36      36      36      36      36
 214          QI      36      36      36      36      36      36      36      36      36      36
 215          QI      36      36      36      36      36      36      36      36      36      36
 216          QI      36      36      36      36      36      36      36      36      36      36
 217          QI      36      36      36      36      36      36      36      36      36      36
 218          QI      36      36      36      36      36      36      36      36      36      36
 219          QI      36      36      36      36      36      36      36      36      36      36
 220          QI      36      36      36      36      36      36      36      36      36      36
 221          QI      36      36      36      36      36      36      36      36      36      36
 222          QI      36      36      36      36      36      36      36      36      36      36
 223          QI      36      36      36      36      36      36      36      36      36      36
 224          QI      36      36      36      36      36      36      36      36      36      36
 225          QI      36      36      36      36      36      36      36      36      36      36
 226          QI      36      36      36      36      36      36      36      36      36      36
 227          QI      36      36      36      36      36      36      36      36      36      36
 228          QI      36      36      36      36      36      36      36      36      36      36
 229          QI      36      36      36      36      36      36      36      36      36      36
 230          QI      36      36      36      36      36      36      36      36      36      36
 231          QI      36      36      36      36      36      36      36      36      36      36
 232          QI      36      36      36      36      36      36      36      36      36      36
 233          QI      36      36      36      36      36      36      36      36      36      36
1                                        HEC-1 INPUT                                                PAGE  7

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 234          QI      36      36      36      36      36      36      36      36      36      36
 235          QI      36      36      36      36      36      36      36      36      36      36
 236          QI      36      36      36      36      36      36      36      36      36      36
 237          QI      36      36      36      36      36      36      36      36      36      36
 238          QI      36      36      36      36      36      36      36      36      36      36
 239          QI      36      36      36      36      36      36      36      36      36      36
 240          QI      36      36      36      36      36      36      36      36      36      36
 241          QI      36      36      36      36      36      36      36      36      36      36
 242          QI      36      36      36      36      36      36      36      36      36      36
 243          QI      36      36      36      36      36      36      36      36      36      36
              *

 244          KK     RMR   ROUTE
 245          KO
 246          RS      71    FLOW
 247          RC   0.050   0.050   0.050    7240  0.0014    0.00
 248          RX    0.00    0.00    0.00    6.00  106.00  112.00  112.00  112.00
 249          RY  1510.0 1510.00 1510.00 1509.00 1509.00 1510.00 1510.00 1510.00
              *
              *

 250          KK   OFF K   BASIN
 251          BA   0.505
 252          LG    0.30    0.23    6.16    0.17       5
 253          UC   1.543   1.047
 254          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 255          UA     100
              *

 256          KK    CB7K COMBINE
 257          HC       3
              *

 258          KK   OFF L   BASIN
```

```
          259          BA   0.052
          260          LG    0.10    0.25    4.03    0.56      13
          261          UC   0.283   0.194
          262          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          263          UA     100
                       *

          264          KK     RL8   ROUTE
          265          RS       4    FLOW
          266          RC   0.025   0.025   0.025    1920  0.0026    0.00
          267          RX    0.00    0.00    4.00   40.00   47.00   49.00   53.00   53.00
          268          RY  1511.5 1511.50 1511.00 1510.00 1510.00 1511.00 1511.50 1511.50
                       *
                       *

          269          KK    ON 8   BASIN
          270          BA   0.229
          271          LG    0.49    0.02    4.96    0.43       1
          272          UC   2.477   1.864
          273          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          274          UA     100
                       *
1                                        HEC-1 INPUT                                          PAGE  8

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          275          KK    CB8L COMBINE
          276          HC       2
                       *

          277          KK     CP8 COMBINE
          278          HC       2
                       *

          279          KK    DET8 STORAGE
          280          KO
          281          RS       1    STOR
          282          SV       0     1.5    3.65   13.57   47.16
          283          SE  1505.0  1506.0  1507.0  1508.0  1509.0
          284          SQ       0      10      34      62    2322
                       *
                       *

          285          KK      DFRETRIEVE
          286          DR     DTF
                       *
                       *

          287          KK      RF   ROUTE
          288          RS      19    FLOW
          289          RC   0.050   0.050   0.050    2309  0.0026    0.00
          290          RX    0.00    0.00    0.00    3.00  403.00  406.00  406.00  406.00
          291          RY  1523.0 1523.00 1523.00 1522.00 1522.00 1523.00 1523.00 1523.00
                       *
                       *

          292          KK   OFF M   BASIN
          293          BA   0.068
          294          LG    0.45    0.07    5.14    0.37       1
          295          UC   1.757   1.652
          296          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          297          UA     100
                       *

          298          KK    CPFM COMBINE
          299          HC       2
                       *
                       *

          300          KK     RFM   ROUTE
          301          RS       7    FLOW
          302          RC   0.050   0.050   0.050     995  0.0032    0.00
          303          RX    0.00    0.00    0.00    3.00  403.00  406.00  406.00  406.00
          304          RY  1523.0 1523.00 1523.00 1522.00 1522.00 1523.00 1523.00 1523.00
                       *
                       *
1                                        HEC-1 INPUT                                          PAGE  9

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          305          KK    ON 3   BASIN
          306          BA   0.096
          307          LG    0.50    0.00    5.14    0.40       0
          308          UC   2.156   1.996
          309          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          310          UA     100
                       *

          311          KK    CPM3 COMBINE
          312          HC       2
                       *

          313          KK     D23 STORAGE
          314          KO
          315          RS       1    STOR
          316          SV       0    0.48    3.29   13.88   36.46
          317          SE  1517.0  1518.0 1519.00 1520.00 1521.00
          318          SS  1520.0   45.00    2.60    1.50
                       *
                       *

          319          KK     R24   ROUTE
          320          RS      10    FLOW
```

```
 321          RC   0.050   0.025   0.025    2600  0.0010    0.00
 322          RX    0.00   20.00  260.00  268.00  310.00  318.00  320.00  320.00
 323          RY  1520.0 1519.00 1519.00 1518.00 1518.00 1519.00 1520.00 1520.00
              *
              *

 324          KK     DA9RETRIEVE
 325          DR    DTA9
              *

 326          KK     RA4   ROUTE
 327          RS      20    FLOW
 328          RC   0.025   0.025   0.050    5193  0.0027    0.00
 329          RX    0.00    3.00   10.00   22.00   29.00   36.00   62.00   71.00
 330          RY  1522.0 1521.00 1521.00 1520.00 1520.00 1521.00 1521.00 1522.00
              *

 331          KK   OFF N   BASIN
 332          BA   0.071
 333          LG    0.50    0.00    5.05    0.42       0
 334          UC   1.362   0.957
 335          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 336          UA     100
              *

 337          KK      RN   ROUTE
 338          RS      16    FLOW
 339          RC   0.025   0.025   0.050    3922  0.0025    0.00
 340          RX    0.00    3.00   10.00   22.00   29.00   36.00   62.00   71.00
 341          RY  1522.0 1521.00 1521.00 1520.00 1520.00 1521.00 1521.00 1522.00
              *
1                                        HEC-1 INPUT                                          PAGE 10

          LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 342          KK    CP4N COMBINE
 343          HC       2
              *

 344          KK    RA4N   ROUTE
 345          RS      13    FLOW
 346          RC   0.025   0.025   0.050    3986  0.0032    0.00
 347          RX    0.00    3.00   10.00   22.00   29.00   36.00   62.00   71.00
 348          RY  1522.0 1521.00 1521.00 1520.00 1520.00 1521.00 1521.00 1522.00
              *

 349          KK    ON 4   BASIN
 350          BA   0.847
 351          LG    0.50    0.00    5.05    0.42       0
 352          UC   5.048   4.081
 353          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 354          UA     100
              *

 355          KK    CP24 COMBINE
 356          HC       3
              *
              *

 357          KK    ON 5   BASIN
 358          BA   0.240
 359          LG    0.50    0.00    5.05    0.42       3
 360          UC   3.407   3.553
 361          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 362          UA     100
              *

 363          KK    CB45 COMBINE
 364          HC       2
              *

 365          KK    RET4 STORAGE
 366          KO
 367          RS       1    STOR
 368          SA     0.2     0.3     0.4     0.5     0.6     1.1     3.6    25.4
 369          SE  1511.0 1512.00 1513.00 1514.00 1515.00 1516.00 1517.00 1518.00
 370          SS  1517.0  475.00    2.60    1.50
              *
              *
 371          ZZ
```

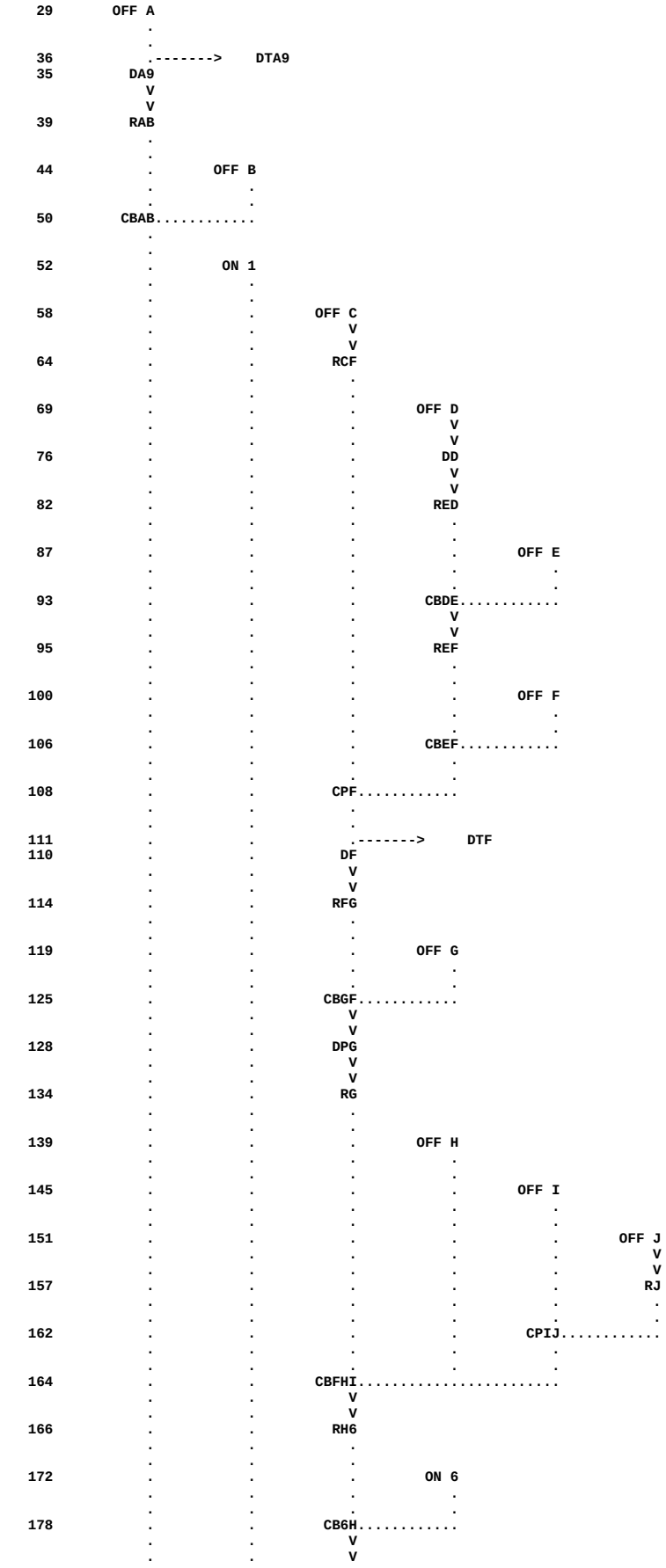
1

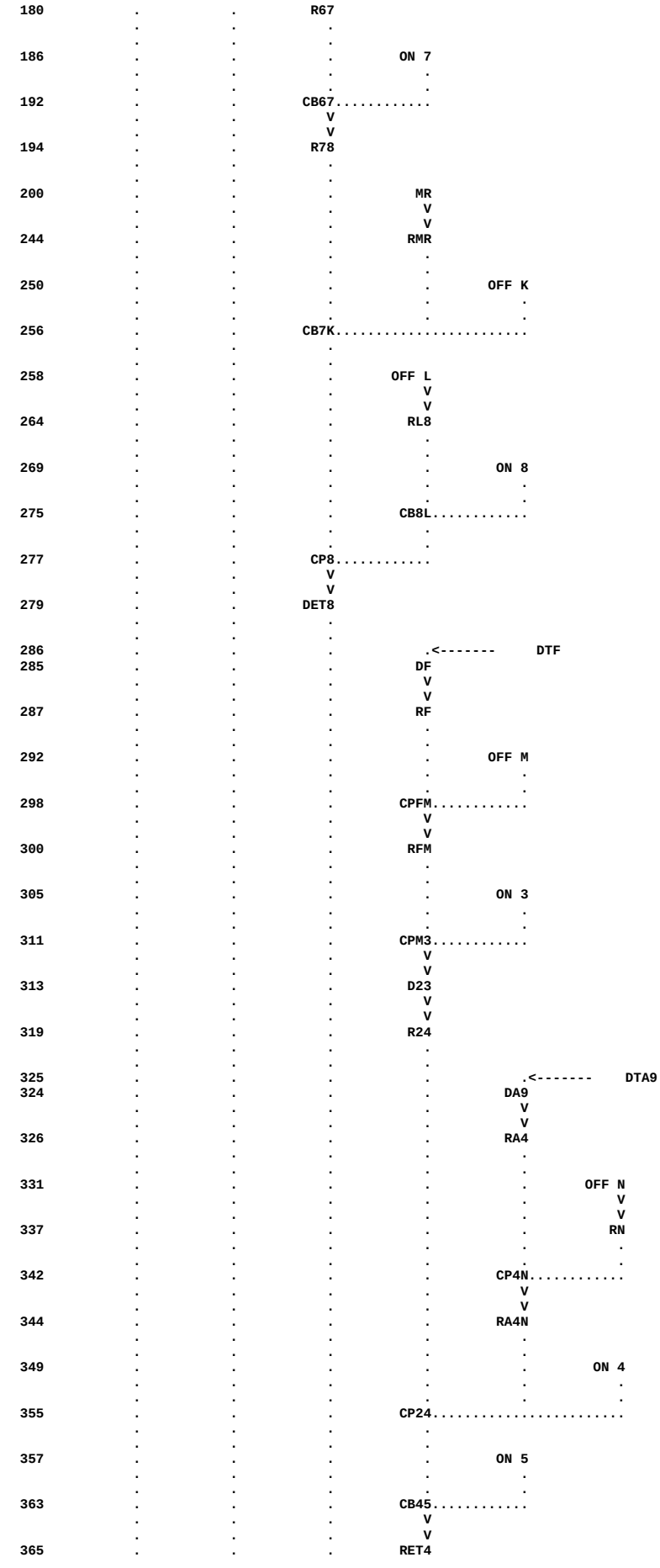
SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

(V) ROUTING (---->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW





(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************                    *****************************************
*                                       *                    *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *    U.S. ARMY CORPS OF ENGINEERS       *
*              JUN   1998               *                    *    HYDROLOGIC ENGINEERING CENTER      *
*            VERSION 4.1                *                    *          609 SECOND STREET            *
*                                       *                    *       DAVIS, CALIFORNIA 95616         *
*  RUN DATE   07JUN17  TIME  10:41:04   *                    *           (916) 756-1104              *
*                                       *                    *                                       *
*****************************************                    *****************************************
```

Flood Control District of Pinal County
AZ FARMS EX 100YR6HR - Arizona Farms MDR Existing Condition 100YR, 6HR
100 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Multiple
FILE NAME: EX100YR6HR.DAT
BY: WOOD/PATEL JCD
11/03/2016

```
  11 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                       NMIN           2  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1JAN99  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      3JAN99  ENDING DATE
                      NDTIME        1838  ENDING TIME
                      ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     .03 HOURS
                       TOTAL TIME BASE   66.63 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT

  13 JD          INDEX STORM NO. 1
                       STRM        2.74  PRECIPITATION DEPTH
                       TRDA         .00  TRANSPOSITION DRAINAGE AREA

  14 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                   .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                   .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                   .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  17 JD          INDEX STORM NO. 2
                       STRM        2.72  PRECIPITATION DEPTH
                       TRDA         .50  TRANSPOSITION DRAINAGE AREA

  18 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                   .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                   .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                   .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  21 JD          INDEX STORM NO. 3
                       STRM        2.67  PRECIPITATION DEPTH
                       TRDA        2.80  TRANSPOSITION DRAINAGE AREA

  22 PI            PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                    .03       .03       .03       .03       .03       .03       .03       .03       .03       .03
                    .02       .02       .02       .02       .02       .02       .02       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

 25 JD          INDEX STORM NO. 4
                     STRM       2.53  PRECIPITATION DEPTH
                     TRDA      16.00  TRANSPOSITION DRAINAGE AREA

 26 PI           PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                    .02       .02       .02       .03       .03       .03       .03       .03       .03       .03
                    .02       .02       .02       .02       .02       .02       .02       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
 69 KK     *     OFF D  *        BASIN
           *            *
           **************

 70 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
 76 KK     *        DD  *      STORAGE
           *            *
           **************

 77 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
125 KK     *      CBGF  *      COMBINE
           *            *
           **************

126 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
128 KK     *       DPG  *      STORAGE
           *            *
           **************

129 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
166 KK    *       RH6  *        ROUTE
          *            *
          **************

167 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
180 KK    *       R67  *        ROUTE
          *            *
          **************

181 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
194 KK    *       R78  *        ROUTE
          *            *
          **************

195 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
244 KK    *       RMR  *        ROUTE
          *            *
          **************

245 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
279 KK    *      DET8  *      STORAGE
          *            *
          **************

280 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
313 KK    *       D23  *      STORAGE
          *            *
          **************

314 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
365 KK    *      RET4  *      STORAGE
          *            *
```

```
          **************

366 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            5  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE
```

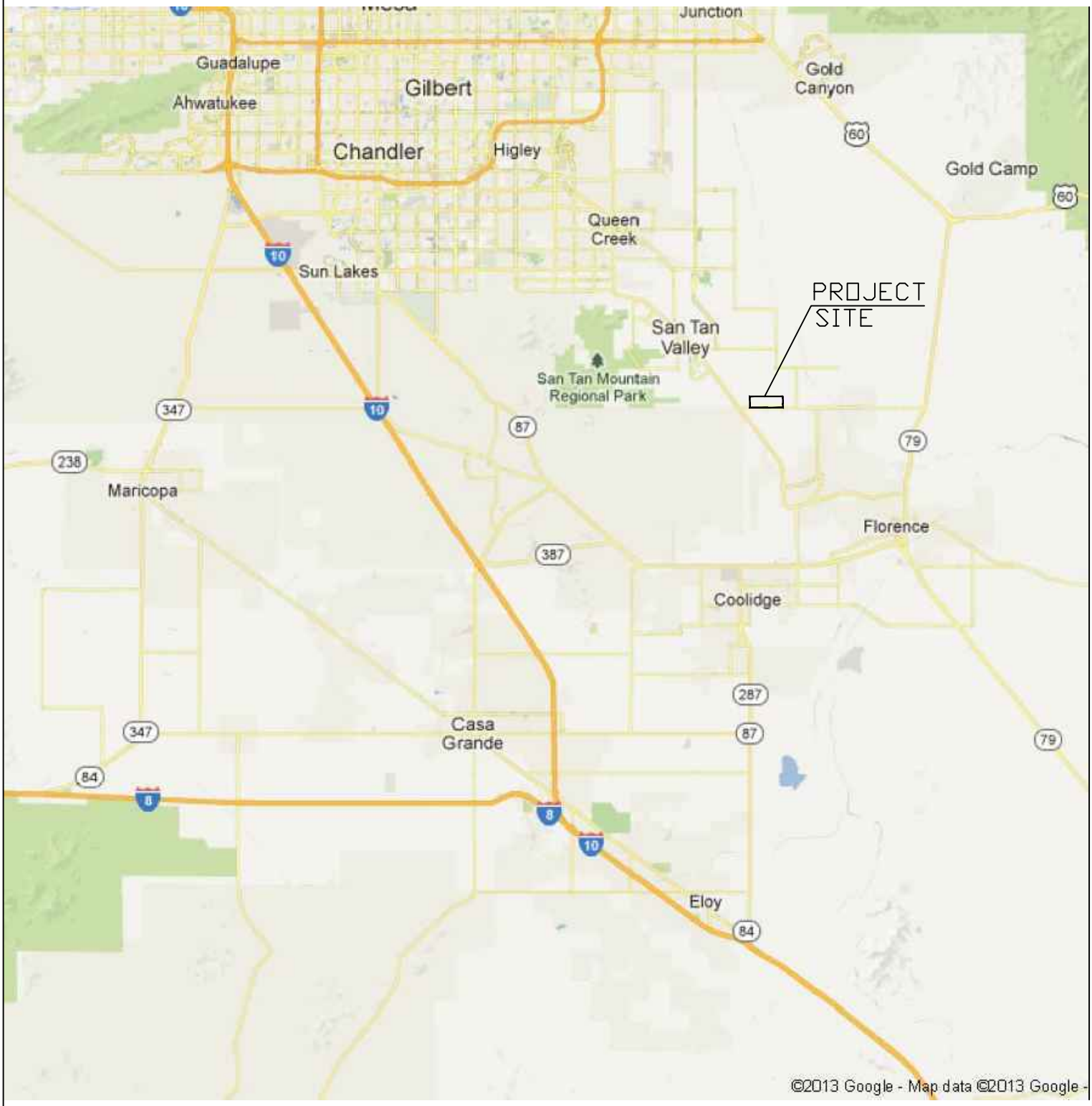
1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	OFF A	208.	6.53	101.	27.	10.	.55		
+	DIVERSION TO	DTA9	56.	6.53	22.	6.	2.	.55		
+	HYDROGRAPH AT	DA9	152.	6.53	79.	22.	8.	.55		
+	ROUTED TO	RAB	151.	6.77	78.	22.	8.	.55		
+	HYDROGRAPH AT	OFF B	108.	7.47	72.	21.	8.	.58		
+	2 COMBINED AT	CBAB	238.	7.10	144.	41.	15.	1.14		
+	HYDROGRAPH AT	ON 1	15.	4.80	4.	1.	0.	.02		
+	HYDROGRAPH AT	OFF C	123.	7.03	76.	22.	8.	.48		
+	ROUTED TO	RCF	123.	7.23	76.	22.	8.	.48		
+	HYDROGRAPH AT	OFF D	265.	5.77	119.	32.	12.	.89		
+	ROUTED TO	DD	63.	8.87	56.	25.	9.	.89		
+	ROUTED TO	RED	63.	9.00	56.	25.	9.	.89		
+	HYDROGRAPH AT	OFF E	124.	4.43	16.	4.	1.	.12		
+	2 COMBINED AT	CBDE	108.	4.43	56.	29.	11.	1.01		
+	ROUTED TO	REF	72.	5.73	55.	28.	10.	1.01		
+	HYDROGRAPH AT	OFF F	203.	8.63	153.	44.	16.	1.19		
+	2 COMBINED AT	CBEF	250.	8.93	196.	69.	25.	2.20		
+	2 COMBINED AT	CPF	335.	8.50	258.	89.	33.	2.68		
+	DIVERSION TO	DTF	82.	8.50	53.	14.	5.	2.68		
+	HYDROGRAPH AT	DF	253.	8.50	206.	75.	28.	2.68		
+	ROUTED TO	RFG	253.	8.80	206.	75.	28.	2.68		
+	HYDROGRAPH AT	OFF G	284.	9.43	220.	62.	22.	1.90		
+	2 COMBINED AT	CBGF	510.	9.30	409.	132.	48.	4.57		
+	ROUTED TO	DPG	188.	13.90	178.	123.	48.	4.57		
+	ROUTED TO	RG	188.	14.00	178.	123.	48.	4.57		
+	HYDROGRAPH AT	OFF H	11.	6.53	8.	3.	1.	.06		
+	HYDROGRAPH AT	OFF I	82.	7.07	53.	16.	6.	.31		
+	HYDROGRAPH AT	OFF J	230.	6.67	115.	31.	11.	.68		
+	ROUTED TO	RJ	230.	6.70	115.	31.	11.	.68		
+	2 COMBINED AT	CPIJ	301.	6.80	165.	46.	17.	.99		
+	3 COMBINED AT	CBFHI	311.	7.03	253.	163.	64.	5.63		
+	ROUTED TO	RH6	308.	7.83	251.	163.	64.	5.63		

+	HYDROGRAPH AT	ON 6	83.	6.07	38.	10.	4.	.22
+	2 COMBINED AT	CB6H	343.	7.77	265.	171.	67.	5.85
+	ROUTED TO	R67	340.	8.30	264.	171.	67.	5.85
+	HYDROGRAPH AT	ON 7	49.	6.37	28.	8.	3.	.19
+	2 COMBINED AT	CB67	362.	8.30	276.	176.	69.	6.04
+	ROUTED TO	R78	360.	8.67	275.	176.	69.	6.04
+	HYDROGRAPH AT	MR	36.	14.77	36.	36.	29.	1.37
+	ROUTED TO	RMR	36.	17.17	36.	36.	27.	1.37
+	HYDROGRAPH AT	OFF K	278.	5.13	79.	20.	7.	.50
+	3 COMBINED AT	CB7K	364.	8.67	275.	204.	101.	7.91
+	HYDROGRAPH AT	OFF L	89.	4.17	7.	2.	1.	.05
+	ROUTED TO	RL8	78.	4.30	7.	2.	1.	.05
+	HYDROGRAPH AT	ON 8	76.	5.90	33.	9.	3.	.23
+	2 COMBINED AT	CB8L	83.	4.30	40.	11.	4.	.28
+	2 COMBINED AT	CP8	374.	8.67	280.	209.	103.	8.19
+	ROUTED TO	DET8	364.	8.90	280.	205.	102.	8.19
+	HYDROGRAPH AT	DF	82.	8.50	53.	14.	5.	2.68
+	ROUTED TO	RF	81.	9.17	52.	14.	5.	2.68
+	HYDROGRAPH AT	OFF M	25.	5.37	9.	2.	1.	.07
+	2 COMBINED AT	CPFM	95.	8.93	61.	19.	7.	.07
+	ROUTED TO	RFM	94.	9.17	61.	19.	7.	.07
+	HYDROGRAPH AT	ON 3	35.	5.67	16.	4.	2.	.10
+	2 COMBINED AT	CPM3	101.	9.10	64.	23.	8.	.16
+	ROUTED TO	D23	52.	11.97	42.	15.	6.	.16
+	ROUTED TO	R24	52.	12.30	42.	15.	6.	.16
+	HYDROGRAPH AT	DA9	56.	6.53	22.	6.	2.	.55
+	ROUTED TO	RA4	55.	7.20	22.	6.	2.	.55
+	HYDROGRAPH AT	OFF N	47.	5.00	12.	3.	1.	.07
+	ROUTED TO	RN	45.	5.53	12.	3.	1.	.07
+	2 COMBINED AT	CP4N	65.	7.07	34.	9.	3.	.07
+	ROUTED TO	RA4N	65.	7.50	34.	9.	3.	.07
+	HYDROGRAPH AT	ON 4	141.	7.97	98.	29.	10.	.85
+	3 COMBINED AT	CP24	196.	7.83	137.	50.	18.	1.08
+	HYDROGRAPH AT	ON 5	52.	6.70	32.	10.	3.	.24
+	2 COMBINED AT	CB45	232.	7.77	162.	58.	21.	1.32

```
          ROUTED TO
+                         RET4       232.    7.87         161.         56.         20.       1.32

 *** NORMAL END OF HEC-1 ***
```

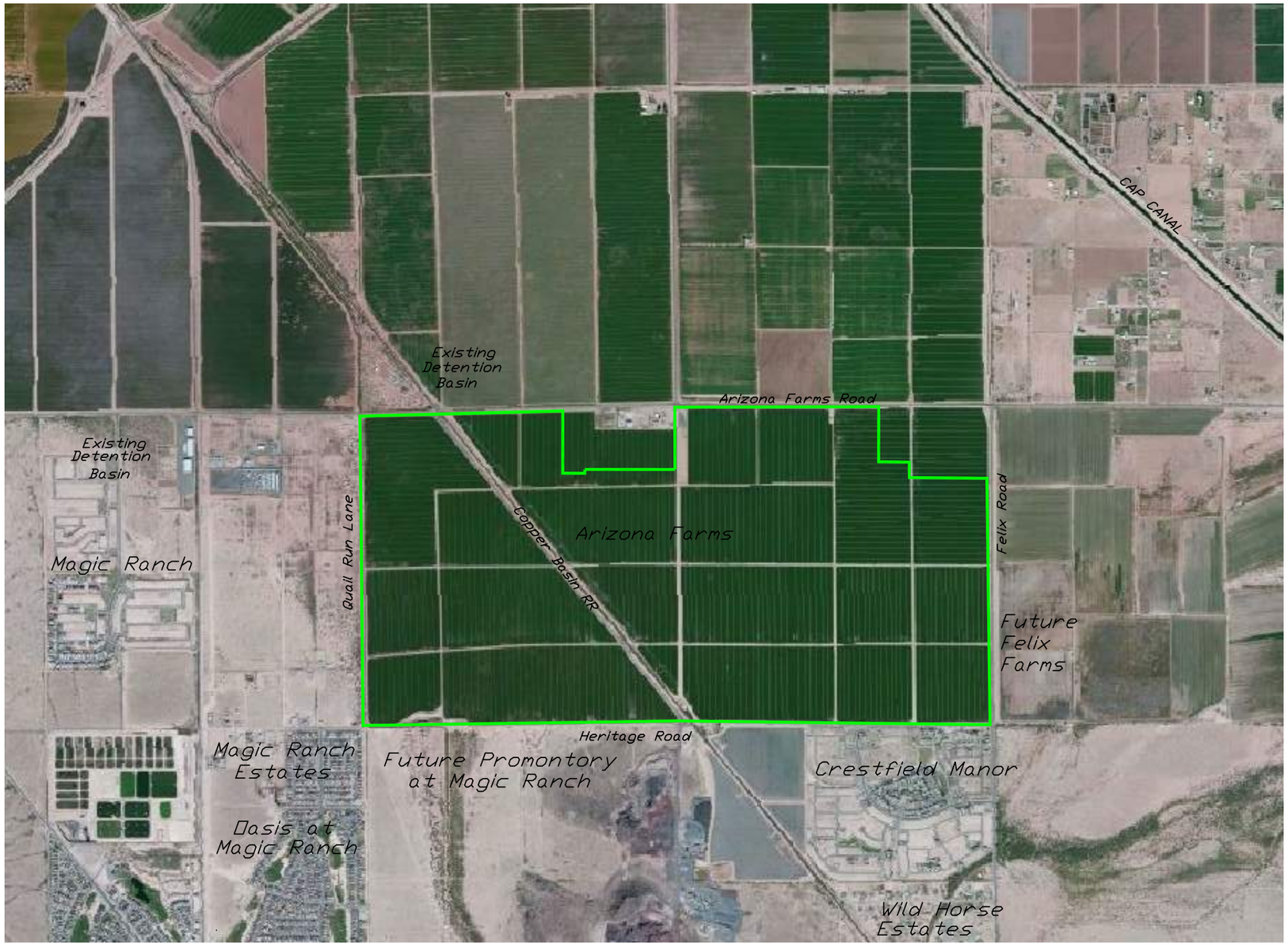


N

PLATE 1
VICINITY MAP

ARIZONA FARMS
PINAL COUNTY, AZ

WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS
2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com



2000 0 1000 2000

1 inch = 2000 ft.

WOOD/PATEL

CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS

2051 W. Northern Ave.
Phoenix, AZ 85021

(602) 335-8500

www.woodpatel.com

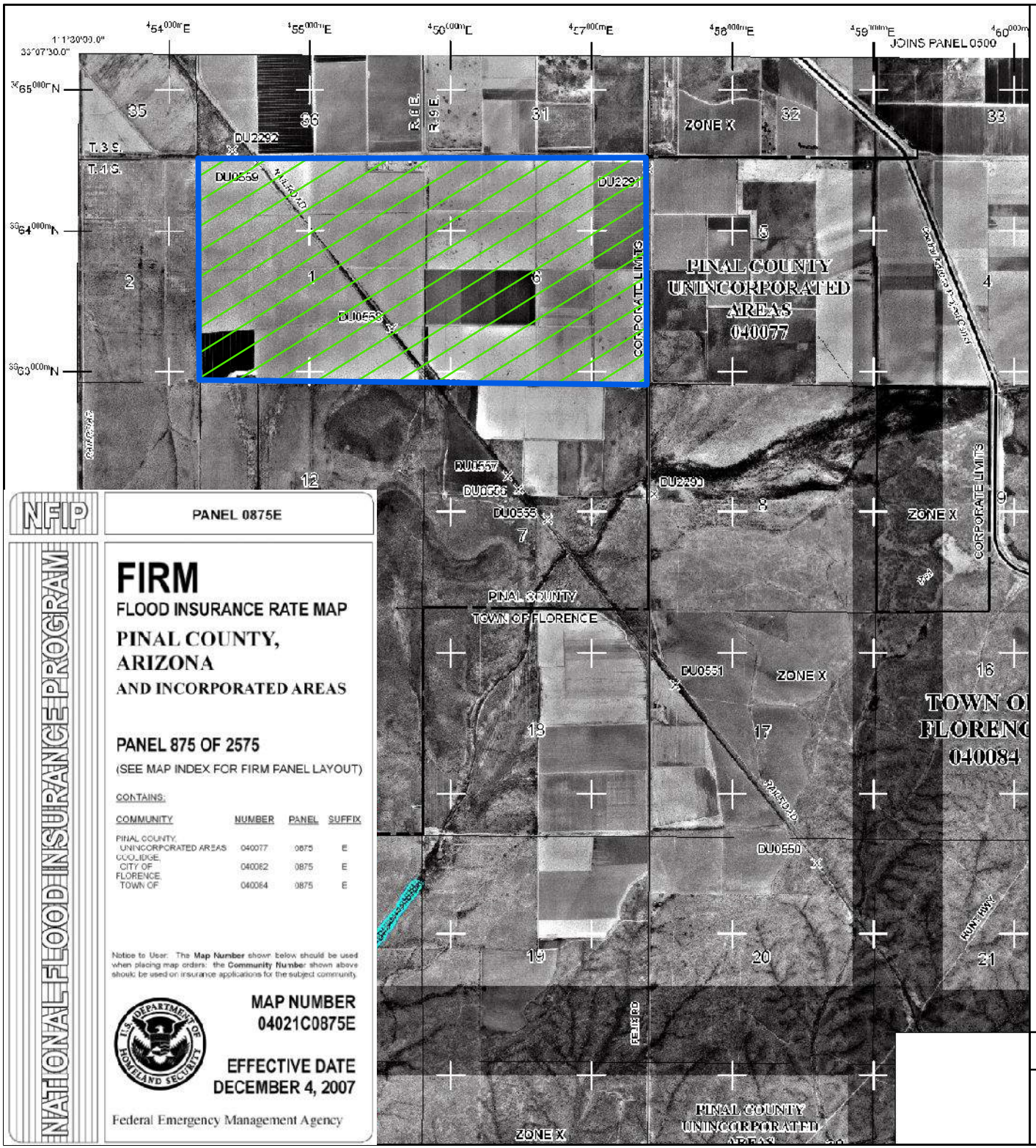
PHOENIX • MESA • GOODYEAR • TUCSON

ARIZONA FARMS

AERIAL MAP
PLATE 2

DATE	SCALE	SHEET
07/28/2016	1" = 2000'	1 OF 1
JOB NO. 144247	DESIGN JCD	CHECK MY
	DRAWN JCD	

N:\2014\144247 AZ Farms\Project Support\Reports\Drainage\MDR Update Pinal County\Exhibits\AZ Farms Plate 2 Aerial Map.dwg



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0875E

FIRM

FLOOD INSURANCE RATE MAP

PINAL COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 875 OF 2575

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
PINAL COUNTY, UNINCORPORATED AREAS	040077	0875	E
COOLIDGE, CITY OF	040062	0875	E
FLORENCE, TOWN OF	040064	0875	E

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
04021C0875E

EFFECTIVE DATE
DECEMBER 4, 2007

Federal Emergency Management Agency

LEGEND

SPECIAL FLOOD HAZARD AREAS 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, AR, A99, 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 Area Zones, and 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 National Geodetic Vertical Datum of 1929

A — A	Cross section line
2 — 2	Transect line
112° 07' 08", 33° 25' 41"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere.
76 mE	1000-meter Universal Transverse Mercator grid tick values zone 12
875000 FT	5000-foot grid tick values: Arizona State Plane coordinate system, central zone (FIPSZONE 3176) NAD83 (Transverse Mercator)
DV2313	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

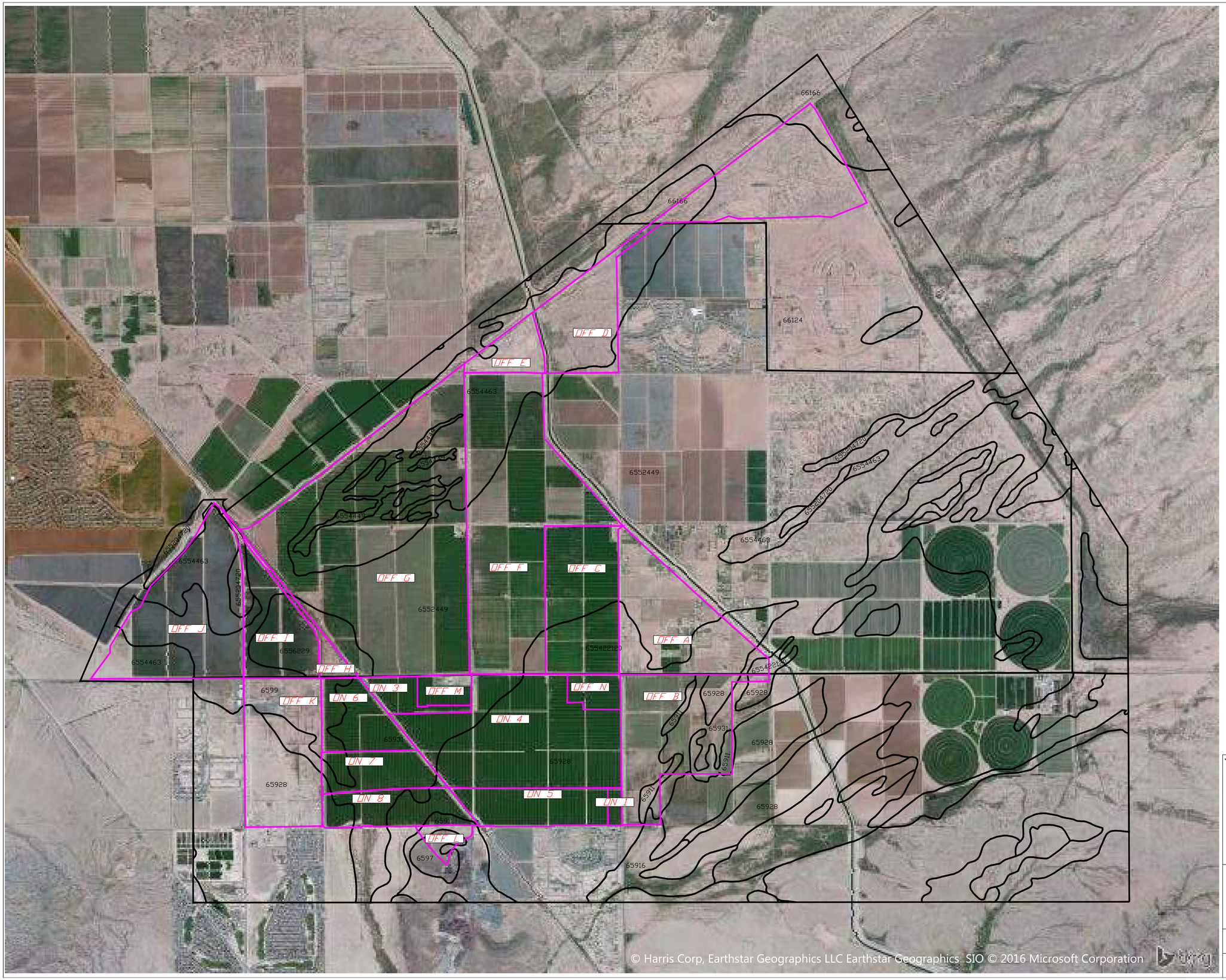
1 INCH = 2000 FEET

N

ARIZONA FARMS

PLATE 3
FEMA FIRM MAP

WOOD/PATEL
MISSION: CLIENT SERVICE℠



LEGEND

SOIL BOUNDARY

65931 SOIL ID

N

1500 0 750 1500

1 inch = 1500 ft.

WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS

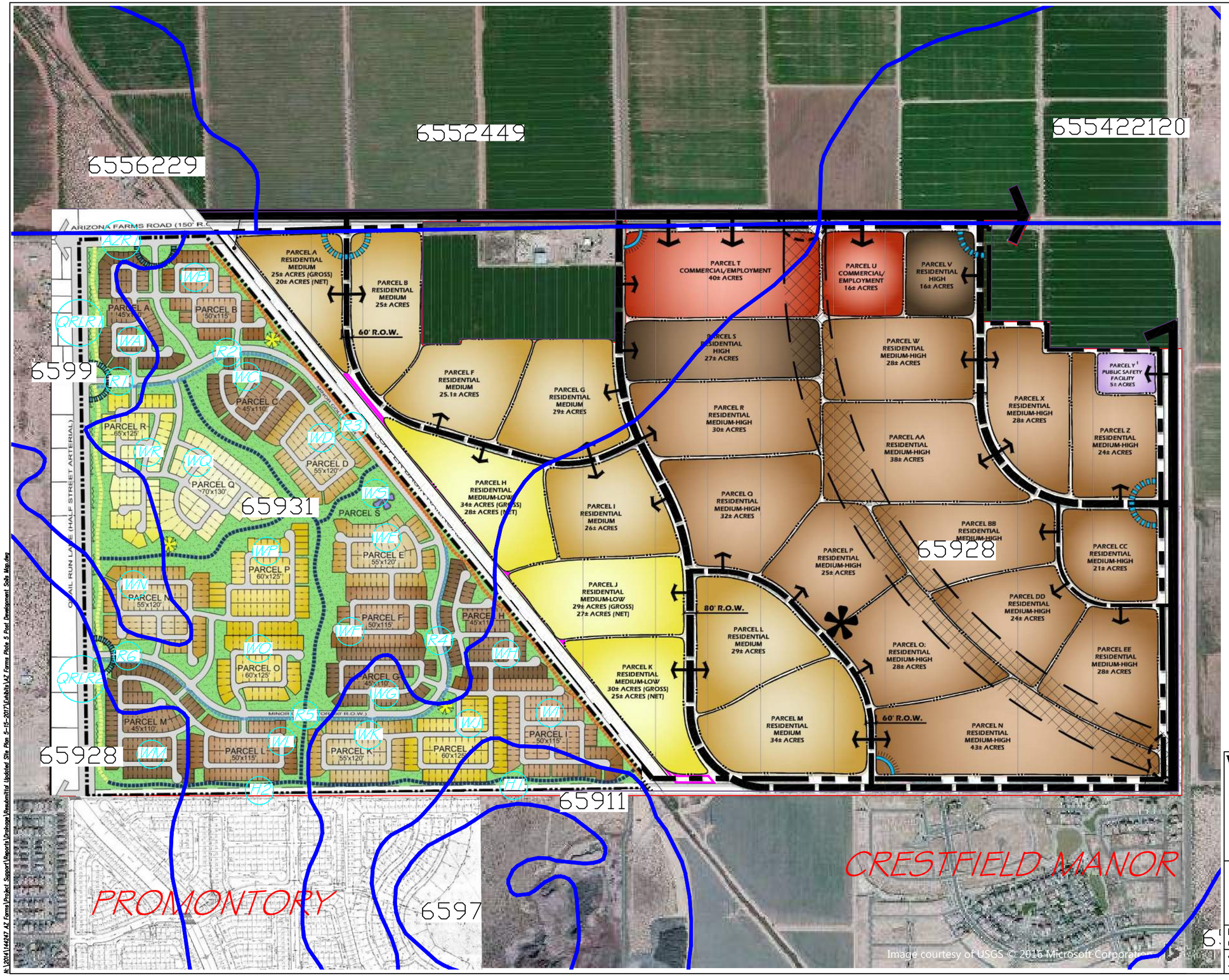
2051 W. Northern Ave.
Phoenix, AZ 85021

(602) 335-8500
www.woodpatel.com

PHOENIX • MESA • TUCSON

ARIZONA FARMS EXISTING CONDITIONS SOILS MAP PLATE 4

DATE	SCALE	SHEET
11/14/2016	1" = 1500'	1 OF 1
JOB NO.	DESIGN JCD	CHECK MY
144247	DRAWN JCD	FILE PLATE 4



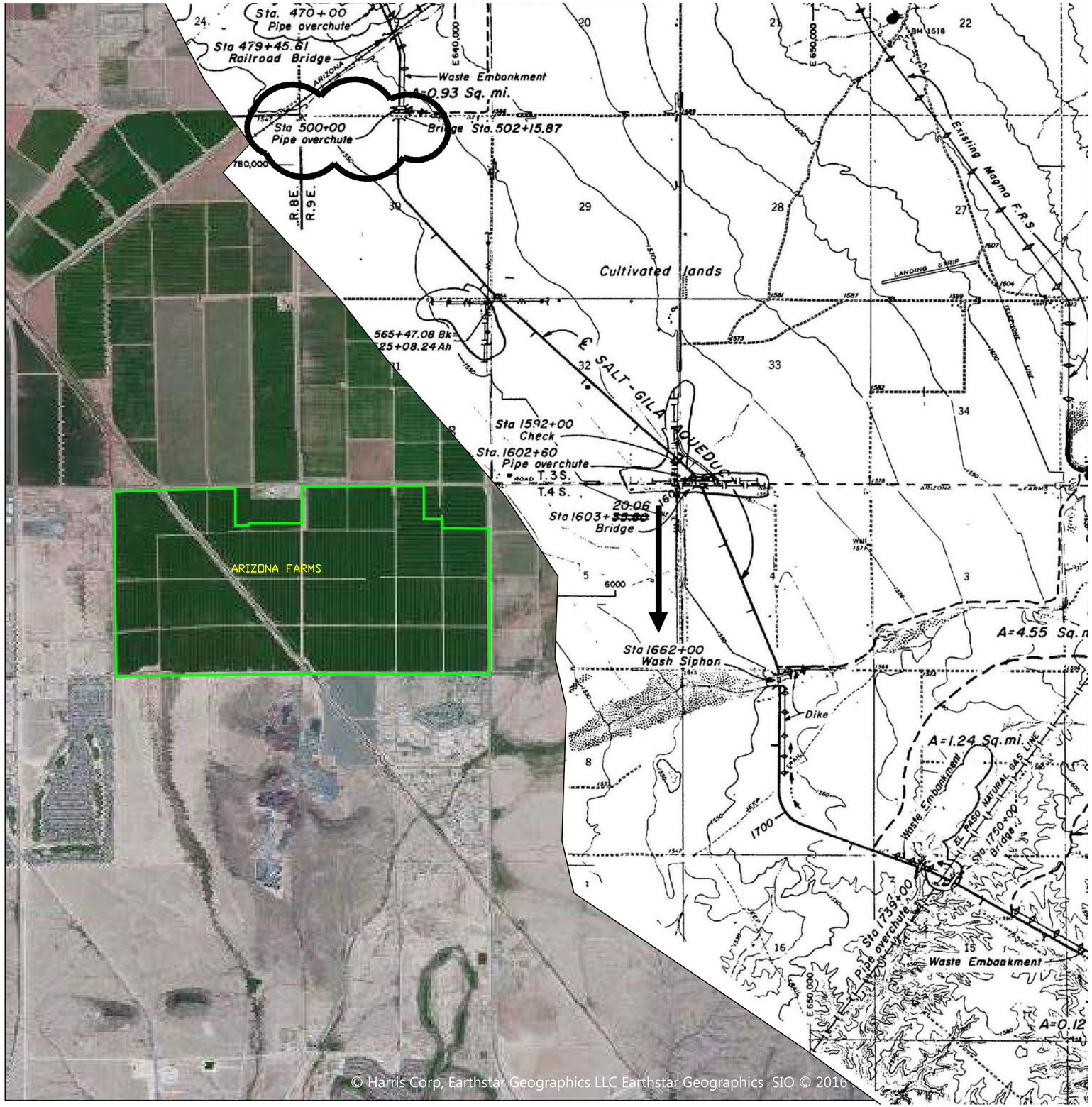
M:\2014\144247 AZ Farms\Project Support\Reports\Drainage\Resubmittal Updated Site Plan 5-15-2017\Exhibits\AZ Farms Plate 5 Post Development Soils Map.dwg

WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS

2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com
PHOENIX ● MESA ● TUCSON

ARIZONA FARMS POST DEVELOPMENT SOILS MAP PLATE 5

DATE	SCALE	SHEET
06/07/2017	1" = 400'	1 OF 1
JOB NO.	DESIGN JCD	CHECK MY
144247	DRAWN JCD	FILE PLATE 5



3000 0 1500 3000

1 inch = 3000 ft.

EXPLANATION

- Aqueduct
- Dike
- Bridge
- Overcrute
- Culvert
- Drainage cut
- Wash Siphon
- Check
- Primary highway
- Secondary highway
- Light-duty road
- Unimproved road
- Jeep trail
- Railroad
- Power line
- Pipeline
- Telephone line

NOTES

Base map is a composite of Advance sheet U.S. Geological Survey 7.5 minute Quadrangle Sheets. Desert Well, Superstition Mts. S.W., Sacaton N.E., Magma, Florence, Florence S.E. All of Pinal County, Arizona.

Arizona State plane coordinate system, central zone.

PROTECTIVE WORKS

STATION	SIZE	PEAK Q in (cfs)	STORAGE CAPICITY (ac ft.)	PEAK Q out (cfs)	DESIGN STORM
161+82.90	4-72" PIPE OVERCHUTE	17,000	8,424	1,113	OUTLET QUEEN CK. FRS
470+00	54" PIPE OVERCHUTE			47	
500+00	2-42" PIPE OVERCHUTE	160	15	60	
502+50	42" PIPE OVERCHUTE				TAIL WATER DRAINAGE
1662+00	WASH SIPHON	684	19	644	100yr. 6hr GENERAL STORM
1884+30	54" PIPE OVERCHUTE	138		138	3hr. THUNDER STORM
1887+06	54" PIPE OVERCHUTE	103		103	" " "
915+45	2-66" PIPE CULVERT	492		286	100yr. 6hr. THURDER STORM
948+60	54" PIPE CULVERT	242		151	"
970+40	2-72" PIPE CULVERT	1032		562	3hr. THUNDER STORM
986+00	48" PIPE CULVERT	117		117	"
991+00	48" PIPE CULVERT	131		125	"
1009+00	36" PIPE CULVERT	67		67	"
1012+00	66" PIPE CULVERT	213		213	"
1036+00	30" PIPE CULVERT	632		480	"
1052+35	42" PIPE CULVERT	95		83	"
1059+50	42" PIPE CULVERT	90		90	"

WOOD/PATEL

CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS

2051 W. Northern Ave.
Phoenix, AZ 85021

(602) 335-8500

www.woodpatel.com

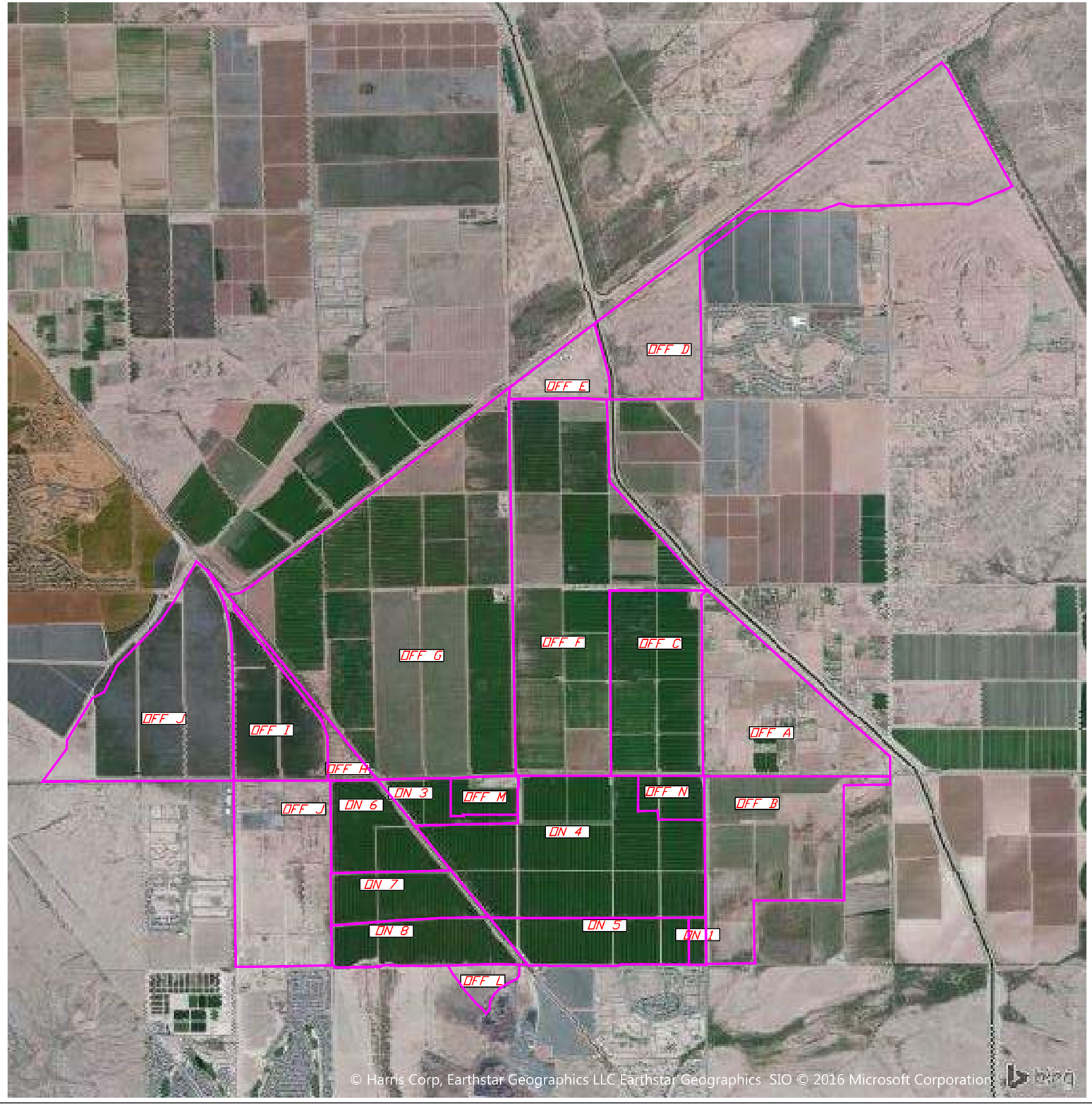
PHOENIX • MESA

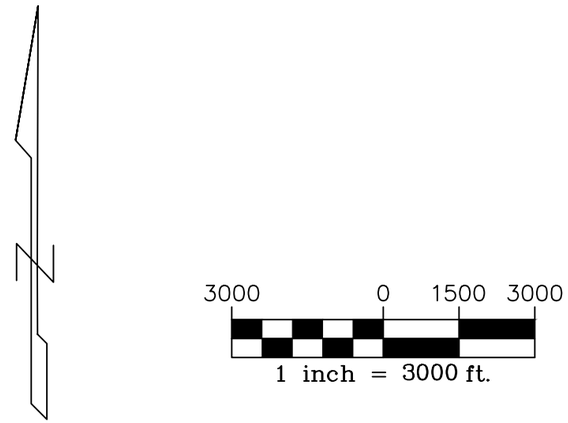
ARIZONA FARMS

SALT-GILA AQUEDUCT REACH 3 MAP PLATE 6

DATE	SCALE	SHEET
01/28/2016	1" = 3000'	1 OF 1
JOB NO. 144247	DESIGN JCD	CHECK MY
	DRAWN JCD	

N:\2014\144247 AZ Farms\Project Support\Reports\Drainage\Exhibits\AZ Farms Plate 6 CAP Salt-GILA Aqueduct Map.dwg





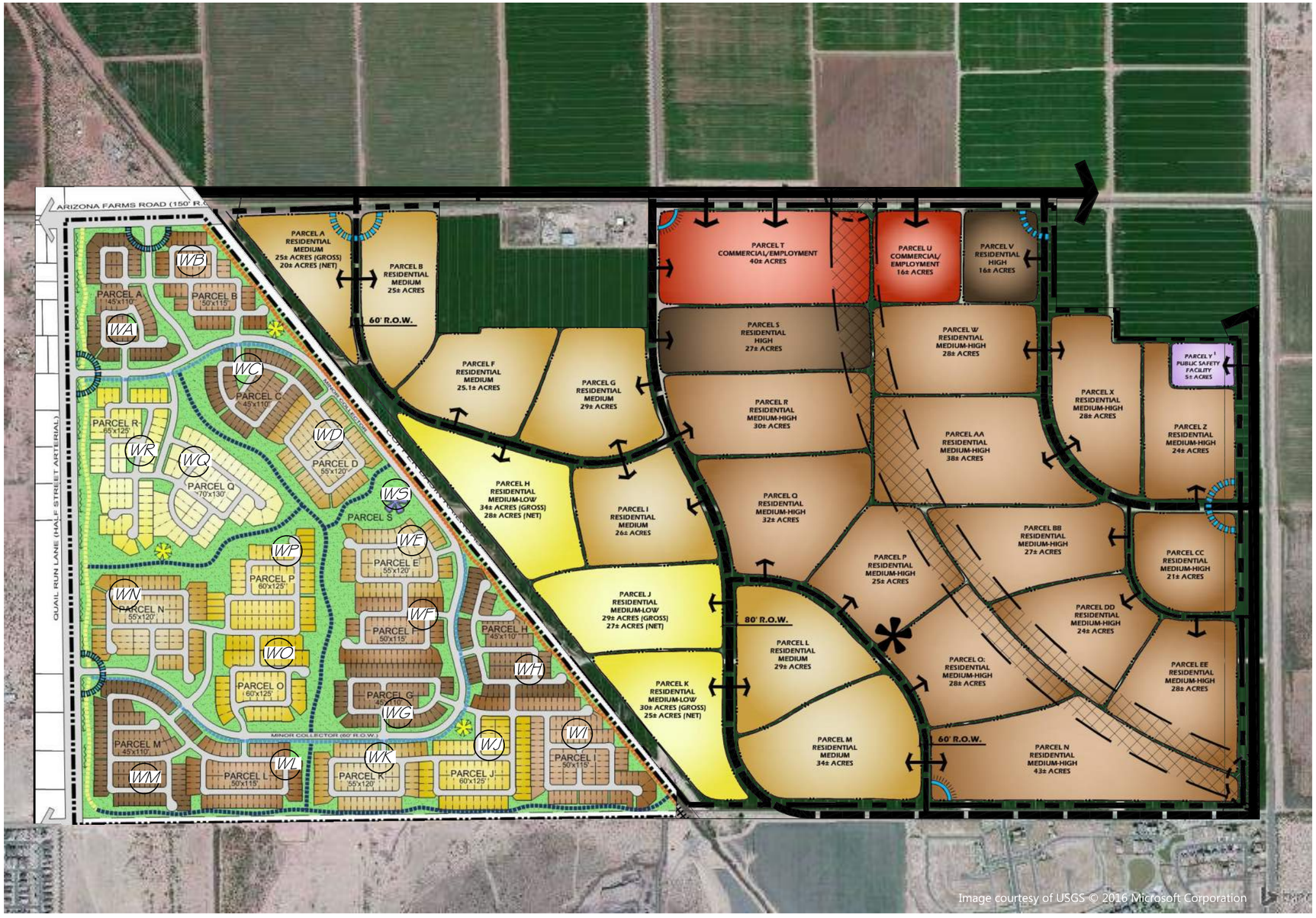
WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS
2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com
PHOENIX • MESA

ARIZONA FARMS

ARIZONA FARMS EXISITNG CONDITIONS LANDUSE PLATE 7

DATE	SCALE	SHEET
11/14/2016	1" = 3000'	1 OF 1
JOB NO. 144247	DESIGN JCD	CHECK MY
	DRAWN JCD	

N:\2014\144247 AZ Farms\Project Support\Reports\Drainage\MDR Update Final County\Resubmittal MDR 11-3-2016\WLB Files 10-20-2016\Exhibits\AZ Farms Plate 7 Existing Conditions Landuse Map 2.dwg



LEGEND OF SYMBOLS:

- Property Boundary
- Planning Parcel Boundary
- Copper Basin Railroad
- Conceptual North-South Freeway Corridor
- Existing Drainage Channel
- Vehicular Access
- Primary Community Entry
- Community Entry
- Potential Secondary Elementary School Site

WEST PLAN SUMMARY TABLE:

Land Use
Single-Family Residential
Single-Family Residential
Community Park Site
Elementary School Site

EAST PLAN SUMMARY TABLE:

Land Use
Single-Family Residential
Single-Family Residential
Single-Family Residential
Multi-Family Residential
Public Safety Facility
Commercial/ Employment

1000 0 500 1000

1 inch = 1000 ft.

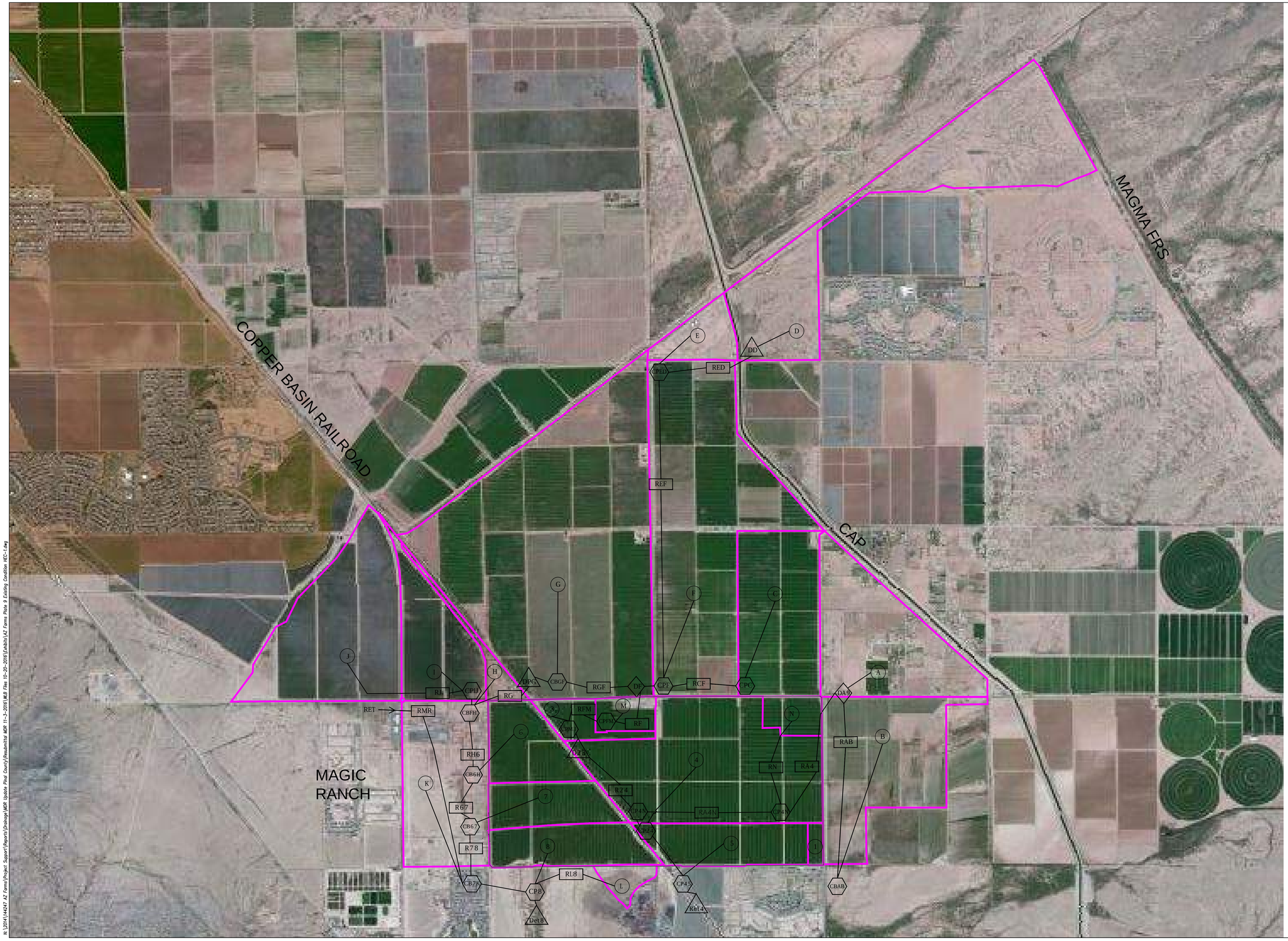
WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS
2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com
PHOENIX • MESA

ARIZONA FARMS

PROPOSED LAND USE MAP
PLATE 8

01/28/2016	1" = 1000'	1 1
144247	DESIGN JCD	CHECK MY
	DRAWN JCD	

N:\2014\144247 AZ Farms\Project Support\Reports\Drainage\Resubmittal Updated Site Plan 5-15-2017\Exhibits\AZ Farms Plate 8 Post Development Land Use Map.dwg



LEGEND

- A — HEC-1 SUB BASIN
- RAB — HEC-1 ROUTING PATH
- CPG1 — HEC-1 COMBINATION POINT
- DPG — HEC-1 STORAGE
- DF — HEC-1 DIVERSION
- DRAINAGE AREAS

1400 0 700 1400

1 inch = 1400 ft.

WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS

2051 W. Northern Ave
Phoenix, AZ 85021

(602) 335-8500
www.woodpatel.com

PHOENIX • MESA

PLATE 9 ARIZONA FARMS EXISTING CONDITION HEC-1 SCHEMATIC MAP

DATE	SCALE	SHEET
11/03/2016	1" = 1400'	1 OF 1
JOB NO. 144247	DESIGN JCD	CHECK MY
	DRAWN JCD	FILE PLATE 9

N:\2016\144247 AZ Farms\Project Support\Reports\Drainage\MDR Update Pinal County\Wastewater MDR 11-3-2016\MLB Plan 10-20-2016\Exhibits\AZ Farms Plate 9 Existing Condition HEC-1.dwg

SEE EXISTING CONDITIONS HEC-1 SCHEMATIC FOR CONTINUATION

SEE EXISTING CONDITIONS HEC-1 SCHEMATIC FOR CONTINUATION

SEE EXISTING CONDITIONS HEC-1 SCHEMATIC FOR CONTINUATION

CRESTFIELD MANOR

LEGEND

- OFFSITE DRAINAGE AREAS
- ET — HEC-1 SUB BASIN
- RV — HEC-1 ROUTING PATH
- CMF2 — HEC-1 COMBINATION POINT
- RET4 — HEC-1 RETENTION/DETENTION
- DEP — HEC-1 DIVERSION
- ONSITE DRAINAGE AREAS

1 inch = 400 ft.

WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS
2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com
PHOENIX • MESA • TUCSON

PLATE 10A
POST-DEVELOPMENT CONDITION
HEC-1 SCHEMATIC MAP

DATE	SCALE	SHEET
07/26/2016	1" = 400'	1 OF 1
JOB NO.	DESIGN JCD	CHECK MY
144247	DRAWN JCD	FILE PLATE 8

SEE EXISTING CONDITIONS HEC-1 SCHEMATIC FOR CONTINUATION

SEE EXISTING CONDITIONS HEC-1 SCHEMATIC FOR CONTINUATION

SEE EXISTING CONDITIONS HEC-1 SCHEMATIC FOR CONTINUATION

LEGEND

- OFFSITE DRAINAGE AREAS
- ET — HEC-1 SUB BASIN
- RV — HEC-1 ROUTING PATH
- CMF2 — HEC-1 COMBINATION POINT
- RET4 — HEC-1 RETENTION/DETENTION
- DEP — HEC-1 DIVERSION
- ONSITE DRAINAGE AREAS

1 inch = 400 ft.

WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS

2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com

PHOENIX • MESA • TUCSON

PLATE 10B
POST-DEVELOPMENT CONDITION
HEC-1 SCHEMATIC MAP
WITH PROMONTORY DOWNSTREAM

DATE	SCALE	SHEET
07/26/2016	1" = 400'	1 OF 1
JOB NO.	DESIGN JCD	CHECK MY
144247	DRAWN JCD	FILE PLATE 8

LEGEND

Q_{100}=182 cfs 100-YR 6-HR PEAK WASH FLOW

EXISTING 100 YR FLOODPLAIN

EXISTING 100 YR PONDING LIMITS

PROJECT BOUNDARY

EXISTING DETENTION BASIN

Q100, 24-HR=518cfs

Q100, 24-HR=191cfs

SPLIT FLOW LOCATION

Q100=335cfs

Q100, 6-HR=82cfs
Q100, 24-HR=82 cfs

Arizona Farms Road

Q100=208cfs

Q100, 6-HR=56cfs

Q100, 6-HR=137cfs

Q100, 6-HR=95cfs

21ac-ft of Storage
WSF=1520.6

Q100=47cfs

Q100, 6-HR=55cfs

Q100, 24-HR=316cfs

Quail Run Lane

Copper Basin Rd

Felix Road

22 ac-ft of Storage
WSF=1508.3

6 ac-ft of Storage
WSF=1517.3

Q100, 6-HR=278cfs

Q100, 6-HR=62cfs
Q100, 24-HR=42cfs

Q100, 6-HR=364cfs
Q100, 24-HR=423cfs

Q100, 24-HR=36 lcfs

850' WEIR OUTFLOW

Heritage Road

Q100, 6-HR=232cfs
Q100, 24-HR=199cfs

760' EX-WEIR OUTFLOW

Crestfield Manor

Image courtesy of USGS © 2016 Microsoft Corporation

500 0 250 500

1 inch = 500 ft.

WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS

2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com

PHOENIX • MESA • TUCSON

PLATE 11 ARIZONA FARMS EXISTING CONDITION HYDRAULICS DRAINAGE MAP

DATE	SCALE	SHEET
11/03/2016	1" = 500'	1 OF 1
JOB NO.	DESIGN JCD	CHECK MY
144247	DRAWN JCD	FILE PLATE 11

LEGEND

Q100=206cfs — 100-YR, 6-HR PEAK DISCHARGE

PROPOSED CULVERTS

PROPOSED CHANNEL ID

STORAGE

N

500 0 250 500

1 inch = 500 ft.

WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS
2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com
PHOENIX • MESA • TUCSON

PLATE 12A
PROPOSED CONDITION HYDRAULICS DRAINAGE MAP

DATE	SCALE	SHEET
11/08/2016	1" = 500'	1 OF 1
JOB NO. 144247	DESIGN JCD	CHECK MY
	DRAWN JCD	FILE PLATE 12

LEGEND

Q100=206cfs — 100-YR, 6-HR PEAK DISCHARGE

PROPOSED CULVERTS

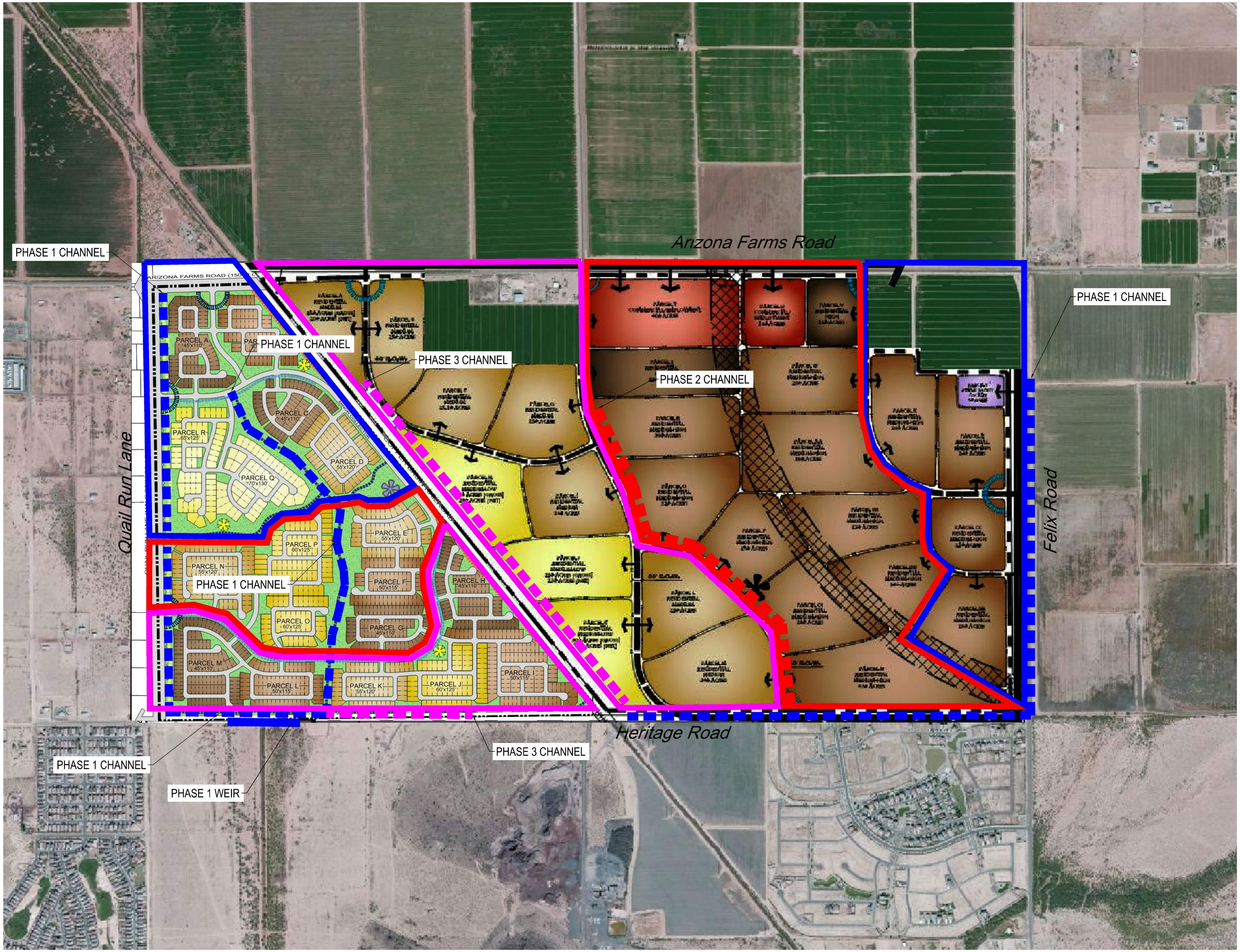
PROPOSED CHANNEL ID

STORAGE

WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS
2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com
PHOENIX • MESA • TUCSON

PLATE 12B
PROPOSED CONDITION
HYDRAULICS DRAINAGE MAP
WITH PROMONTORY DOWNSTREAM

DATE	SCALE	SHEET
06/06/2017	1" = 500'	1 OF 1
JOB NO.	DESIGN JCD	CHECK MY
144247	DRAWN JCD	FILE PLATE 12



LEGEND

- PHASE 1 DEVELOPMENT
- PHASE 2 DEVELOPMENT
- PHASE 3 DEVELOPMENT
- PHASE 1 CHANNEL
- PHASE 2 CHANNEL
- PHASE 3 CHANNEL

N

500 0 250 500

1 inch = 500 ft.

WOOD/PATEL

CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS

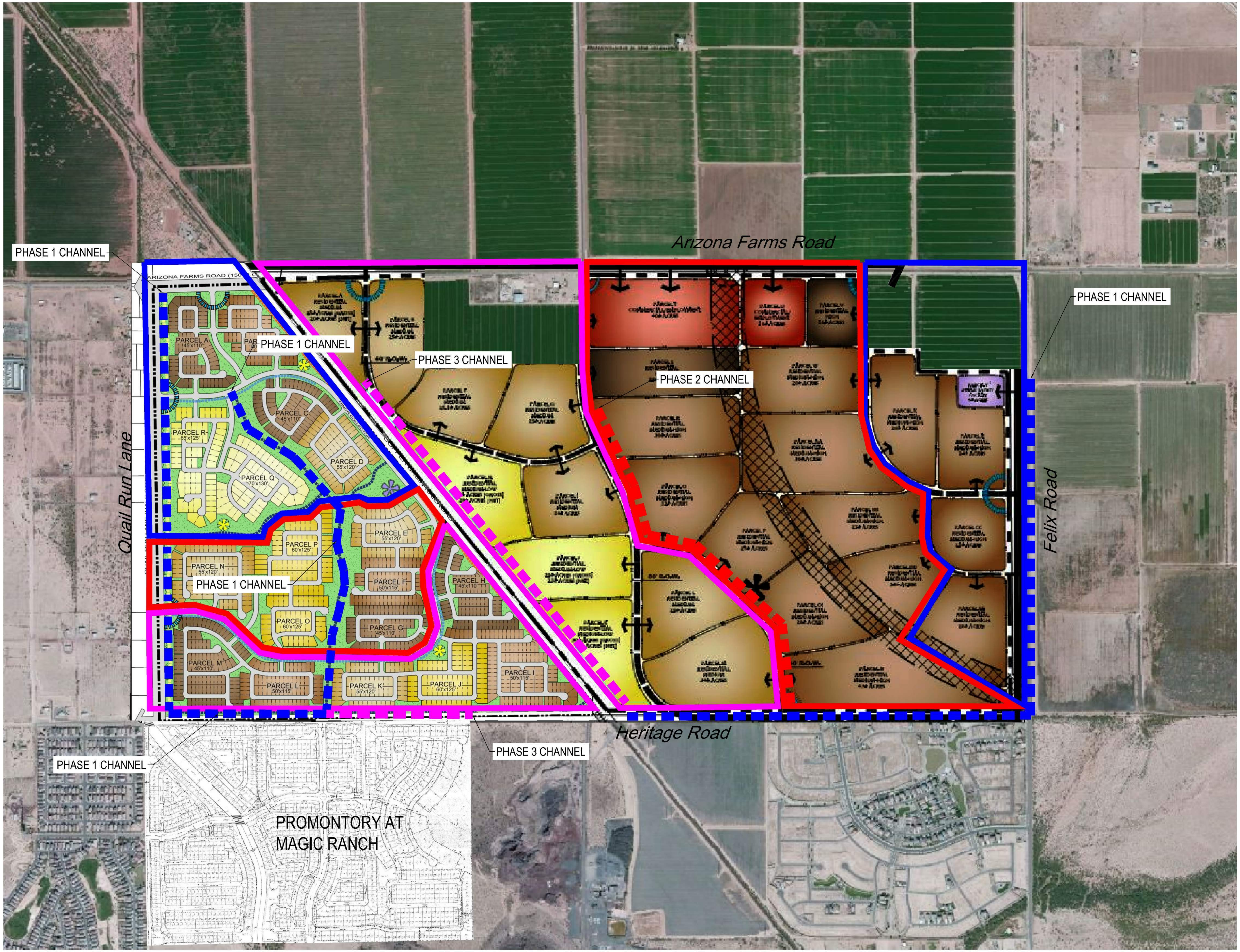
2051 W. Northern Ave.
Phoenix, AZ 85021

(602) 335-8500
www.woodpatel.com

PHOENIX • MESA • TUCSON

PLATE 13A AZ FARMS
DEVELOPMENT PHASING MAP

DATE	SCALE	SHEET
06/07/2017	1" = 500'	1 OF 1
JOB NO.	DESIGN JCD	CHECK MY
144247	DRAWN JCD	FILE PLATE 13



LEGEND

- PHASE 1 DEVELOPMENT
- PHASE 2 DEVELOPMENT
- PHASE 3 DEVELOPMENT
- PHASE 1 CHANNEL
- PHASE 2 CHANNEL
- PHASE 3 CHANNEL

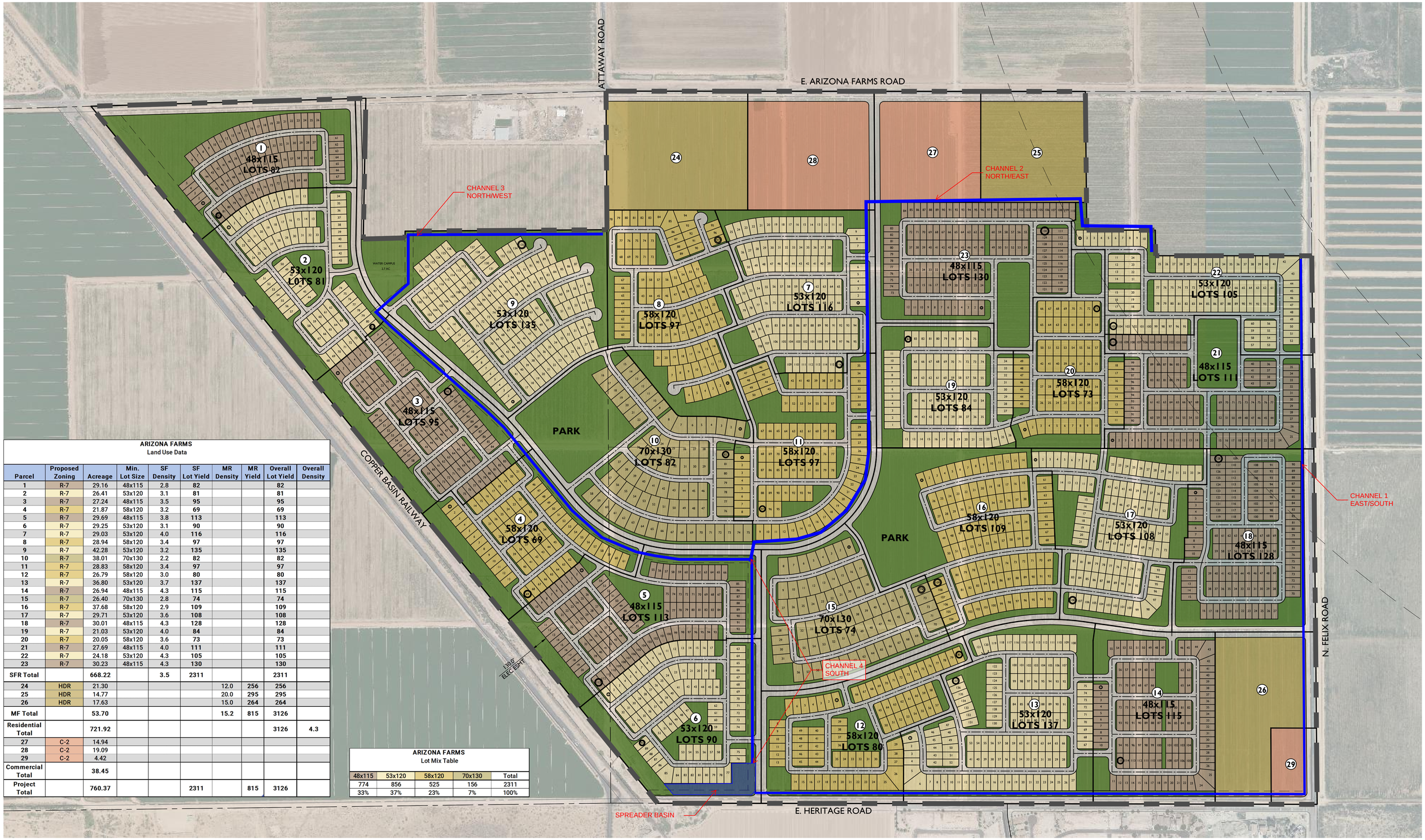
WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS

2051 W. Northern Ave.
Phoenix, AZ 85021
(602) 335-8500
www.woodpatel.com
PHOENIX • MESA • TUCSON

PLATE 13B AZ FARMS
DEVELOPMENT PHASING MAP
WITH PROMONTORY DOWNSTREAM

DATE	SCALE	SHEET
06/06/2017	1" = 500'	1 OF 1
JOB NO.	DESIGN JCD	CHECK MY
144247	DRAWN JCD	FILE PLATE 13

Appendix D.2
HEC-1 Schematic Map



ARIZONA FARMS
Land Use Data

Parcel	Proposed Zoning	Acreage	Min. Lot Size	SF Density	SF Lot Yield	MR Density	MR Yield	Overall Lot Yield	Overall Density
1	R-7	29.16	48x115	2.8	82			82	
2	R-7	26.41	53x120	3.1	81			81	
3	R-7	27.24	48x115	3.5	95			95	
4	R-7	21.87	58x120	3.2	69			69	
5	R-7	29.69	48x115	3.8	113			113	
6	R-7	29.25	53x120	3.1	90			90	
7	R-7	29.03	53x120	4.0	116			116	
8	R-7	28.94	58x120	3.4	97			97	
9	R-7	42.28	53x120	3.2	135			135	
10	R-7	38.01	70x130	2.2	82			82	
11	R-7	28.83	58x120	3.4	97			97	
12	R-7	26.79	58x120	3.0	80			80	
13	R-7	36.80	53x120	3.7	137			137	
14	R-7	26.94	48x115	4.3	115			115	
15	R-7	26.40	70x130	2.8	74			74	
16	R-7	37.68	58x120	2.9	109			109	
17	R-7	29.71	53x120	3.6	108			108	
18	R-7	30.01	48x115	4.3	128			128	
19	R-7	21.03	53x120	4.0	84			84	
20	R-7	20.05	58x120	3.6	73			73	
21	R-7	27.69	48x115	4.0	111			111	
22	R-7	24.18	53x120	4.3	105			105	
23	R-7	30.23	48x115	4.3	130			130	
SFR Total		668.22		3.5	2311			2311	
24	HDR	21.30				12.0	256	256	
25	HDR	14.77				20.0	295	295	
26	HDR	17.63				15.0	264	264	
MF Total		53.70				15.2	815	3126	
Residential Total		721.92						3126	4.3
27	C-2	14.94							
28	C-2	19.09							
29	C-2	4.42							
Commercial Total		38.45							
Project Total		760.37			2311		815	3126	

ARIZONA FARMS
Lot Mix Table

48x115	53x120	58x120	70x130	Total
774	856	525	156	2311
33%	37%	23%	7%	100%

21-0483

El Dorado Holdings, Inc.

Arizona Farms

Pinal County, Arizona

Development Plan

NORTH

0' 150' 300' 600'

SCALE: 1" = 300'-0"

04.05.2022

EPS GROUP

Appendix D.3
Hydroflow Outputs

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Apr 21 2022

21-0389 AZ Farms - Off Drn Channel - East/South

Trapezoidal

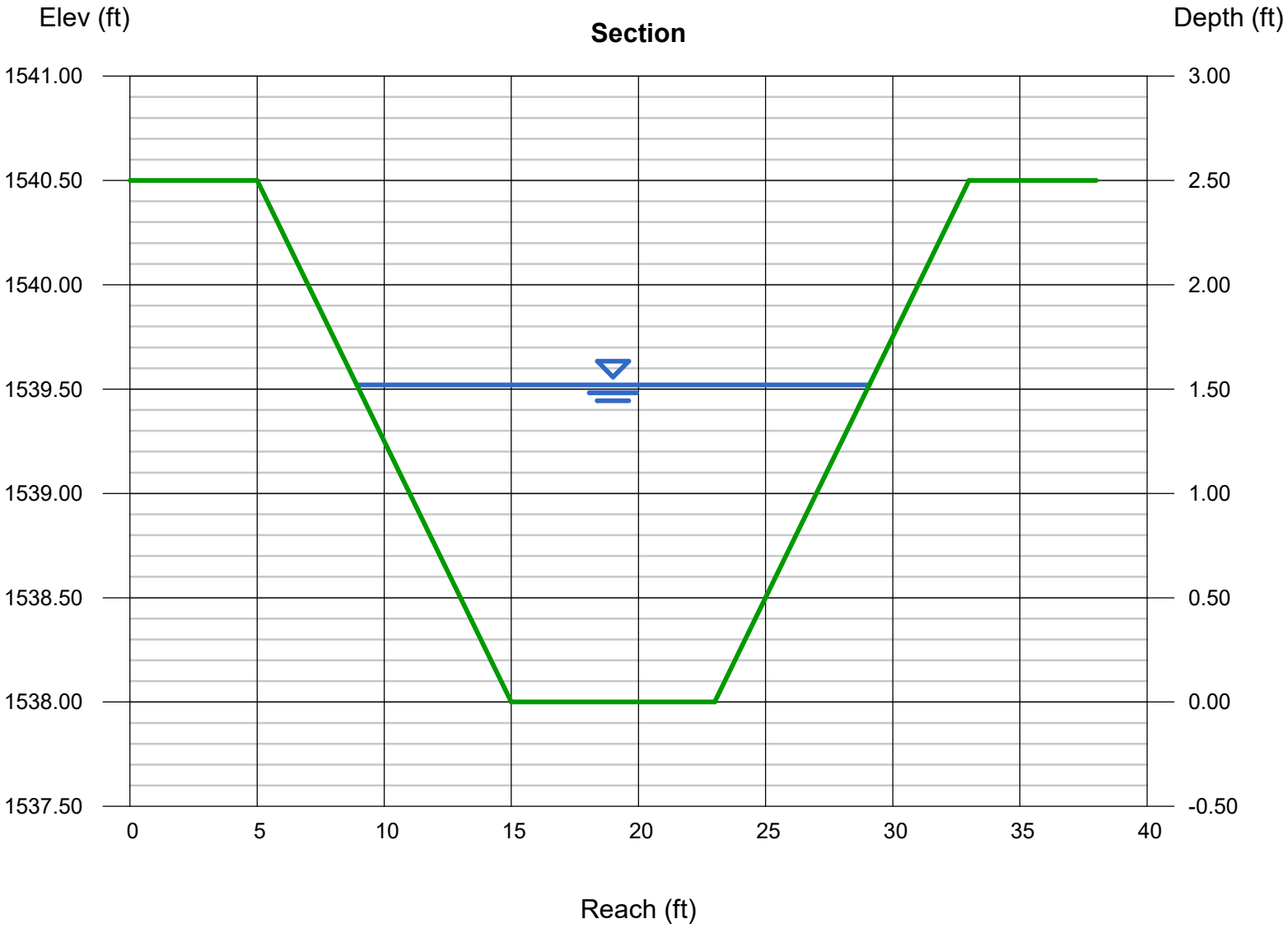
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 1538.00
Slope (%)	= 0.25
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 65.00

Highlighted

Depth (ft)	= 1.52
Q (cfs)	= 65.00
Area (sqft)	= 21.40
Velocity (ft/s)	= 3.04
Wetted Perim (ft)	= 20.53
Crit Depth, Yc (ft)	= 1.06
Top Width (ft)	= 20.16
EGL (ft)	= 1.66



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Apr 21 2022

21-0389 AZ Farms - Off Drn Channel - North/East

Trapezoidal

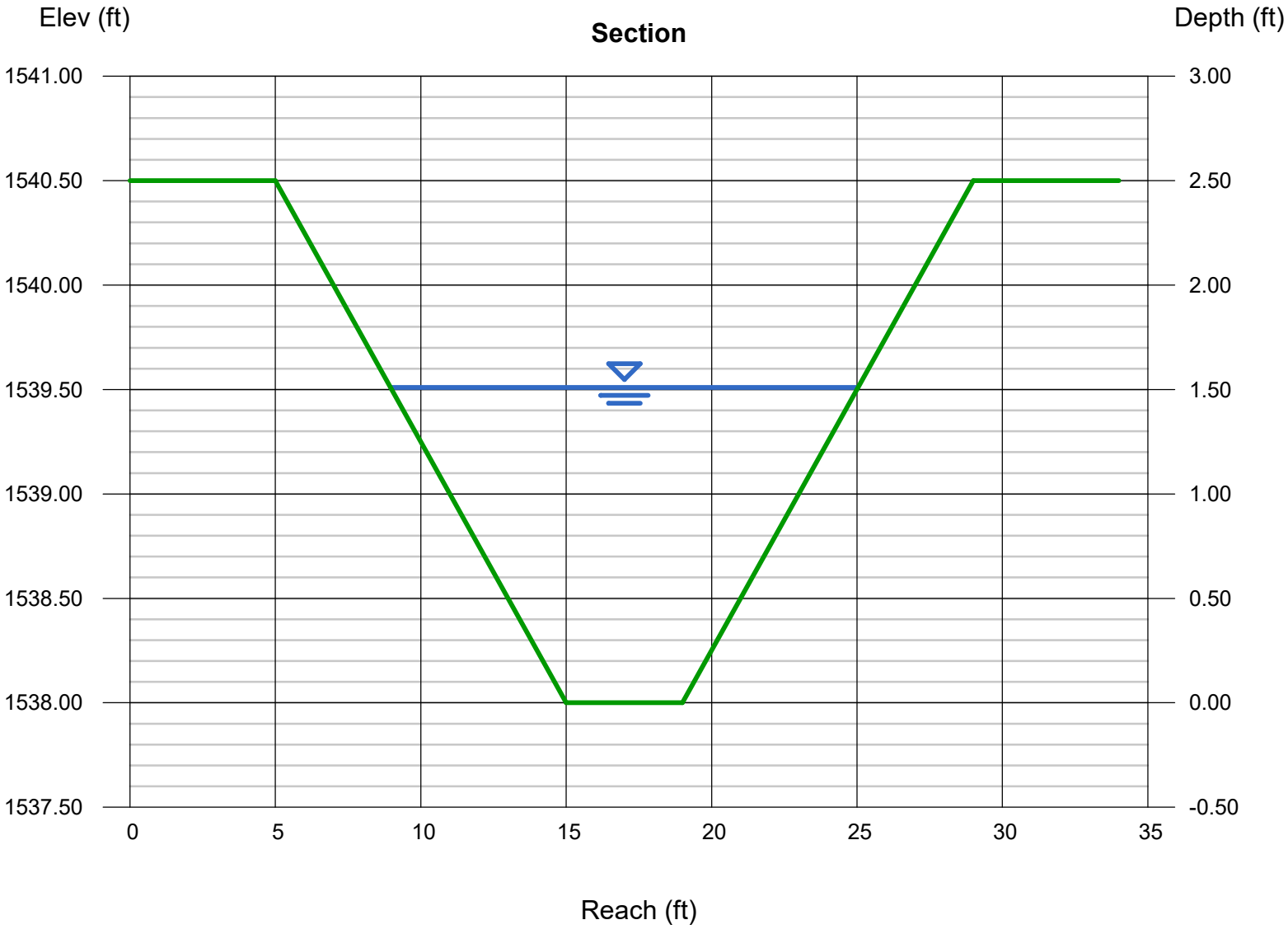
Bottom Width (ft)	= 4.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 1538.00
Slope (%)	= 0.31
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 47.00

Highlighted

Depth (ft)	= 1.51
Q (cfs)	= 47.00
Area (sqft)	= 15.16
Velocity (ft/s)	= 3.10
Wetted Perim (ft)	= 16.45
Crit Depth, Yc (ft)	= 1.14
Top Width (ft)	= 16.08
EGL (ft)	= 1.66



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Apr 21 2022

21-0389 AZ Farms - Off Drn Channel - North/West

Trapezoidal

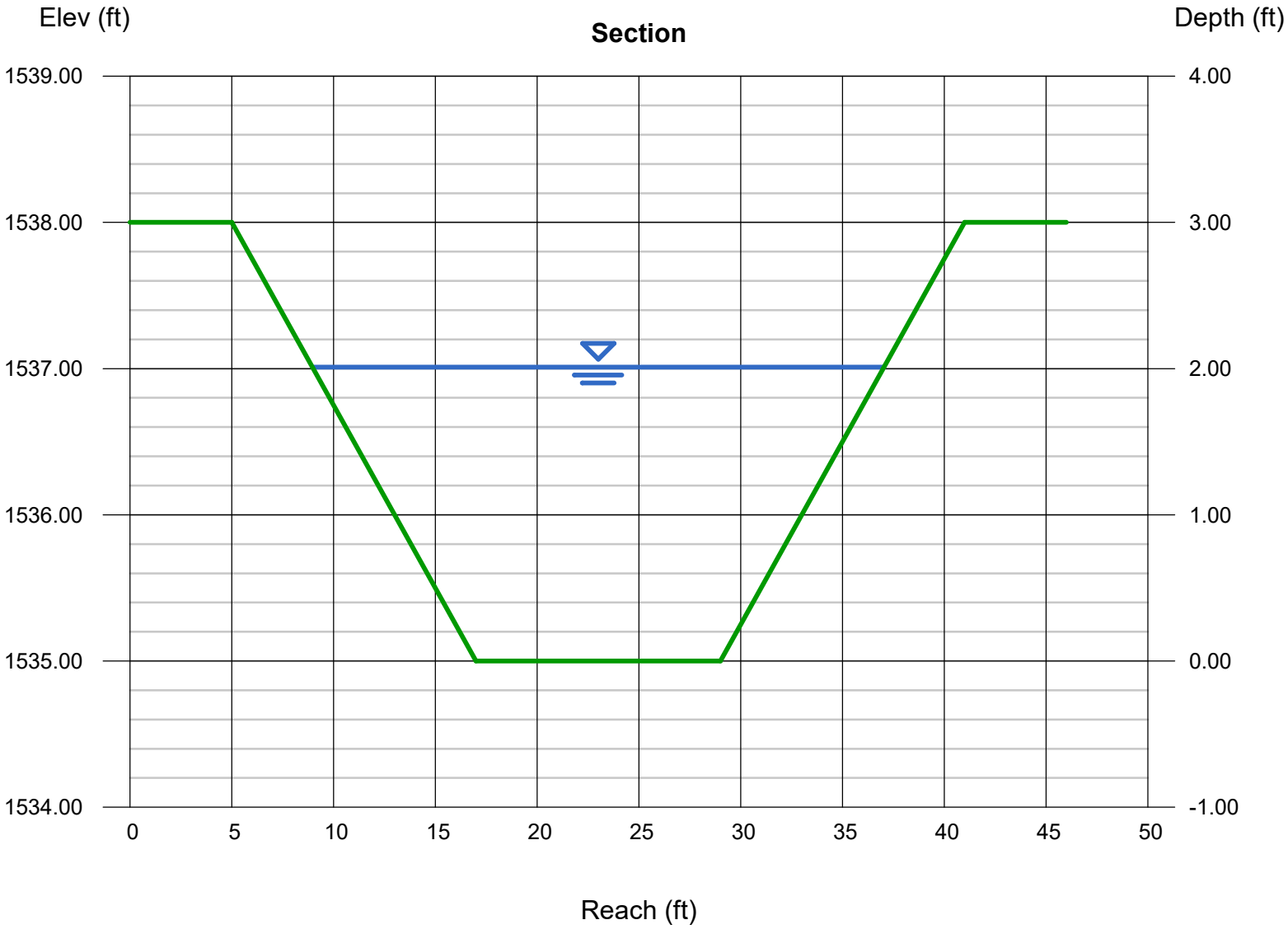
Bottom Width (ft)	= 12.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1535.00
Slope (%)	= 0.10
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 95.00

Highlighted

Depth (ft)	= 2.01
Q (cfs)	= 95.00
Area (sqft)	= 40.28
Velocity (ft/s)	= 2.36
Wetted Perim (ft)	= 28.57
Crit Depth, Yc (ft)	= 1.10
Top Width (ft)	= 28.08
EGL (ft)	= 2.10



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Apr 21 2022

21-0389 AZ Farms - Off Drn Channel - North/West

Trapezoidal

Bottom Width (ft)	= 20.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1525.00
Slope (%)	= 0.10
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 142.00

Highlighted

Depth (ft)	= 2.02
Q (cfs)	= 142.00
Area (sqft)	= 56.72
Velocity (ft/s)	= 2.50
Wetted Perim (ft)	= 36.66
Crit Depth, Yc (ft)	= 1.08
Top Width (ft)	= 36.16
EGL (ft)	= 2.12