

DRAINAGE REPORTS

ABBREVEATED WATER & SEWER NEED REPORTS

WATER STUDY

WASTERWATER STUDY

STORMWATER WAIVER APPLICATION

**PRELIMINARY
DRAINAGE REPORT
CATTLETRAK TRUE HOMES**

 **FILE COPY**

**JUNE 2016
DEA PROJECT NO. TRUH0001**

**19-ZN-2016
7/7/2016**

PRELIMINARY DRAINAGE REPORT
FOR
CATTLETRACK TRUE HOMES

PREPARED FOR

TRUE HOMES
7831 E. BUENA TERRA WAY
SCOTTSDALE, AZ 85250

PREPARED BY

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JULY 2016
DEA PROJECT NO. TRUH0001

Exp: 3-31-2017

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Exp: 3-31-2017

1. INTRODUCTION

This Preliminary drainage report has been prepared under a contract with True Homes, owner/developer of the proposed subdivision. The purpose of this report is to provide preliminary drainage analyses, required by the City of Scottsdale, to support the proposed site plan for this project. This report and design follows the procedures outlined in the *City of Scottsdale, Design Standards and Policy Manual* (Reference 1) and the *Drainage Design Manuals for Maricopa County, Arizona, Volumes I and II* (References 2 and 3).

The overall project is located in Section 14, Township 2 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The site is bounded by Cattletrack Road to the west, residential development to the north, open space/tennis courts to the south, and Arizona Trail/Canal to the east. Figure 1, located in Appendix A, illustrates the location of the project in relation to the City of Scottsdale's street system.

The Cattletrack Subdivision project is a proposed development of approximately 1.9 acres. Onsite improvements include; street, graded pads, and open space/retention to the east.

2. EXISTING DRAINAGE CONDITIONS

This project is currently an existing single residential home. The site drains in an easterly direction towards the canal. There are few feet drop to the east. There is an open space to the south with tennis court and it is depressed several feet from the elevations onsite.

Cattletrack Road, to the west, is developed road with curb and gutter and slopes in a southerly direction.

Offsite runoff impacts the eastern portion of the site and a floodplain (Zone A) occupies the eastern portion of the site as shown in the FIRM panel 04013C1770L. Zone A floodplain is defined as areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.

The remainder of the site to the west is located in Zone D. Zone D floodplain is defined as Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

The general lay of the land is in an easterly direction. Runoff flows towards the canal and ponds next to it and eventually flows in a southern direction when the ponding next to the canal recedes.

DEA drainage team researched available drainage information and coordinated with the Flood

control district and their consultant for the overall drainage study taken place in the area. This drainage report is based on existing floodplain conditions and not the new drainage study underway.

3. PROPOSED DRAINAGE CONCEPT

The proposed drainage concept is presented in three parts: on-site drainage conveyance, off-site drainage conveyance and on-site storm water storage. The hydrology analysis is summarized in section 4.0 and the hydraulic analysis is summarized in section 5.0. See Exhibit A, located in the back pocket, for a graphical illustration of the proposed drainage conditions map.

3.1. On-Site Drainage Conveyance

The intent of the grading design is to convey the runoff generated onsite during a 100-year 2-hour storm event or smaller into retention basins, along the lots and the eastern open space of the overall project.

The road conveys street runoff to the east into the cul-de-sac and then spills into the open space east of the project along the canal. The eastern portion of the site is where the existing floodplain is located.

The extreme outfall of the site is over the canal, at an elevation of 1979.40. The finish floor elevations of the proposed subdivision are being designed to be above this elevation by a foot. Refer to Exhibit A in the back pocket of the report for reference and to the Concept Grading Plans also included in the back pocket.

A CLOMR application will be filed for this project that will show that the proposed grading and reduction in the floodplain area is based on providing compensatory storage (820 ft³) where the lots are being filled. The project will provide volume generated during the 100-year 2 hour storm event onsite. The compensatory volume will be stored above the retention volume in the same basin and will be allowed to enter and leave as needed since it is a ponding situation next to the canal. The volume information is also reflected in the retention calculations section. The compensatory storage is calculated based on the difference between the proposed finish grade elevations and what currently exists in the floodplain. The difference between the two surfaces, using Civil 3D software, was accounted for in the compensatory storage calculations.

3.2. Off-Site Drainage Conveyance

The only runoff that impacts the site is from the floodplain to the east. The floodplain is currently being studied by Flood Control District of Maricopa County (FCDMC) in collaboration with the City of Scottsdale (COS). The current FEMA floodplain is changing based on the new study, however the results are preliminary and not being used for this project. The current effective firm panel information is being used for the purpose of this drainage report.

Through discussions with the consultant for FCDMC, although the new study reflects a larger potential floodplain for the project, the high water surface elevations that are being analyzed through modeling of the overall area are not higher than the adjacent existing grade near the canal. Hence the finish floor elevations are being designed based on the spill elevations along the adjacent Arizona Canal (existing floodplain) and it will also work for the proposed floodplain as well.

The volume that is being filled in the floodplain is being compensated for with open space at the eastern portion of the site in addition to the 100 year volume as mentioned above.

3.3. On-Site Storm Water Storage

The City of Scottsdale requires new development to store the on-site runoff generated during a 100-year, 2-hour storm event. The required storage volume for the project site is estimated as follows:

$$V_R = (P/12)*A*C$$

Where:

- V_R = Calculated volume in acre-feet
- C_{wt} = Weighted Runoff coefficient (C= .76)
- P = Precipitation amount in inches (2.18 inches)
- A = Drainage area in acres, including one-half of all abutting streets

A drywell will be utilized to assist in percolating the stored runoff for the 100-year 2 hour volume only into the ground, as there is no adjacent City storm drain system. The number of drywells will be determined after the first drywell is installed and a percolation test is done. The testing of the drywells will be performed and completed by a licensed geotechnical engineer.

4. HYDROLOGIC ANALYSIS

The hydrologic analysis for the site will be determined using the procedures set in the *City of Scottsdale Design Standards and Policies Manual* and the *Drainage Design Manual for Maricopa County, Arizona, Volume I*. Rational for Windows will be utilized to compute the on-site peak discharges. The program is based on the Flood Control District of Maricopa County methodology as explained in Volume 1. The following establishes the Rational Method equation and the basic input data required:

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

Where:

- C_{wt} = The runoff coefficient relating runoff to rainfall
- I = Average rainfall intensity in inches/hour, lasting for T_c
- T_c = The time of concentration (minutes)
- A = The contributing drainage area in acres (from Exhibit A).

Upon acceptance of this conceptual design by the City of Scottsdale, on-site peak discharges will be performed using the methodology above in order to size inlets and storm drain pipes as part of the final drainage report.

5. HYDRAULIC ANALYSIS

The hydraulic analysis of the proposed stormwater management facilities will be determined according to the *City of Scottsdale Design Standards and Policies Manual* and the *Maricopa County Drainage Design Manual, Volume II, Hydraulics*.

6. CONCLUSIONS

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

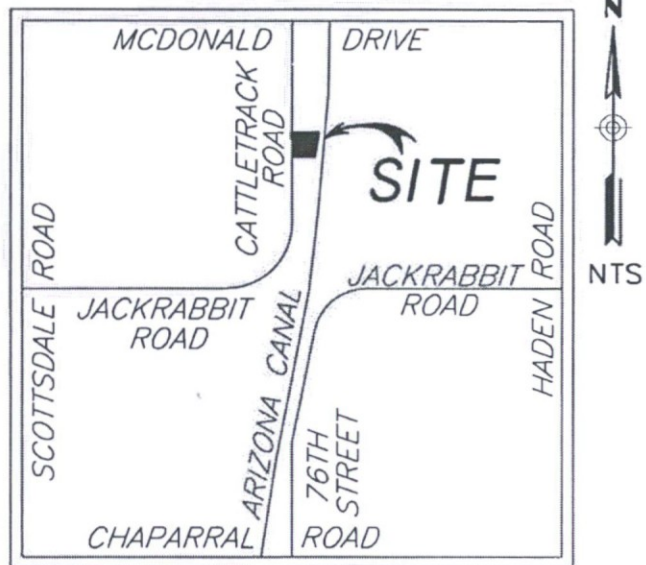
- * The site will be developed according to the *City of Scottsdale Design Standards and Policies Manual* and the *Drainage Design Manuals for Maricopa County*.
- * The 100-year 2-hour volume is retained on-site.
- * Compensatory storage will be provided for filling in the floodplain portion of the site.
- * The buildings will not be inundated during a 100-year storm event.
- * A CLOMR application will be filed after the acceptance of this drainage report, followed by a LOMR application after the project is built.

7. REFERENCES

- 1) *City of Scottsdale, Design Standards and Policy Manual*, January 2010.
- 2) *Drainage Design Manual for Maricopa County, Arizona, Volume I, Hydrology*, Flood Control District of Maricopa County, August 15, 2013.
- 3) *Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics*, Flood Control District of Maricopa County, August 15, 2013.

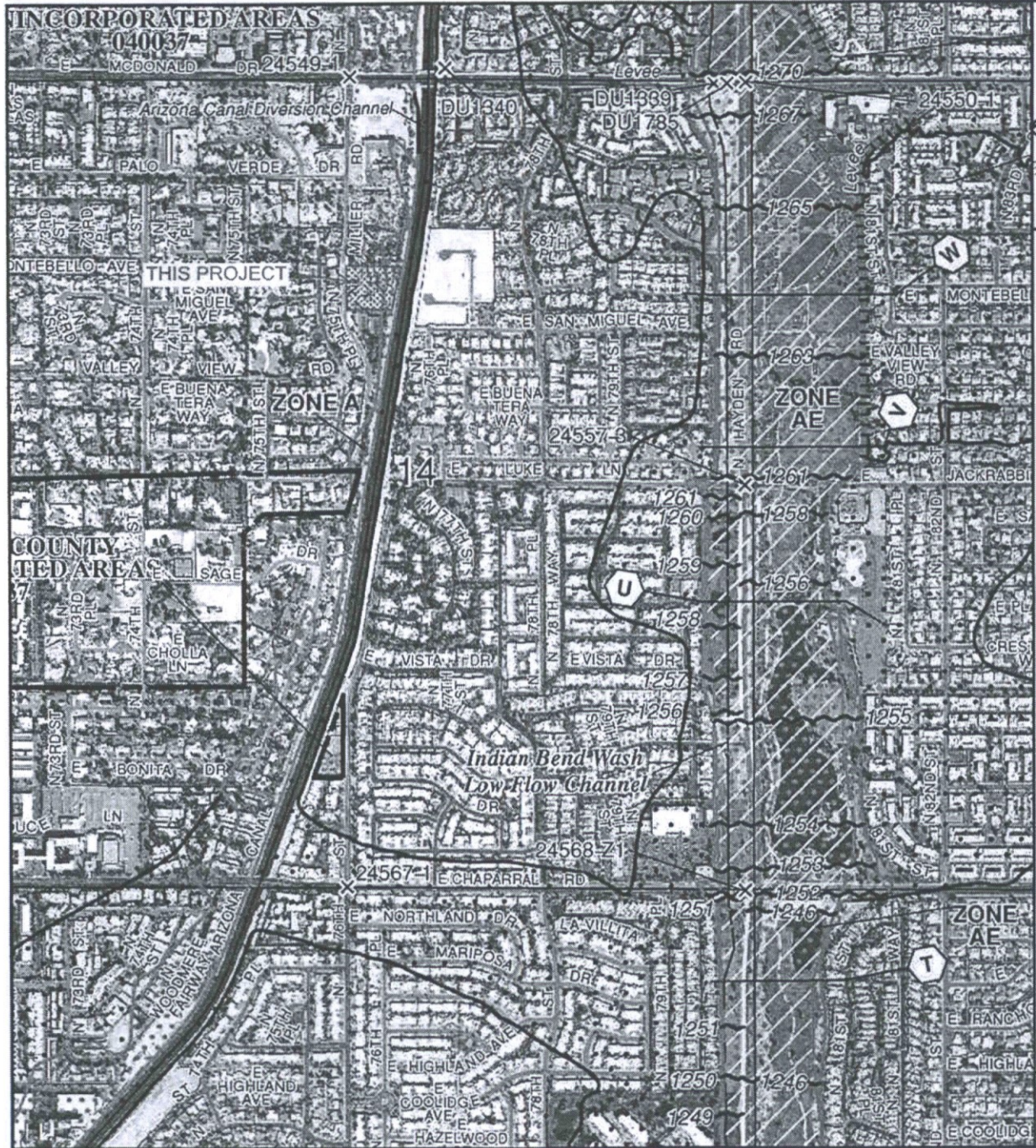
APPENDIX A

FIGURE 1
(Vicinity Map)

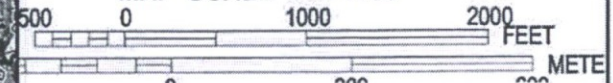


VICINITY MAP
N.T.S.

APPENDIX B
(FEMA Flood Insurance Rate Map)



MAP SCALE 1" = 1000'



NFIP

PANEL 17/0L

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY,
ARIZONA
AND INCORPORATED AREAS

PANEL 1770 OF 4425
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

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

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
04013C1770L
MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

APPENDIX C
(Volume Calculations and Data Sheets)

Contributing Drainage Areas: A
 Basin: Need surplus of 820 FT3 in compesatory volume and it was calculated using Civil 3D.

VOLUME REQUIRED CALCULATIONS

Type	Area		'C' Coefficient C	Precipitation (Inches)	Retention Required	
	(ft)	(Ac)			(ft ³)	(Ac-ft)
Residential	48,188	1.11			6,653	0.16

RETENTION BASIN CALCULATIONS (100-year 2 Hours Only)

Elevation	Delta Depth (ft)	Surface Area (ft ²)		Volume Provided			
				(ft ³)	Σ (ft ³)	(Ac-ft)	Σ (Ac-ft)
1279.4	1.4	8,843	8,692	11,425	22,159	0.26	0.51
1278.0	1.0	7,497	8,692	6,579	10,734	0.15	0.25
1277.0	1.0	5,702	5,750	4,154	4,154	0.10	0.10
1276.0		2,780	3,161		10,734		0.25
				<i>Provided</i>	10,734		0.25
				<i>Required</i>	6,653		0.18
				<i>Balance</i>	4,080		0.07
		Basin Depth					
		1.38					

11,425 Compensatory Storage

10,734 Provided for 100-year, 2 hours
 4,080 Excess

Total for Compensatory
 4,080+11,425= 15,505 > 820 FT3
 0.36 ac-ft

RETENTION BASIN CALCULATIONS, Compensatory Volume, Same Basin Above

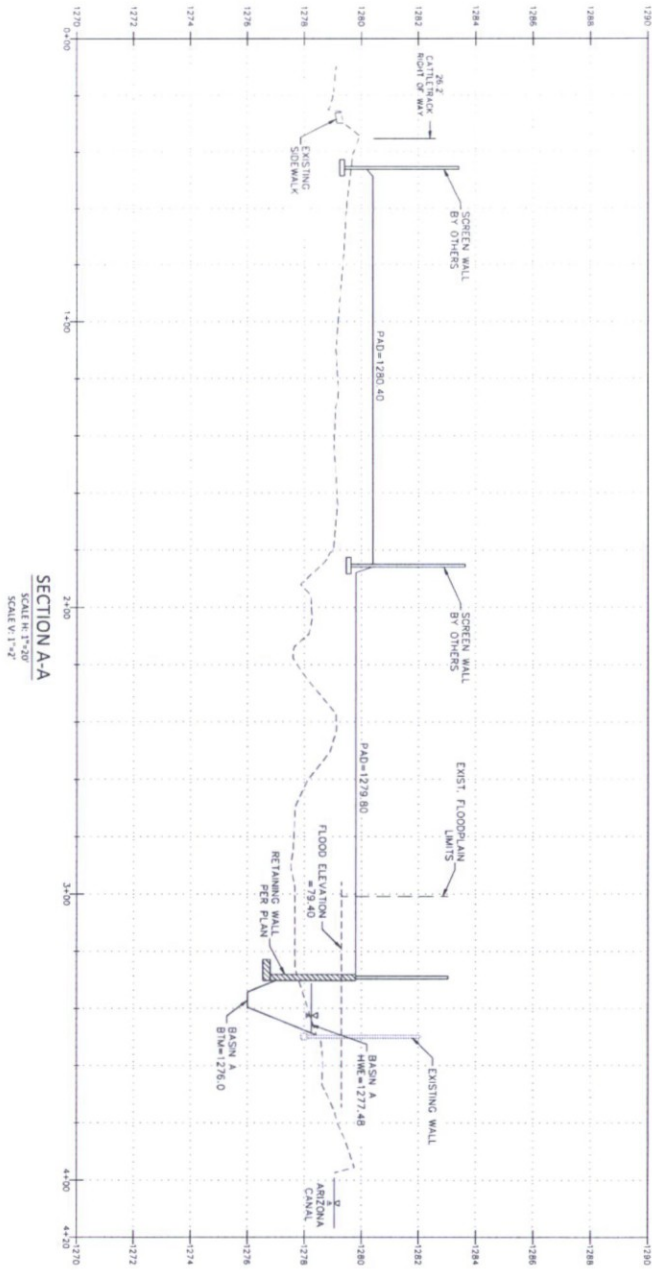
Elevation	Delta Depth (ft)	Surface Area (ft ²)		Volume Provided			
				(ft ³)	Σ (ft ³)	(Ac-ft)	Σ (Ac-ft)
1278.8	0.8	8,843	8,692	6,529	17,262	0.15	0.40
1278.0	1.0	7,497	8,692	6,579	10,734	0.15	0.25
1277.0	1.0	5,702	5,750	4,154	4,154	0.10	0.10
1276.0		2,780	3,161		10,734		0.25
				<i>Provided</i>	10,734		0.25
				<i>Required</i>	6,653		0.00
				<i>Balance</i>	4,080		0.25
		Basin Depth					
		1.38					

Contributing Drainage Areas: B						
Basin:						
VOLUME REQUIRED CALCULATIONS						
Type	Area		'C' Coefficient C	Precipitation (Inches)	Retention Required	
	(ft)	(Ac)			(ft ³)	(Ac-ft)
Residential	9,170	0.21			1,266	0.02
RETENTION BASIN CALCULATIONS						
Elevation	Delta Depth (ft)	Surface Area (ft ²)	Volume Provided			
			(ft ³)	Σ (ft ³)	(Ac-ft)	Σ (Ac-ft)
1280.4	1.1	2,489	2,112	2,065	0.05	0.05
1279.3	-0.1	1,402	-47	-47	0.00	0.00
1279.4				2,065		0.05
			Provided	2,065		0.05
			Required	1,266		0.02
			Balance	<u>799</u>		<u>0.03</u>
Basin Depth						
0.58						

Contributing Drainage Areas: C						
Basin:						
VOLUME REQUIRED CALCULATIONS						
Type	Area		'C' Coefficient C	Precipitation (Inches)	Retention Required	
	(ft)	(Ac)			(ft ³)	(Ac-ft)
Residential	8,875	0.20			1,225	0.02
RETENTION BASIN CALCULATIONS						
Elevation	Delta Depth (ft)	Surface Area (ft ²)	Volume Provided			
			(ft ³)	Σ (ft ³)	(Ac-ft)	Σ (Ac-ft)
1279.8	1.0	2,661	2,111	2,111	0.05	0.05
1278.8	0.0	1,606	0	0	0.00	0.00
1278.8				2,111		0.05
			Provided	2,111		0.05
			Required	1,225		0.02
			Balance	<u>886</u>		<u>0.03</u>
Basin Depth						
0.58						

Contributing Drainage Areas: D						
Basin:						
VOLUME REQUIRED CALCULATIONS						
Type	Area		'C' Coefficient C	Precipitation (Inches)	Retention Required	
	(ft)	(Ac)			(ft ³)	(Ac-ft)
Residential	6,750	0.15			932	0.02
RETENTION BASIN CALCULATIONS						
Elevation	Delta Depth (ft)	Surface Area (ft ²)	Volume Provided			
			(ft ³)	Σ (ft ³)	(Ac-ft)	Σ (Ac-ft)
1279.8	1.3	1,750	1,421	1,421	0.03	0.03
1278.5	0.0	549	0	0	0.00	0.00
1278.5		0		1,421		0.03
			<i>Provided</i>	1,421		0.03
			<i>Required</i>	932		0.02
			<i>Balance</i>	<u>489</u>		<u>0.01</u>
Basin Depth		0.85				

Contributing Drainage Areas: E						
Basin:						
VOLUME REQUIRED CALCULATIONS						
Type	Area		'C' Coefficient C	Precipitation (Inches)	Retention Required	
	(ft)	(Ac)			(ft ³)	(Ac-ft)
Residential	6,990	0.16			965	0.02
RETENTION BASIN CALCULATIONS						
Elevation	Delta Depth (ft)	Surface Area (ft ²)	Volume Provided			
			(ft ³)	Σ (ft ³)	(Ac-ft)	Σ (Ac-ft)
1280.4	1.3	1,748	1,481	1,481	0.03	0.03
1279.1	0.0	625	0	0	0.00	0.00
1279.1		0		1,481		0.03
			<i>Provided</i>	1,481		0.03
			<i>Required</i>	965		0.02
			<i>Balance</i>	<u>516</u>		<u>0.01</u>
Basin Depth		0.85				



SECTION A-A
SCALE 1/4"
SCALE 1/4"



SECTION	14
TITLE	CONCEPT GRADING & DRAINAGE
DATE	06/29/2016
PROJECT	5713 N. CATTLETRACK ROAD
SHEET	2 OF 2

CONCEPT GRADING & DRAINAGE
5713 N. CATTLETRACK ROAD
SCOTTSDALE, ARIZONA

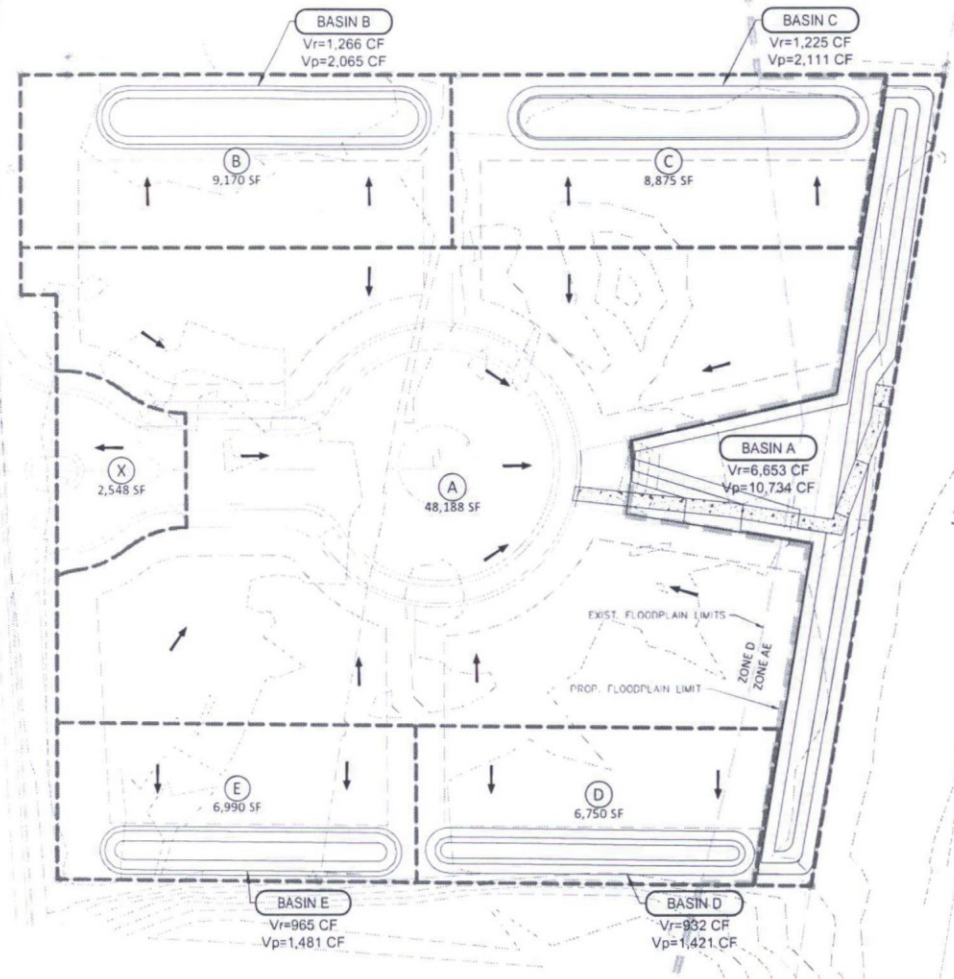


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DRAWN BY	JCF
DESIGN BY	JCF
CHECKED BY	BYC
DATE	06-29-2016

DATE	REVISION

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DEVELOPER/OWNER

TRUE NORTH
7831 E. BUENA TERRA WAY
SCOTTSDALE, AZ 85250

ENGINEER

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4600 E. WASHINGTON STREET, SUITE 250
PHOENIX, AZ 85034
CONTACT: RANZI GEORGES, P.E.
(602) 978-5151

LEGEND

- FLOW DIRECTION
- SUB BASIN BOUNDARY
- SUB BASIN LABEL
- SUB BASIN AREA LABEL
- CONCENTRATION POINT
- RETENTION BASIN LABEL
- RETENTION BASIN VOLUME REQUIRED
- RETENTION BASIN VOLUME PROVIDED
- OUTFALL

PROJECT MANAGER	DESIGNED BY: JCT
	DRAWN BY: JCT
	CHECKED BY: RYC
	DATE: 6/29/2016
 DAVID EVANS AND ASSOCIATES, INC. 4600 E. WASHINGTON ST. SUITE 250 PHOENIX, AZ 85034 Phone: 602.978.5151	SECTION: 14 TOWNSHIP: 2N RANGE: 4E
	JOB NO: HUN-03203 SHEET: 1 OF 1

SCOTTSDALE, ARIZONA
5713 N. CATTLETRACK ROAD
DRAINAGE EXHIBIT

