DRAINAGE REPORT

FOR

WINDSOR ESTATES MINOR LAND DIVISION

Prepared For:

BRIDAL FASHION DEBUT PSP

14176 E. Kalil Dr.

Scottsdale, AZ 85259

Plan #

Case # 1-MD-2018

Q-S #

☒ Accepted

☐ Corrections

DG 3/9/18

Reviewed By Date

Registered Professional Engineer (Civil) CERTIFICATE NO. 63518 ROBERT B. JARRETT DATE SIGNED 2-23-18 ARIZONA U.S.A. Expires 3/31/2020

Prepared By:

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Project No. 10166

C.O.S. Case# 1-MD-2018

1-MD-2018

02/23/18

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NARRATIVE

This drainage report for Windsor Estates will outline the hydrology and hydraulic calculations and procedures for the further development of this site. This report will be submitted per the requirements outlined in the current versions of the Maricopa County Drainage Policies and Standards, Drainage Design Manuals for Maricopa County, Volume 1 – Hydrology and Volume 2 – Hydraulics, Section 1205 of the Maricopa County Zoning Ordinance per form 712A Drainage Report #10 and the City of Scottsdale's Design Standards & Policies Manual. The results of this study will be used to ensure the site structures are free from flooding for the 100 year storm event. All designs in this report will be developed in accordance with the current Maricopa County regulations, standards and policies.

LOCATION

This site is located at 12440 E. Mountain View Rd. on 3.0142 Acres (Figure 1). The site is identified by the Maricopa County Assessor's office as Parcel 217-32-066D.

SITE DESCRIPTION

The site has an existing single family residence that was constructed in approximately 1975. The site slopes from the north east to the south west at approximately 0.0156 '/'. There is one wash that traverses the site. This wash enters the site at the northeast corner of the property and exits the site along the south property line via a 60" CMP culvert under E. Mountain View Rd. The construction of the CAP canal significantly disrupted the historical flow and volume of runoff within this wash. This wash will be referred to as Wash 1. The lot is bound on the west by existing residences and on the east by an existing place of worship. The CAP canal borders the lot on the north, and paved access to the site is provided via E. Mountain View Dr on the south. Refer to Figure 2 for an aerial map of the site.

PROPOSED DEVELOPMENT

The owner would like to perform a lot split on the existing 3 acre parcel and create two parcels roughly 1.5 acres each. The existing residence will remain and one new residence will be constructed on a new parcel created from the original lot.

FEMA FLOODPLAIN CLASSIFICATION

This site lies in flood zone "X" per FIRM Panel 04013C1785L dated 10-16-2013. Therefore, there is not any portion of this site that will lie within any designated floodplain and no flood insurance will be required. Please refer to Figure 3 for a FIRM map.

OFFSITE DRAINAGE DESCRIPTION

Wash 1 is fed by offsite flows that originate immediately south of the CAP canal. The western portion of the site is subject to sheet flows that originate south of the CAP canal and exit the site along the southwest corner. The offsite drainage areas have been delineated and are shown on the enclosed Drainage Map found in Figure 4. This drainage area was determined from contour data obtained from City of Scottsdale Contour Quarter Section Map 28-58.

OFFSITE HYDROLOGY

Methodology:

The 100 year peak runoff for the contributing drainage areas were determined by using Rational Method procedures in conjunction with the Drainage Design Management System for Windows (DDMSW). These hydrological calculations are contained in Appendix A.

Parameters:

DDMSW provides default values for the runoff and watershed resistance coefficients based upon land use. A Land Use code of 120 corresponding to Estate Residential – (1/5 du per acre to 1 du per acre) was selected when determining the runoff coefficients for the analysis. This selection resulted in a runoff coefficient of 0.53 during the 100 year

peak event. All of the runoff coefficients were then modified per the values found in Figure 4.1-4 in the City of Scottsdale Drainage Standards & Policies Manual. A default minimum value for the Tc (time of concentration) was set to 5 minutes. The DDMSW program has all of the default parameter values for each land surface type from Table 3.1 – DDMMC – Vol II, built into the program. Land surface type "A" was selected when calculating the roughness parameter in the Time of Concentration equation to account for the geography of the drainage area.

Results:

The drainage area characteristics and resulting 100 year peak flows are shown below.

AREA #	AREA SQ. FT.	AREA ACRES	LENGTH FT.	TOP ELEV.	BOTTOM ELEV.	100 YR. PEAK FLOW CFS
SB1	83,640	1.92	607	1,520	1,501	9.3
SB2	104,987	2.41	600	1520.5	1511	11.5

EXISTING HYDRAULICS – WASH 1

Methodology:

The following hydraulic calculations were calculated using Hydraulic Toolbox software developed by Aquaveo and the Federal Highways Administration. Any calculation not found below can be found in Appendix B at the end of the report.

Parameters:

Wash 1 can be modeled as a trapezoidal channel with a 12' base and 2:1 & 3:1 side slopes and a longitudinal slope of 0.0119 '/'. A flow rate of 9.3 cfs will be used to model the flow in the channel. A Manning's 'n' of 0.030 was selected based on visual inspection that confirmed a combination of firm earth and well graded gravel 2-25.4 millimeters in size with minor organic obstructions. This manning's n-value falls within the range of values given in Table 7.3 in the DDMMC Vol. II – Hydraulics.

Results:

The above analysis indicates a depth of flow of 0.31 feet with a velocity of 2.3 feet per second.

REFERENCES

City of Scottsdale, Design Standards & Policies Manual, August 2017 DRAFT.

Flood Control District of Maricopa County, Drainage Design Manual for Maricopa County – Volume II, Hydraulics, August 2013.

Flood Control District of Maricopa County, Drainage Design Manual for Maricopa County – Volume I, Hydrology, August 2013.

Flood Control District of Maricopa County, Drainage Policies and Standards Manual, January 2007.

FIGURES

FIGURE 1

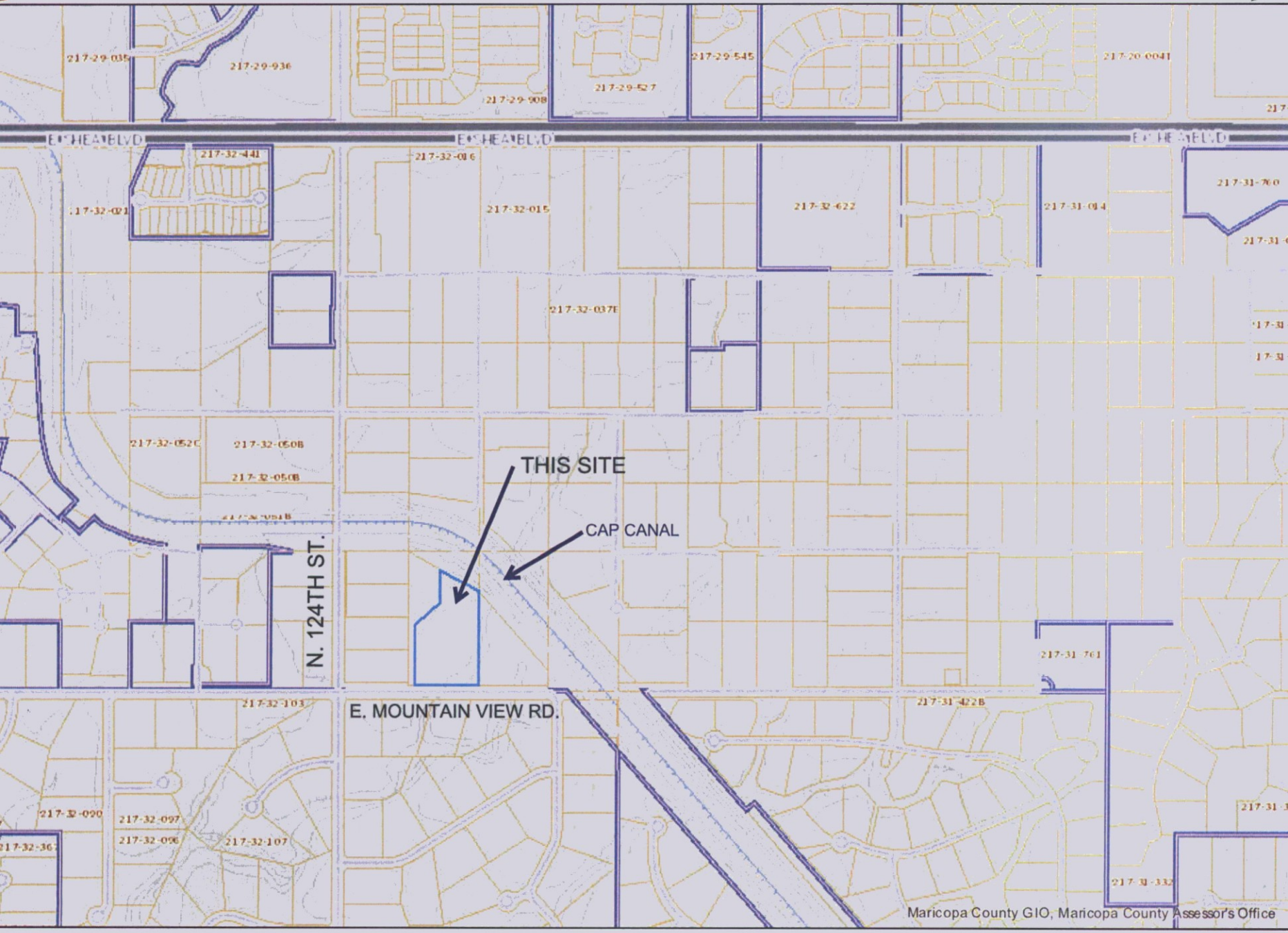
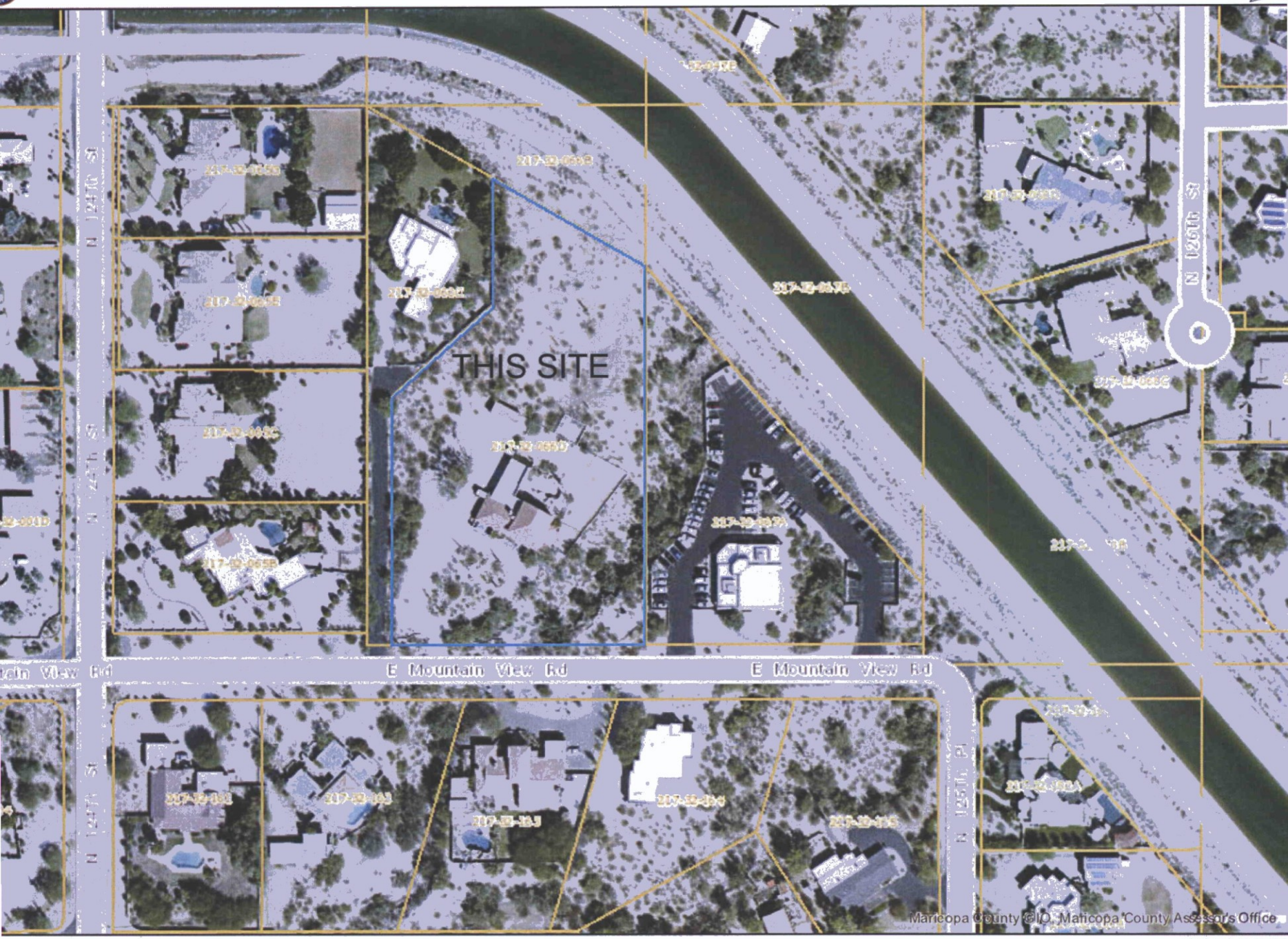

E. SHEA BLVD
E. SHEA BLVD
E. SHEA BLVD
217-29-035
217-29-936
217-29-908
217-29-527
217-29-545
217-20-0041
217-32-021
217-32-441
217-32-016
217-32-015
217-32-622
217-31-014
217-31-760
217-32-037E
217-32-052C
217-32-050B
217-32-054B
THIS SITE
CAP CANAL
N. 124TH ST.
E. MOUNTAIN VIEW RD.
217-32-103
217-31-761
217-31-422B
217-32-090
217-32-097
217-32-096
217-32-107
217-32-362
217-31-332
Maricopa County GIO, Maricopa County Assessor's Office
1/16/2018 12:39:40 P

FIGURE 2


THIS SITE
E Mountain View Rd
E Mountain View Rd
N 124th St
N 125th St
N 126th St
Maricopa County GIO, Maricopa County Assessor's Office
1/16/2018 12:38:37 P

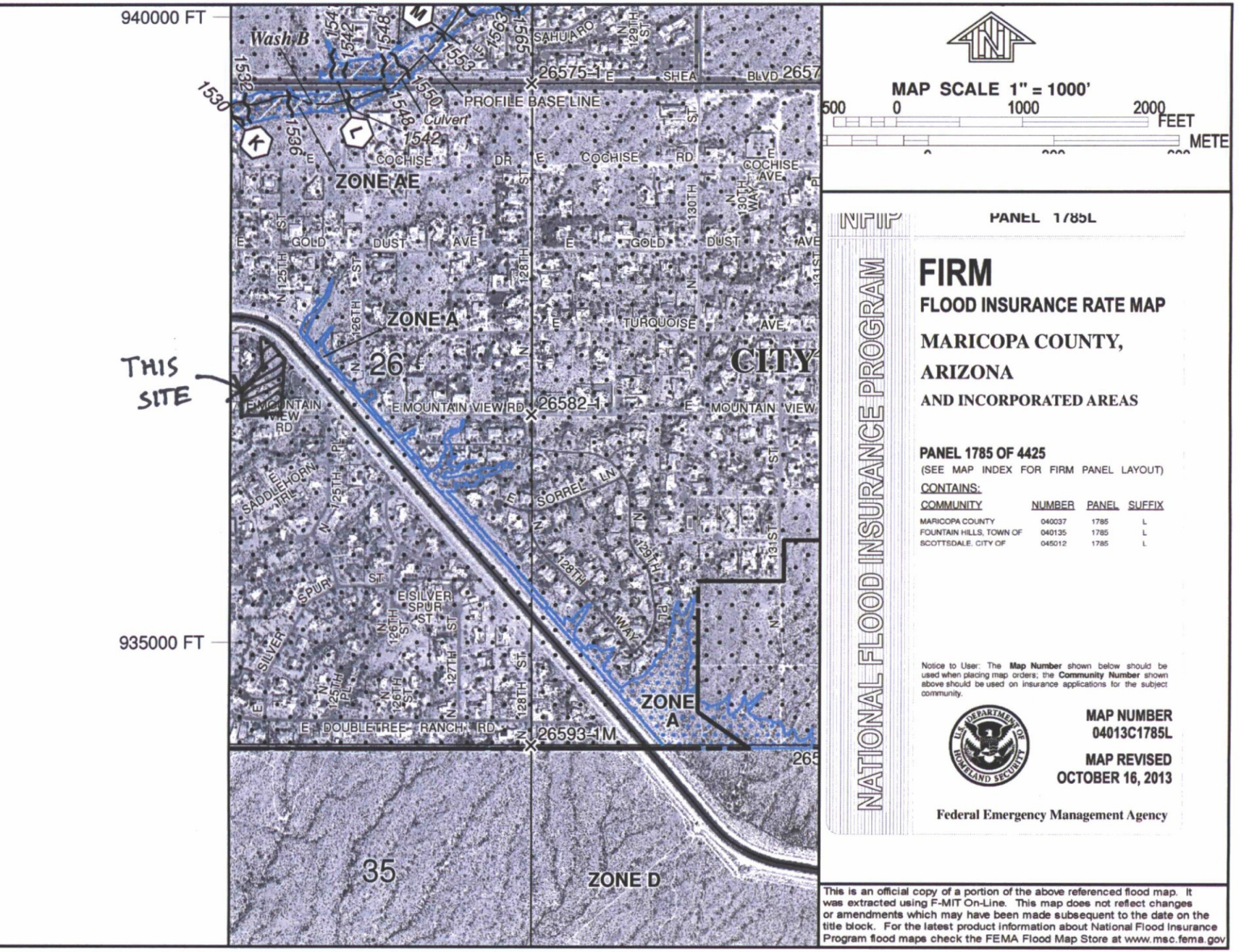

940000 FT
935000 FT
Wash B
PROFILE BASE LINE
Culvert
ZONE AE
ZONE A
ZONE A
ZONE D
THIS SITE
26575-1
26582-1
26593-1M
E SHEA BLVD
E COCHISE DR
E COCHISE RD
E COCHISE AVE
E GOLD DUST AVE
E TURQUOISE AVE
E MOUNTAIN VIEW RD
E DOUBLETREE RANCH RD
SAHUARO
SADDLEHORN TRL
SILVER SPUR
SORREL LN
MAP SCALE 1" = 1000'
500 0 1000 2000
FEET
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS
PANEL 1785 OF 4425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
MARICOPA COUNTY 040037 1785 L
FOUNTAIN HILLS, TOWN OF 040135 1785 L
SCOTTSDALE, CITY OF 045012 1785 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
04013C1785L
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

FIGURE 3

APPENDIX A
Hydrology Calculations

Project

Reference	10166
Title	WINDSOR ESTATES MLD
Location	12440 E. MOUNTAIN VIEW RD.
Agency	JARRETT ENGINEERING, LLC

Project Defaults

Model	Rational
Land Use Agency	FCDMC
Rainfall	NOAA14
Roads Agency	MCDOT
Inlets Agency	MCDOT

Comments

Runoff Coefficients modified per C.O.S. DS&PM Figure 4.1-4 "Runoff Coefficients for Use With Rational Method"

JARRETT ENGINEERING, LLC
Drainage Design Management System
SUB BASINS
Project Reference: 10166

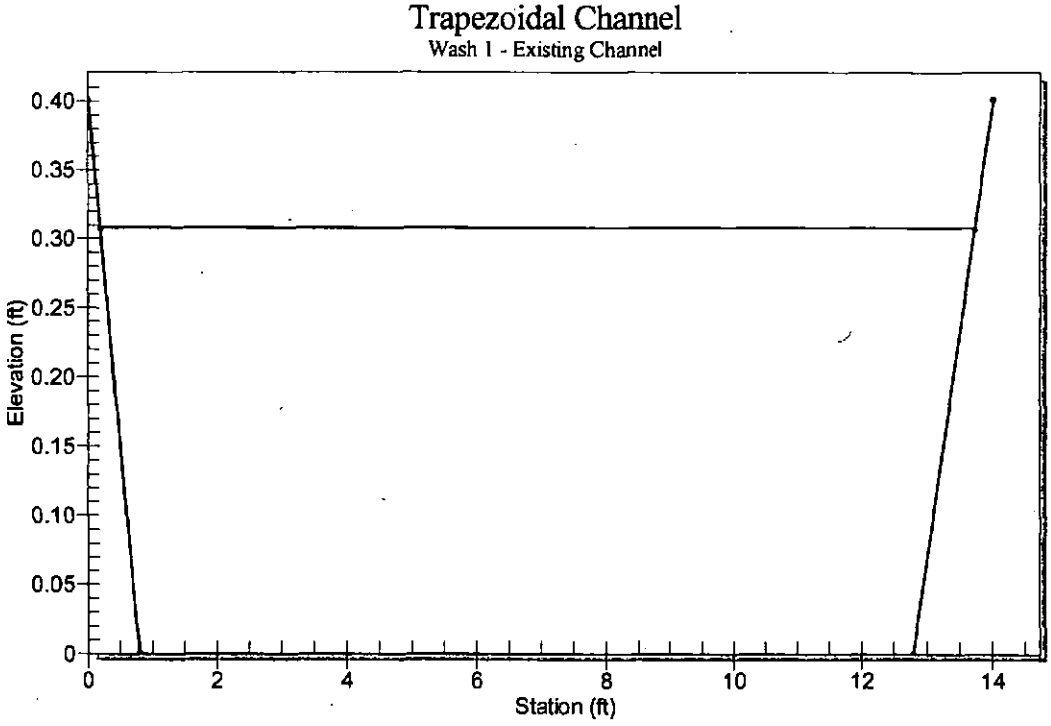
Sub Basin Data							Sub Basin Hydrology Summary					
Area (acres)	Length (ft)	USGE	DSGE	Slope (ft/mi)	Kb		2 Year	5 Year	10 Year	25 Year	50 Year	100 Yea
or Basin ID: 01												
1.9	607	1,520.00	1,501.00	165.3	0.038	Q (cfs)	2.2	3.0	3.6	4.4	7.4	9.
						C	0.38	0.38	0.38	0.38	0.55	0.6
						CA (ac)	0.73	0.73	0.73	0.73	1.06	1.1
						Tc (min)	6	5	5	5	5	
						i (in/hr)	2.95	4.14	4.96	6.08	6.95	7.8
2.4	600	1,520.50	1,511.00	83.6	0.038	Q (cfs)	2.5	3.6	4.4	5.5	9.2	11.
						C	0.38	0.38	0.38	0.38	0.55	0.6
						CA (ac)	0.92	0.92	0.92	0.92	1.33	1.4
						Tc (min)	7	6	6	5	5	
						i (in/hr)	2.71	3.86	4.74	5.98	6.95	7.8

* Non default value

APPENDIX B

Existing Wash Hydraulic Calculations

Hydraulic Analysis Report



Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 2.0000 ft/ft
Side Slope 2 (Z2): 3.0000 ft/ft
Channel Width: 12.0000 ft
Longitudinal Slope: 0.0119 ft/ft
Manning's n: 0.0300
Flow: 9.3000 cfs

Result Parameters

Depth: 0.3086 ft
Area of Flow: 3.9417 ft^2
Wetted Perimeter: 13.6661 ft
Hydraulic Radius: 0.2884 ft
Average Velocity: 2.3594 ft/s
Top Width: 13.5431 ft
Froude Number: 0.7707
Critical Depth: 0.2602 ft
Critical Velocity: 2.8254 ft/s
Critical Slope: 0.0212 ft/ft
Critical Top Width: 13.30 ft
Calculated Max Shear Stress: 0.2292 lb/ft^2
Calculated Avg Shear Stress: 0.2142 lb/ft^2

APPENDIX C

Existing Culvert Crossing Hydraulic Calculations

HY-8 Culvert Analysis Report

60" CMP Culvert
E. Mountain View Dr.

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 9.3 cfs

Maximum Flow: 9.3 cfs

Table 1 - Summary of Culvert Flows at Crossing: E. MOUNTIAN VIEW DR.

Headwater Elevation (ft)	Total Discharge (cfs)	60" CMP Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1501.48	0.00	0.00	0.00	1
1501.74	0.93	0.93	0.00	1
1501.82	1.86	1.86	0.00	1
1501.93	2.79	2.79	0.00	1
1502.02	3.72	3.72	0.00	1
1502.11	4.65	4.65	0.00	1
1502.19	5.58	5.58	0.00	1
1502.27	6.51	6.51	0.00	1
1502.34	7.44	7.44	0.00	1
1502.41	8.37	8.37	0.00	1
1502.48	9.30	9.30	0.00	1
1511.00	176.89	176.89	0.00	Overtopping

Rating Curve Plot for Crossing: E. MOUNTIAN VIEW DR.

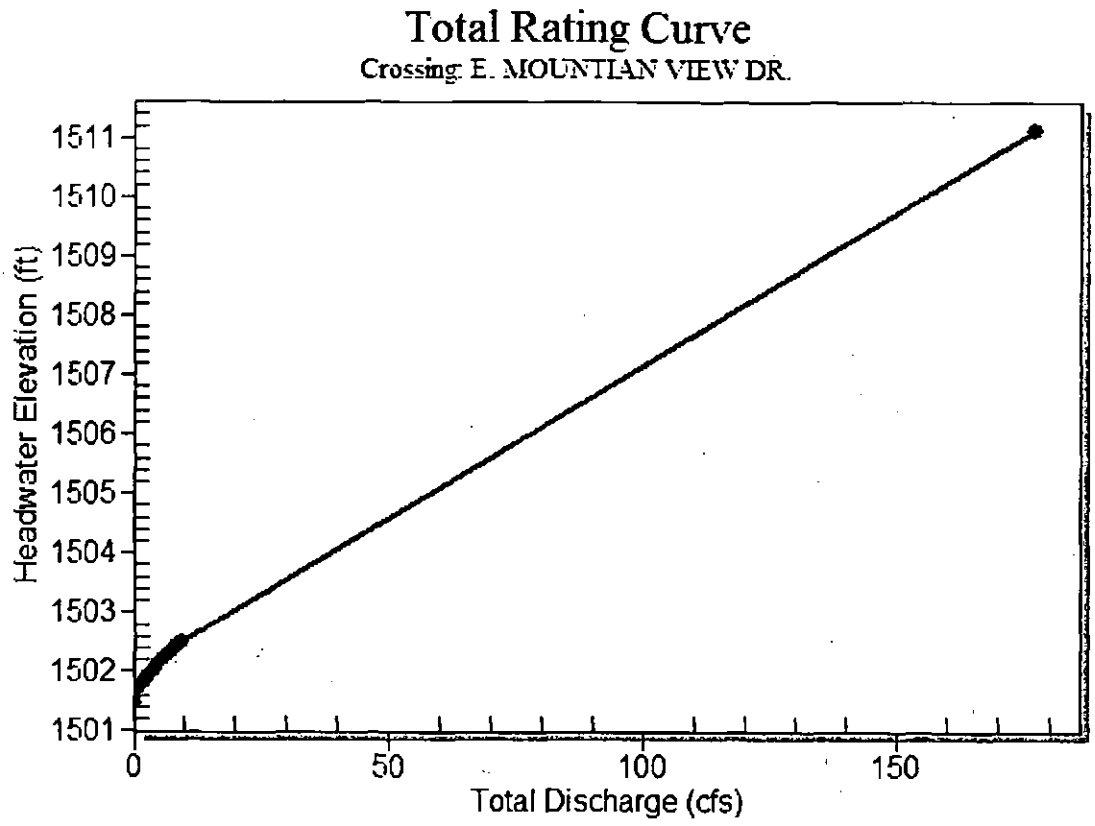


Table 2 - Culvert Summary Table: 60" CMP

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1501.48	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.93	0.93	1501.74	0.257	0.217	2-M2c	0.119	0.101	0.101	0.083	2.105	0.923
1.86	1.86	1501.82	0.301	0.342	2-M2c	0.188	0.166	0.166	0.125	2.522	1.211
2.79	2.79	1501.93	0.345	0.451	2-M2c	0.238	0.222	0.222	0.160	2.818	1.416
3.72	3.72	1502.02	0.389	0.544	2-M2c	0.287	0.271	0.271	0.190	3.053	1.583
4.65	4.65	1502.11	0.432	0.633	2-M2c	0.327	0.316	0.316	0.217	3.253	1.724
5.58	5.58	1502.19	0.474	0.713	2-M2c	0.367	0.357	0.357	0.242	3.432	1.849
6.51	6.51	1502.27	0.516	0.791	2-M2c	0.403	0.396	0.396	0.265	3.594	1.960
7.44	7.44	1502.34	0.557	0.865	2-M2c	0.438	0.434	0.434	0.287	3.742	2.061
8.37	8.37	1502.41	0.598	0.934	2-M2c	0.472	0.469	0.469	0.308	3.877	2.155
9.30	9.30	1502.48	0.638	1.002	2-M2c	0.503	0.499	0.499	0.328	4.044	2.241

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****
****

Straight Culvert

Inlet Elevation (invert): 1501.48 ft, Outlet Elevation (invert): 1499.45 ft

Culvert Length: 80.03 ft, Culvert Slope: 0.0254

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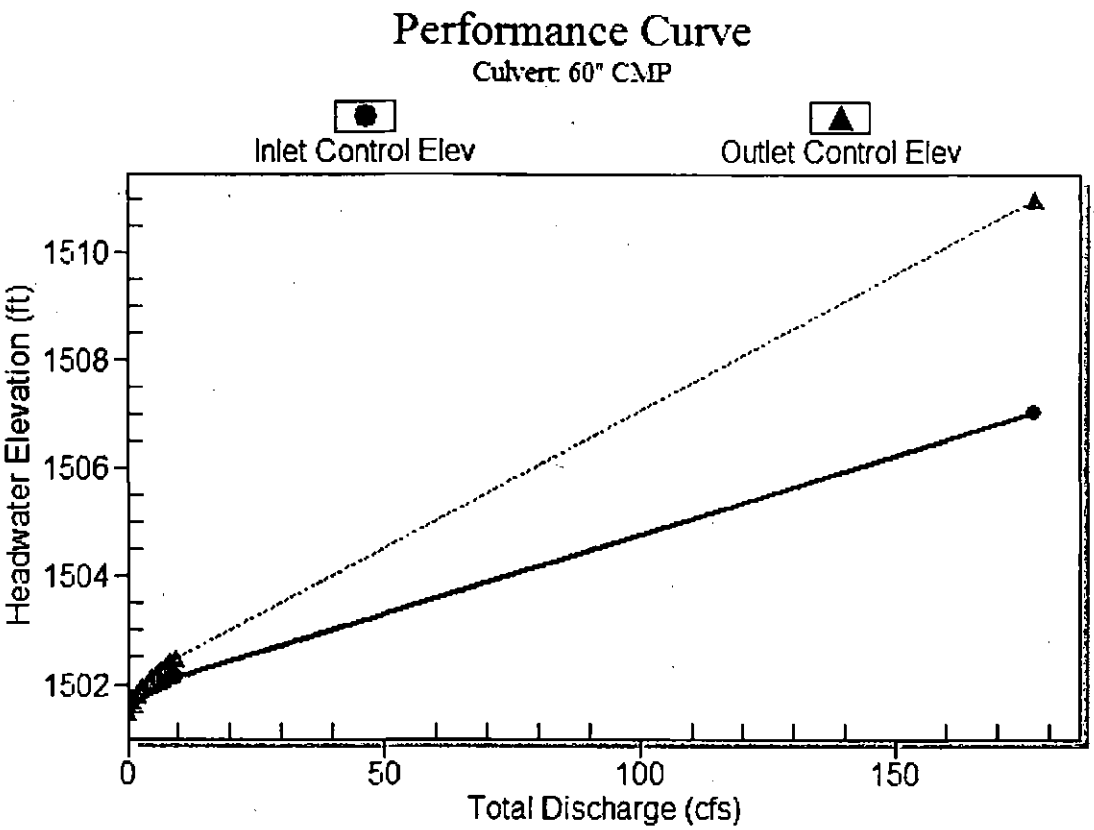
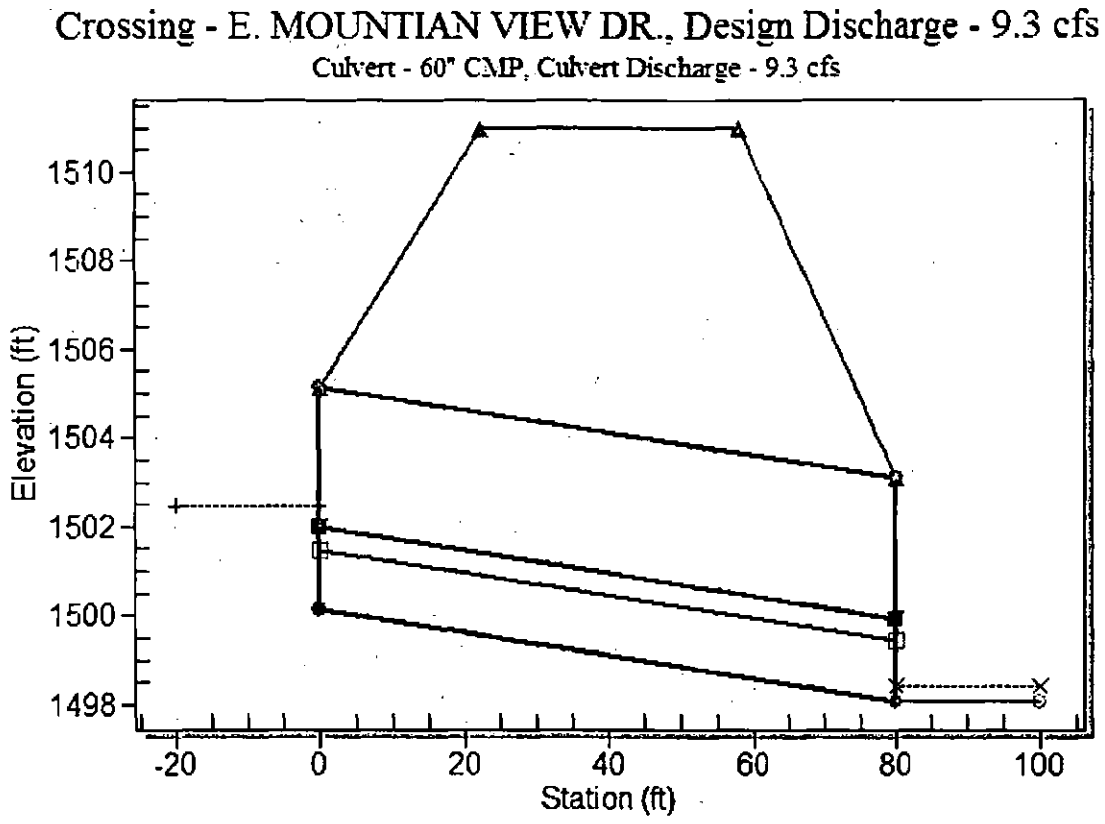
****
****

Culvert Performance Curve Plot: 60" CMP



Water Surface Profile Plot for Culvert: 60" CMP



Site Data - 60" CMP

- Site Data Option: Culvert Invert Data
- Inlet Station: 0.00 ft
- Inlet Elevation: 1500.13 ft
- Outlet Station: 80.00 ft
- Outlet Elevation: 1498.10 ft
- Number of Barrels: 1

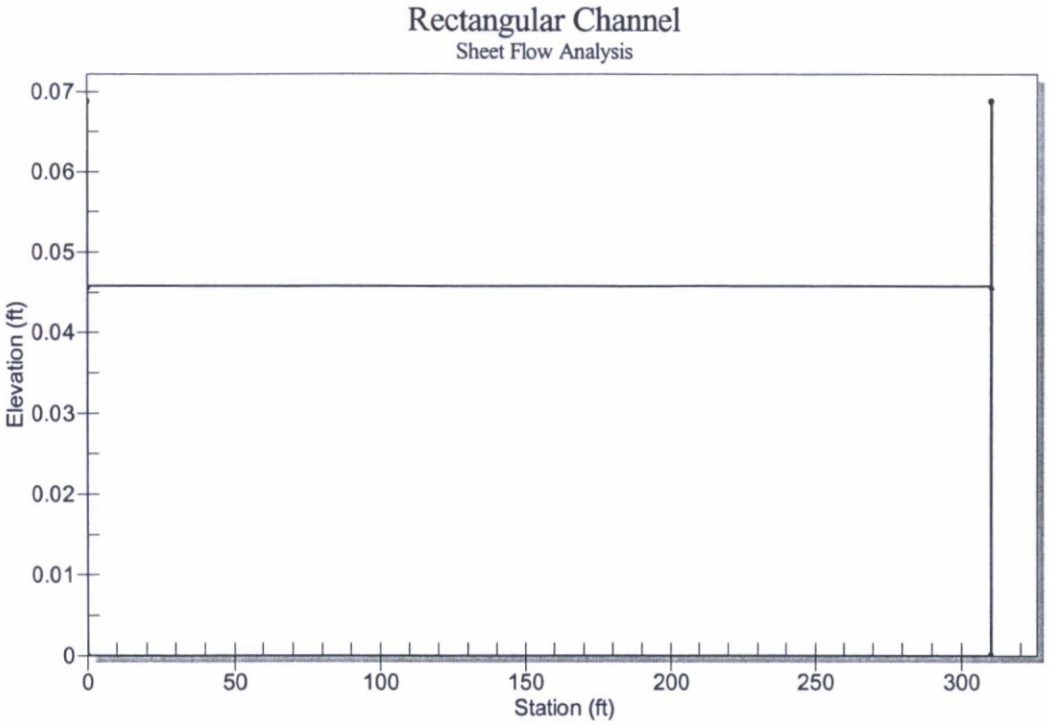
Culvert Data Summary - 60" CMP

- Barrel Shape: Circular
- Barrel Diameter: 5.00 ft
- Barrel Material: Corrugated Steel
- Embedment: 16.20 in
- Barrel Manning's n: 0.0240 (top and sides)
- Manning's n: 0.0350 (bottom)
- Culvert Type: Straight
- Inlet Configuration: Thin Edge Projecting
- Inlet Depression: None

APPENDIX D

Existing Sheet Flow Hydraulic Calculations

Hydraulic Analysis Report



Input Parameters

Channel Type: Rectangular
Channel Width: 310.0000 ft
Longitudinal Slope: 0.0158 ft/ft
Manning's n: 0.0300
Flow: 11.5000 cfs

Result Parameters

Depth: 0.0458 ft
Area of Flow: 14.2069 ft^2
Wetted Perimeter: 310.0917 ft
Hydraulic Radius: 0.0458 ft
Average Velocity: 0.8095 ft/s
Top Width: 310.0000 ft
Froude Number: 0.6663
Critical Depth: 0.0350 ft
Critical Velocity: 1.0610 ft/s
Critical Slope: 0.0401 ft/ft
Critical Top Width: 310.00 ft
Calculated Max Shear Stress: 0.0452 lb/ft^2
Calculated Avg Shear Stress: 0.0452 lb/ft^2