VOLUME 2 of 2

Technical Data Notebook for Lower Painted Rock Watershed Zone A

Floodplain Delineation Study

East Watershed

Maricopa County, Arizona

FCD 2004C065

February 16, 2007

Prepared for:

Flood Control District of Maricopa County

Prepared by:

Kimley-Horn and Associates, Inc.

LTM Engineering, Inc.

Technical Data Notebook for Lower Painted Rock Watershed Zone A Floodplain Delineation Study East Watershed Maricopa County, Arizona

Volume 2 of 2

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February 16, 2007
KHA Project #091131013

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E.1 Roughness Coefficient Estimation

E.1 Roughness Coefficient Estimation

Final Roughness Coefficient Estimation for Lower Painted Rock East Watershed Zone A Floodplain Delineation Study Maricopa County, Arizona

September 28, 2006

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LTM Engineering, Inc.

DRAFT TECHNICAL MEMORANDUM

Date of Site Visits: February 2 and May 8, 2006
Project: Lower Painted Rock East Watershed Zone A Floodplain Delineation Study
FCD Contract No.: 2004C065

Registered Professional Engineer (Civil) CERTIFICATE NO. 20934 LAURIE T. MILLER Date Signed 9-28-06 ARIZONA, U.S.A.

The study team conducted field reconnaissance on February 2 and May 8, 2006, to assess the drainage characteristics of the watershed and estimate the hydraulic roughness coefficient, Manning's "n".

In addition, photographic records were made of numerous hydraulic structures as part of the field data collection task for this study. These photographs and their locations are presented separately in the Technical Data Notebook (TDN).

Channel roughness was observed for washes throughout the study area and photographs were taken of representative washes within the Lower Painted Rock East Watershed. Six different stream types were identified and documented.

Manning roughness coefficients were estimated from these field observations and included allowances for channel irregularity, non-vegetative obstructions, vegetation, variations in channel cross section, and degree of meandering. Quantitative estimation of these components was performed using the U.S. Geological Survey's "Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona". A photographic record of the channel reaches and the associated estimation of roughness coefficients is included herein. A key map with locations of photographs is presented for the East Watershed at the end of this Technical Memorandum.

The washes delineated for this study displayed similar hydraulic characteristics of wide and shallow sandy bottoms and minimal in-channel vegetation. Channel Manning's "n" values for these washes ranged from 0.031 to 0.038. The channel banks and overbanks were vegetated with short grasses, brush, and trees. Overbank roughness for these wash types ranged from 0.038 to 0.06.

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Estimation of Manning's "n" Values

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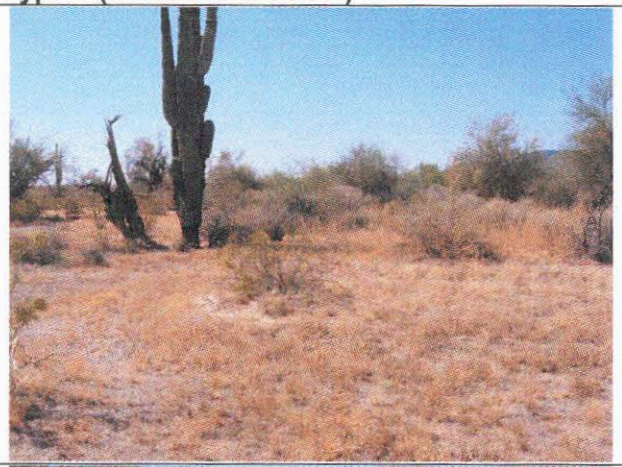
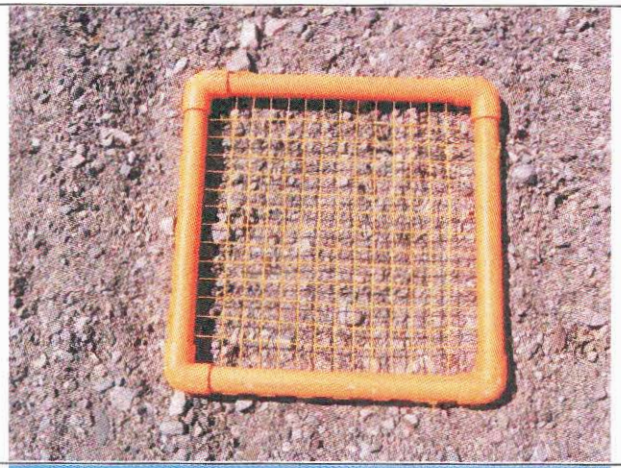
Photo Template

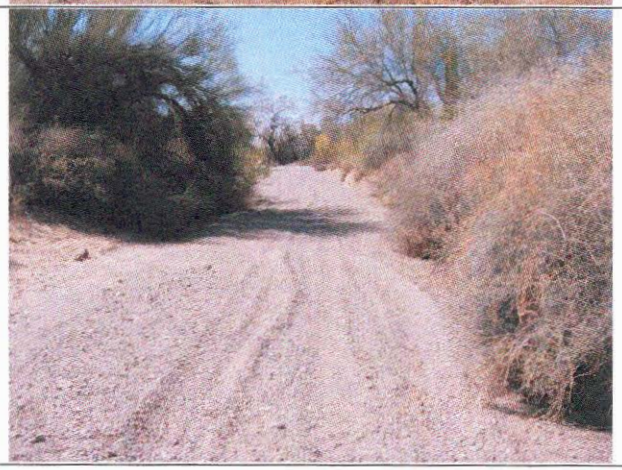
Photographs are arranged in the following sequence:

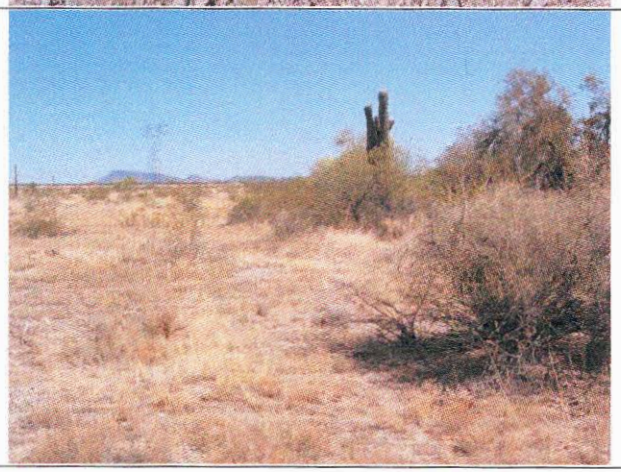
Left Overbank	Bed Material
Main Channel	Right Overbank

Wash Type 1 (Unnamed Wash C)







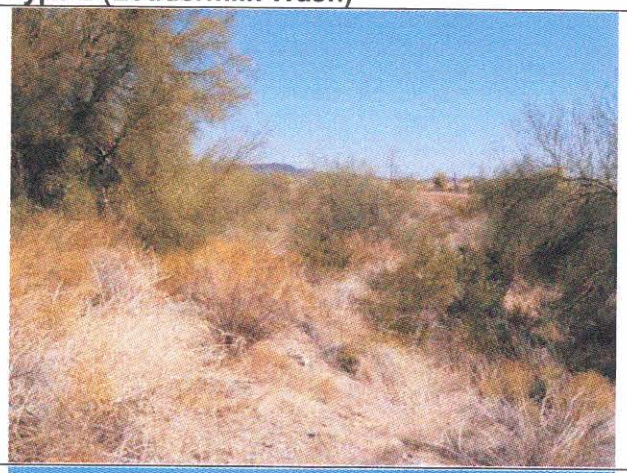


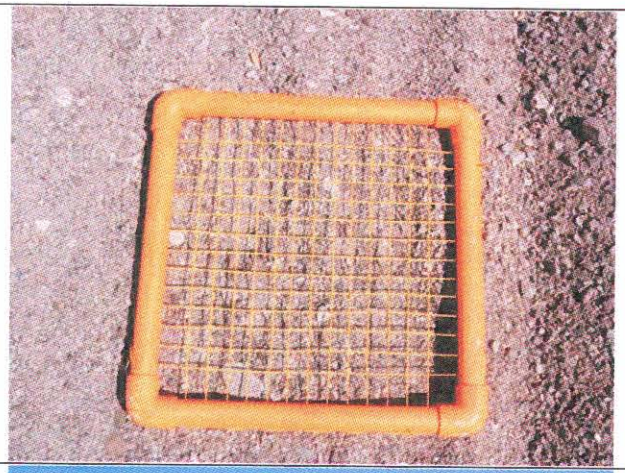
Wash Type 1 (Unnamed Wash C , Loudermilk Wash Tributary 1)

Project: Lower Painted Rock Zone A FDS
Stream: Unnamed Wash C
Location: N33° 06' 41.04" W113° 07' 50.88"

Channel Conditions		Manning's n Adjustment		Left Overbank	Channel	Right Overbank
Channel Material	Concrete	n_b	.012 - .018			
	Rock Cut		0.025			
	Firm Soil		.025 - .032	.03		.03
	Course Sand		.026 - .035		.03	
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n_i	0			
	Minor		.001 - .005	.002	.004	
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n_o	.000 - .004		0	
	Minor		.005 - .015	.005		.005
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n_v	.002 - .010	.005	-	.005
	Medium		.010 - .025			
	Large		.025 - .050			
	Very Large		.050 - .100			
Variations in Channel Cross Section	Gradual	n_a	0	0	0	0
	Occasional Alternating		.001 - .005			
	Frequent Alternating		.010 - .015			
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Severe		1.3			
$n = m(n_b + n_i + n_o + n_{v+} n_a)$				**.042**	**.034**	**.042**

Wash Type 2 (Loudermilk Wash)



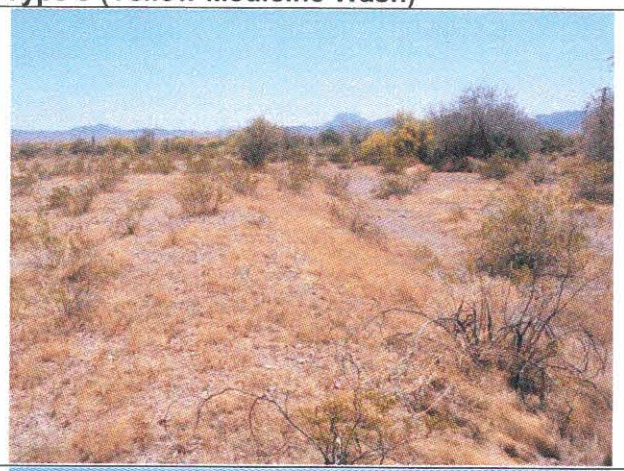


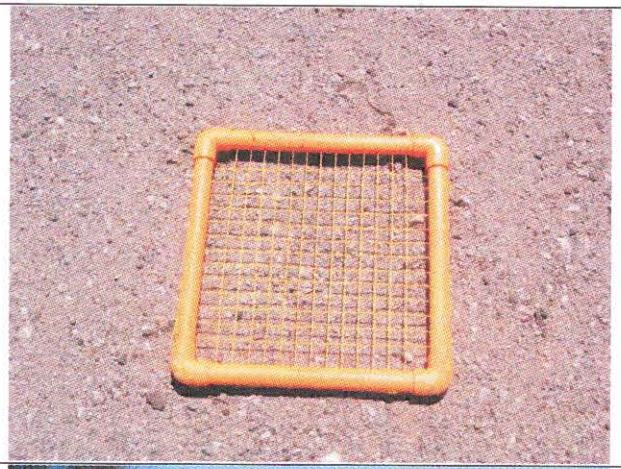
Wash Type 2 (Loudermilk Wash)

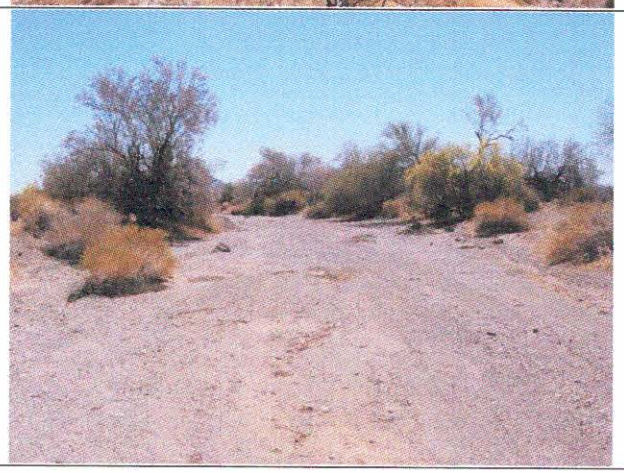
Project: Lower Painted Rock Zone A FDS
Stream: Loudermilk Wash
Location: N33° 07' 31.86" W113° 06' 52.20" Upstream of Railroad Tracks

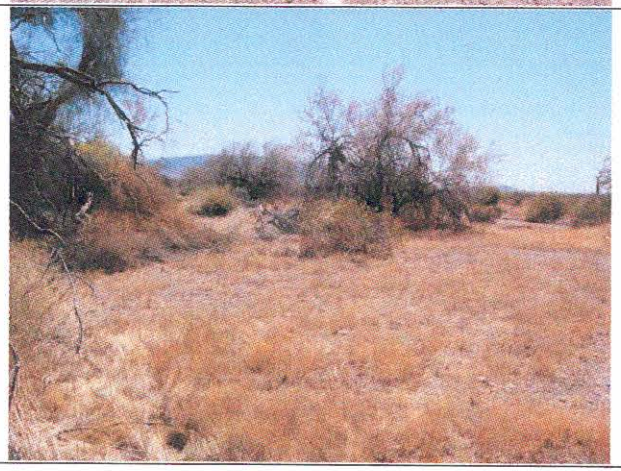
Channel Conditions		Manning's n Adjustment		Left Overbank	Channel	Right Overbank
Channel Material	Concrete	n_b	.012 - .018			
	Rock Cut		0.025			
	Firm Soil		.025 - .032			
	Course Sand		.026 - .035	.03	.03	.03
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n_i	0			
	Minor		.001 - .005	.005	.001	.
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n_o	.000 - .004		0	.004
	Minor		.005 - .015	.015		
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n_v	.002 - .010		.002	.004
	Medium		.010 - .025	.01		
	Large		.025 - .050			
	Very Large		.050 - .100			
Variations in Channel Cross Section	Gradual	n_a	0	0	0	0
	Occasional Alternating		.001 - .005			
	Frequent Alternating		.010 - .015			
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Severe		1.3			
$n = m(n_b + n_i + n_o + n_v + n_a)$				**.06**	**.031**	**.038**

Wash Type 3 (Yellow Medicine Wash)







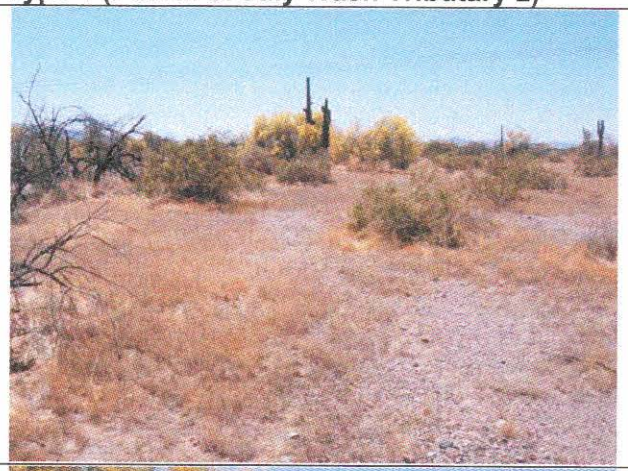
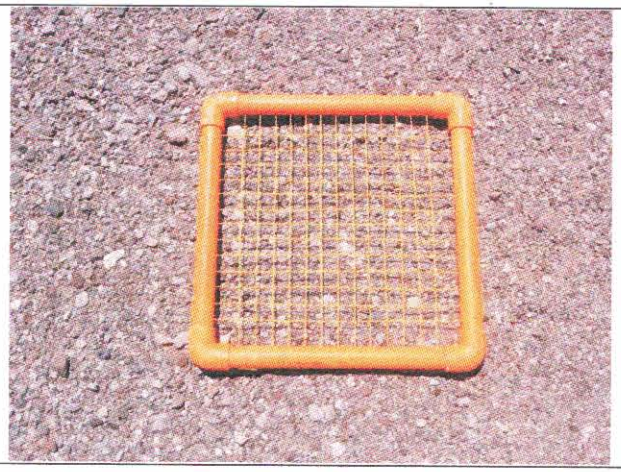
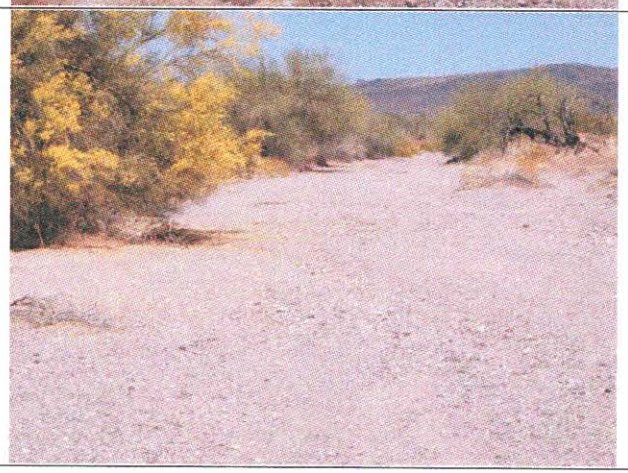


Wash Type 3 (Yellow Medicine Wash)

Project: Lower Painted Rock Zone A FDS
Stream: Yellow Medicine Wash
Location: N33° 08' 21.72" W113° 05' 55.92"

Channel Conditions		Manning's n Adjustment		Left Overbank	Channel	Right Overbank
Channel Material	Concrete	n_b	.012 - .018			
	Rock Cut		0.025			
	Firm Soil		.025 - .032	.03		.03
	Course Sand		.026 - .035		.03	
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n_i	0			
	Minor		.001 - .005	.004	.001	.002
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n_o	.000 - .004	.002	0	.005
	Minor		.005 - .015			
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n_v	.002 - .010	.01	.002	.005
	Medium		.010 - .025			
	Large		.025 - .050			
	Very Large		.050 - .100			
Variations in Channel Cross Section	Gradual	n_a	0	0	0	0
	Occasional Alternating		.001 - .005			
	Frequent Alternating		.010 - .015			
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Severe		1.3			
$n = m(n_b + n_i + n_o + n_v + n_a)$				**.046**	**.033**	**.042**

Wash Type 4 (Fourth of July Wash Tributary 2)

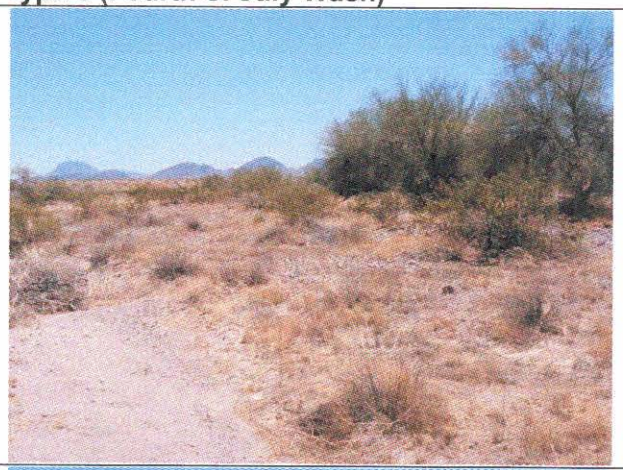
	
	Photo Unavailable

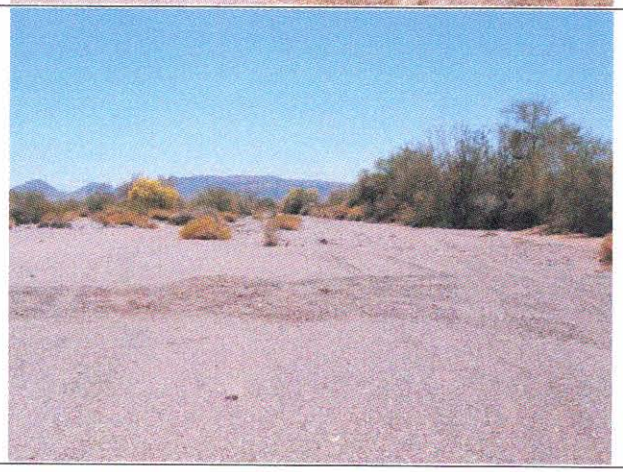
Wash Type 4 (Fourth of July Wash Tributary 2)

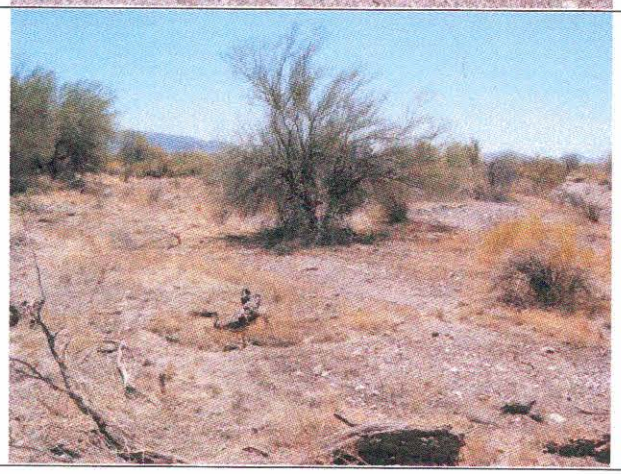
Project: Lower Painted Rock Zone A FDS
Stream: Fourth of July Wash Tributary 2
Location: N33° 09' 14.22" W113° 05' 16.03" Upstream of Railroad Tracks

Channel Conditions		Manning's n Adjustment		Left Overbank	Channel	Right Overbank
Channel Material	Concrete	n_b	.012 - .018			
	Rock Cut		0.025			
	Firm Soil		.025 - .032			
	Course Sand		.026 - .035	.035	.03	.03
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n_i	0			
	Minor		.001 - .005	.004	.002	.004
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n_o	.000 - .004		.002	
	Minor		.005 - .015	.005		.005
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n_v	.002 - .010	.002	.002	.002
	Medium		.010 - .025			
	Large		.025 - .050			
	Very Large		.050 - .100			
Variations in Channel Cross Section	Gradual	n_a	0	0	0	0
	Occasional Alternating		.001 - .005			
	Frequent Alternating		.010 - .015			
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Severe		1.3			
$n = m(n_b + n_i + n_o + n_{v+} n_a)$				**.046**	**.036**	**.041**

Wash Type 5 (Fourth of July Wash)





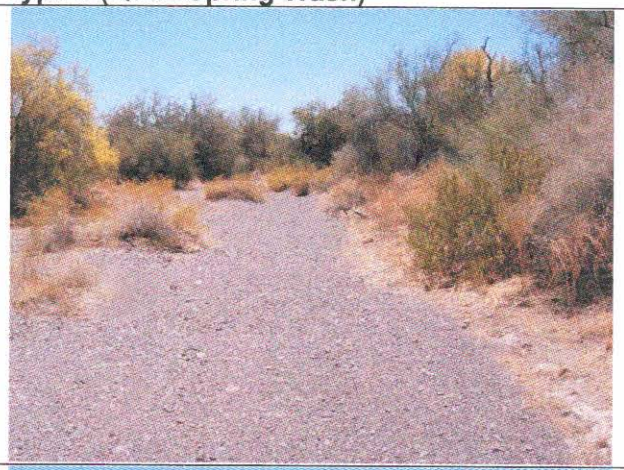


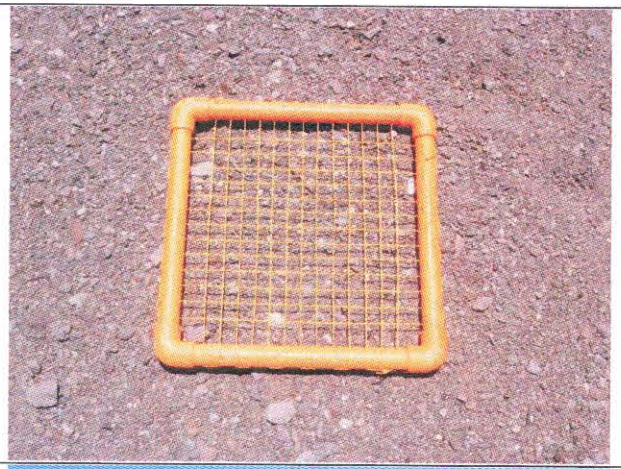
Wash Type 5 (Fourth of July Wash)

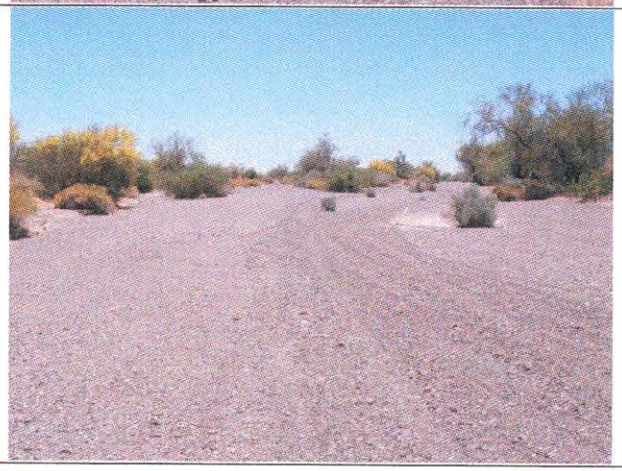
Project: Lower Painted Rock Zone A FDS
Stream: Fourth of July Wash
Location: N33° 09' 21.99" W113° 04' 42.52" Downstream of Railroad Tracks

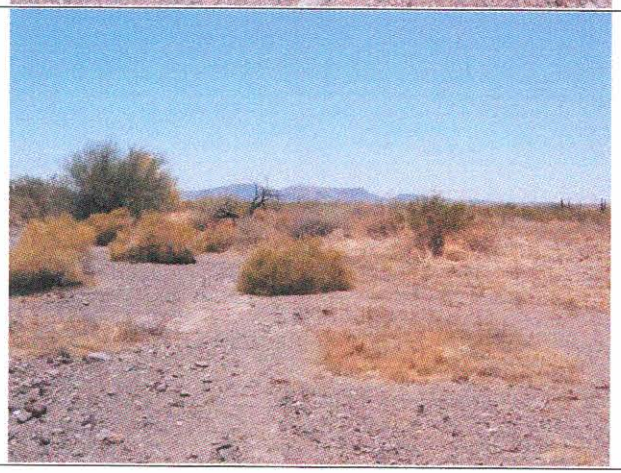
Channel Conditions		Manning's n Adjustment		Left Overbank	Channel	Right Overbank
Channel Material	Concrete	n_b	.012 - .018			
	Rock Cut		0.025			
	Firm Soil		.025 - .032	.03	.03	.03
	Course Sand		.026 - .035			
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n_i	0			
	Minor		.001 - .005	.005	.001	.002
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n_o	.000 - .004		.004	
	Minor		.005 - .015	.005		.005
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n_v	.002 - .010	.01	-	.01
	Medium		.010 - .025			
	Large		.025 - .050			
	Very Large		.050 - .100			
Variations in Channel Cross Section	Gradual	n_a	0	0	0	0
	Occasional Alternating		.001 - .005			
	Frequent Alternating		.010 - .015			
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Severe		1.3			
$n = m(n_b + n_i + n_o + n_v + n_a)$				**.05**	**.035**	**.047**

Wash Type 6 (Quail Spring Wash)









Wash Type 6 (Quail Spring Wash, Quail Spring Wash Tributary 1)

Project: Lower Painted Rock Zone A FDS
Stream: Quail Spring Wash
Location: N33° 10' 10.68" W113° 03' 45.30"

Channel Conditions		Manning's n Adjustment		Left Overbank	Channel	Right Overbank
Channel Material	Concrete	n_b	.012 - .018			
	Rock Cut		0.025			
	Firm Soil		.025 - .032			
	Course Sand		.026 - .035			
	Cobble		.030 - .050	.032	.032	.032
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n_i	0			
	Minor		.001 - .005	.001	.001	.001
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n_o	.000 - .004			
	Minor		.005 - .015	.01	.005	.008
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n_v	.002 - .010	.002	-	.003
	Medium		.010 - .025			
	Large		.025 - .050			
	Very Large		.050 - .100			
Variations in Channel Cross Section	Gradual	n_a	0	0	0	0
	Occasional Alternating		.001 - .005			
	Frequent Alternating		.010 - .015			
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Severe		1.3			
$n = m(n_b + n_i + n_o + n_{v+} n_a)$				**.045**	**.038**	**.044**

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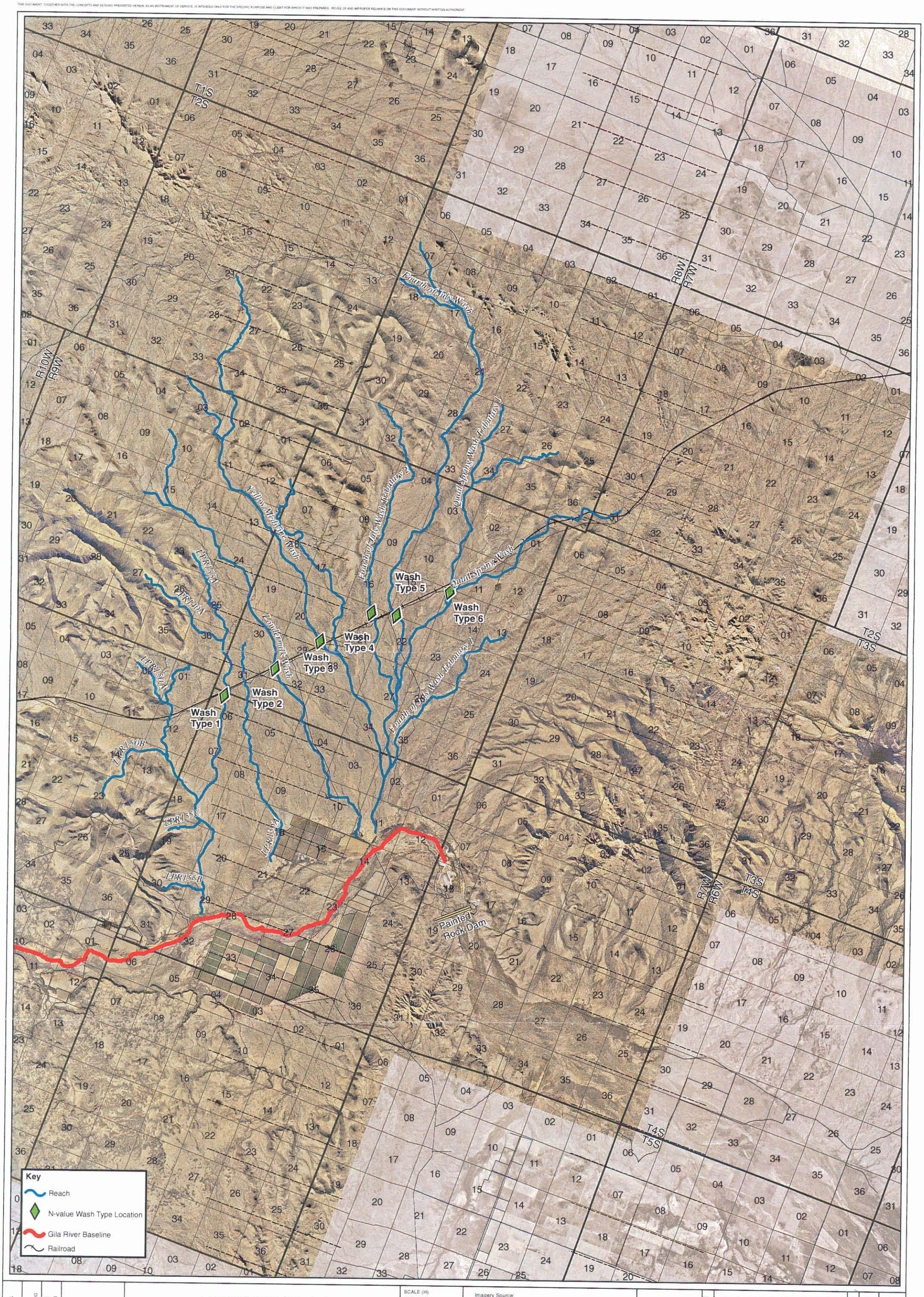
THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE SPECIFIC PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZAT



1 OF 1	DRAWING NAME	PROJECT NO. 091131.0013	

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
Wash Type Photo Locations for Manning's N Estimation
East Watershed

SCALE (H):
SCALE (V):
DESIGNED BY:
DRAWN BY: ERS
CHECKED BY: JTA
DATE: 12/15/06

Imagery Source:
FCDMC Flight Dates December 2003 - January 2004

Supplemental Aerial Imagery Source:
USGS Digital Orthophotos (DOQ/DOQQ)
Mosaic 1996-2000

Kimley-Horn and Associates, Inc.

NO.	REVISION	BY	DATE	APPR.

E.2 Cross Section Plots

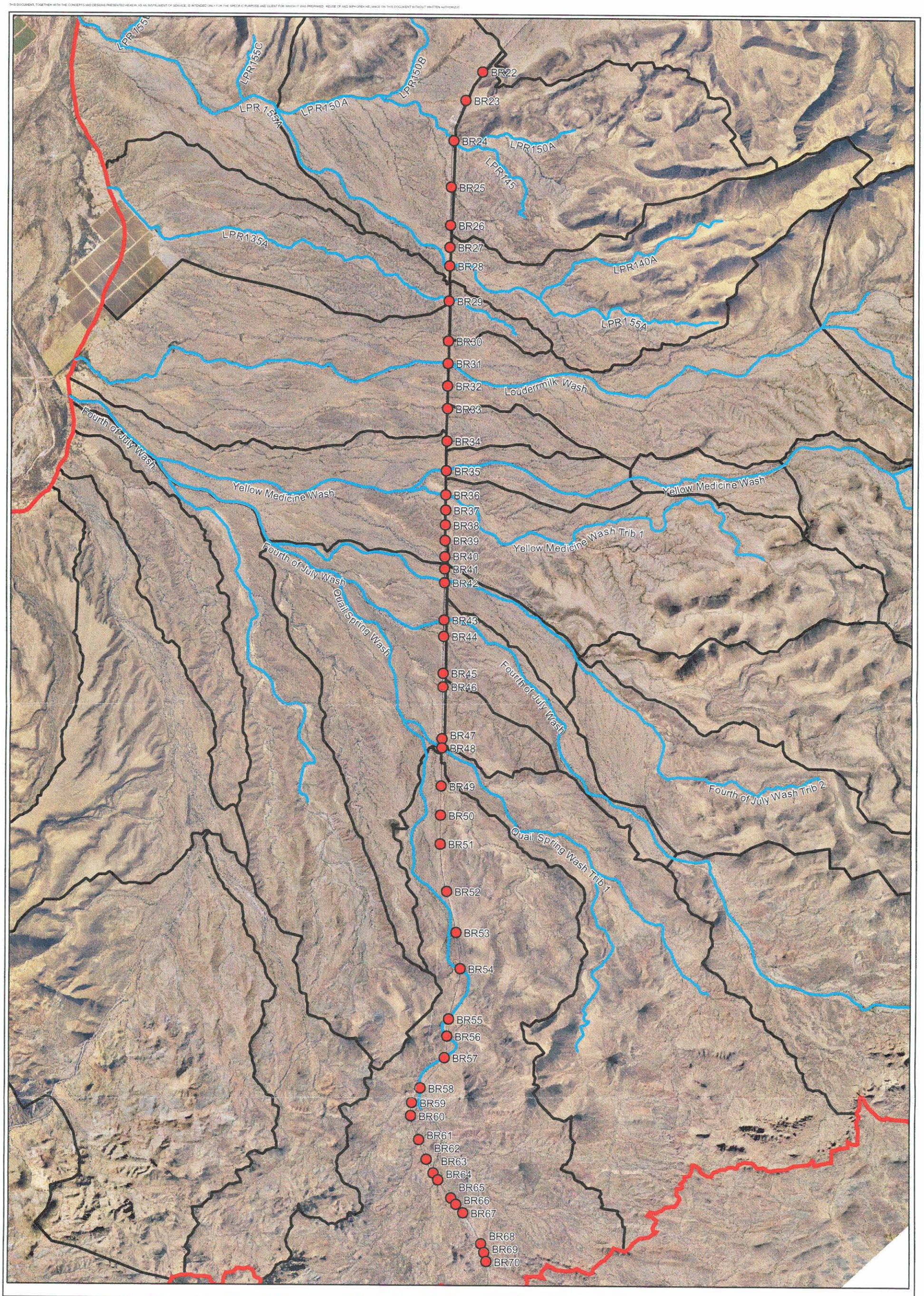
Cross Section plots in PDF format added to study CD located before front inside cover of TDN Volume 1.

E.3 Expansion and Contraction Coefficients

As noted in Section 5.3.2 all expansion and contraction coefficients set to 0.3 and 0.1 respectively.

E.4 Analysis of Structures

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE SPECIFIC PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZAT



OF	DRAWING NAME:	PROJECT NO.	0 0.25 0.5 Miles	**Figure 10** **Railroad Bridge Locations** **Lower Painted Rock** **Watershed Zone A Floodplain Delineation Study** **East Watershed**	SCALE (H): SCALE (V): none DESIGNED BY: DRAWN BY: MDC CHECKED BY: JTA DATE: 12/15/06	Imagery Source: FCDMC November 2004 Kimley-Horn and Associates, Inc.

NO.	REVISION	BY	DATE	APPR.

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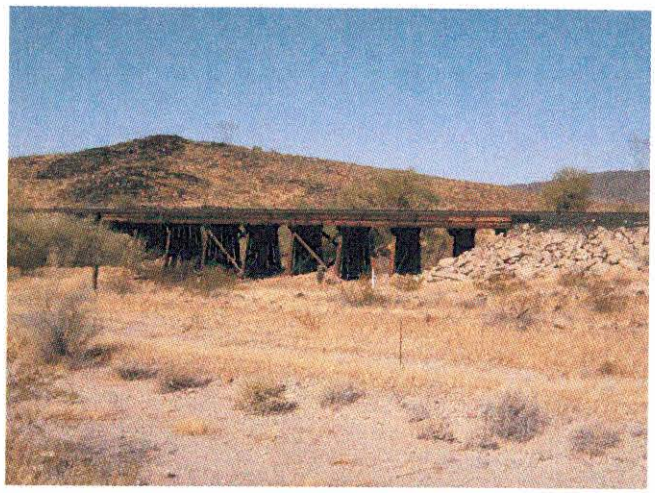
BR23



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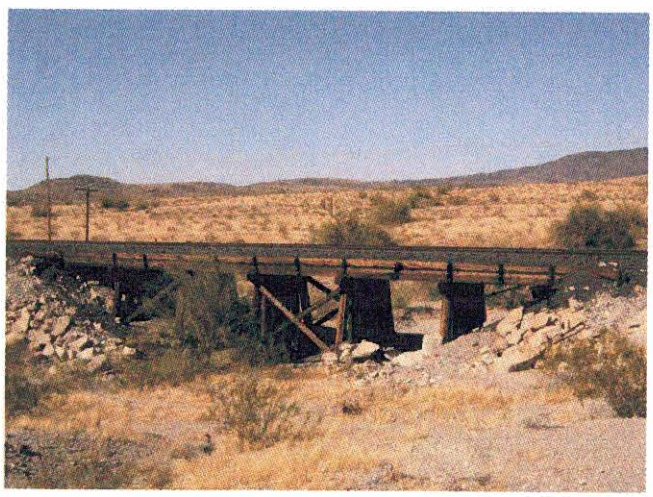

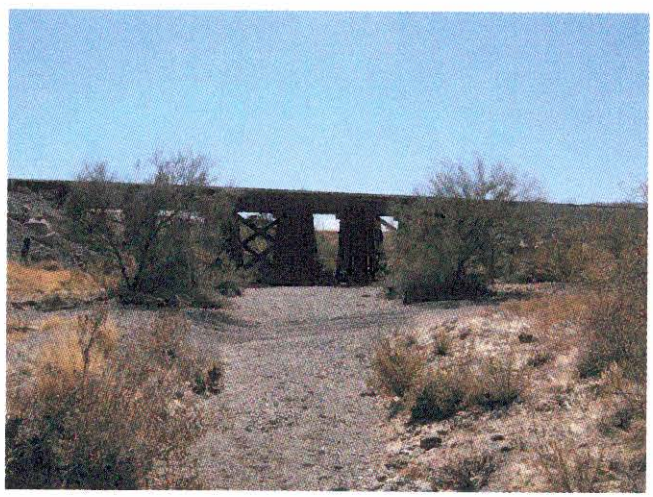

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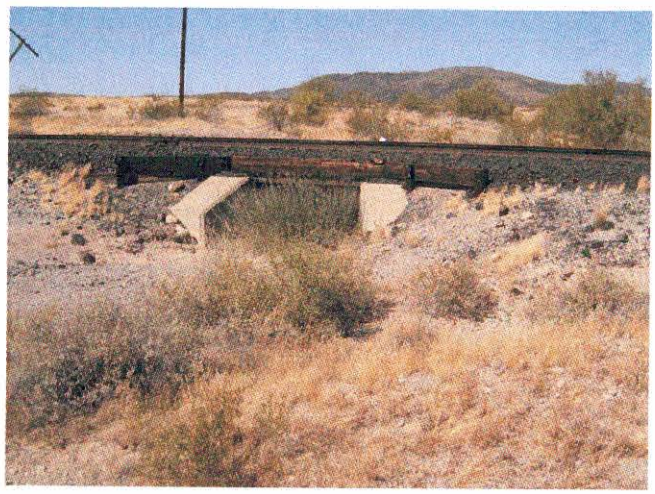

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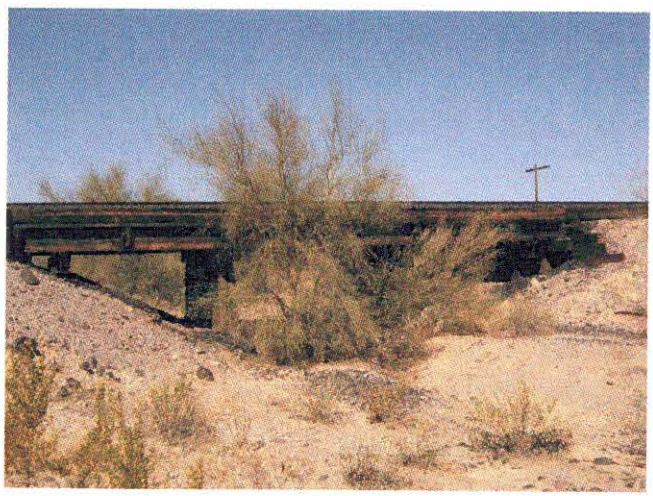

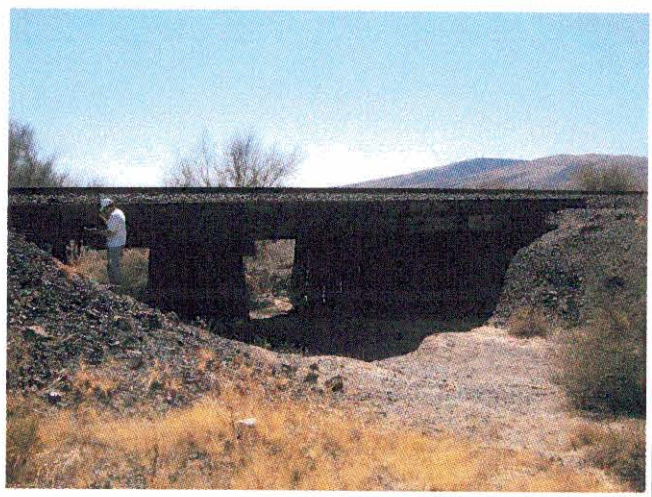

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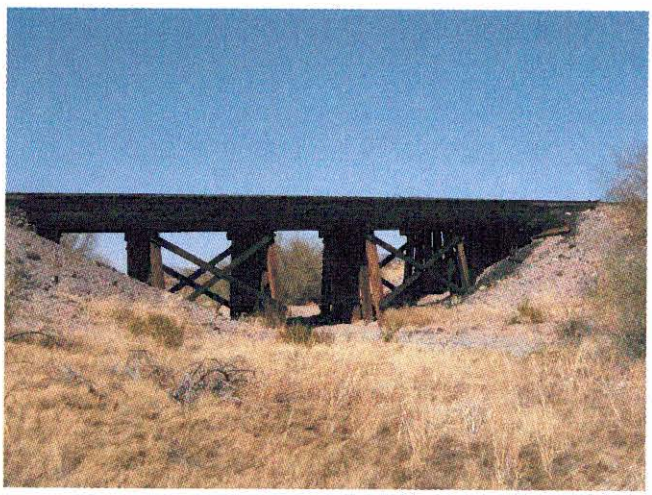

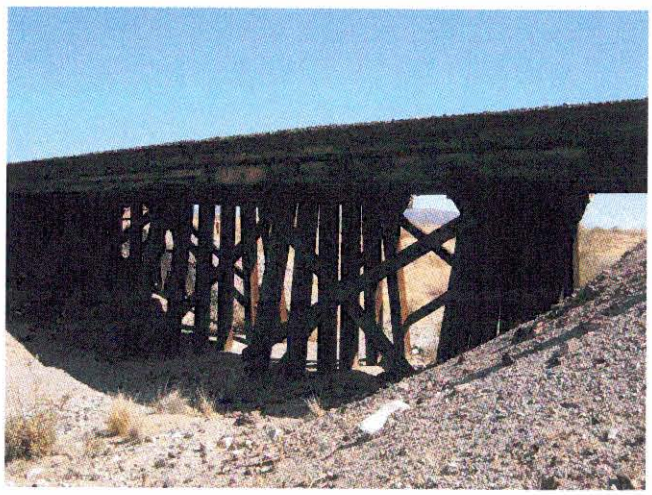

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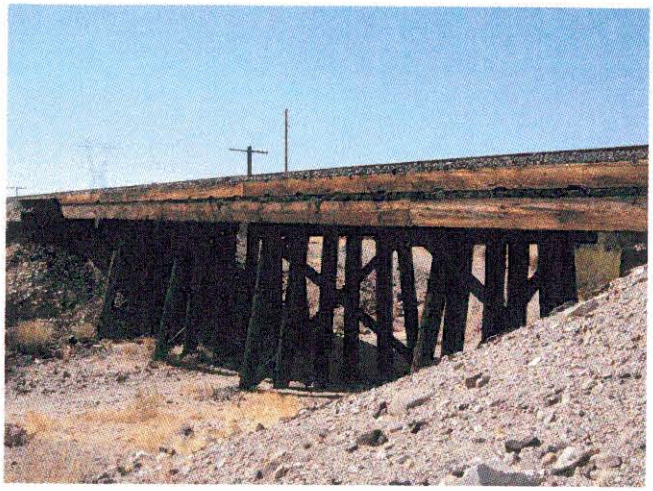

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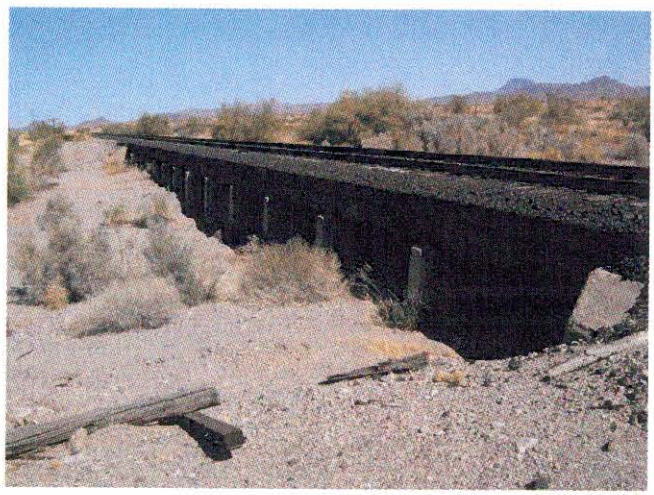

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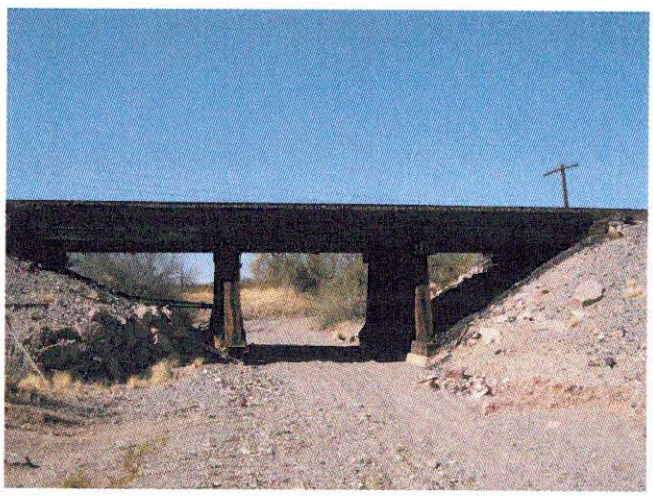

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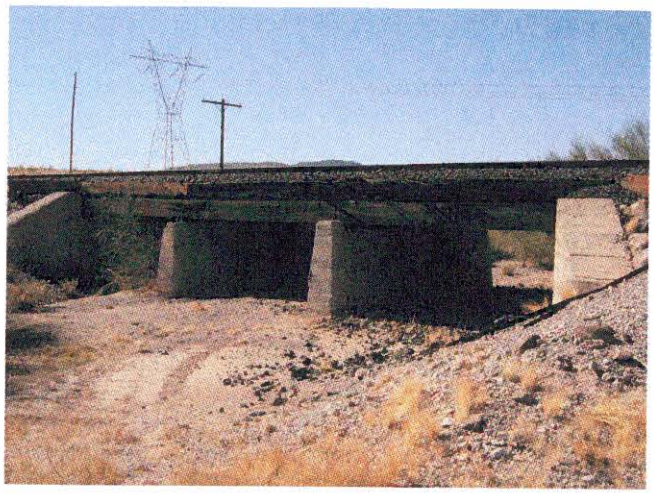

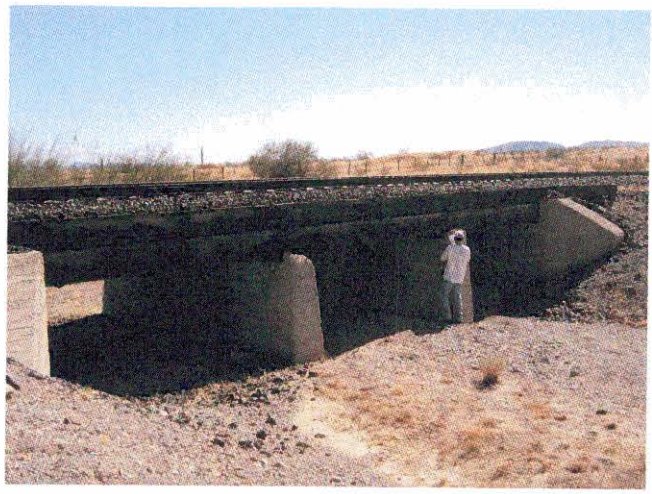

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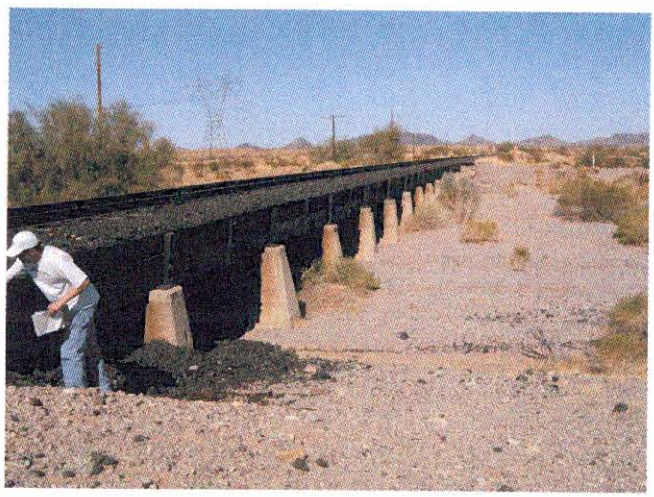

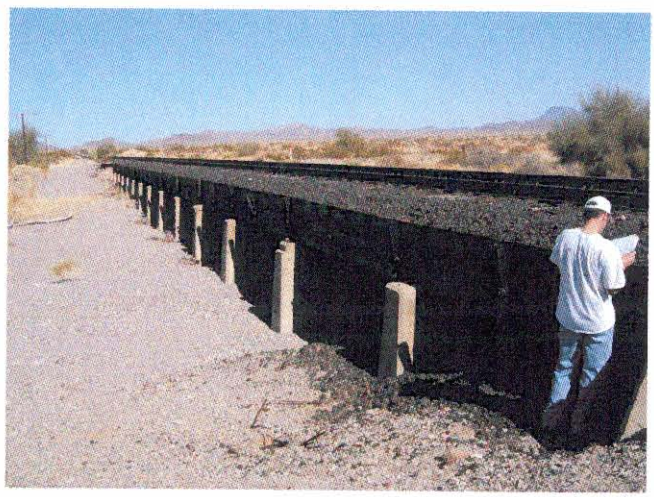

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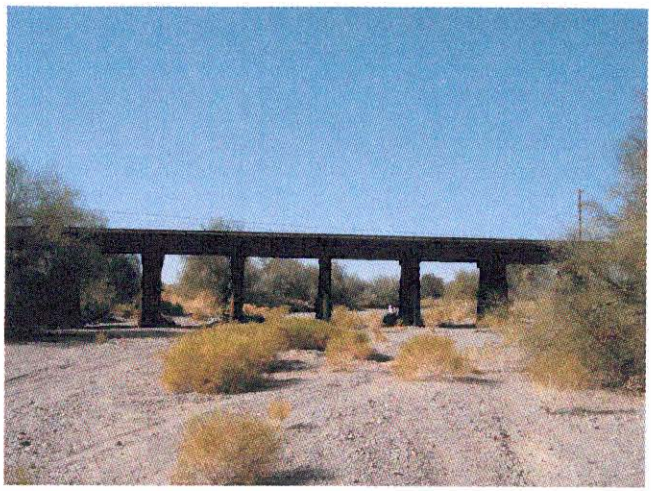

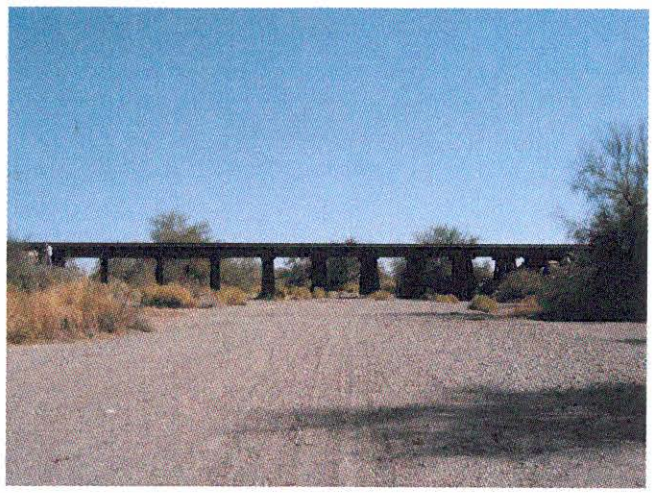

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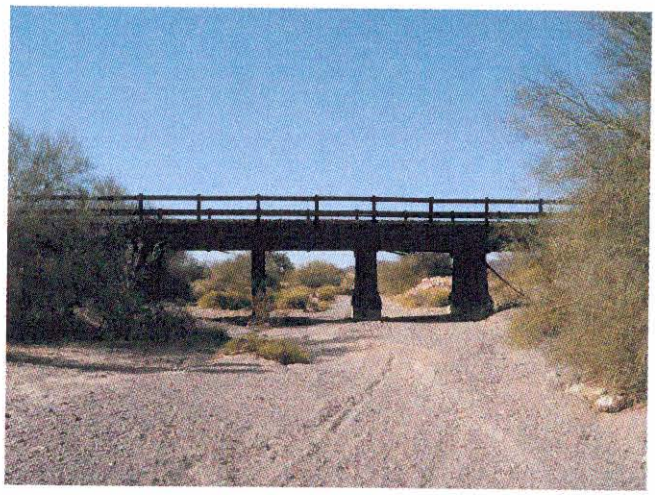

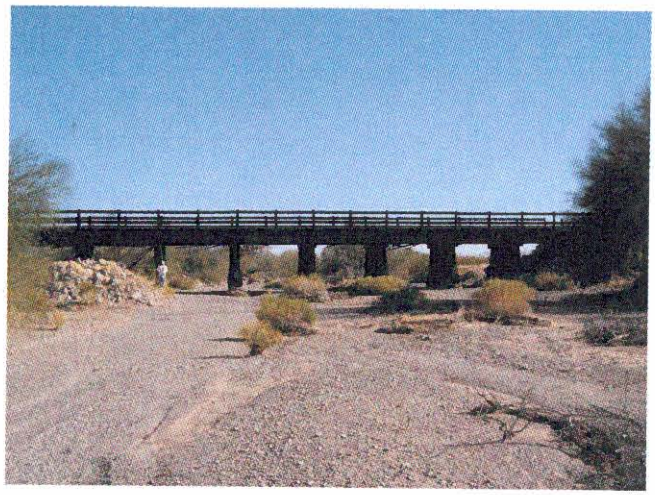

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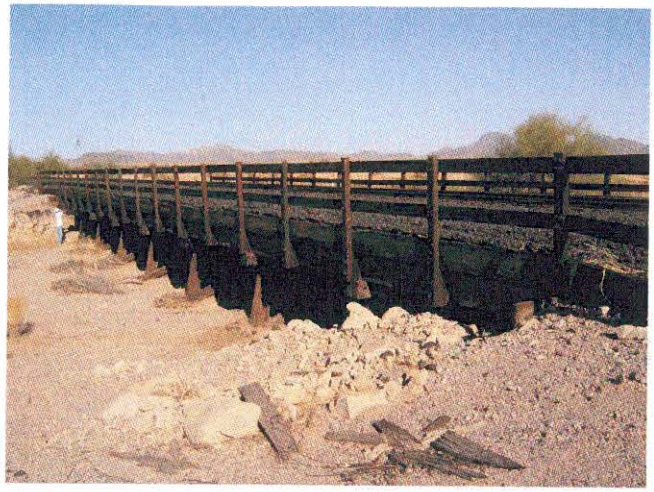

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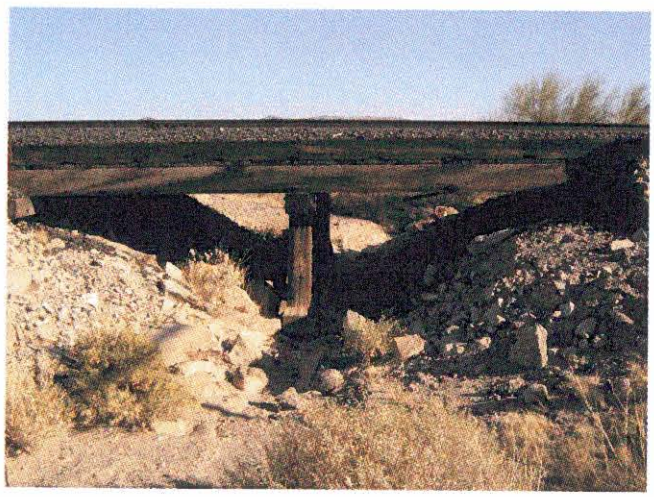

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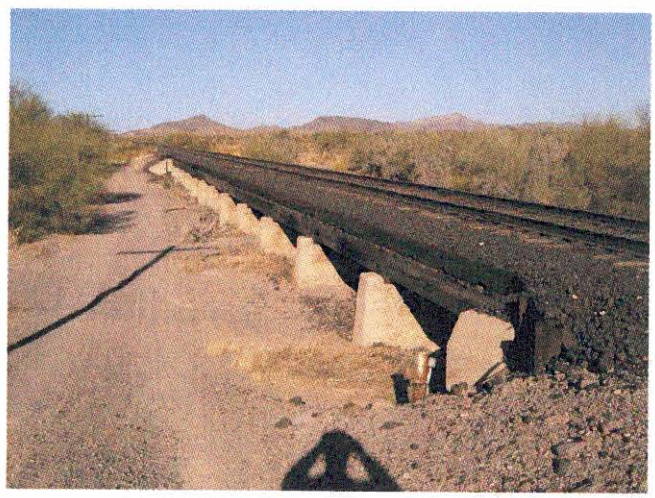

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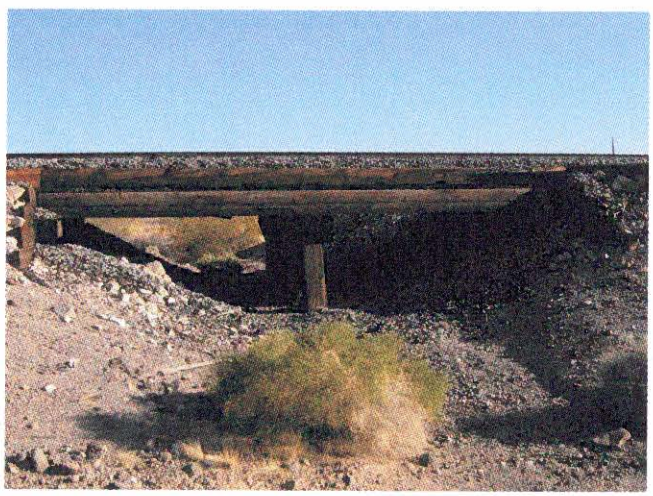

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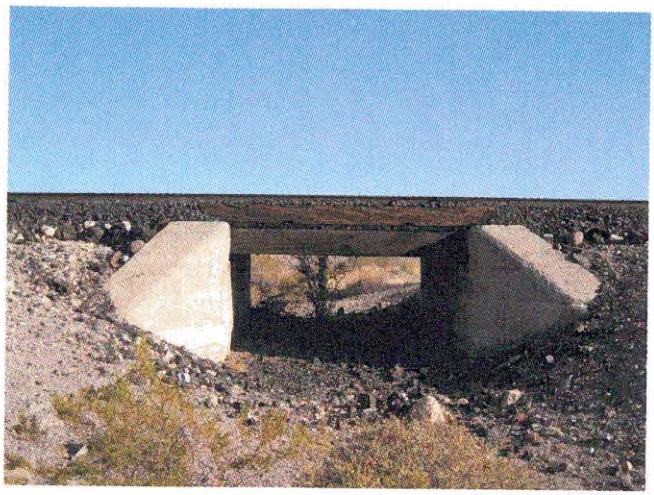

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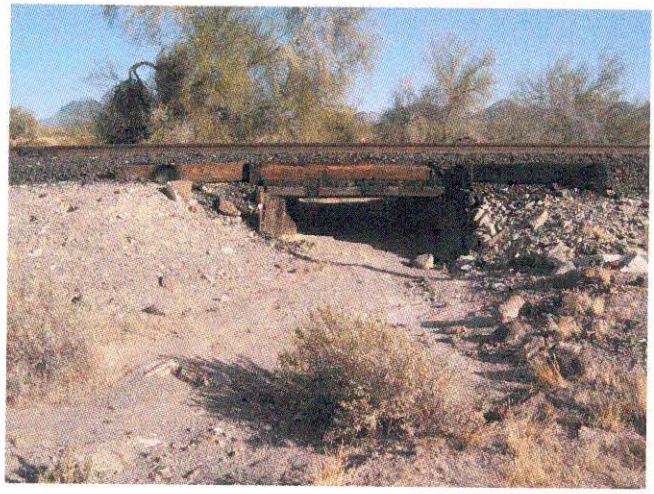

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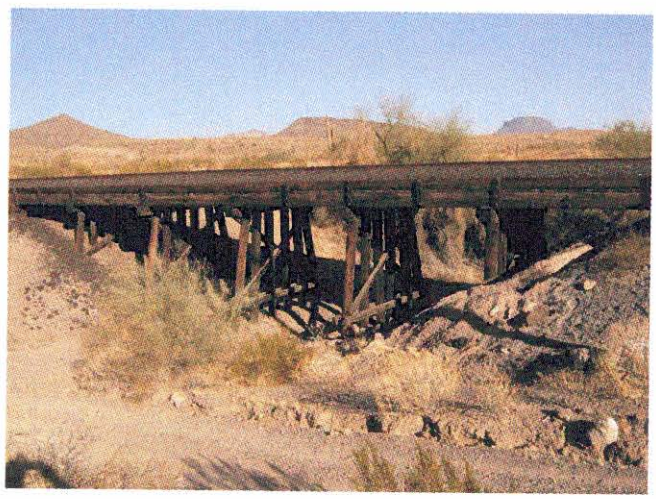

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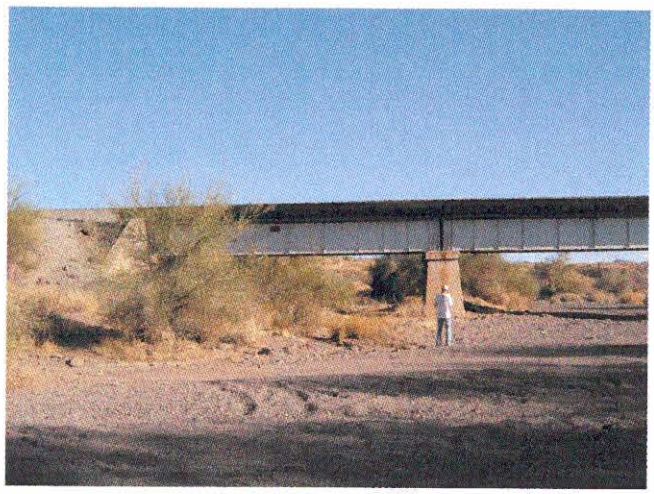

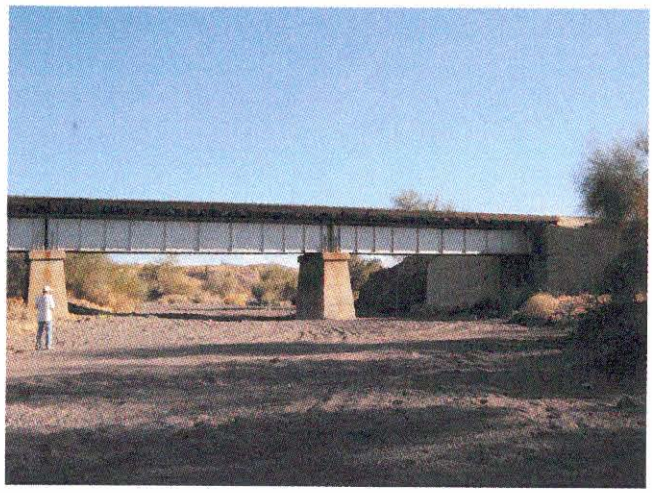

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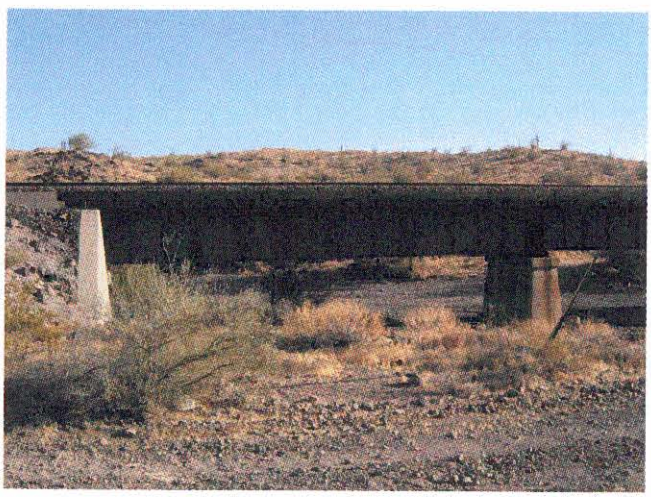

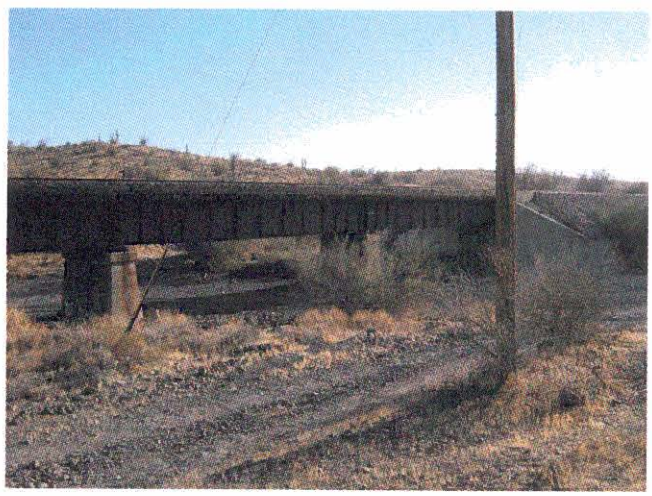

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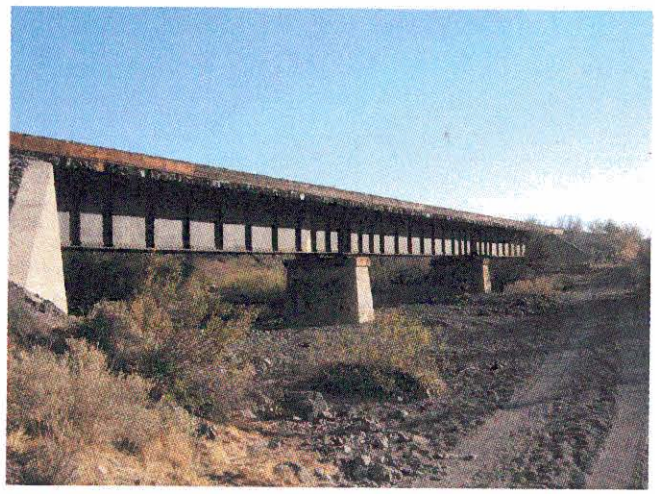

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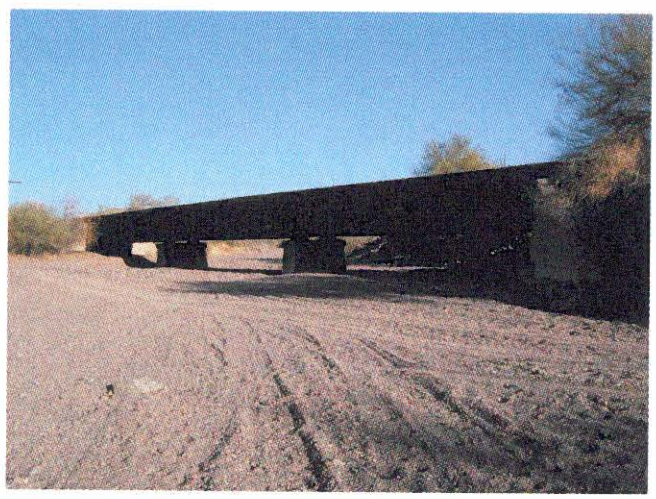

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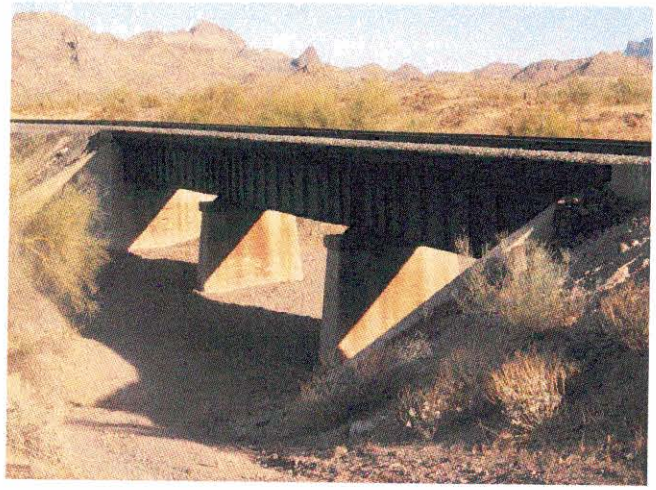

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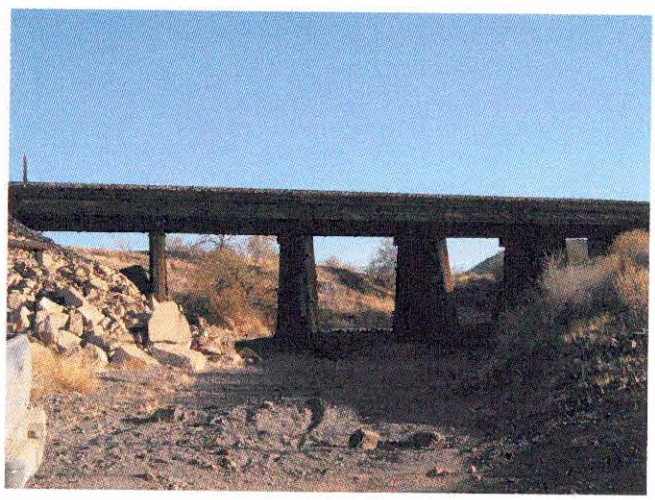

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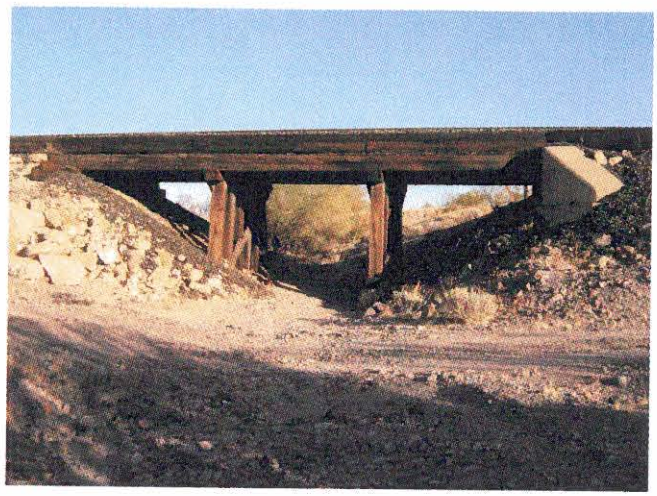

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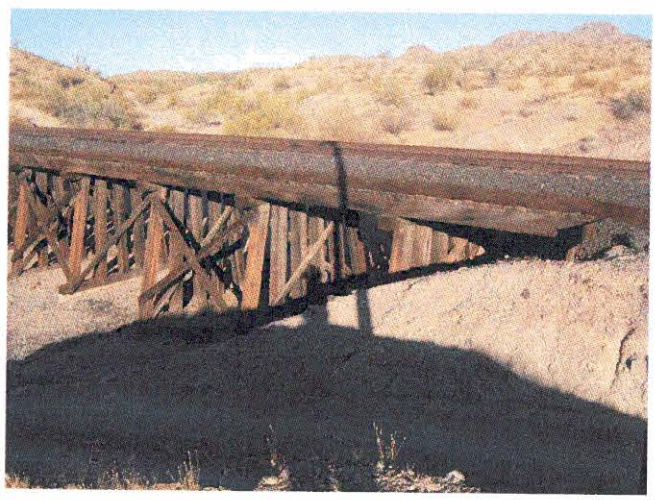

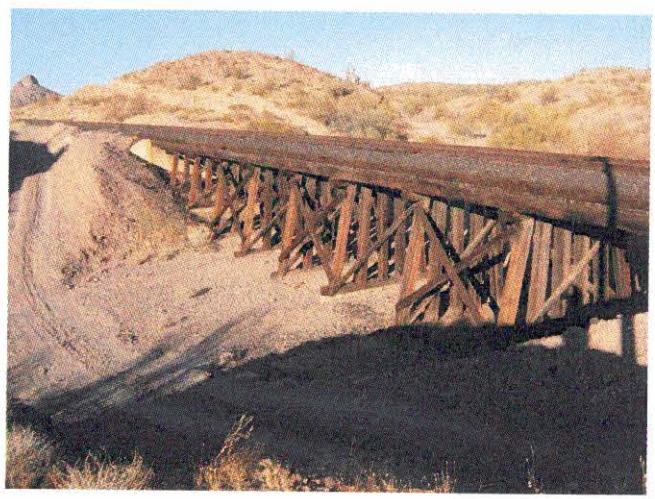

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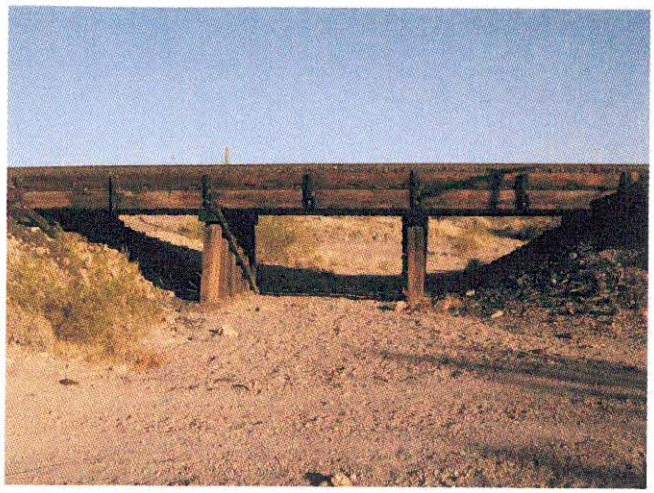

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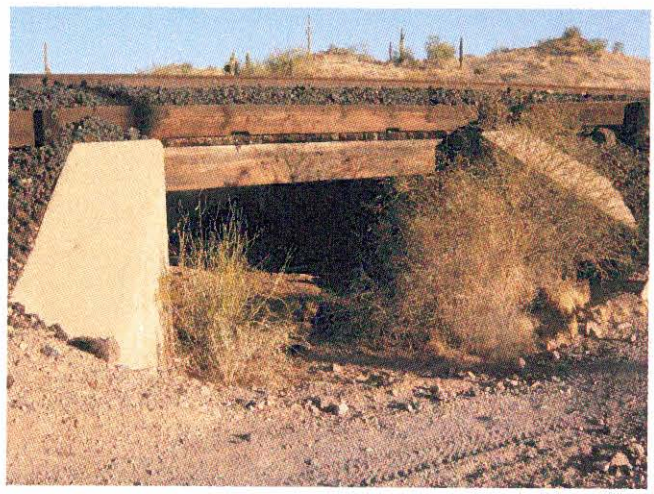

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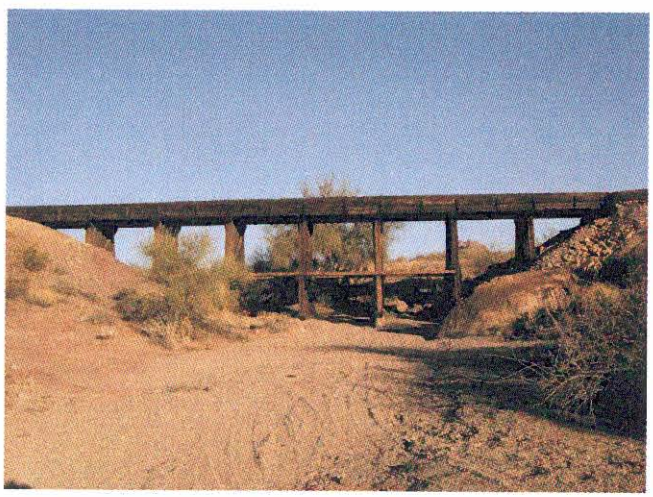

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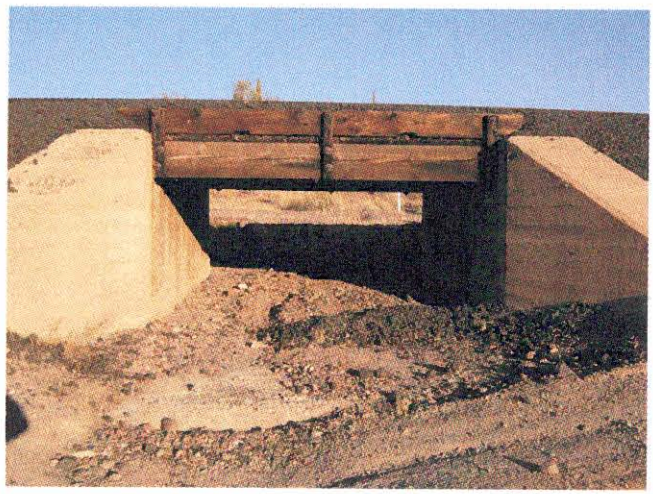

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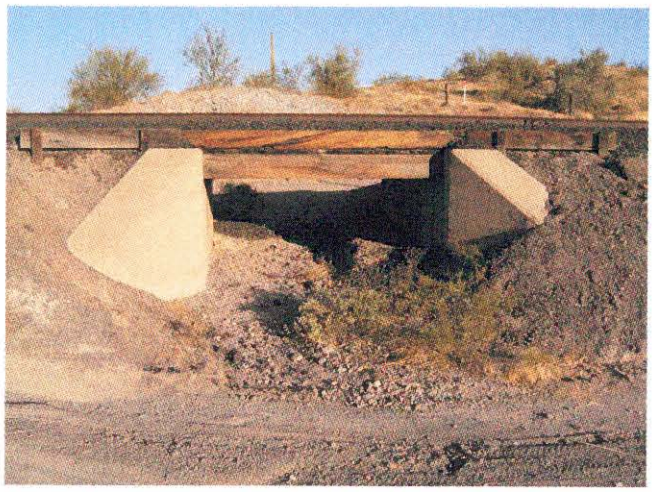

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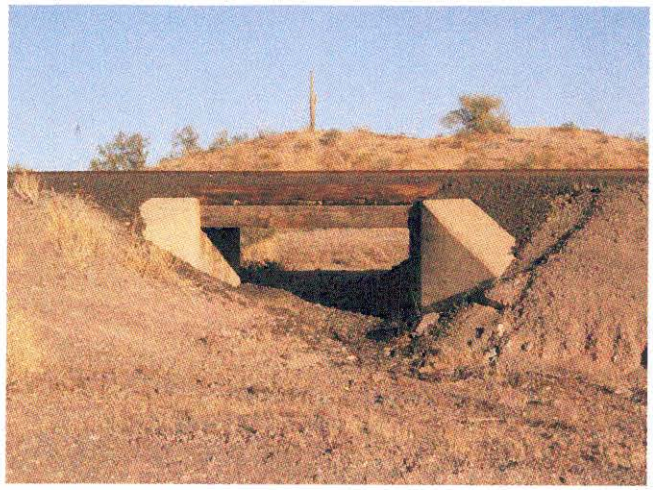

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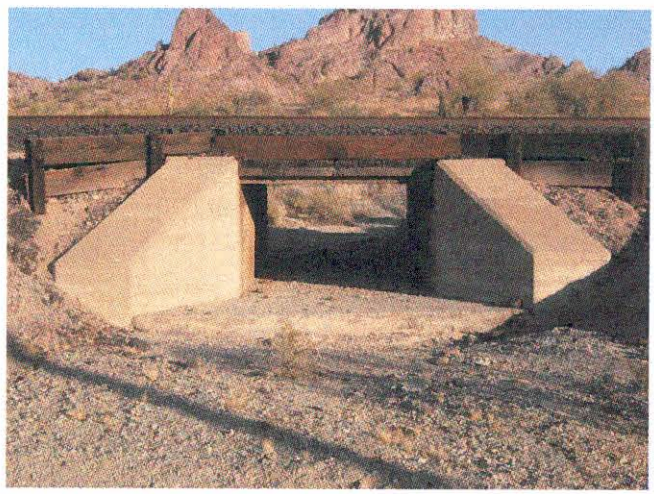

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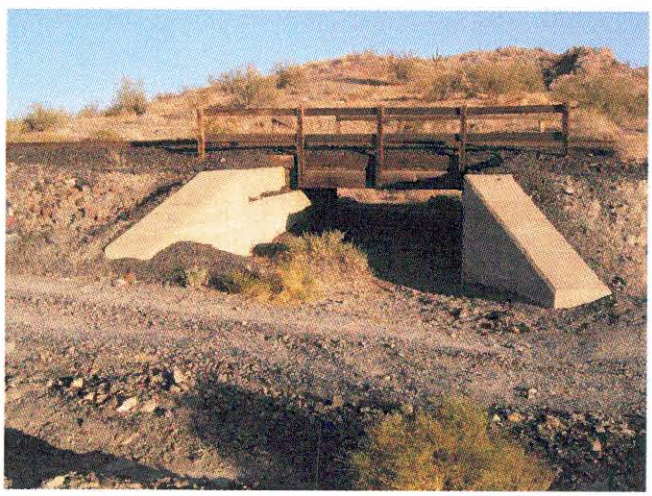


BR70

Cross Section for BR24 - Irregular Section

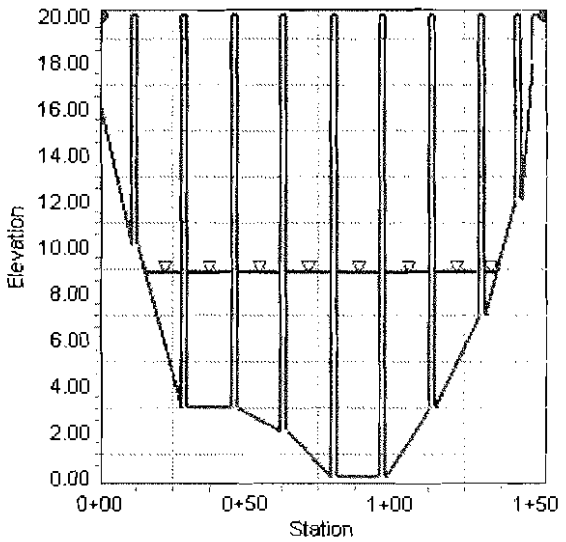
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00450	ft/ft
Normal Depth	8.81	ft
Discharge	4098.00	ft^3/s

Cross Section Image



Worksheet for BR24 - Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00450	ft/ft
Discharge	4098.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	20.00
0+00	16.00
0+11	10.00
0+11	20.00
0+13	20.00
0+13	10.00
0+28	3.00
0+28	20.00
0+30	20.00
0+30	3.00
0+45	3.00
0+45	20.00
0+47	20.00
0+47	3.00
0+62	2.00
0+62	20.00
0+64	20.00
0+64	2.00
0+79	0.00
0+79	20.00
0+81	20.00
0+81	0.00
0+96	0.00
0+96	20.00
0+98	20.00
0+98	0.00
1+13	3.00

Worksheet for BR24 - Irregular Section

Input Data

Station (ft)	Elevation (ft)
1+13	20.00
1+15	20.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 20.00)	(1+53, 20.00)	0.034

Results

Normal Depth		8.81	ft
Elevation Range	0.00 to 20.00 ft		
Flow Area		637.60	ft²
Wetted Perimeter		196.43	ft
Top Width		106.43	ft
Normal Depth		8.81	ft
Critical Depth		6.09	ft
Critical Slope		0.01942	ft/ft
Velocity		6.43	ft/s
Velocity Head		0.64	ft
Specific Energy		9.45	ft
Froude Number		0.46	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for BR24 - Irregular Section

GVF Output Data

Normal Depth	8.81	ft
Critical Depth	6.09	ft
Channel Slope	0.00450	ft/ft
Critical Slope	0.01942	ft/ft

Cross Section for BR28 Irregular Section

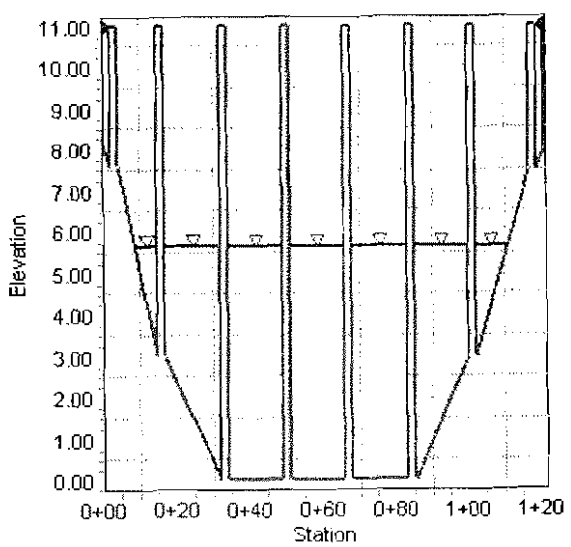
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00600	ft/ft
Normal Depth	5.63	ft
Discharge	2604.00	ft^3/s

Cross Section Image



Worksheet for BR28 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00600	ft/ft
Discharge	2604.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	11.00
0+00	8.10
0+02	7.60
0+02	11.00
0+04	11.00
0+04	7.60
0+15	3.00
0+15	11.00
0+17	11.00
0+17	3.00
0+32	0.00
0+32	11.00
0+34	11.00
0+34	0.00
0+49	0.00
0+49	11.00
0+51	11.00
0+51	0.00
0+66	0.00
0+66	11.00
0+68	11.00
0+68	0.00
0+83	0.00
0+83	11.00
0+85	11.00
0+85	0.00
1+00	3.00

Worksheet for BR28 Irregular Section

Input Data

Station (ft)	Elevation (ft)
1+00	11.00
1+02	11.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 11.00)	(1+21, 11.00)	0.034

Results

Normal Depth		5.63	ft
Elevation Range	0.00 to 11.00 ft		
Flow Area		396.88	ft²
Wetted Perimeter		147.09	ft
Top Width		90.05	ft
Normal Depth		5.63	ft
Critical Depth		3.99	ft
Critical Slope		0.01890	ft/ft
Velocity		6.56	ft/s
Velocity Head		0.67	ft
Specific Energy		6.30	ft
Froude Number		0.55	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for BR28 Irregular Section

GVF Output Data

Normal Depth	5.63	ft
Critical Depth	3.99	ft
Channel Slope	0.00600	ft/ft
Critical Slope	0.01890	ft/ft

Cross Section for BR29 Irregular Section

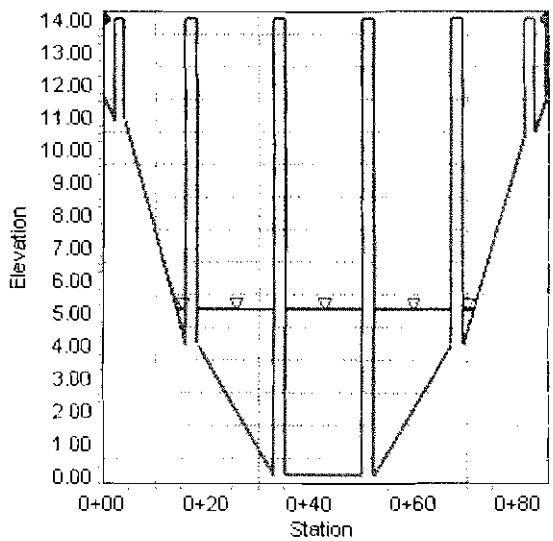
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00680	ft/ft
Normal Depth	5.07	ft
Discharge	1059.00	ft³/s

Cross Section Image



Worksheet for BR29 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00680	ft/ft
Discharge	1059.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	14.00
0+00	11.60
0+02	10.90
0+02	14.00
0+04	14.00
0+04	10.90
0+16	4.00
0+16	14.00
0+18	14.00
0+18	4.00
0+33	0.00
0+33	14.00
0+35	14.00
0+35	0.00
0+50	0.00
0+50	14.00
0+52	14.00
0+52	0.00
0+67	4.00
0+67	14.00
0+69	14.00
0+69	4.00
0+81	10.50
0+81	14.00
0+83	14.00
0+83	10.50
0+85	11.60

Worksheet for BR29 Irregular Section

Input Data

Station (ft)	Elevation (ft)
0+85	14.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 14.00)	(0+85, 14.00)	0.034

Results

Normal Depth		5.07	ft
Elevation Range	0.00 to 14.00 ft		
Flow Area		170.17	ft²
Wetted Perimeter		74.99	ft
Top Width		48.83	ft
Normal Depth		5.07	ft
Critical Depth		3.90	ft
Critical Slope		0.01872	ft/ft
Velocity		6.22	ft/s
Velocity Head		0.60	ft
Specific Energy		5.67	ft
Froude Number		0.59	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.07	ft

Worksheet for BR29 Irregular Section

GVF Output Data

Critical Depth	3.90	ft
Channel Slope	0.00680	ft/ft
Critical Slope	0.01872	ft/ft

Cross Section for BR31 Irregular Section

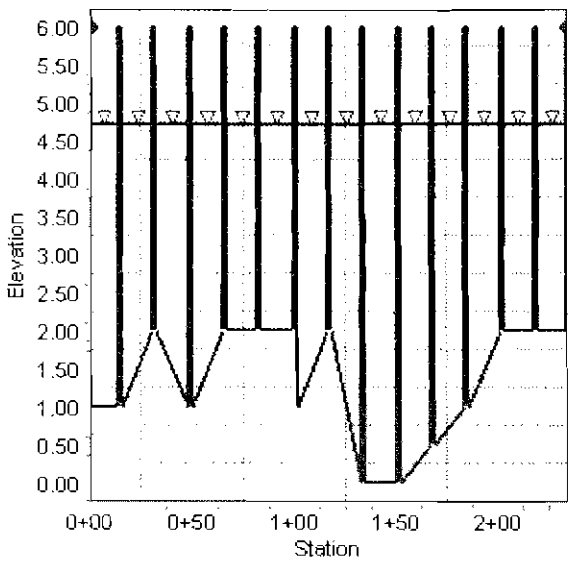
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00800	ft/ft
Normal Depth	4.72	ft
Discharge	5336.00	ft³/s

Cross Section Image



Worksheet for BR31 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0 00800	ft/ft
Discharge	5336.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	6.00
0+00	1.00
0+14	1.00
0+14	6.00
0+16	6.00
0+16	1.00
0+31	2.00
0+31	6.00
0+33	6.00
0+33	2.00
0+48	1.00
0+48	6.00
0+50	6.00
0+50	1.00
0+65	2.00
0+65	6.00
0+67	6.00
0+67	2.00
0+82	2.00
0+82	6.00
0+84	6.00
0+84	2.00
0+99	2.00
0+99	6.00
1+01	6.00
1+01	1.00
1+16	2.00

Worksheet for BR31 Irregular Section

Input Data

Station (ft)	Elevation (ft)
1+16	6.00
1+18	6.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 6.00)	(2+34, 6.00)	0.031

Results

Normal Depth		4.72	ft
Elevation Range	0.00 to 6.00 ft		
Flow Area		707.82	ft²
Wetted Perimeter		303.55	ft
Top Width		208.00	ft
Normal Depth		4.72	ft
Critical Depth		4.05	ft
Critical Slope		0.01523	ft/ft
Velocity		7.54	ft/s
Velocity Head		0.88	ft
Specific Energy		5.61	ft
Froude Number		0.72	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for BR31 Irregular Section

GVF Output Data

Normal Depth	4.72	ft
Critical Depth	4.05	ft
Channel Slope	0.00800	ft/ft
Critical Slope	0.01523	ft/ft

Cross Section for BR35 Irregular Section

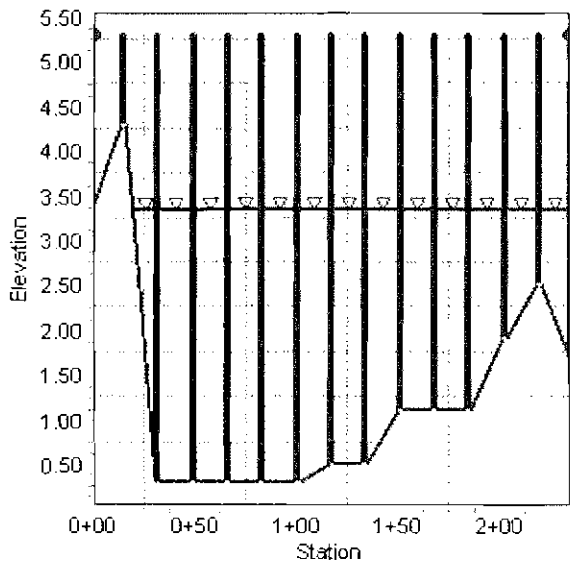
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00840	ft/ft
Normal Depth	3.03	ft
Discharge	2760.00	ft^3/s

Cross Section Image



Worksheet for BR35 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00840	ft/ft
Discharge	2760.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	5.30
0+00	3.40
0+14	4.30
0+14	5.30
0+16	5.30
0+16	4.30
0+31	0.30
0+31	5.30
0+33	5.30
0+33	0.30
0+48	0.30
0+48	5.30
0+50	5.30
0+50	0.30
0+65	0.30
0+65	5.30
0+67	5.30
0+67	0.30
0+82	0.30
0+82	5.30
0+84	5.30
0+84	0.30
0+99	0.30
0+99	5.30
1+01	5.30
1+01	0.30
1+16	0.50

Worksheet for BR35 Irregular Section

Input Data

Station (ft)	Elevation (ft)
1+16	5.30
1+18	5.30

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5.30)	(2+34, 5.30)	0.033

Results

Normal Depth		3.03	ft
Elevation Range	0.30 to 5.30 ft		
Flow Area		452.69	ft²
Wetted Perimeter		252.10	ft
Top Width		190.38	ft
Normal Depth		3.03	ft
Critical Depth		2.52	ft
Critical Slope		0.01746	ft/ft
Velocity		6.10	ft/s
Velocity Head		0.58	ft
Specific Energy		3.61	ft
Froude Number		0.70	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for BR35 Irregular Section

GVF Output Data

Normal Depth	3.03	ft
Critical Depth	2.52	ft
Channel Slope	0.00840	ft/ft
Critical Slope	0.01746	ft/ft

Cross Section for BR 36 Irregular Section

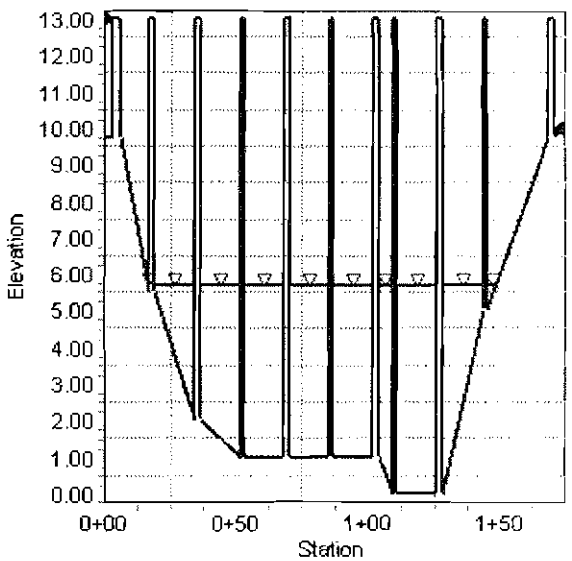
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00520	ft/ft
Normal Depth	5.69	ft
Discharge	2780.00	ft^3/s

Cross Section Image



Worksheet for BR 36 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00520	ft/ft
Discharge	2780.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	13.00
0+00	9.80
0+04	9.70
0+04	13.00
0+06	13.00
0+06	9.70
0+17	5.50
0+17	13.00
0+19	13.00
0+19	5.50
0+34	2.00
0+34	13.00
0+36	13.00
0+36	2.00
0+51	1.00
0+51	13.00
0+53	13.00
0+53	1.00
0+68	1.00
0+68	13.00
0+70	13.00
0+70	1.00
0+85	1.00
0+85	13.00
0+87	13.00
0+87	1.00
1+02	1.00

Worksheet for BR 36 Irregular Section

Input Data

Station (ft)	Elevation (ft)
1+02	13.00
1+04	13.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 13.00)	(1+74, 10.00)	0.033

Results

Normal Depth		5.69	ft
Elevation Range	0.00 to 13.00 ft		
Flow Area		463.62	ft²
Wetted Perimeter		184.74	ft
Top Width		113.82	ft
Normal Depth		5.69	ft
Critical Depth		4.07	ft
Critical Slope		0.01842	ft/ft
Velocity		6.00	ft/s
Velocity Head		0.56	ft
Specific Energy		6.25	ft
Froude Number		0.52	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for BR 36 Irregular Section

GVF Output Data

Normal Depth	5.69	ft
Critical Depth	4.07	ft
Channel Slope	0.00520	ft/ft
Critical Slope	0.01842	ft/ft

Cross Section for BR41 and BR42 Irregular Section

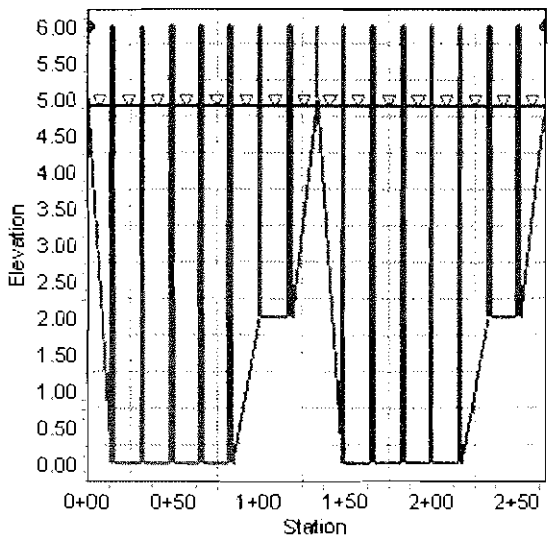
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00700	ft/ft
Normal Depth	4.89	ft
Discharge	5756.00	ft^3/s

Cross Section Image



Worksheet for BR41 and BR42 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00700	ft/ft
Discharge	5756.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	6.00
0+00	5.00
0+14	0.00
0+14	6.00
0+16	6.00
0+16	0.00
0+31	0.00
0+31	6.00
0+33	6.00
0+33	0.00
0+48	0.00
0+48	6.00
0+50	6.00
0+50	0.00
0+65	0.00
0+65	6.00
0+67	6.00
0+67	0.00
0+82	0.00
0+82	6.00
0+84	6.00
0+84	0.00
0+99	2.00
0+99	6.00
1+01	6.00
1+01	2.00
1+16	2.00

Worksheet for BR41 and BR42 Irregular Section

Input Data

Station (ft)	Elevation (ft)
1+16	6.00
1+18	6.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 6.00)	(2+66, 6.00)	0.036

Results

Normal Depth		4.89	ft
Elevation Range	0.00 to 6.00 ft		
Flow Area		903.63	ft²
Wetted Perimeter		360.70	ft
Top Width		237.27	ft
Normal Depth		4.89	ft
Critical Depth		3.58	ft
Critical Slope		0.02093	ft/ft
Velocity		6.37	ft/s
Velocity Head		0.63	ft
Specific Energy		5.52	ft
Froude Number		0.58	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for BR41 and BR42 Irregular Section

GVF Output Data

Normal Depth	4.89	ft
Critical Depth	3.58	ft
Channel Slope	0.00700	ft/ft
Critical Slope	0.02093	ft/ft

Cross Section for BR43 Irregular Section

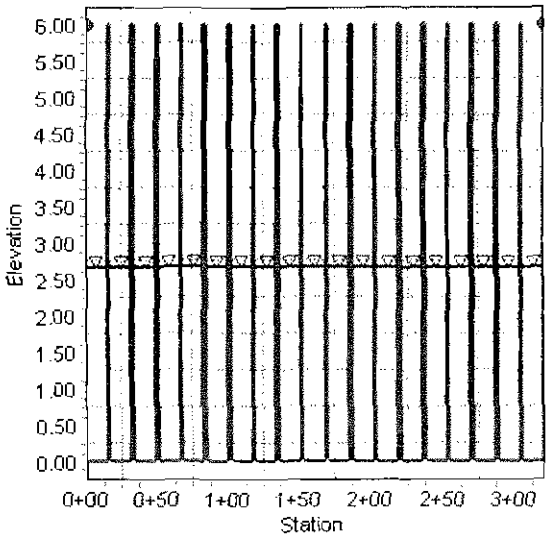
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00880	ft/ft
Normal Depth	2.66	ft
Discharge	4747.00	ft^3/s

Cross Section Image



Worksheet for BR43 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00880	ft/ft
Discharge	4747.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	6.00
0+00	0.00
0+15	0.00
0+15	6.00
0+17	6.00
0+17	0.00
0+32	0.00
0+32	6.00
0+34	6.00
0+34	0.00
0+49	0.00
0+49	6.00
0+51	6.00
0+51	0.00
0+66	0.00
0+66	6.00
0+68	6.00
0+68	0.00
0+83	0.00
0+83	6.00
0+85	6.00
0+85	0.00
1+00	0.00
1+00	6.00
1+02	6.00
1+02	0.00
1+17	0.00

Worksheet for BR43 Irregular Section

Input Data

Station (ft)	Elevation (ft)
1+17	6.00
1+19	6.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 6.00)	(3+21, 6.00)	0.035

Results

Normal Depth		2.66	ft
Elevation Range	0.00 to 6.00 ft		
Flow Area		759.51	ft²
Wetted Perimeter		386.27	ft
Top Width		285.00	ft
Normal Depth		2.66	ft
Critical Depth		2.05	ft
Critical Slope		0.01939	ft/ft
Velocity		6.25	ft/s
Velocity Head		0.61	ft
Specific Energy		3.27	ft
Froude Number		0.67	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for BR43 Irregular Section

GVF Output Data

Normal Depth	2.66	ft
Critical Depth	2.05	ft
Channel Slope	0.00880	ft/ft
Critical Slope	0.01939	ft/ft

Cross Section for BR48 Irregular Section

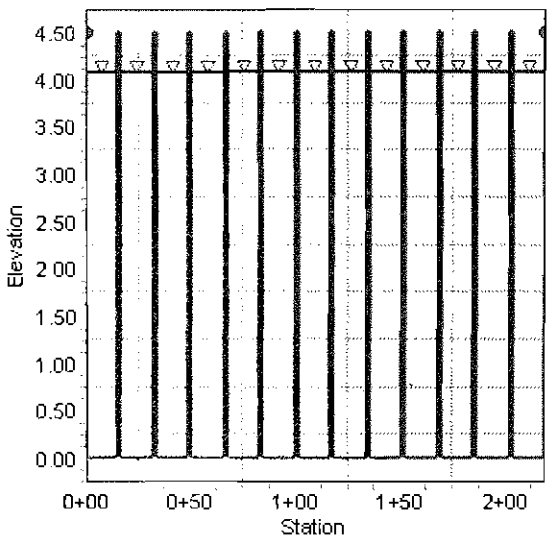
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00670	ft/ft
Normal Depth	4.07	ft
Discharge	4842.00	ft³/s

Cross Section Image



Worksheet for BR48 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00670	ft/ft
Discharge	4842.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	4.50
0+00	0.00
0+15	0.00
0+15	4.50
0+17	4.50
0+17	0.00
0+32	0.00
0+32	4.50
0+34	4.50
0+34	0.00
0+49	0.00
0+49	4.50
0+51	4.50
0+51	0.00
0+66	0.00
0+66	4.50
0+68	4.50
0+68	0.00
0+83	0.00
0+83	4.50
0+85	4.50
0+85	0.00
1+00	0.00
1+00	4.50
1+02	4.50
1+02	0.00
1+17	0.00

Worksheet for BR48 Irregular Section

Input Data

Station (ft)	Elevation (ft)
1+17	4.50
1+19	4.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 4.50)	(2+19, 4.50)	0.038

Results

Normal Depth		4.07	ft
Elevation Range	0.00 to 4.50 ft		
Flow Area		792.69	ft²
Wetted Perimeter		300.69	ft
Top Width		195.00	ft
Normal Depth		4.07	ft
Critical Depth		2.68	ft
Critical Slope		0.02277	ft/ft
Velocity		6.11	ft/s
Velocity Head		0.58	ft
Specific Energy		4.64	ft
Froude Number		0.53	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for BR48 Irregular Section

GVF Output Data

Normal Depth	4.07	ft
Critical Depth	2.68	ft
Channel Slope	0.00670	ft/ft
Critical Slope	0.02277	ft/ft

Cross Section for BR54 Irregular Section

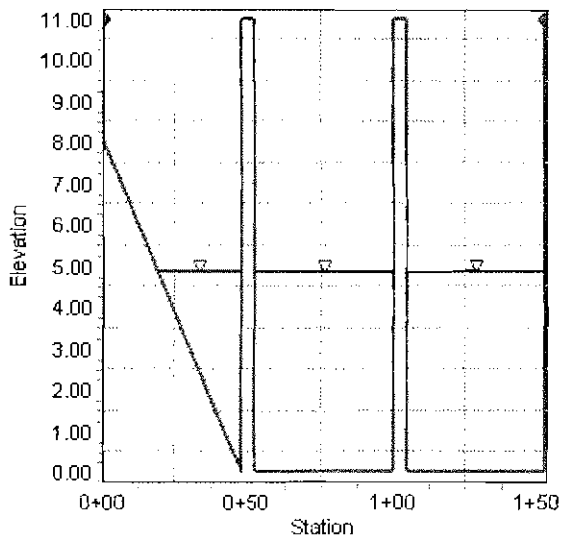
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00820	ft/ft
Normal Depth	4.83	ft
Discharge	4369.00	ft^3/s

Cross Section Image



Worksheet for BR54 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00820	ft/ft
Discharge	4369.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	11.00
0+00	8.00
0+48	0.00
0+48	11.00
0+53	11.00
0+53	0.00
1+00	0.00
1+00	11.00
1+05	11.00
1+05	0.00
1+53	0.00
1+53	11.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 11.00)	(1+53, 11.00)	0.038

Results

Normal Depth	4.83	ft
Elevation Range	0.00 to 11.00 ft	
Flow Area	528.68	ft^2
Wetted Perimeter	148.28	ft
Top Width	123.71	ft
Normal Depth	4.83	ft

Worksheet for BR54 Irregular Section

Results

Critical Depth	3.87	ft
Critical Slope	0.01703	ft/ft
Velocity	8.26	ft/s
Velocity Head	1.06	ft
Specific Energy	5.90	ft
Froude Number	0.70	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.83	ft
Critical Depth	3.87	ft
Channel Slope	0.00820	ft/ft
Critical Slope	0.01703	ft/ft

Cross Section for BR55 Irregular Section

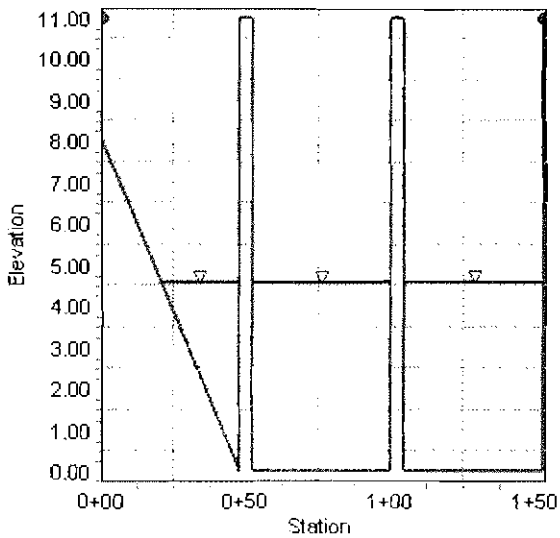
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00730	ft/ft
Normal Depth	4.56	ft
Discharge	3742.00	ft^3/s

Cross Section Image



Worksheet for BR55 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00730	ft/ft
Discharge	3742.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	11.00
0+00	8.00
0+48	0.00
0+48	11.00
0+53	11.00
0+53	0.00
1+00	0.00
1+00	11.00
1+05	11.00
1+05	0.00
1+53	0.00
1+53	11.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 11.00)	(1+53, 11.00)	0.038

Results

Normal Depth	4.56	ft
Elevation Range	0.00 to 11.00 ft	
Flow Area	494.73	ft²
Wetted Perimeter	145.24	ft
Top Width	122.07	ft
Normal Depth	4.56	ft

Worksheet for BR55 Irregular Section

Results

Critical Depth		3.50	ft
Critical Slope		0.01730	ft/ft
Velocity		7.56	ft/s
Velocity Head		0.89	ft
Specific Energy		5.45	ft
Froude Number		0.66	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.56	ft
Critical Depth	3.50	ft
Channel Slope	0.00730	ft/ft
Critical Slope	0.01730	ft/ft

Cross Section for BR56 Irregular Section

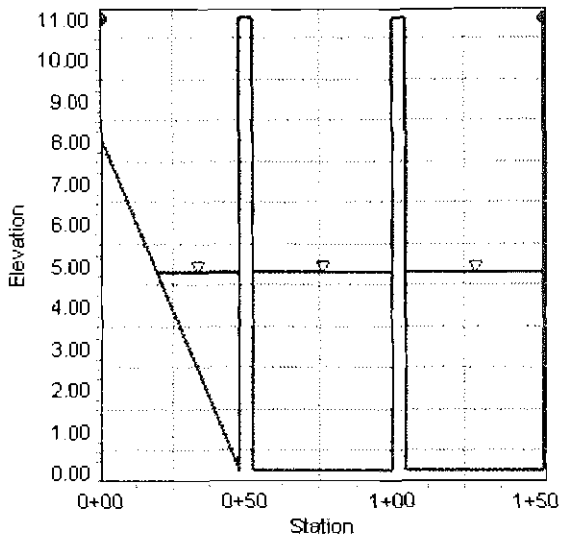
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00620	ft/ft
Normal Depth	4.79	ft
Discharge	3742.00	ft^3/s

Cross Section Image



Worksheet for BR56 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00620	ft/ft
Discharge	3742.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	11.00
0+00	8.00
0+48	0.00
0+48	11.00
0+53	11.00
0+53	0.00
1+00	0.00
1+00	11.00
1+05	11.00
1+05	0.00
1+53	0.00
1+53	11.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 11.00)	(1+53, 11.00)	0.038

Results

Normal Depth	4.79	ft
Elevation Range	0.00 to 11.00 ft	
Flow Area	523.22	ft^2
Wetted Perimeter	147.80	ft
Top Width	123.44	ft
Normal Depth	4.79	ft

Worksheet for BR56 Irregular Section

Results

Critical Depth		3.50	ft
Critical Slope		0.01730	ft/ft
Velocity		7.15	ft/s
Velocity Head		0.79	ft
Specific Energy		5.59	ft
Froude Number		0.61	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.79	ft
Critical Depth	3.50	ft
Channel Slope	0.00620	ft/ft
Critical Slope	0.01730	ft/ft

Cross Section for BR57 Irregular Section

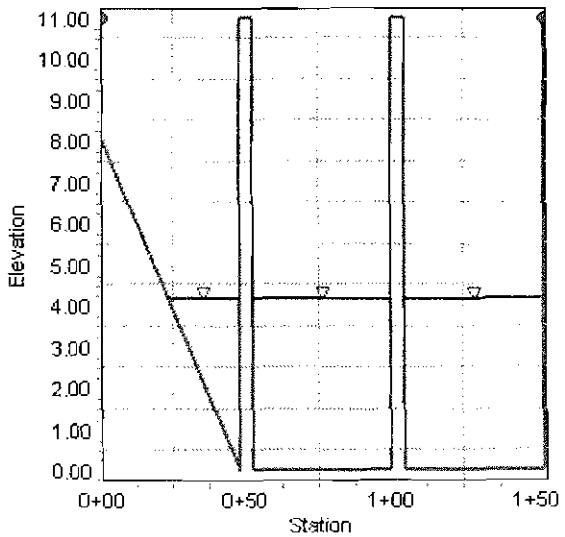
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00690	ft/ft
Normal Depth	4.15	ft
Discharge	3115.00	ft³/s

Cross Section Image



Worksheet for BR57 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00690	ft/ft
Discharge	3115.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	11.00
0+00	8.00
0+48	0.00
0+48	11.00
0+53	11.00
0+53	0.00
1+00	0.00
1+00	11.00
1+05	11.00
1+05	0.00
1+53	0.00
1+53	11.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 11.00)	(1+53, 11.00)	0.038

Results

Normal Depth	4.15	ft
Elevation Range	0.00 to 11.00 ft	
Flow Area	445.07	ft²
Wetted Perimeter	140.71	ft
Top Width	119.63	ft
Normal Depth	4.15	ft

Worksheet for BR57 Irregular Section

Results

Critical Depth		3.11	ft
Critical Slope		0.01764	ft/ft
Velocity		7.00	ft/s
Velocity Head		0.76	ft
Specific Energy		4.91	ft
Froude Number		0.64	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.15	ft
Critical Depth	3.11	ft
Channel Slope	0.00690	ft/ft
Critical Slope	0.01764	ft/ft

Cross Section for BR58 Irregular Section

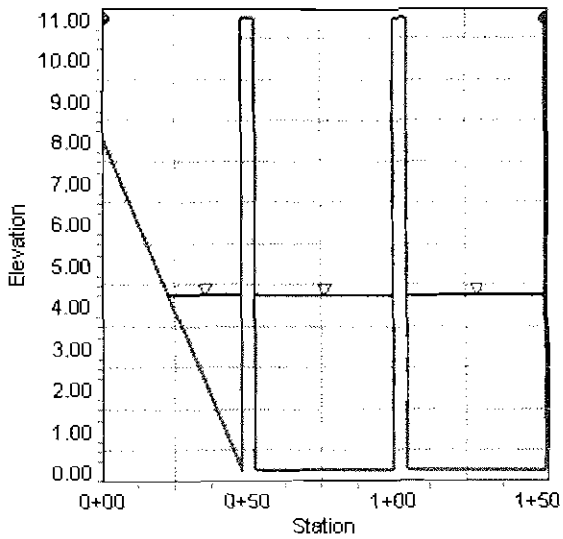
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00650	ft/ft
Normal Depth	4.22	ft
Discharge	3115.00	ft^3/s

Cross Section Image



Worksheet for BR58 Irregular Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00650	ft/ft
Discharge	3115.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	11.00
0+00	8.00
0+48	0.00
0+48	11.00
0+53	11.00
0+53	0.00
1+00	0.00
1+00	11.00
1+05	11.00
1+05	0.00
1+53	0.00
1+53	11.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 11.00)	(1+53, 11.00)	0.038

Results

Normal Depth	4.22	ft
Elevation Range	0.00 to 11.00 ft	
Flow Area	454.19	ft²
Wetted Perimeter	141.55	ft
Top Width	120.08	ft
Normal Depth	4.22	ft

E.5 Hydraulic Calculations

Table E.1: HEC-RAS Summary Table

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
FourthJlyWsh	Reach 1	0.452	PF 1	17936	537.8	542.48	541.78	542.9	0.006005	5.2	3525.13	2107.27	0.65
FourthJlyWsh	Reach 1	1.299	PF 1	17936	565.69	568.97	568.38	569.39	0.005844	5.19	3459.01	1712.8	0.64
FourthJlyWsh	Reach 1	1.571	PF 1	16484	573.33	576.33	575.63	576.66	0.004358	4.6	3602.03	1783.92	0.56
FourthJlyWsh	Reach 2	1.752	PF 1	16484	577.97	581.81	581.59	582.69	0.009406	7.58	2244.05	1040.6	0.85
FourthJlyWsh	Reach 2	1.865	PF 1	16484	582.61	586.61		587.16	0.006081	5.96	2767.38	1146.69	0.68
FourthJlyWsh	Reach 3	2.85	PF 1	15702	610.15	615.45	614.63	615.97	0.005026	8.87	3336.88	1237.93	0.69
FourthJlyWsh	Reach 3	3.281	PF 1	15702	624.79	628.52	628.05	629.21	0.006609	6.77	2453.26	1098.49	0.72
FourthJlyWsh	Reach 4	4.226	PF 1	10847	650.1	655.63	654.72	655.91	0.004084	4.24	2555.53	1305.78	0.53
FourthJlyWsh	Reach 4	4.277	PF 1	10847	654.76	657.35	657.35	658.13	0.015051	7.07	1554.06	1107.25	0.99
FourthJlyWsh	Reach 5	4.994	PF 1	4667	677.88	680.42	679.61	680.51	0.001688	2.98	2324.15	1500.01	0.35
FourthJlyWsh	Reach 5	5.371	PF 1	4747	689.71	692.31	692.31	693.04	0.015148	8.21	786.4	542.17	1.03
FourthJlyWsh	Reach 5	5.569	PF 1	4747	698.51	700.71		700.87	0.004813	4.18	1551.4	1017.62	0.57
FourthJlyWsh	Reach 5	5.74	PF 1	4747	707.6	710.8	710.8	711.53	0.011055	7.25	792.08	605.89	0.89
FourthJlyWsh	Reach 5	5.766	PF 1	4747	708.26	711.98		712.2	0.00247	4.14	1418.45	698.25	0.44
FourthJlyWsh	Reach 5	5.939	PF 1	4782	718.59	720.61	720.61	721.19	0.011553	6.45	905.68	866.72	0.88
FourthJlyWsh	Reach 5	6.127	PF 1	4782	721.82	725.95		726.33	0.002922	4.96	994.01	363.12	0.49
FourthJlyWsh	Reach 5	6.32	PF 1	4782	730.52	733.81	733.81	734.93	0.014069	8.47	564.75	259.76	1.01
FourthJlyWsh	Reach 5	6.511	PF 1	4782	739.71	742.6	741.91	743	0.005059	5.11	936.54	425.81	0.61
FourthJlyWsh	Reach 5	6.697	PF 1	4782	747.27	750.8	750.8	751.8	0.014246	8.01	596.87	300.13	1
FourthJlyWsh	Reach 5	6.884	PF 1	4907	753.4	757.34	756.27	757.68	0.003241	4.67	1074.85	444.06	0.5
FourthJlyWsh	Reach 5	7.074	PF 1	4907	761.56	765.3	765.3	766.5	0.01366	8.79	558.27	236.63	1.01
FourthJlyWsh	Reach 5	7.266	PF 1	4907	768.82	772.56		772.93	0.003588	4.92	996.69	369.86	0.53
FourthJlyWsh	Reach 5	7.502	PF 1	4907	779.2	781.84	781.84	782.76	0.014884	7.66	640.37	355.82	1.01
FourthJlyWsh	Reach 5	8.021	PF 1	5033	799.88	803.18		803.43	0.004561	4.46	1283.99	683.2	0.56
FourthJlyWsh	Reach 5	8.211	PF 1	5033	808.85	811.65	811.65	812.5	0.015392	7.43	677.45	404.3	1.01
FourthJlyWsh	Reach 5	8.59	PF 1	5033	826.95	830.47	829.94	830.94	0.006098	5.55	957.65	596.86	0.66
FourthJlyWsh	Reach 5	8.968	PF 1	5158	839.98	844.15	843.7	845.04	0.008113	7.58	680.56	243.68	0.8
FourthJlyWsh	Reach 5	9.458	PF 1	5158	859.87	862.66	862.16	863	0.00598	4.69	1111.02	727.16	0.63
FourthJlyWsh	Reach 5	9.728	PF 1	5158	871.94	873.3	873	873.56	0.009788	3.97	1267.59	1069.86	0.73
FourthJlyWsh	Reach 5	9.944	PF 1	8108	879.58	881.75	881.22	882.11	0.007583	5.29	1713.23	941.97	0.71
FourthJlyWsh	Reach 5	10.092	PF 1	8108	881.98	886.74	886.04	887.54	0.00613	7.17	1136.36	381.64	0.71
FourthJlyWsh	Reach 5	10.485	PF 1	8108	899.96	902.17	901.9	902.84	0.009076	6.69	1254.23	626.61	0.81
FourthJlyWsh	Reach 5	10.675	PF 1	8108	903.84	907.86	906.75	908.22	0.003493	4.81	1687.32	636.81	0.52
FourthJlyWsh	Reach 5	10.866	PF 1	8108	913.31	916.36	916.36	917.54	0.013694	6.72	929.6	399.51	1.01
FourthJlyWsh	Reach 5	11.053	PF 1	8234	919.75	923.89	922.96	924.34	0.004093	5.41	1544.42	611.96	0.57
FourthJlyWsh	Reach 5	11.24	PF 1	8234	926.34	929.87	929.87	930.67	0.010928	7.76	1327.45	845.34	0.9
FourthJlyWsh	Reach 5	11.427	PF 1	8234	935.05	938.17	937.67	938.59	0.006126	5.18	1593.97	843.48	0.65
FourthJlyWsh	Reach 5	11.62	PF 1	8234	943.8	946.45	946.3	947.14	0.011896	6.66	1235.95	716.16	0.89
FourthJlyWsh	Reach 5	11.81	PF 1	8234	948.47	952.56	951.76	952.87	0.003756	5.09	2045.36	927.6	0.54
FourthJlyWsh	Reach 5	11.999	PF 1	8361	956.59	960.59	960.59	961.4	0.008341	7.7	1407.77	909.4	0.81
FourthJlyWsh	Reach 5	12.188	PF 1	8361	965.34	969.36	969.02	970.2	0.009255	7.37	1134.12	719.17	0.83
FourthJlyWsh	Reach 5	12.378	PF 1	8361	969.63	973.83		974.1	0.002088	4.14	2018.7	646.52	0.41
FourthJlyWsh	Reach 5	12.567	PF 1	8361	975.71	979.92	979.92	980.9	0.013583	8.06	1097.61	617.81	0.98
FourthJlyWsh	Reach 5	13.025	PF 1	8487	997.46	1001.48	1001.13	1002.15	0.006215	6.99	1501.05	789.29	0.71
FourthJlyWsh	Reach 5	13.209	PF 1	8487	999.45	1006.01		1006.63	0.00354	6.3	1350.24	356.22	0.56
FourthJlyWsh	Reach 5	13.458	PF 1	8487	1008.16	1012.68	1012.29	1013.56	0.008334	7.5	1133.22	428.72	0.81
FourthJlyWsh	Reach 5	13.574	PF 1	8487	1015.62	1019.38	1019.38	1020.43	0.014445	8.21	1033.55	509.41	1.01

Table E.1: HEC-RAS Summary Table (Continued)

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
FourthJlyWsh	Reach 5	13.75	PF 1	8487	1019.64	1025.15	1023.55	1025.58	0.002875	5.31	1597.49	447.67	0.5
FourthJlyWsh	Reach 6	13.974	PF 1	5644	1028.21	1031.42	1031.42	1032.51	0.013467	8.42	684.48	333.79	0.99
FourthJlyWsh	Reach 6	14.06	PF 1	5644	1039.4	1041.59	1041.59	1042.34	0.014417	7.01	839.96	608.92	0.97
FourthJlyWsh	Reach 6	14.247	PF 1	5644	1039.69	1045.12		1045.39	0.001283	4.2	1412.04	368.07	0.35
FourthJlyWsh	Reach 6	14.413	PF 1	5644	1047.26	1051.38	1051.38	1052.44	0.011569	8.45	734.16	369.78	0.94
FourthJlyWsh	Reach 6	14.598	PF 1	5644	1057.51	1061.58	1061.27	1062.09	0.008483	5.73	984.65	554.56	0.76
FourthJlyWsh	Reach 6	14.673	PF 1	5644	1060	1063.38		1063.55	0.002054	3.65	1747.58	709.98	0.4
FourthJlyWsh	Reach 6	14.849	PF 1	5644	1069.31	1071.35	1071.35	1072.2	0.015167	7.41	762.1	452	1.01
FourthJlyWsh	Reach 6	14.97	PF 1	5034	1069.69	1075.62	1074	1076.14	0.003053	5.8	877.32	236.25	0.52
FourthJlyWsh	Reach 6	15.09	PF 1	5034	1079.51	1082	1082	1082.96	0.014701	7.86	640.08	338.86	1.01
FourthJlyWsh	Reach 6	15.24	PF 1	5034	1079.97	1086.05		1086.43	0.002029	4.94	1018.91	244.89	0.43
FourthJlyWsh	Reach 6	15.332	PF 1	5034	1085.12	1088.53	1088.53	1089.62	0.01407	8.41	598.58	277.26	1.01
FourthJlyWshTb1	Reach 1	0.815	PF 1	2107	604.68	607.15	605.95	607.21	0.000981	1.93	1157	721.37	0.24
FourthJlyWshTb1	Reach 1	1.006	PF 1	1847	609.49	610.86	610.86	611.22	0.023628	5.3	406.99	617.45	1.03
FourthJlyWshTb1	Reach 1	1.194	PF 1	1847	615.14	617.36	616.62	617.49	0.00285	2.94	675.54	526.39	0.4
FourthJlyWshTb1	Reach 1	1.382	PF 1	1847	619.95	621.66	621.29	621.86	0.007242	3.87	542.26	531.4	0.61
FourthJlyWshTb1	Reach 1	1.762	PF 1	1847	628.76	631.55	630.84	631.71	0.003702	3.14	588.52	397.14	0.45
FourthJlyWshTb1	Reach 1	1.952	PF 1	1847	633.42	635.5	634.83	635.63	0.00412	2.87	643.65	526.52	0.46
FourthJlyWshTb1	Reach 1	2.063	PF 1	1587	639.56	640.76	640.76	641.13	0.026674	5.24	327.02	461.55	1.07
FourthJlyWshTb1	Reach 1	2.314	PF 1	1587	646.49	649.06	648.13	649.2	0.002888	3.07	531.06	327.74	0.4
FourthJlyWshTb1	Reach 1	2.519	PF 1	1587	653.66	655.02	654.98	655.44	0.019218	5.21	305.22	331.96	0.95
FourthJlyWshTb1	Reach 1	2.776	PF 1	1587	659.66	662.17	661.21	662.3	0.002275	2.95	563.01	339.08	0.37
FourthJlyWshTb1	Reach 1	3.071	PF 1	1326	668.59	670.03	670.03	670.51	0.021534	5.55	240.05	267.19	1
FourthJlyWshTb1	Reach 1	3.279	PF 1	1326	675.92	678.46	677.69	678.65	0.003694	3.51	385.01	244.18	0.46
FourthJlyWshTb1	Reach 1	3.466	PF 1	1326	681.43	683.56	683.18	683.89	0.008139	4.6	291.66	210.19	0.66
FourthJlyWshTb1	Reach 1	3.581	PF 1	1326	682.8	684.87		684.91	0.000679	1.61	847.72	470.2	0.2
FourthJlyWshTb1	Reach 1	3.66	PF 1	1326	685.28	686.81	686.81	687.34	0.020635	5.82	230.13	233.54	1
FourthJlyWshTb1	Reach 1	3.848	PF 1	1326	697.28	699.81	699.46	700.24	0.008913	5.3	255.58	171.51	0.71
FourthJlyWshTb1	Reach 1	4.033	PF 1	1066	699.35	703.13		703.24	0.001312	2.6	411.4	172.64	0.29
FourthJlyWshTb1	Reach 1	4.127	PF 1	1066	707.84	708.8	708.8	709.2	0.021517	5.13	214.55	273.95	0.98
FourthJlyWshTb1	Reach 1	4.37	PF 1	1066	709.32	711.88	710.74	711.92	0.000743	1.48	720.95	441.01	0.2
FourthJlyWshTb1	Reach 1	4.486	PF 1	1066	713.07	714.48	714.48	714.93	0.022611	5.35	199.39	229.95	1.01
FourthJlyWshTb1	Reach 1	4.6	PF 1	1066	716.85	719.77	718.98	719.98	0.004268	3.7	288.88	168.87	0.49
FourthJlyWshTb1	Reach 1	4.852	PF 1	1066	725.72	728.05	727.88	728.58	0.010598	6.28	201.77	146.77	0.79
FourthJlyWshTb2	Reach 1	1.124	PF 1	5552	661.9	665.01	664.37	665.23	0.003257	3.96	1713.42	1392.25	0.47
FourthJlyWshTb2	Reach 1	1.217	PF 1	5552	666.48	668.86	668.86	669.5	0.014063	6.53	919.48	763.85	0.93
FourthJlyWshTb2	Reach 1	1.645	PF 1	5552	679.08	682.37		682.62	0.003153	4.02	1463.36	794.39	0.47
FourthJlyWshTb2	Reach 1	1.929	PF 1	5552	689.59	693.11	693.11	694.23	0.01241	8.62	684.02	343.29	0.95
FourthJlyWshTb2	Reach 1	2.188	PF 1	5690	699.43	702.54	701.8	702.77	0.003737	4.61	1590.67	934.49	0.52
FourthJlyWshTb2	Reach 1	2.272	PF 1	5690	707.37	710.21	710.21	710.87	0.01083	8.2	1077.76	1207.77	0.89
FourthJlyWshTb2	Reach 1	2.309	PF 1	5690	702.01	710.94		710.94	0.000013	0.52	11718.17	2306.11	0.04
FourthJlyWshTb2	Reach 1	2.555	PF 1	5734	712.74	713.94	713.94	714.4	0.018976	5.49	1086.66	1340.7	0.99
FourthJlyWshTb2	Reach 1	2.747	PF 1	5734	719.51	721.81	721.28	721.96	0.003837	3.85	2010.57	1598.54	0.5
FourthJlyWshTb2	Reach 1	2.938	PF 1	5734	727.13	728.52	728.48	728.95	0.015981	5.64	1173.76	1241.68	0.94
FourthJlyWshTb2	Reach 1	3.129	PF 1	5734	731.19	734.29	733.28	734.54	0.002725	4.21	1543.96	759.69	0.45
FourthJlyWshTb2	Reach 1	3.69	PF 1	5904	754.71	756.48	756.48	756.93	0.012714	5.95	1272.53	1427.59	0.87
FourthJlyWshTb2	Reach 1	3.882	PF 1	5904	759.1	763.06	762.61	763.44	0.003894	5.48	1566.74	1174.52	0.55
FourthJlyWshTb2	Reach 1	4.126	PF 1	5904	765.6	769.44	769.11	770.32	0.007433	7.91	883.5	400.95	0.77

Table E.1: HEC-RAS Summary Table (Continued)

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
FourthJlyWshTb2	Reach 1	4.289	PF 1	3306	774.26	776.07	775.7	776.33	0.006168	4.16	853.05	738.37	0.61
FourthJlyWshTb2	Reach 1	4.445	PF 1	3306	778.44	780.97	780.65	781.23	0.00578	4.3	883.23	812.38	0.6
FourthJlyWshTb2	Reach 1	4.639	PF 1	3306	786.91	788.67	788.5	789.06	0.010452	5.08	692.69	660.53	0.78
FourthJlyWshTb2	Reach 1	4.829	PF 1	3306	789.87	792.4		792.54	0.001689	2.98	1153.72	575.69	0.34
FourthJlyWshTb2	Reach 1	4.987	PF 1	3306	799.62	801.18	801.18	801.7	0.019876	6.15	587.51	603.55	1.04
FourthJlyWshTb2	Reach 1	5.207	PF 1	2106	807.39	810.57	809.84	810.74	0.00305	3.54	774.3	892.8	0.45
FourthJlyWshTb2	Reach 1	5.387	PF 1	2106	813.94	815.53	815.36	815.83	0.011293	4.41	482.08	511.14	0.77
FourthJlyWshTb2	Reach 1	5.586	PF 1	2106	818.27	820.13	819.4	820.23	0.002161	2.63	890.22	752.05	0.37
FourthJlyWshTb2	Reach 1	5.951	PF 1	2106	830.59	832.31	832.31	832.9	0.017823	6.13	345.79	318.73	1
FourthJlyWshTb2	Reach 1	6.124	PF 1	2106	838.16	839.16	838.81	839.33	0.005403	2.4	673.81	677.63	0.5
FourthJlyWshTb2	Reach 1	6.344	PF 1	1704	850.19	853.67	853.67	854.9	0.012985	8.98	195.13	82.94	0.97
FourthJlyWshTb2	Reach 1	6.422	PF 1	1704	859.14	862.73	862.73	863.89	0.014178	8.65	197.73	88.03	1
FourthJlyWshTb2	Reach 1	6.538	PF 1	1704	862.23	865.9		866.01	0.001427	2.67	639.29	287.83	0.31
FourthJlyWshTb2	Reach 1	6.611	PF 1	1704	869.31	871.27	871.27	871.89	0.01732	6.36	270.86	233.34	1
FourthJlyWshTb2	Reach 1	6.91	PF 1	1704	890.39	892.72	892.53	893.3	0.010876	6.09	285.11	188.35	0.83
FourthJlyWshTb2	Reach 1	7.099	PF 1	1704	905.92	908.49	908.49	909.35	0.015761	7.43	230.75	139.19	1
FourthJlyWshTb2	Reach 1	7.313	PF 1	1302	925.74	927.8	927.8	928.47	0.014713	6.67	208.47	171.85	0.95
FourthJlyWshTb2	Reach 1	7.397	PF 1	1302	930.08	932.37	931.94	932.7	0.006591	4.59	285.94	192.09	0.64
FourthJlyWshTb2	Reach 1	7.486	PF 1	1302	939.4	941.06	941.06	941.66	0.017023	6.23	212.76	188.79	0.98
FourthJlyWshTb2	Reach 1	7.621	PF 1	1302	954.77	956.97	956.97	957.66	0.01735	6.65	195.75	144.58	1.01
FourthJlyWshTb2	Reach 1	7.67	PF 1	1302	958.71	961.07	960.94	961.56	0.013333	5.65	230.67	185.22	0.88
FourthJlyWshTb2	Reach 1	7.86	PF 1	1302	976.48	978.82	978.82	979.53	0.017323	6.77	192.33	138.16	1.01
FourthJlyWshTb2	Reach 1	7.984	PF 1	1302	991.05	992.77	992.77	993.37	0.018231	6.21	209.8	179.11	1.01
FourthJlyWshTb3	Reach 1	0.286	PF 1	3601	1037.14	1040.28	1040.28	1041.13	0.011469	7.67	537.79	349.97	0.91
FourthJlyWshTb3	Reach 1	0.393	PF 1	3601	1039.13	1043.71	1042.5	1044.21	0.003055	6.04	717.06	243.82	0.52
FourthJlyWshTb3	Reach 1	0.58	PF 1	3601	1047.5	1050.85	1050.85	1051.83	0.010071	9.03	558.59	301.8	0.91
FourthJlyWshTb3	Reach 1	0.837	PF 1	3601	1058.52	1062.42	1061.85	1063.21	0.007097	7.09	507.86	181.66	0.75
FourthJlyWshTb3	Reach 1	0.977	PF 1	3601	1059.71	1065.66		1066.19	0.002608	5.91	645.04	158.64	0.49
FourthJlyWshTb3	Reach 1	1.057	PF 1	3147	1069.69	1071.68	1071.68	1072.49	0.01583	8.22	480.21	308.27	1.05
FourthJlyWshTb3	Reach 1	1.163	PF 1	3147	1069.69	1073.83		1074.01	0.001045	3.36	975.68	290.6	0.3
FourthJlyWshTb3	Reach 1	1.314	PF 1	3147	1074.44	1078.02	1078.02	1079.1	0.014108	8.34	377.42	177.34	1.01
FourthJlyWshTb3	Reach 1	1.516	PF 1	3147	1079.48	1083.17		1083.4	0.001824	4.3	893.01	291.56	0.4
FourthJlyWshTb3	Reach 1	1.656	PF 1	3147	1081.9	1086.92	1086.92	1088.49	0.010339	10.29	338.07	118.67	0.94
FourthJlyWshTb3	Reach 1	1.815	PF 1	3147	1088.88	1093.13	1092.14	1093.6	0.003874	5.52	579.71	213.54	0.56
LoudrmlkWsh	Reach 1	0.542	PF 1	4830	535.09	536.22	535.87	536.41	0.007404	3.05	1420.11	1551.44	0.67
LoudrmlkWsh	Reach 1	0.78	PF 1	4830	538.9	542.05	541.42	542.27	0.003202	3.75	1307.82	921.9	0.52
LoudrmlkWsh	Reach 1	1.082	PF 1	4830	548.34	550.62	550.62	551.07	0.006915	6.02	1244.39	1415.06	0.78
LoudrmlkWsh	Reach 1	1.48	PF 1	4830	559.98	562.5		562.84	0.004527	4.7	1027.41	583.72	0.62
LoudrmlkWsh	Reach 1	2.017	PF 1	4959	573.68	575.83	575.53	576.16	0.006155	5.9	1212.93	900.13	0.74
LoudrmlkWsh	Reach 1	2.238	PF 1	4959	579.11	582.02		582.5	0.004742	5.96	1144.93	789.81	0.67
LoudrmlkWsh	Reach 1	2.507	PF 1	4959	589.44	592.38	592.38	593.2	0.008659	8	878.11	626.5	0.91
LoudrmlkWsh	Reach 1	3.169	PF 1	5088	615.52	617.42	617.12	617.71	0.005906	4.26	1195.57	985.93	0.67
LoudrmlkWsh	Reach 1	3.379	PF 1	5088	620.14	623.64	623.29	624.05	0.005479	5.21	1081.71	953.02	0.69
LoudrmlkWsh	Reach 1	3.569	PF 1	5217	627.56	630.01	629.75	630.44	0.007485	5.29	990.22	735.75	0.78
LoudrmlkWsh	Reach 1	3.758	PF 1	5217	635.01	637.18	636.89	637.52	0.00671	4.71	1110.06	878.36	0.72
LoudrmlkWsh	Reach 1	4.144	PF 1	5217	648.5	651.36	651.15	651.83	0.007245	5.65	1020.46	780.01	0.78
LoudrmlkWsh	Reach 1	4.361	PF 1	5217	657.62	660.13	660	660.62	0.008196	5.79	983.05	900.22	0.82
LoudrmlkWsh	Reach 1	4.651	PF 1	5346	668.02	670.52	670.18	670.97	0.005692	5.43	1074.3	755.86	0.71

Table E.1: HEC-RAS Summary Table (Continued)

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
LoudrmlkWsh	Reach 1	5.017	PF 1	5346	679.97	682.69	682.46	683.35	0.007196	6.69	918.18	560.45	0.81
LoudrmlkWsh	Reach 1	5.269	PF 1	5346	689.06	692.16	692.04	692.91	0.007238	7.54	909.51	560.83	0.84
LoudrmlkWsh	Reach 1	5.431	PF 1	5346	694.53	698.79	698.79	700.11	0.008524	9.35	629.78	715.25	0.94
LoudrmlkWsh	Reach 1	5.463	PF 1	5346	695.32	700.38	698.48	700.44	0.000478	2.19	3204.8	2680.96	0.22
LoudrmlkWsh	Reach 1	5.652	PF 1	5463	704.05	705.9	705.9	706.47	0.012071	6.12	930.51	908.29	0.96
LoudrmlkWsh	Reach 1	5.838	PF 1	5463	709.93	712.56	712.14	712.84	0.004031	4.37	1406.17	1177.71	0.59
LoudrmlkWsh	Reach 1	6.599	PF 1	4986	735.9	737.94	737.9	738.52	0.012303	6.09	818.74	667.85	0.97
LoudrmlkWsh	Reach 1	6.978	PF 1	4986	746.05	750.22	749.4	750.73	0.003639	5.76	883.95	506.56	0.61
LoudrmlkWsh	Reach 1	7.55	PF 1	5070	768.4	769.93	769.93	770.42	0.014151	6.83	1152.55	1148.49	1.05
LoudrmlkWsh	Reach 1	7.753	PF 1	5070	778.13	779.54		779.7	0.005015	3.96	1650.84	1136.53	0.62
LoudrmlkWsh	Reach 1	8.101	PF 1	5070	792.44	794.08	794.08	794.6	0.013497	5.93	926.52	950.59	1
LoudrmlkWsh	Reach 1	8.476	PF 1	5154	806.77	809.31	808.86	809.66	0.004898	4.74	1099.53	717.47	0.64
LoudrmlkWsh	Reach 1	8.872	PF 1	5154	817.76	820.89	820.53	821.46	0.006481	6.08	848.81	441.72	0.76
LoudrmlkWsh	Reach 1	9.31	PF 1	5154	832.48	834.43	834.05	834.77	0.005135	4.68	1136.83	836.49	0.65
LoudrmlkWsh	Reach 1	9.482	PF 1	5239	837.94	839.82	839.59	840.21	0.007048	4.99	1092.63	941.39	0.75
LoudrmlkWsh	Reach 1	10.008	PF 1	5239	854.51	856.99	856.56	857.39	0.005462	5.09	1042.45	633.21	0.68
LoudrmlkWsh	Reach 1	10.277	PF 1	5239	865.44	867.71	867.66	868.36	0.011638	8.47	811.28	607.45	0.96
LoudrmlkWsh	Reach 2	10.388	PF 1	5308	869.99	872.72	872.39	873.18	0.006092	5.47	1009.8	697.29	0.72
LoudrmlkWsh	Reach 2	10.583	PF 1	5308	879.13	881.45	881.45	882.1	0.012576	6.49	848.28	731.68	0.99
LoudrmlkWsh	Reach 2	10.826	PF 1	5308	891.82	894.18	894.03	894.63	0.007852	5.47	1044.18	1067.46	0.8
LoudrmlkWsh	Reach 2	10.955	PF 1	5308	898.61	901.3	901.3	902.09	0.010657	7.25	787.75	594.87	0.96
LoudrmlkWsh	Reach 2	11.124	PF 1	5308	907.59	910.67	910.63	911.39	0.010228	6.86	809.04	642.19	0.93
LoudrmlkWsh	Reach 2	11.318	PF 1	4707	918.85	921.02	920.92	921.46	0.009269	5.32	936.17	939.03	0.84
LoudrmlkWsh	Reach 2	11.484	PF 1	4707	927.98	930.37	930.37	931	0.009602	6.5	827.86	804.98	0.9
LoudrmlkWsh	Reach 2	11.635	PF 1	4707	937.74	939.99	939.99	940.73	0.012554	6.91	683.5	503.55	1.01
LoudrmlkWsh	Reach 2	11.902	PF 1	4707	951.4	953.85	953.74	954.42	0.007871	6.36	856.73	626.45	0.83
LoudrmlkWsh	Reach 2	12.078	PF 1	4707	959.96	962.38	962.38	963.22	0.010242	7.42	677.82	464.47	0.95
LoudrmlkWsh	Reach 2	12.181	PF 1	4707	967.24	969.46	969.46	970.26	0.010054	7.55	727.51	488.81	0.95
LoudrmlkWshTb1	Reach 1	0.183	PF 1	3074	869.76	872.62	871.48	872.74	0.001654	2.79	1111.47	615.29	0.35
LoudrmlkWshTb1	Reach 1	0.294	PF 1	3074	875.72	877.64	877.64	878.23	0.016244	6.18	497.26	429.83	1.01
LoudrmlkWshTb1	Reach 1	0.381	PF 1	3074	878.32	881.2	880.24	881.38	0.003907	5.32	997.5	695.37	0.57
LoudrmlkWshTb1	Reach 1	0.485	PF 1	3074	880.58	883.62	883.09	884.01	0.006299	5.05	609.06	346.93	0.67
LoudrmlkWshTb1	Reach 1	0.612	PF 1	3074	886.11	888.74	888.5	889.27	0.009786	5.81	528.96	339.37	0.82
LoudrmlkWshTb1	Reach 1	0.751	PF 1	3074	889.23	892.57	891.76	892.74	0.002739	3.31	944.36	620.99	0.44
LPR100A	Reach 1	0.376	PF 1	2274	639.97	642.3	642.05	642.8	0.008944	5.68	400.01	259.28	0.81
LPR100A	Reach 1	0.879	PF 1	2274	659.81	661.48	661.15	661.75	0.005808	4.23	563.93	495.36	0.64
LPR100A	Reach 1	1.186	PF 1	2274	669.04	671.19	670.91	671.4	0.005837	3.68	653.82	723.09	0.62
LPR100A	Reach 1	1.536	PF 1	2274	680	681.6	681.49	682.13	0.006005	4.69	538.93	465.07	0.66
LPR100A	Reach 1	1.953	PF 1	2274	696.09	697.54	697.34	697.77	0.008476	3.88	587.99	681.38	0.72
LPR125A	Reach 1	0.1	PF 1	4959	558.96	560.43	560.21	560.74	0.007403	4.42	1121.97	1011.24	0.74
LPR125A	Reach 1	0.214	PF 1	4959	565.33	567.19	567.19	567.84	0.012532	6.47	781.63	671.99	0.99
LPR135A	Reach 1	1.743	PF 1	3078	534.96	536.49	536.13	536.6	0.005208	2.68	1149.24	1468.66	0.53
LPR135A	Reach 1	1.98	PF 1	3078	538.18	540.64	540.01	540.74	0.002296	2.52	1240.29	997.43	0.39
LPR135A	Reach 1	2.329	PF 1	3078	549.48	550.68	550.68	550.99	0.017469	4.57	714.64	1202.73	0.96
LPR135A	Reach 1	2.586	PF 1	2573	559.11	561.38	560.95	561.55	0.004002	3.41	852.91	933.74	0.51
LPR135A	Reach 1	2.761	PF 1	2573	568.42	569.92	569.92	570.3	0.012622	5.8	621.73	824.72	0.9
LPR135A	Reach 1	2.95	PF 1	2573	578.48	580.04		580.26	0.007459	4.69	742	730.03	0.7
LPR135A	Reach 1	3.159	PF 1	2573	588.62	589.89	589.78	590.18	0.011677	4.29	602.53	953.6	0.81

Table E.1: HEC-RAS Summary Table (Continued)

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
LPR135A	Reach 1	3.278	PF 1	2573	593.27	595.21	594.9	595.51	0.006197	4.6	628.37	550.01	0.65
LPR135A	Reach 1	3.497	PF 1	2068	599.98	602.17	601.88	602.5	0.005987	4.75	493.53	447.76	0.65
LPR135A	Reach 1	3.752	PF 1	2068	608.76	610.93		611.31	0.007151	4.96	429.98	323.91	0.7
LPR135A	Reach 1	3.937	PF 1	2068	617.24	619.33	619.13	619.72	0.010578	5.07	408.03	342.1	0.82
LPR135A	Reach 1	4.35	PF 1	2068	629.34	631.68	630.97	631.9	0.003439	3.81	547.37	320.46	0.5
LPR135A	Reach 1	4.682	PF 1	1564	640.14	642.47	642.47	642.94	0.008003	5.75	349.03	450.25	0.76
LPR135A	Reach 1	4.801	PF 1	1564	645.72	647.36	647.09	647.64	0.006952	4.28	389.79	387.47	0.67
LPR135A	Reach 1	5.344	PF 1	1564	660	662.7	661.97	662.98	0.004146	4.19	373.26	205.35	0.55
LPR135A	Reach 1	5.613	PF 1	1059	668.87	670.87	670.69	671.25	0.010746	4.92	215.46	191.93	0.81
LPR135A	Reach 1	5.811	PF 1	1059	675.56	677.73		677.92	0.004205	3.47	305.3	225.41	0.53
LPR135A	Reach 1	5.923	PF 1	1059	678.27	680.5	680	680.74	0.005371	3.93	269.32	197.92	0.59
LPR135A	Reach 1	6.075	PF 1	1059	685.25	686.62	686.57	687.05	0.012598	5.34	213.51	235.58	0.88
LPR135A	Reach 1	6.12	PF 1	1059	689.78	692.01	692.01	692.72	0.013284	6.91	163.34	123.65	0.96
LPR135A	Reach 1	6.135	PF 1	1059	690.05	693.03		693.33	0.004803	4.44	243.39	146.34	0.59
LPR135A	Reach 1	6.173	PF 1	680	689.89	693.37		693.37	0.000012	0.33	2119.93	707.94	0.03
LPR135A	Reach 1	6.378	PF 1	680	695.68	697.39	697.39	697.84	0.018305	5.35	127.07	147.55	1.02
LPR135A	Reach 1	6.577	PF 1	680	701.24	703.57		703.72	0.00265	3.07	224.14	154.75	0.43
LPR135A	Reach 1	6.631	PF 1	680	706.78	708.02	708.02	708.41	0.018771	5.02	135.52	176.67	1.01
LPR135A	Reach 1	6.679	PF 1	680	708.62	710.12		710.21	0.003615	2.47	274.76	300.61	0.46
LPR135A	Reach 1	6.756	PF 1	680	709.52	711.17		711.26	0.001946	2.36	288.25	213.81	0.36
LPR135A	Reach 1	7.093	PF 1	680	729.16	730.13	730.13	730.47	0.018424	4.72	146.79	230.24	0.99
LPR140A	Reach 1	0.162	PF 1	1529	726.4	727.85	727.64	728.06	0.006979	3.82	444.62	528.46	0.65
LPR140A	Reach 1	0.302	PF 1	1529	737.44	739.18	739.18	739.76	0.016551	6.08	252.12	225.38	1.01
LPR140A	Reach 1	0.779	PF 1	1529	789.47	791.13	791.13	791.68	0.012701	6.35	284.4	271.43	0.93
LPR140A	Reach 1	0.945	PF 1	1529	803.96	806.48	806.48	807.26	0.014904	7.05	216.85	142.63	1.01
LPR140A	Reach 1	1.088	PF 1	1207	819.21	821.46	821.46	822.28	0.014347	7.27	166.65	105.31	1
LPR140A	Reach 1	1.251	PF 1	1207	835.92	838.69	838.69	839.51	0.014298	7.28	165.81	101.62	1
LPR140A	Reach 1	1.483	PF 1	1207	858.01	860.45	860.45	861.25	0.013617	7.27	171.7	114.83	0.98
LPR140A	Reach 1	1.58	PF 1	1207	868.75	870.88	870.88	871.66	0.012778	7.22	179.92	125.62	0.96
LPR140A	Reach 1	1.681	PF 1	1207	878.93	880.95	880.95	881.6	0.012484	6.7	201.29	166.6	0.93
LPR140A	Reach 1	1.761	PF 1	1207	888.65	890.39	890.39	891.01	0.013989	6.39	198.07	173.15	0.96
LPR140A	Reach 1	1.819	PF 1	1207	890.89	893.28	892.84	893.64	0.005781	4.86	256.46	164.36	0.64
LPR140A	Reach 1	1.954	PF 1	1207	907.25	909.53	909.53	910.3	0.014761	7.05	171.86	117.01	1
LPR140A	Reach 1	2.043	PF 1	886	917.08	918.94	918.94	919.56	0.014564	6.37	144.73	124.88	0.97
LPR140A	Reach 1	2.245	PF 1	886	938.6	940.56	940.56	941.24	0.015166	6.64	134.06	101.68	1
LPR140A	Reach 1	2.389	PF 1	886	950.24	952.46	952.46	953.17	0.012145	7.23	143.86	107.62	0.94
LPR140A	Reach 1	2.501	PF 1	886	968.52	970.11	970.11	970.66	0.016129	5.94	151.1	148.34	0.99
LPR140A	Reach 1	2.623	PF 1	886	978.52	980.6	980.6	981.25	0.015658	6.5	136.52	106.97	1.01
LPR145A	Reach 1	0.104	PF 1	836	646.38	648.62		648.91	0.005553	4.33	199.11	144.8	0.62
LPR145A	Reach 1	0.426	PF 1	836	659.9	661.85	661.77	662.44	0.012255	6.2	139.02	106.21	0.91
LPR145A	Reach 1	0.595	PF 1	836	669.03	670.85	670.62	671.25	0.008173	5.22	172.92	137.88	0.75
LPR145A	Reach 1	0.708	PF 1	836	676.77	678.49	678.49	679.03	0.01677	5.88	142.13	134.08	1.01
LPR145A	Reach 1	0.843	PF 1	836	682.6	685.19	684.71	685.54	0.005773	4.78	180.47	116.83	0.64
LPR145A	Reach 1	0.976	PF 1	836	689.63	691.46	691.46	692.1	0.015848	6.44	129.76	102.28	1.01
LPR145A	Reach 1	1.268	PF 1	478	704.37	705.83	705.48	705.99	0.004459	3.38	165.64	190.62	0.53
LPR150A	Reach 1	0.208	PF 1	5467	587.52	591.86		592.19	0.003955	4.69	1305.22	965.76	0.55
LPR150A	Reach 1	0.373	PF 1	5467	590	594.54		594.83	0.002417	4.3	1272.86	466.31	0.45
LPR150A	Reach 1	0.579	PF 1	5467	595.63	600.12	600.12	601.59	0.010955	9.77	579.8	227.15	0.97

Table E.1: HEC-RAS Summary Table (Continued)

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
LPR150A	Reach 1	0.667	PF 1	5467	597.34	602.59		602.68	0.00074	2.87	2584.32	987.12	0.26
LPR150A	Reach 1	0.757	PF 1	5467	599.17	602.92		603	0.000632	2.33	2396.96	834.42	0.23
LPR150A	Reach 1	0.93	PF 1	5467	599.8	603.46		603.54	0.000548	2.35	2380.76	741.75	0.22
LPR150A	Reach 1	1.056	PF 1	4783	602.74	605.16	605.16	605.98	0.013882	7.28	667.01	438.77	0.99
LPR150A	Reach 1	1.143	PF 1	4783	605.96	609.12	608.53	609.64	0.005143	5.83	865.21	409.24	0.65
LPR150A	Reach 1	1.261	PF 1	4783	608.46	611.83		612	0.002842	3.35	1449.83	909.59	0.45
LPR150A	Reach 2	1.575	PF 1	4783	616.73	619.14	619.04	619.64	0.008419	6.13	984.91	894.53	0.79
LPR150A	Reach 2	1.714	PF 1	4783	619.13	622.67		622.93	0.002842	4.29	1308.87	758.55	0.48
LPR150A	Reach 2	1.905	PF 1	4783	623.68	626.2	625.65	626.46	0.004598	4.12	1176.6	790.06	0.57
LPR150A	Reach 2	2.094	PF 1	4098	626.92	629.78		629.99	0.0027	3.7	1155.07	679.8	0.45
LPR150A	Reach 2	2.173	PF 1	4098	628.4	631.25		631.67	0.006041	5.23	794.64	463	0.67
LPR150A	Reach 2	2.262	PF 1	4098	629.89	633.79	633.19	634.44	0.00544	6.6	677.03	369.93	0.68
LPR150A	Reach 2	2.347	PF 1	4098	635.98	638.83	638.83	639.78	0.013905	7.84	522.61	278.36	1.01
LPR150A	Reach 2	2.4	PF 1	4098	644.74	647.21	647.21	647.97	0.014165	8.08	638.4	436.85	1.02
LPR150A	Reach 2	2.421	PF 1	4098	644.92	648.11		648.15	0.000302	1.59	2600.42	908.22	0.16
LPR150A	Reach 2	2.536	PF 1	3800	644.92	648.28		648.32	0.000243	1.49	2581.19	845.42	0.15
LPR150A	Reach 3	2.949	PF 1	3800	645.63	649.28		649.98	0.005876	6.78	575.1	224.25	0.7
LPR150A	Reach 3	3.078	PF 1	3800	649.18	653.14		653.51	0.004512	4.9	775.12	359.06	0.59
LPR150A	Reach 3	3.234	PF 1	3800	650	654.26		654.33	0.000405	2.14	1823.14	533.85	0.19
LPR150A	Reach 3	3.344	PF 1	3800	652.42	656.52	656.52	657.84	0.011392	9.27	420.11	174.88	0.98
LPR150A	Reach 3	3.42	PF 1	3800	655.68	659.89		660.5	0.00416	6.9	703.39	286.11	0.62
LPR150A	Reach 3	3.525	PF 1	2927	660.65	663.42	663.42	664.25	0.014195	7.34	398.55	237.85	1
LPR150A	Reach 3	3.597	PF 1	2927	667.21	670.25	670.25	671.19	0.013574	7.81	377.16	211.36	1
LPR150A	Reach 3	3.763	PF 1	2927	679.28	682.53	682.53	683.67	0.012738	8.55	344.77	160.66	1
LPR150A	Reach 3	4.009	PF 1	2927	690.4	693.67	693.09	694.21	0.005561	5.89	506.93	231.06	0.67
LPR150B	Reach 1	0.298	PF 1	1744	616.84	618.78	618.78	619.44	0.013363	6.64	278.55	229.18	0.95
LPR150B	Reach 1	0.385	PF 1	1744	618.63	620.82		620.89	0.001287	2.09	835.13	556.22	0.3
LPR150B	Reach 1	0.653	PF 1	1744	627.85	629.63	629.63	630.24	0.014016	6.35	292.81	262.61	0.96
LPR150B	Reach 1	0.759	PF 1	1744	634.56	635.96	635.75	636.24	0.008168	4.28	429.2	475.29	0.71
LPR150B	Reach 1	1.019	PF 1	1053	649.45	651.21	651.21	651.69	0.018027	5.54	190.05	210.23	1.02
LPR150B	Reach 1	1.144	PF 1	1053	659.62	661.23	661.19	661.74	0.013088	5.89	192.03	346.24	0.92
LPR150B	Reach 1	1.339	PF 1	1053	679.69	681.41	681.41	681.99	0.013605	6.45	185.2	168.4	0.95
LPR150B	Reach 1	1.514	PF 1	1053	696.69	698.44	698.44	698.99	0.016819	5.92	177.94	166.74	1.01
LPR150B	Reach 1	1.912	PF 1	1053	739.18	741.23	741.23	741.82	0.016411	6.15	171.31	148.84	1.01
LPR150B	Reach 1	2.037	PF 1	362	760.58	761.78	761.78	762.15	0.01929	4.87	74.33	103.4	1.01
LPR150B	Reach 1	2.229	PF 1	362	798.78	800.22	800.22	800.67	0.015877	5.6	71.06	82.18	0.97
LPR150B	Reach 1	2.37	PF 1	362	831.18	832.37	832.37	832.74	0.014935	5.54	83.15	111.76	0.95
LPR155A	Reach 1	0.453	PF 1	5677	510	512.95	512.73	513.79	0.009008	7.41	792.61	381.93	0.85
LPR155A	Reach 1	0.585	PF 1	5677	514.66	518.94	518.68	519.94	0.008535	8.03	724.69	303.82	0.84
LPR155A	Reach 1	0.72	PF 1	5677	518.34	522.58		522.9	0.002358	4.61	1283.29	481.54	0.45
LPR155A	Reach 1	1.006	PF 1	5677	527.95	530.84	530.84	531.44	0.009856	6.64	1033.83	834.42	0.85
LPR155A	Reach 2	1.267	PF 1	5581	535.65	539.15	538.26	539.46	0.003791	4.44	1255.76	829.5	0.54
LPR155A	Reach 2	1.467	PF 1	5581	539.95	543.26	542.55	543.59	0.00403	4.59	1260.63	732.99	0.55
LPR155A	Reach 2	1.622	PF 1	5581	544.84	547.33	547.02	547.79	0.006642	5.57	1097.86	731.26	0.7
LPR155A	Reach 2	1.758	PF 1	5581	549.83	552.22		552.64	0.006703	5.48	1128.19	725.98	0.7
LPR155A	Reach 2	1.907	PF 1	5581	549.93	554.75		554.96	0.001526	3.72	1530.98	551.93	0.37
LPR155A	Reach 2	2.195	PF 1	5485	558.45	561.31	561.31	561.91	0.014356	6.27	912.28	822.75	0.97
LPR155A	Reach 2	2.554	PF 1	5485	567.19	570.79		571.04	0.002357	4.15	1485.81	797.36	0.44

Table E.1: HEC-RAS Summary Table (Continued)

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
LPR155A	Reach 2	2.788	PF 1	5485	569.97	573.59		573.8	0.002094	3.67	1509.24	663.7	0.41
LPR155A	Reach 3	3.005	PF 1	5485	578.91	581.17	581.17	581.72	0.009573	6.31	1061.68	1011.28	0.83
LPR155A	Reach 3	3.089	PF 1	5485	579.93	583		583.17	0.001666	3.36	1782.11	951.91	0.37
LPR155A	Reach 3	3.321	PF 1	5389	583.43	586.21	585.8	586.72	0.00592	5.95	1016.98	577.21	0.68
LPR155A	Reach 4	3.692	PF 1	2127	597.37	599.39	599.19	599.81	0.009402	5.22	414.26	345.61	0.79
LPR155A	Reach 4	3.811	PF 1	2127	599.89	602.22	601.42	602.34	0.002121	2.77	799.81	602.36	0.38
LPR155A	Reach 4	4.041	PF 1	2127	607.78	609.37	609.37	609.86	0.017517	5.62	379.24	409.29	1.01
LPR155A	Reach 4	4.23	PF 1	2127	615.91	618.04	617.62	618.33	0.004964	4.43	526.93	402.2	0.59
LPR155A	Reach 4	4.42	PF 1	2365	619.83	622.29	621.66	622.5	0.003429	3.67	679.35	490.11	0.49
LPR155A	Reach 4	4.61	PF 1	2365	627.55	629.56	629.56	630.15	0.012188	6.34	419.06	754.53	0.91
LPR155A	Reach 4	4.988	PF 1	2365	638.3	641.14	640.54	641.29	0.003165	3.19	763.94	578.59	0.46
LPR155A	Reach 4	5.219	PF 1	2365	646.54	648.13	648.1	648.62	0.014537	5.76	441.45	450.05	0.95
LPR155A	Reach 4	5.368	PF 1	2604	650.13	652.36	651.65	652.51	0.002648	3.21	860.55	578.55	0.43
LPR155A	Reach 4	5.557	PF 1	2604	657.45	659.18	659.18	659.7	0.015632	5.82	456.91	491.4	0.98
LPR155A	Reach 4	5.746	PF 1	2604	663.22	665.52	664.9	665.67	0.003097	3.18	851.58	643.43	0.46
LPR155A	Reach 4	5.951	PF 1	2604	667.23	669.81	669.42	670.16	0.005596	4.84	597.17	491.79	0.64
LPR155A	Reach 4	6.125	PF 1	2604	670.71	673.81		674.13	0.003498	4.53	599.37	311.27	0.52
LPR155A	Reach 4	6.309	PF 1	2604	679.9	681.12	681.12	681.53	0.016103	5.28	515.5	1425.5	0.97
LPR155A	Reach 4	6.323	PF 1	2604	679.78	681.8	681.07	681.93	0.002347	2.97	921.47	1471.6	0.41
LPR155A	Reach 4	6.406	PF 1	2840	680.01	682.88		683.07	0.002745	3.53	838.94	529.95	0.45
LPR155A	Reach 4	6.658	PF 1	2840	689.21	691.05	691.05	691.54	0.016253	5.65	515.83	572.84	0.99
LPR155A	Reach 4	7.237	PF 1	2840	705.36	708.29		708.5	0.002761	3.68	773.91	399.66	0.46
LPR155A	Reach 4	7.45	PF 1	2071	710.22	713.39	713.39	714.46	0.012025	8.4	257.23	128.33	0.97
LPR155A	Reach 5	7.717	PF 1	2071	719.34	722.64		722.97	0.00357	5.25	593.56	468.24	0.55
LPR155A	Reach 5	7.942	PF 1	2071	724.86	727.76	727.06	727.94	0.002366	3.87	710.88	459.65	0.44
LPR155A	Reach 5	8.017	PF 1	2071	727.71	729.98	729.98	730.73	0.011566	7.57	337.49	246.94	0.93
LPR155A	Reach 5	8.207	PF 1	2071	734.25	737.04		737.4	0.004249	4.94	449.54	242.79	0.58
LPR155A	Reach 5	8.425	PF 1	1303	742.21	744.13	744.12	744.74	0.015889	6.29	207.32	170.06	1
LPR155A	Reach 5	8.735	PF 1	1303	759.19	761.02	760.74	761.41	0.00706	5.17	281.59	217.95	0.71
LPR155A	Reach 5	8.986	PF 1	1303	768.53	770.45	770.16	770.81	0.007205	4.88	281.65	228.27	0.7
LPR155A	Reach 5	9.187	PF 1	1303	776.5	778.66	778.38	779.08	0.008424	5.21	252.61	183.01	0.75
LPR155A	Reach 5	9.337	PF 1	534	786.62	787.89	787.89	788.32	0.016123	5.46	107	134.22	0.97
LPR155A	Reach 5	9.536	PF 1	534	797.71	799.44	799.18	799.69	0.007786	4	135.1	137.54	0.69
LPR155A	Reach 5	9.618	PF 1	534	803.16	804.56	804.56	805.04	0.015493	5.69	101.21	114.88	0.97
LPR155A	Reach 5	9.757	PF 1	534	812.45	813.57	813.43	813.81	0.009608	4.06	142.9	196.82	0.74
LPR155A	Reach 5	9.897	PF 1	534	824.27	825.4	825.4	825.8	0.016895	5.12	108.07	145.83	0.98
LPR155A	Reach 5	9.992	PF 1	534	833.33	834.49	834.49	834.88	0.014952	5.39	118.22	161.6	0.94
LPR155A	Reach 5	10.016	PF 1	534	836.54	837.7	837.7	838.08	0.014918	5.39	119.38	163.24	0.94
LPR155B	Reach 1	0.207	PF 1	824	568.54	570.32	570.32	570.92	0.014313	6.25	137.08	128.5	0.96
LPR155B	Reach 1	0.302	PF 1	824	589.43	591.16	591.16	591.71	0.013921	6.08	147.85	155.6	0.95
LPR155B	Reach 1	0.401	PF 1	824	617.28	618.49	618.49	618.87	0.017421	5.03	169.49	236.06	0.98
LPR155B	Reach 1	0.567	PF 1	824	658.59	660.27	660.27	660.78	0.01611	5.79	145.17	146.78	0.99
LPR155B	Reach 1	0.758	PF 1	824	709.55	711.43	711.43	712.07	0.01403	6.67	136.23	114.17	0.97
LPR155B	Reach 1	0.944	PF 1	824	770.8	773.7	773.7	774.53	0.014816	7.33	112.4	69.17	1.01
LPR155B	Reach 1	1.01	PF 1	824	790.47	792.84	792.84	793.61	0.013261	7.14	121.68	85.46	0.97
LPR155C	Reach 1	0.133	PF 1	812	589.3	590.5	590.5	590.9	0.018199	5.1	159.96	212.35	1
LPR155C	Reach 1	0.316	PF 1	812	609.81	611.04	611.04	611.46	0.018192	5.2	156.42	196.14	1.01
LPR155C	Reach 1	0.468	PF 1	812	629.57	631.27	631.27	631.87	0.012996	6.49	143.34	130.02	0.94

Table E.1: HEC-RAS Summary Table (Continued)

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
LPR155C	Reach 1	0.838	PF 1	812	676.6	678.34	678.34	678.92	0.014006	6.26	140.85	133.63	0.96
QuailSprWsh	Reach 1	1.031	PF 1	9362	691.34	693.68	693.07	693.81	0.003323	3.21	3469.44	2539.25	0.43
QuailSprWsh	Reach 1	1.843	PF 1	9362	719.87	722.11	721.94	722.75	0.020655	7.31	1602.49	1535.36	1.06
QuailSprWsh	Reach 2	2.544	PF 1	5624	748.94	751.71		751.83	0.002918	3.76	2177.54	1389.64	0.43
QuailSprWsh	Reach 2	2.839	PF 1	5624	759.81	762.28	762.28	763.03	0.013122	7.54	931.01	695.76	0.9
QuailSprWsh	Reach 2	3.115	PF 1	5624	770.02	774.36	773.41	774.84	0.005541	5.57	1010.12	381.68	0.6
QuailSprWsh	Reach 2	3.494	PF 1	4997	785.84	788.69	788.34	789.23	0.010068	5.88	850.78	473.84	0.76
QuailSprWsh	Reach 2	4.063	PF 1	4997	809.36	812.96	812.35	813.58	0.006666	6.41	818.6	348.74	0.67
QuailSprWsh	Reach 2	4.249	PF 1	4997	817.14	820.83	820.79	821.69	0.010349	7.78	752.85	453.23	0.83
QuailSprWsh	Reach 2	4.441	PF 1	4997	828.74	831.24	830.9	831.82	0.009572	6.1	827.79	443	0.76
QuailSprWsh	Reach 2	4.642	PF 1	4369	832.32	837.47	836.18	838.08	0.003808	6.5	750.72	224.79	0.54
QuailSprWsh	Reach 2	4.823	PF 1	4369	840	843.35	843.26	844.43	0.013403	8.39	533.51	240.18	0.93
QuailSprWsh	Reach 2	4.984	PF 1	4369	846.11	850.64	849.62	851.13	0.005084	5.63	776.56	270.7	0.59
QuailSprWsh	Reach 2	5.269	PF 1	4369	860.6	865.3	865.3	866.82	0.014892	9.88	442.06	148.72	1.01
QuailSprWsh	Reach 2	5.284	PF 1	4369	860.07	866.92		867.11	0.000765	3.66	1311.2	270.6	0.26
QuailSprWsh	Reach 2	5.37	PF 1	4369	866.36	870.03	870.03	870.8	0.018546	7.52	645.5	499.91	1.02
QuailSprWsh	Reach 2	5.574	PF 1	3742	873.2	879.5	877.96	880.21	0.00455	6.74	555.29	135.09	0.59
QuailSprWsh	Reach 2	5.766	PF 1	3742	880.08	885.29	884.58	886.23	0.007843	7.78	480.94	142.3	0.75
QuailSprWsh	Reach 2	5.94	PF 1	3742	888.58	893.48	893.18	894.69	0.010819	8.82	425.53	136.98	0.87
QuailSprWsh	Reach 2	5.977	PF 1	3742	889.11	895.29		895.78	0.002971	5.6	672.46	164.48	0.48
QuailSprWsh	Reach 2	6.144	PF 1	3742	899.63	902.97	902.97	904.28	0.014779	9.21	412.18	166.04	0.99
QuailSprWsh	Reach 2	6.208	PF 1	3742	899.63	905.5		905.92	0.002234	5.37	774.35	208.73	0.42
QuailSprWsh	Reach 2	6.226	PF 1	3742	900.07	905.78		906.14	0.002068	4.86	805.98	213.93	0.4
QuailSprWsh	Reach 2	6.289	PF 1	3742	900.05	906.53		907.15	0.004028	6.29	595.31	146.97	0.55
QuailSprWsh	Reach 2	6.523	PF 1	3115	912.99	916.34	916.34	917.45	0.016365	8.47	369.15	173.52	1.01
QuailSprWsh	Reach 2	6.565	PF 1	3115	915.73	919.52	919.08	920.2	0.009499	6.63	469.97	204.69	0.77
QuailSprWsh	Reach 2	6.597	PF 1	3115	917.81	921.57	921.57	922.58	0.017263	8.08	385.49	195.15	1.01
QuailSprWsh	Reach 2	6.714	PF 1	3115	918.59	924.36		924.57	0.001235	3.73	854.65	216.05	0.31
QuailSprWsh	Reach 2	6.907	PF 1	3115	925.93	929.45	929.45	930.62	0.015929	8.67	359.45	154.24	1
QuailSprWsh	Reach 2	7.055	PF 1	3115	935.91	939.75	939.42	940.6	0.010378	7.41	422.27	174.96	0.82
QuailSprWsh	Reach 2	7.08	PF 1	3115	939.34	941.52	941.45	942.22	0.014778	6.79	472.47	317.07	0.92
QuailSprWsh	Reach 2	7.137	PF 1	3115	939.28	943.09		943.26	0.001333	3.27	974.6	306.01	0.31
QuailSprWsh	Reach 2	7.211	PF 1	3115	939.28	943.61		943.78	0.001349	3.3	944.36	275.47	0.31
QuailSprWsh	Reach 2	7.308	PF 1	3115	939.96	944.5		945.16	0.005469	6.53	484.31	160.59	0.62
QuailSprWshTb1	Reach 1	0.559	PF 1	4842	745.98	749	747	749.21	0.002284	2.72	1354.49	477.74	0.36
QuailSprWshTb1	Reach 1	0.574	PF 1	4842	746.38	749.23		749.33	0.000915	1.81	1976.43	627.31	0.23
QuailSprWshTb1	Reach 1	0.755	PF 1	4842	750.25	752.66	752.66	753.31	0.013895	7.21	848.16	656.68	0.91
QuailSprWshTb1	Reach 1	0.942	PF 1	4842	757.12	760.46	759.73	760.89	0.004618	5.43	1027.36	744.79	0.57
QuailSprWshTb1	Reach 1	1.138	PF 1	4842	761.84	764.88	763.84	765.23	0.003689	4.75	1042.77	403.99	0.5
QuailSprWshTb1	Reach 1	1.327	PF 1	4842	772.67	774.58	774.58	775.18	0.020202	6.19	784.49	701.55	1.01
QuailSprWshTb1	Reach 1	1.509	PF 1	4842	779.81	783.24	782.35	783.52	0.004757	4.26	1135.94	571.54	0.53
QuailSprWshTb1	Reach 1	1.705	PF 1	4240	788.05	790.2	789.97	790.6	0.011311	5.09	843.9	710.52	0.77
QuailSprWshTb1	Reach 1	2.087	PF 1	4240	802.1	804.73		804.96	0.004873	3.84	1104.54	666.41	0.52
QuailSprWshTb1	Reach 1	2.277	PF 1	4240	808.36	811.73	811.5	812.08	0.01122	4.74	896.42	752.24	0.76
QuailSprWshTb1	Reach 1	2.459	PF 1	4240	816.63	819.1	818.56	819.37	0.005478	4.21	1072.81	806.17	0.56
QuailSprWshTb1	Reach 1	2.842	PF 1	3637	832.06	834.25	834.02	834.6	0.011728	4.72	769.91	653.45	0.77
QuailSprWshTb1	Reach 1	3.118	PF 1	3637	839.5	843.17	842.19	843.48	0.003709	4.49	830.63	367.74	0.49
QuailSprWshTb1	Reach 2	3.406	PF 1	3637	849.45	853.19	853.19	854.5	0.013907	9.29	406.74	166.44	0.97

Table E.1: HEC-RAS Summary Table (Continued)

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
QuailSprWshTb1	Reach 2	3.497	PF 1	3637	857.87	861.02	861.02	862.09	0.014506	8.44	454.75	226.28	0.96
QuailSprWshTb1	Reach 2	3.6	PF 1	3035	858.39	863.96		864.23	0.001502	4.29	775.73	210.65	0.35
QuailSprWshTb1	Reach 2	3.687	PF 1	3035	860.03	864.93		865.53	0.005417	6.17	492.07	156.4	0.61
QuailSprWshTb1	Reach 2	3.784	PF 1	3035	871.37	873.92	873.92	874.72	0.01718	7.28	429.21	280.76	0.99
QuailSprWshTb1	Reach 2	3.977	PF 1	3035	889.03	891.45	891.45	892.29	0.014703	7.57	438.38	282.03	0.94
QuailSprWshTb1	Reach 2	4.108	PF 1	3035	889.82	894.36		894.55	0.001344	3.5	887.29	258.96	0.32
QuailSprWshTb1	Reach 2	4.166	PF 1	3035	895.95	899.33	899.33	900.34	0.015092	8.13	385.81	202.43	0.97
QuailSprWshTb1	Reach 2	4.263	PF 1	3035	898.98	903.2		903.52	0.003267	4.63	690.55	279.41	0.47
QuailSprWshTb1	Reach 2	4.368	PF 1	3035	904.01	908.31	908.31	909.71	0.011893	10.08	348.38	132.02	0.93
QuailSprWshTb1	Reach 2	4.544	PF 1	2432	909.23	913.35		913.57	0.001733	3.8	665.64	216.19	0.35
QuailSprWshTb1	Reach 2	4.736	PF 1	2432	917.96	921.21	921.21	922.14	0.016952	7.72	316.22	175.96	1
QuailSprWshTb1	Reach 2	4.923	PF 1	2432	926.19	930.51	929.74	931.19	0.00568	6.73	388.96	141.84	0.64
QuailSprWshTb1	Reach 2	5.054	PF 1	2432	929.42	933.96		934.4	0.003854	5.36	461.07	155.27	0.52
QuailSprWshTb1	Reach 2	5.163	PF 1	2432	935.84	937.92	937.84	938.49	0.016244	6.05	402.65	307.01	0.92
QuailSprWshTb1A	Reach 1	0.272	PF 1	2084	858.68	860.83	860.83	861.55	0.015148	7.27	333.37	247.86	0.94
QuailSprWshTb1A	Reach 1	0.388	PF 1	2084	859.19	863.57		863.75	0.001508	3.47	642.21	234.55	0.33
QuailSprWshTb1A	Reach 1	0.488	PF 1	2084	869.57	871.77	871.77	872.56	0.016576	7.18	300.42	207.42	0.97
QuailSprWshTb1A	Reach 1	0.568	PF 1	2084	870.72	875.01	873.82	875.43	0.00357	5.3	418.46	150.07	0.51
QuailSprWshTb1A	Reach 1	0.756	PF 1	2084	884.73	888.11	888.11	889.22	0.014958	8.5	250.72	120.21	0.97
QuailSprWshTb1A	Reach 1	1.038	PF 1	1523	901.03	903.46	902.9	903.77	0.006109	4.47	342.53	201.55	0.59
QuailSprWshTb1A	Reach 1	1.103	PF 1	1523	906.7	909.16	909.16	909.99	0.014679	7.52	222.3	145.45	0.94
QuailSprWshTb1A	Reach 1	1.205	PF 1	1523	909.96	913.23	912.31	913.53	0.003645	4.5	366.5	178.13	0.49
QuailSprWshTb1A	Reach 1	1.255	PF 1	1523	917.99	919.87	919.87	920.51	0.017671	6.5	242.77	205.95	0.97
QuailSprWshTb1A	Reach 1	1.304	PF 1	1523	918.66	921.58		921.7	0.001952	2.79	549.81	286.18	0.34
QuailSprWshTb1A	Reach 1	1.432	PF 1	1523	929.58	931.96	931.96	932.73	0.018705	7.04	216.19	142.87	1.01
QuailSprWshTb1A	Reach 1	1.567	PF 1	1523	938.96	941.18	940.78	941.54	0.008721	4.82	315.73	207.87	0.69
QuailSprWshTb1A	Reach 1	1.68	PF 1	1523	939.64	943.17		943.33	0.001485	3.47	493.46	173.01	0.33
QuailSprWshTb1A	Reach 1	1.766	PF 1	1523	940.73	944.31	944.31	945.45	0.015085	8.75	182.1	80.5	0.98
QuailSprWshTb1A	Reach 1	1.908	PF 1	1523	950.09	953.53	953.06	954.1	0.008892	6.05	251.54	119.29	0.73
QuailSprWshTb1A	Reach 1	2.206	PF 1	962	969.99	971.21	971.2	971.69	0.017951	5.9	183.48	187.96	0.95
QuailSprWshTb1A	Reach 1	2.334	PF 1	962	980.11	981.83	981.68	982.16	0.013795	4.66	206.45	203.04	0.81
QuailSprWshTb1A	Reach 1	2.479	PF 1	962	990	992.39	992.24	993	0.014187	6.25	153.89	98.79	0.88
YellwMedWsh	Reach 1	0.664	PF 1	3746	597.88	600.36	600.36	600.88	0.013136	5.83	686.23	793.18	0.94
YellwMedWsh	Reach 1	0.991	PF 1	3746	609.26	611.96		612.16	0.00406	5.19	1209.87	791.95	0.59
YellwMedWsh	Reach 1	1.291	PF 1	3746	618.95	621.79	621.79	622.34	0.01015	8.84	856.52	741.36	0.94
YellwMedWsh	Reach 1	1.611	PF 1	3746	629.24	631.61	631.04	631.8	0.003839	3.57	1085.88	850.3	0.52
YellwMedWsh	Reach 2	1.953	PF 1	3746	639.51	642.43	642.42	643.35	0.012156	7.7	497.78	295.08	0.98
YellwMedWsh	Reach 2	2.233	PF 1	3722	649.98	652.39	651.7	652.62	0.003757	3.83	973.21	614.39	0.53
YellwMedWsh	Reach 2	2.615	PF 1	3722	663.19	665.47	665.47	666.25	0.013368	7.09	530.8	369.89	0.99
YellwMedWsh	Reach 2	2.787	PF 1	3722	668.77	672.36	671.71	672.78	0.00443	5.26	726.86	367.83	0.61
YellwMedWsh	Reach 2	2.999	PF 1	3722	677.31	679.05	678.61	679.29	0.007893	4.81	1026.91	938.9	0.74
YellwMedWsh	Reach 3	3.426	PF 1	2760	698.38	701.06	701.06	701.72	0.010942	6.69	464.42	445.49	0.91
YellwMedWsh	Reach 3	3.544	PF 1	2760	702.58	705.83	705.24	706.26	0.005205	5.25	527.58	266.81	0.65
YellwMedWsh	Reach 3	3.562	PF 1	2760	703.49	706.25	706.05	706.96	0.008431	6.88	429.64	246.1	0.83
YellwMedWsh	Reach 3	3.802	PF 1	2760	717.08	718.77	718.71	719.3	0.011275	5.96	506.11	472.07	0.89
YellwMedWsh	Reach 3	4.181	PF 1	2760	734.1	735.46	735.18	735.66	0.006189	3.55	784.04	845.66	0.62
YellwMedWsh	Reach 3	4.332	PF 1	2760	739.33	741.15	740.95	741.55	0.008732	5.06	556.07	466.06	0.78
YellwMedWsh	Reach 3	4.598	PF 1	2913	751.53	753.7	753.55	754.26	0.009298	6.1	505.06	376.7	0.83

Table E.1: HEC-RAS Summary Table (Continued)

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
YellwMedWsh	Reach 3	4.752	PF 1	2913	759.39	761.62	761.53	762.18	0.010227	6.26	522.88	422.61	0.87
YellwMedWsh	Reach 3	4.94	PF 1	2913	768.22	770.51	770.26	770.94	0.007641	5.32	591.5	668.05	0.75
YellwMedWsh	Reach 3	5.13	PF 1	2913	777.31	779.2	779.11	779.69	0.009998	5.74	562.44	544.05	0.84
YellwMedWsh	Reach 3	5.297	PF 1	2913	785.56	787.37	787.16	787.75	0.008376	4.93	607.94	545.54	0.76
YellwMedWsh	Reach 3	5.509	PF 1	2913	796.47	797.62	797.47	797.87	0.009712	4.11	743.98	932.08	0.77
YellwMedWsh	Reach 3	5.707	PF 1	3065	806.72	808.38	808.37	808.83	0.011132	5.51	639.86	868.17	0.87
YellwMedWsh	Reach 3	6.079	PF 1	5104	824.98	826.31	826.14	826.59	0.008089	4.25	1269.75	1491.8	0.72
YellwMedWsh	Reach 3	6.165	PF 1	5104	828.45	830.33	830.23	830.62	0.010322	5.2	1310.56	1476.92	0.83
YellwMedWsh	Reach 3	6.317	PF 1	5104	834.13	836.6	836.32	836.93	0.006426	4.92	1298.77	1336.52	0.69
YellwMedWsh	Reach 3	6.609	PF 1	5104	846.81	848.89	848.76	849.36	0.010518	5.51	946.27	803.48	0.85
YellwMedWsh	Reach 3	6.852	PF 1	5360	857.95	860.1	859.83	860.44	0.007221	4.74	1207.63	1361.98	0.71
YellwMedWsh	Reach 3	7.069	PF 1	5360	866.38	868.24	867.97	868.55	0.007026	4.49	1219.4	1038.64	0.69
YellwMedWsh	Reach 3	7.211	PF 1	5360	871.56	873.96	873.77	874.54	0.008852	6.12	920.78	808.24	0.82
YellwMedWsh	Reach 3	7.402	PF 1	5360	878.43	881.84		882.29	0.006759	5.44	1022.49	646.25	0.72
YellwMedWsh	Reach 3	7.591	PF 1	5360	887.51	890.67	890.67	891.63	0.01245	7.89	689.55	395.09	0.99
YellwMedWsh	Reach 3	7.781	PF 1	5587	896.76	900.68	900.42	901.05	0.00725	5.01	1202.31	947.12	0.72
YellwMedWsh	Reach 3	8.138	PF 1	5587	910.03	912.37	911.93	912.74	0.005381	4.88	1182.81	740.5	0.64
YellwMedWsh	Reach 3	8.348	PF 1	5587	918.87	921.11	921.03	921.54	0.02066	5.97	1092.72	1169.95	1.12
YellwMedWsh	Reach 3	8.541	PF 1	5587	928.01	931.31	930.92	931.63	0.005798	4.57	1228.46	826.23	0.65
YellwMedWsh	Reach 3	8.973	PF 1	4948	946.46	949.92	949.92	950.83	0.008529	7.86	758.21	635.43	0.86
YellwMedWsh	Reach 3	9.096	PF 1	4948	949.98	952.88		953.11	0.001806	3.84	1354.95	529.91	0.4
YellwMedWsh	Reach 4	9.296	PF 1	4948	962.76	964.96	964.96	965.67	0.012646	6.86	762.6	578.21	0.96
YellwMedWsh	Reach 4	9.485	PF 1	4948	974.44	978.82	978.82	979.75	0.006784	8.06	762.55	481.5	0.79
YellwMedWsh	Reach 4	9.833	PF 1	4308	990.76	993.85	993.72	994.77	0.010388	7.68	564.33	272.43	0.92
YellwMedWsh	Reach 4	10.118	PF 1	4308	1008.56	1012.52	1012.52	1013.72	0.010312	8.92	517.04	241.96	0.95
YellwMedWsh	Reach 4	10.243	PF 1	4308	1010.89	1016.25		1016.68	0.002386	5.26	828.75	246.59	0.48
YellwMedWsh	Reach 4	10.801	PF 1	3669	1041.62	1045	1045	1046.12	0.012166	8.49	432.01	193.03	1
YellwMedWsh	Reach 4	10.991	PF 1	3669	1053.53	1056.95	1056.87	1057.77	0.010945	7.24	514.14	317.11	0.92
YellwMedWsh	Reach 4	11.381	PF 1	3669	1082.83	1087.16	1087.16	1088.65	0.009307	9.98	395.44	141.22	0.94
YellwMedWsh	Reach 4	11.566	PF 1	3669	1100.38	1105.14	1105.14	1106.85	0.009895	10.57	357.7	111.35	0.98
YellwMedWsh	Reach 4	11.978	PF 1	3029	1129.49	1133.28	1133.28	1134.66	0.010086	9.55	337.73	133.69	0.96
YellwMedWsh	Reach 4	12.324	PF 1	3029	1155.71	1160.53	1160.53	1161.91	0.011403	9.43	321.08	116.37	1
YellwMedWsh	Reach 4	12.516	PF 1	3029	1168.25	1172.34	1172.34	1173.74	0.011348	9.47	319.92	114.92	1
YellwMedWsh	Reach 4	12.837	PF 1	2390	1192.93	1196.63	1196.63	1197.86	0.012134	8.87	269.38	112.25	1.01
YellwMedWsh	Reach 4	13.002	PF 1	2390	1211.08	1215.11	1215.11	1216.43	0.01154	9.25	258.75	99.39	1
YellwMedWsh	Reach 4	13.106	PF 1	2390	1215.16	1220.48	1219.98	1221.38	0.00705	7.61	314.11	109.46	0.79
YellwMedWsh	Reach 4	13.194	PF 1	2390	1218.31	1222.74		1223.1	0.002165	4.89	530.47	179.56	0.46
YellwMedWsh	Reach 4	13.262	PF 1	2390	1228.64	1232.12	1232.12	1233.32	0.010887	8.81	278.88	125.14	0.97
YellwMedWsh	Reach 4	13.346	PF 1	2390	1236.47	1239.48	1239.48	1240.53	0.012721	8.2	291.41	141.81	1.01
YellwMedWsh	Reach 4	13.391	PF 1	2390	1241.88	1247.02	1247.02	1248.54	0.010116	9.96	249.19	89.89	0.97
YellwMedWsh	Reach 4	13.431	PF 1	2390	1249.5	1254.36	1254.36	1255.76	0.010668	9.53	255.59	96.22	0.98
YellwMedWsh	Reach 4	13.479	PF 1	2390	1250.7	1256.47		1257.23	0.003469	7.08	351.77	94.96	0.59
YellwMedWsh	Reach 4	13.527	PF 1	2390	1254.31	1258.73	1258.73	1260.24	0.010928	9.86	243.59	84.41	0.99
YellwMedWsh	Reach 4	13.576	PF 1	2390	1260.23	1264.71	1264.71	1266.23	0.009669	10	253.31	91.11	0.95
YellwMedWsh	Reach 4	13.633	PF 1	2390	1262.15	1267.3		1268.22	0.004485	7.84	329.72	99.63	0.67
YellwMedWsh	Reach 4	13.676	PF 1	2390	1272.1	1276.93	1276.93	1278.51	0.009475	10.37	251.72	87.29	0.96
YellwMedWshTb1	Reach 1	0.37	PF 1	2780	688.26	690.48		690.65	0.003511	4.31	974.47	712.67	0.53
YellwMedWshTb1	Reach 1	0.467	PF 1	2780	693.85	695.36	695.36	695.99	0.014793	6.39	434.98	344.95	1

Table E.1: HEC-RAS Summary Table (Continued)

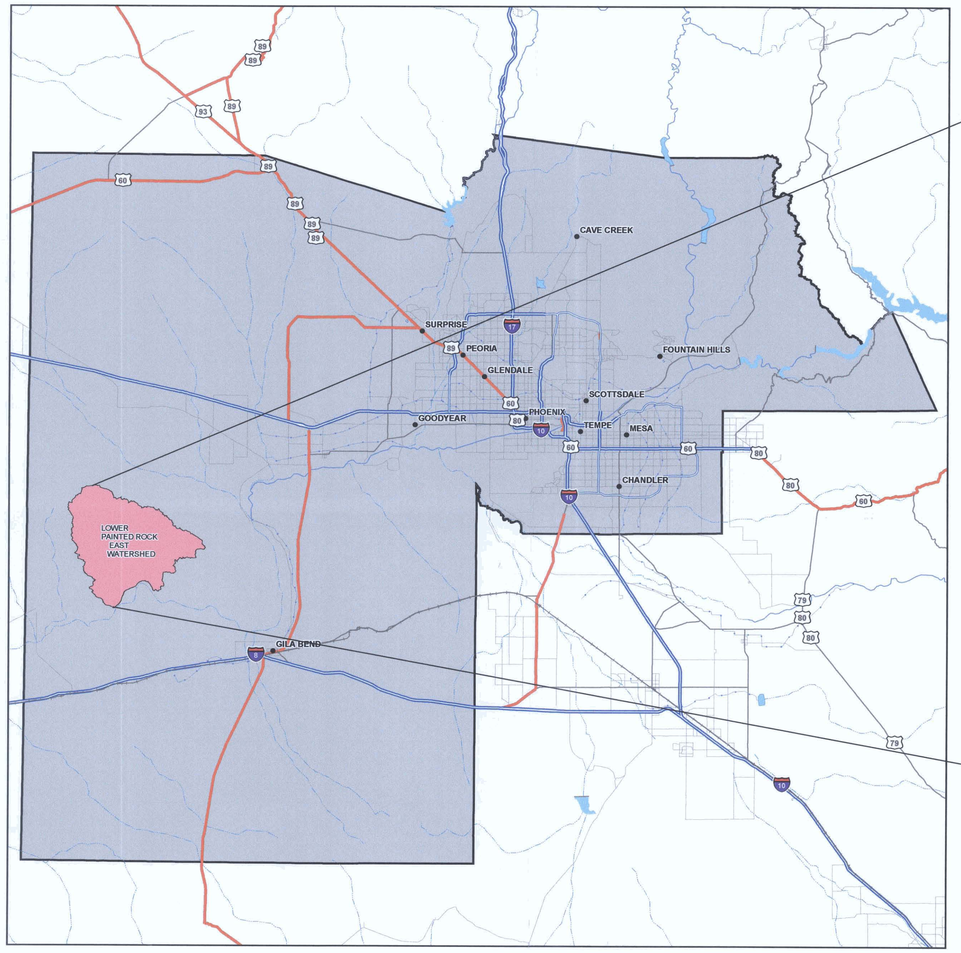
River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
YellwMedWshTb1	Reach 1	0.497	PF 1	2780	699.87	700.38	700.38	700.63	0.033602	5.27	699.29	1402.38	1.3
YellwMedWshTb1	Reach 1	0.56	PF 1	2780	699.87	701.63		701.67	0.001044	2.12	1807.87	1091.19	0.28
YellwMedWshTb1	Reach 1	0.75	PF 1	2780	699.96	702.86		702.94	0.001656	3.7	1365.19	852.52	0.38
YellwMedWshTb1	Reach 1	0.94	PF 1	2780	707.44	709.89	709.89	710.54	0.009474	6.93	515.17	455.73	0.87
YellwMedWshTb1	Reach 1	1.318	PF 1	2780	719.18	722.18		722.54	0.004542	5.65	659.67	377.38	0.62
YellwMedWshTb1	Reach 1	1.511	PF 1	2386	727.45	728.55	728.46	728.87	0.015477	5.52	558.46	660.77	0.98
YellwMedWshTb1	Reach 1	1.657	PF 1	2386	730.62	732.8	732.07	732.96	0.002681	3.18	765.9	520.6	0.44
YellwMedWshTb1	Reach 1	1.884	PF 1	2386	739.23	741.26	741.26	741.84	0.013196	7.5	449.99	387.06	1
YellwMedWshTb1	Reach 1	2.075	PF 1	2386	746.19	749.39	749.12	749.86	0.005329	6.66	534.47	331	0.69
YellwMedWshTb1	Reach 1	2.262	PF 1	2386	750	753.2		753.38	0.002521	4.8	742.98	327.07	0.48
YellwMedWshTb1	Reach 1	2.455	PF 1	2388	758.45	760.41	760.41	760.86	0.010804	7.2	582.9	599.07	0.92
YellwMedWshTb1	Reach 1	2.639	PF 1	1992	766.62	768.96	768.64	769.34	0.00693	4.92	410.26	308.79	0.71
YellwMedWshTb1	Reach 1	2.844	PF 1	1992	776.08	777.63	777.46	778.08	0.009516	5.39	371.36	284.27	0.81
YellwMedWshTb1	Reach 1	3.016	PF 1	1992	780	781.63	780.96	781.74	0.002168	2.56	778.04	576.55	0.39
YellwMedWshTb1	Reach 1	3.21	PF 1	1992	789.11	791.3	791.3	792.02	0.010716	7.16	335.8	263.09	0.91
YellwMedWshTb1	Reach 1	3.365	PF 1	1992	798.27	800.07	799.91	800.48	0.010105	5.13	391.43	351.87	0.82
YellwMedWshTb1	Reach 1	3.55	PF 1	1598	800.11	803.36	802.32	803.43	0.001212	2.15	744.86	465.02	0.3
YellwMedWshTb1	Reach 1	3.651	PF 1	1598	805.19	806.83	806.83	807.35	0.01618	5.76	277.54	275.34	1.01
YellwMedWshTb1	Reach 1	3.85	PF 1	1598	810.61	813.47	812.62	813.68	0.003096	3.75	426.2	235.13	0.49
YellwMedWshTb1	Reach 1	4.015	PF 1	1598	819.99	820.87	820.87	821.28	0.016546	5.17	315.9	397.18	0.99
YellwMedWshTb1	Reach 1	4.058	PF 1	1598	819.99	822.11		822.25	0.001846	3.12	566.49	335.57	0.38
YellwMedWshTb1	Reach 1	4.251	PF 1	1598	827.51	829.58	829.58	830.3	0.012688	6.87	245.11	189.44	0.96
YellwMedWshTb1	Reach 1	4.292	PF 1	1598	829.53	831.76		832.13	0.005859	5.02	344.55	249.15	0.67
YellwMedWshTb1	Reach 1	4.361	PF 1	1598	831.24	833.63		833.97	0.004627	4.97	379.73	258.06	0.61
YellwMedWshTb1	Reach 1	4.464	PF 1	1598	837.29	839.72	839.72	840.54	0.011632	7.51	237.12	160.4	0.95
YellwMedWshTb1	Reach 1	4.496	PF 1	1204	838.18	841.31		841.55	0.002818	3.95	320.85	189.29	0.48
YellwMedWshTb1	Reach 1	4.536	PF 1	1204	839.19	841.92		842.11	0.002437	3.53	360.97	223.21	0.44
YellwMedWshTb1	Reach 1	4.817	PF 1	1204	855.05	857.06	857.06	857.78	0.012114	6.94	187.8	144.17	0.95
YellwMedWshTb1	Reach 1	4.916	PF 1	1204	859.56	862.05	861.77	862.62	0.007186	6.12	212	131.75	0.76
YellwMedWshTb1	Reach 1	5.008	PF 1	1204	869.48	870.7	870.7	871.14	0.016644	5.33	226.72	266.67	1
YellwMedWshTb1	Reach 1	5.067	PF 1	1204	869.49	872.28		872.45	0.001841	3.44	388.94	212.17	0.39
YellwMedWshTb1	Reach 1	5.318	PF 1	1204	885.11	887	887	887.62	0.012038	6.55	208.82	185.67	0.93
YellwMedWshTb1	Reach 1	5.438	PF 1	1204	890.38	893.01	892.64	893.5	0.007385	5.62	214.34	122.36	0.75
YellwMedWshTb1	Reach 1	5.49	PF 1	1204	895.69	898.14	898.14	898.95	0.013826	7.24	166.27	103.79	1.01
YellwMedWshTb1	Reach 1	5.568	PF 1	1204	898.33	901.41	900.78	901.77	0.004018	4.9	265.2	153.26	0.58
YellwMedWshTb2	Reach 1	0.09	PF 1	1880	953.84	956.55	956.55	957.51	0.011582	7.97	250.3	142.97	0.97
YellwMedWshTb2	Reach 1	0.3	PF 1	1880	962.52	964.95	964.42	965.31	0.004646	4.92	410.21	250.27	0.61
YellwMedWshTb2	Reach 1	0.377	PF 1	1880	966.45	968.38	968.38	969.05	0.012164	6.72	310.72	258	0.94
YellwMedWshTb2	Reach 1	0.613	PF 1	1880	974.02	976.47	975.8	976.71	0.003682	3.96	481.14	292.3	0.53
YellwMedWshTb2	Reach 1	0.728	PF 1	1880	979.95	981.17	981.17	981.71	0.014705	5.95	325.87	315.68	0.98
YellwMedWshTb2	Reach 1	0.817	PF 1	1880	985.86	988.02	988.02	988.75	0.014104	6.85	275.74	199.91	1
YellwMedWshTb2	Reach 1	0.95	PF 1	1880	990	992.74	991.83	993.01	0.003675	5.25	500.71	238.5	0.57
YellwMedWshTb2	Reach 1	1.034	PF 1	1196	996.6	998.98	998.98	999.67	0.012203	6.72	190.61	160.74	0.94
YellwMedWshTb2	Reach 1	1.129	PF 1	1196	998.14	1000.61		1000.67	0.00074	2.1	653.72	357.28	0.25
YellwMedWshTb2	Reach 1	1.197	PF 1	1196	999.97	1001.12	1001.12	1001.58	0.021442	6.31	233.15	266.79	1.15
YellwMedWshTb2	Reach 1	1.401	PF 1	1196	1009.31	1011.14	1010.69	1011.41	0.004751	4.61	323.71	235.9	0.6
YellwMedWshTb2	Reach 1	1.471	PF 1	1196	1012.27	1014.71	1014.71	1015.52	0.01233	7.31	171.75	116.06	0.97
YellwMedWshTb2	Reach 1	1.598	PF 1	1196	1018.49	1020.87		1021.36	0.006453	5.8	231.57	151.14	0.72

Table E.1: HEC-RAS Summary Table (Continued)

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
YellwMedWshTb2	Reach 1	1.751	PF 1	1196	1026.25	1028.69	1028.69	1029.45	0.012962	7.12	177.17	125	0.98
YellwMedWshTb2	Reach 1	1.816	PF 1	1196	1028.11	1030.52		1030.64	0.001467	3.03	467.13	262.33	0.35
YellwMedWshTb2	Reach 1	1.926	PF 1	1196	1030.72	1033.78	1033.78	1034.77	0.011799	8.24	158.93	85.65	0.98

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

LOWER PAINTED ROCK WATERSHED
ZONE A FLOODPLAIN DELINEATION STUDY
EAST WATERSHED
FCD CONTRACT NO. 2004C065



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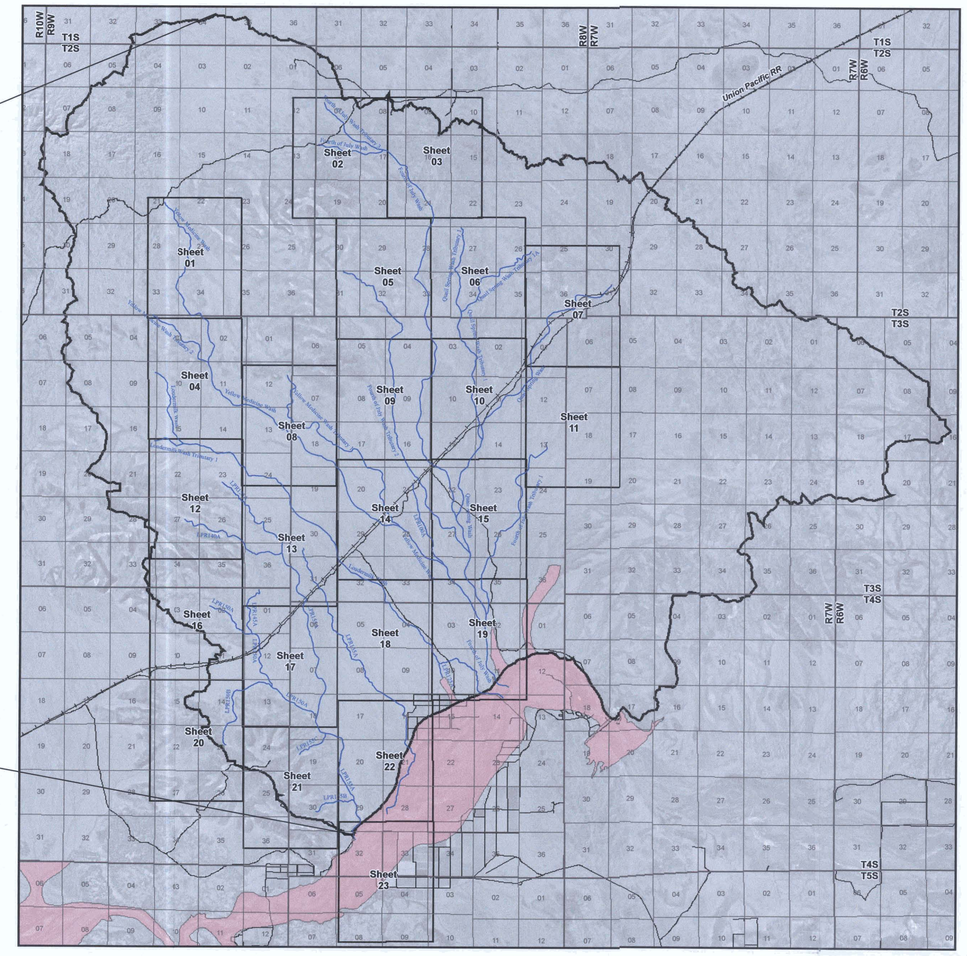

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Not to Scale

Legend

- Stream Centerline
- Railroad
- East Watershed Boundary
- Existing FEMA Zone A

HYDROLOGY & HYDRAULICS

KIMLEY-HORN AND ASSOCIATES, INC.
7878 NORTH 16TH STREET, SUITE 300
PHOENIX, ARIZONA 85020

STUDY AREA MAP AND SHEET INDEX

SHEET INDEX

SHEET 1-23 FLOOD DELINEATION STUDY

NOTES

1. SECTION BOUNDARIES PROVIDED BY FCDMC
2. HORIZONTAL PROJECTION IS ARIZONA STATE PLANE CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983
3. ALL ELEVATIONSARE BASED ON NORTH AMERICAN DATUM OF 1988

No.	REVISION	BY	DATE
2			
1			

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed
FCD Contract No. 2004C065

Kimley-Horn and Associates, Inc.

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 2-16-07 ARIZONA, U.S.A.

LAYOUT	DRAFTED	CHECKED
DRAWING SCALE(S)		
ORIGINAL PLAN DATE		SHEET NO.
LATEST REVISION		COVER
PROJECT NUMBER		OF 23 SHEETS

AERIAL MAPPING AND SURVEY - STEWART TECHNOLOGIES, INC. AERIAL PHOTOGRAPHY FLIGHT DATE; DECEMBER 2003 / JANUARY 2004

TOPOGRAPHIC DATA PROVIDED BY THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY BY STEWART TECHNOLOGIES, INC. DATE; 2000 AND 2001

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

- Roads
- Railroad (U.P.RR- Union Pacific Railroad)
- Cross Section
- Flood Zone — ZONE "A"
- Cross Section Number — 1.031 / 9362
- Wash Name — *Yellow Medicine Wash*
- Stream Centerline
- Flood Hazard Boundary
- Gila River Baseline
- GDAC Point/Number — 3PF3

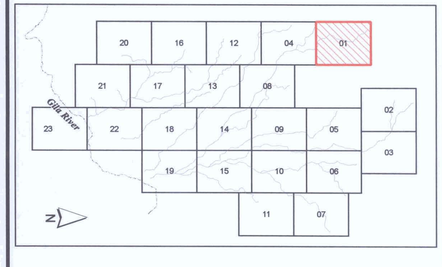
ELEVATION REFERENCE MARKS

NOTES

NOTE: ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.

GDAC NUMBER	ELEVATION (FT)
3PF3 (see Sheet 10)	715.21
3DP3 (see Sheet 03)	1200.29
3EO3 (see Sheet 07)	968.61
3EQ3 (see Sheet 04)	1012.54
3GQ3 (see Sheet 17)	675.25
3HP3 (see Sheet 22)	557.53
3HR3 (see Sheet 16)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

N

Registered Professional Engineer (Civil)
CERTIFICATE NO. 34141
JON T. AHERN
Date Signed 2/16/07
ARIZONA, U.S.A.

Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	01/31/07
DESIGN CHK.	JTA	01/31/07
PLANS	ERS	01/31/07
PLANS CHK.	JTA	01/31/07

Sheet 01 of 23

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

- Roads
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ELEVATION REFERENCE MARKS

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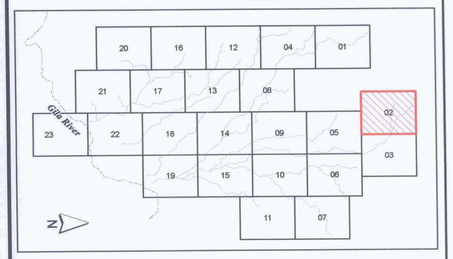
SHEET INDEX MAP



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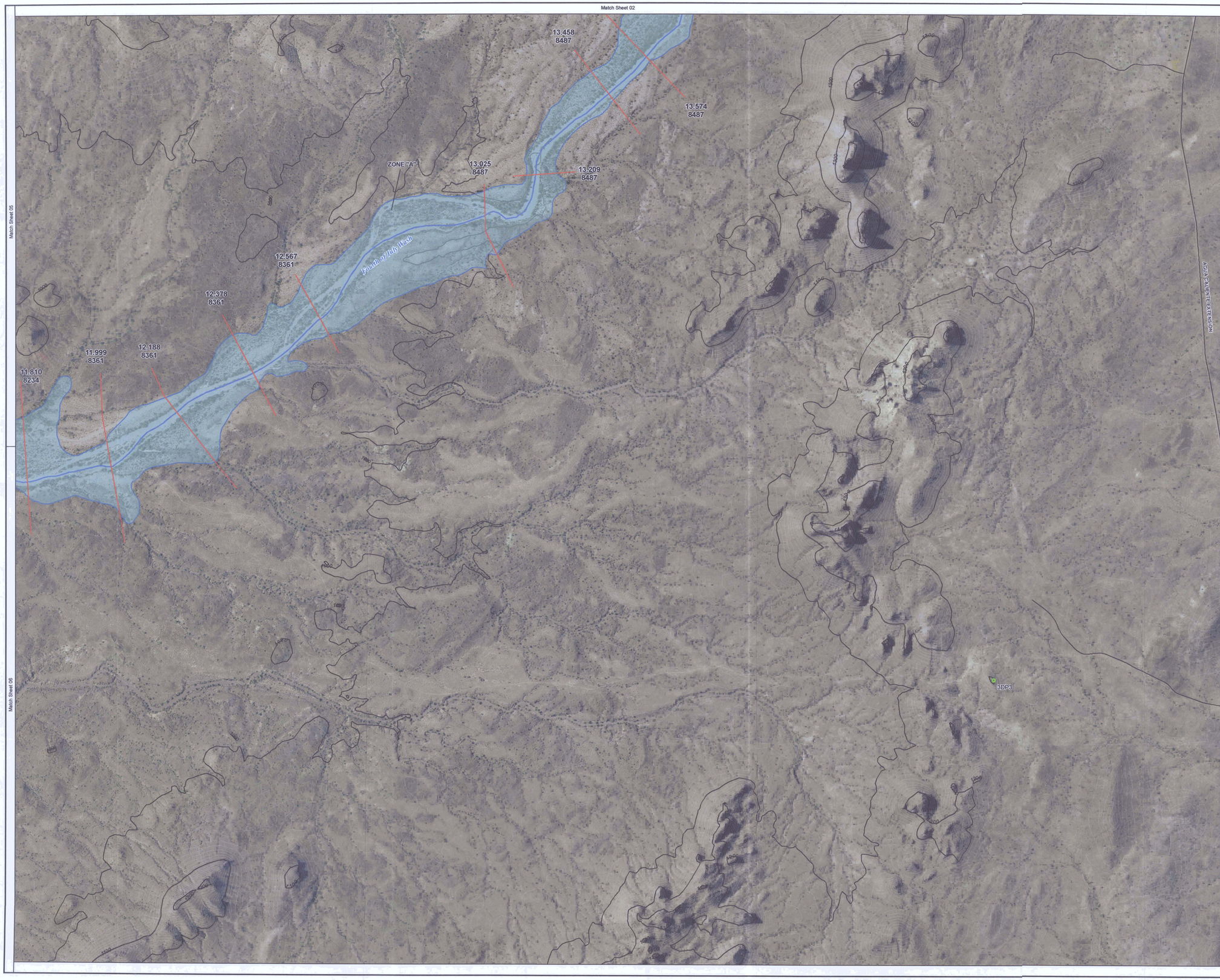
DESIGN CHK.	JTA	01/31/07
PLANS	ERS	01/31/07
PLANS CHK.	JTA	01/31/07

Sheet 02 of 23



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Cross Section	
Flood Zone	ZONE "A"
Cross Section Number	1.031 9362
Wash Name	*Yellow Medicine Wash*
Stream Centerline	
Flood Hazard Boundary	
Gila River Baseline	
GDAC Point/Number	3PF3

ELEVATION REFERENCE MARKS

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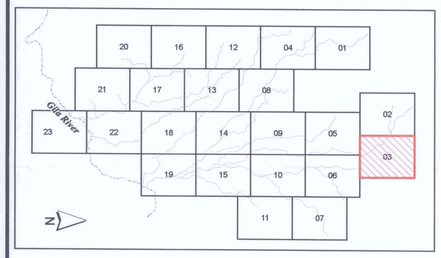
SHEET INDEX MAP



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Registered Professional Engineer (Civil)
CERTIFICATE NO. 34141
JON T. AHERN
Date Signed 2 NOV 07
ARIZONA, U.S.A.

Kimley-Horn and Associates, Inc.

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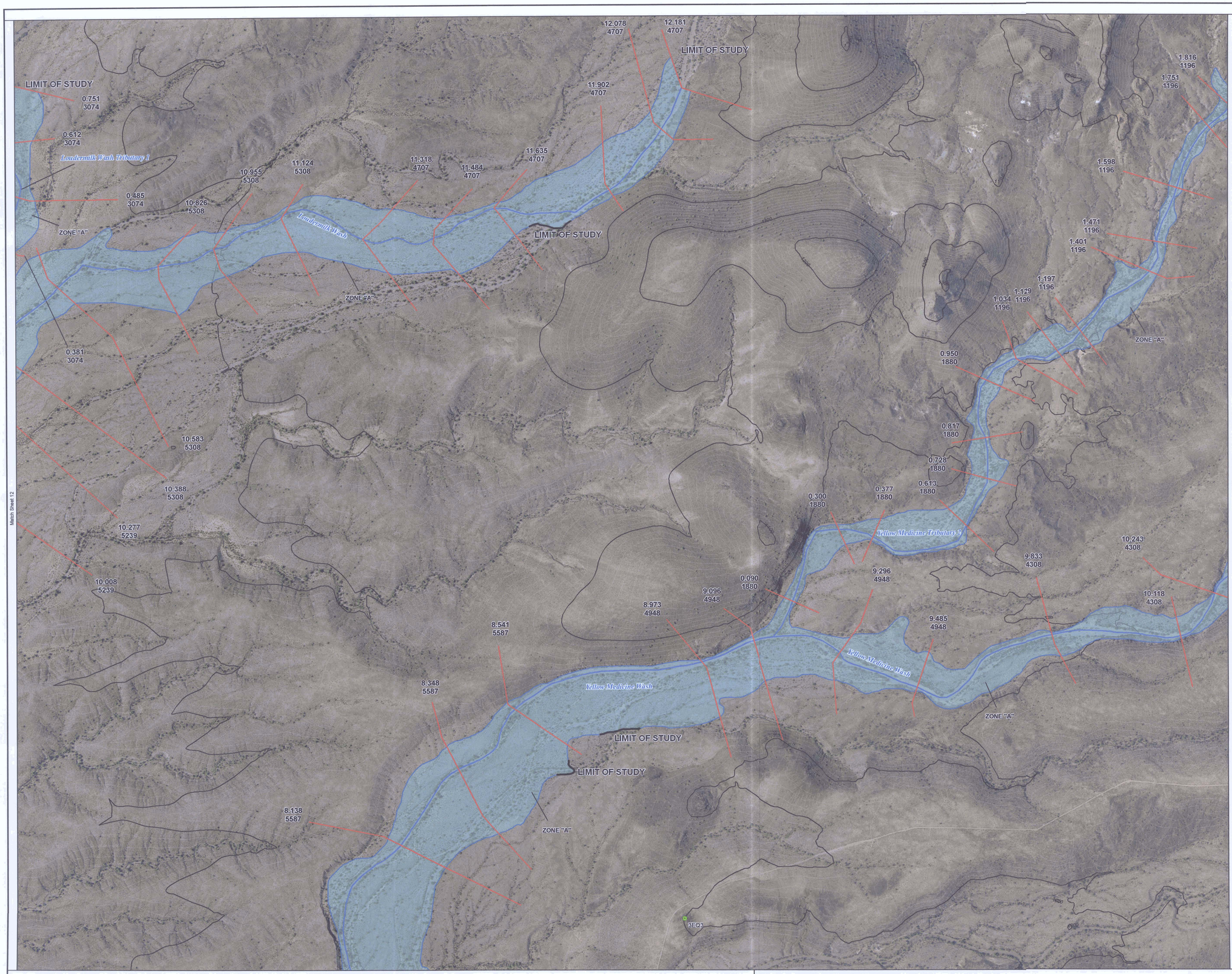
DESIGN	NRE	01/31/07
DESIGN CHK.	JTA	01/31/07
PLANS	ERS	01/31/07
PLANS CHK.	JTA	01/31/07

Sheet 03 of 23



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

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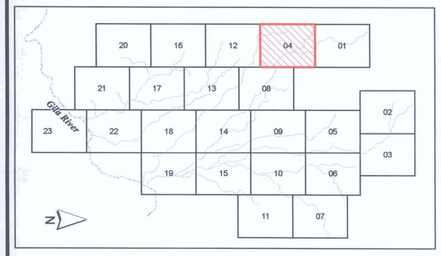
SHEET INDEX MAP



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Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	01/31/07
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PLANS	ERS	01/31/07
PLANS CHK.	JTA	01/31/07

Sheet 04 of 23

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

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NOTES

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GDAC NUMBER	ELEVATION (FT)
3PF3 (see Sheet 10)	715.21
3DP3 (see Sheet 03)	1200.29
3EO3 (see Sheet 07)	968.61
3EQ3 (see Sheet 04)	1012.54
3GQ3 (see Sheet 17)	675.25
3HP3 (see Sheet 22)	557.53
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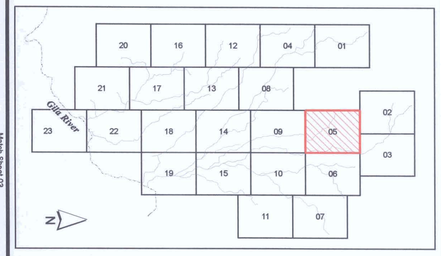
SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

N

Registered Professional Engineer (Civil)
CERTIFICATE NO.
34141
JON T.
AHERN
Date Signed 2/16/07
ARIZONA, U.S.A.

Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	01/31/07
DESIGN CHK.	JTA	01/31/07
PLANS	ERS	01/31/07
PLANS CHK.	JTA	01/31/07

Sheet 05 of 23

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

- Roads
- Railroad (U.P.RR- Union Pacific Railroad)
- Cross Section
- Flood Zone — ZONE "A"
- Cross Section Number — 1.031 / 9362
- Wash Name — *Yellow Medicine Wash*
- Stream Centerline
- Flood Hazard Boundary
- Gila River Baseline
- GDAC Point/Number — 3PF3

ELEVATION REFERENCE MARKS

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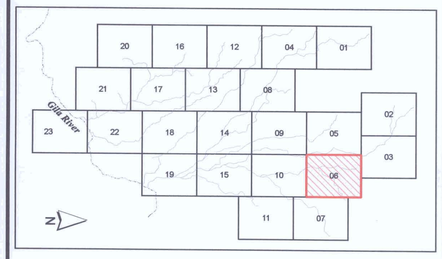

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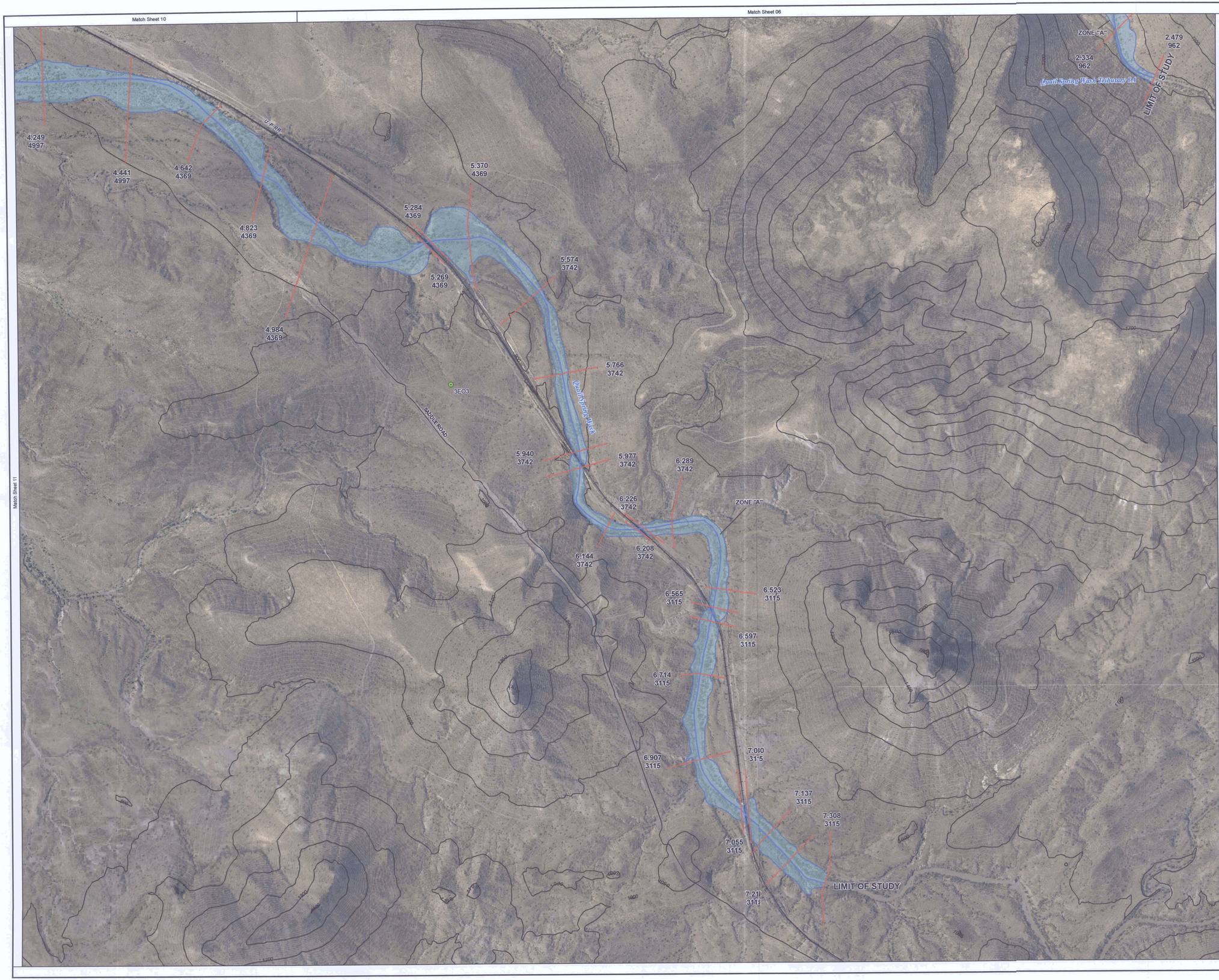
Sheet 06 of 23



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

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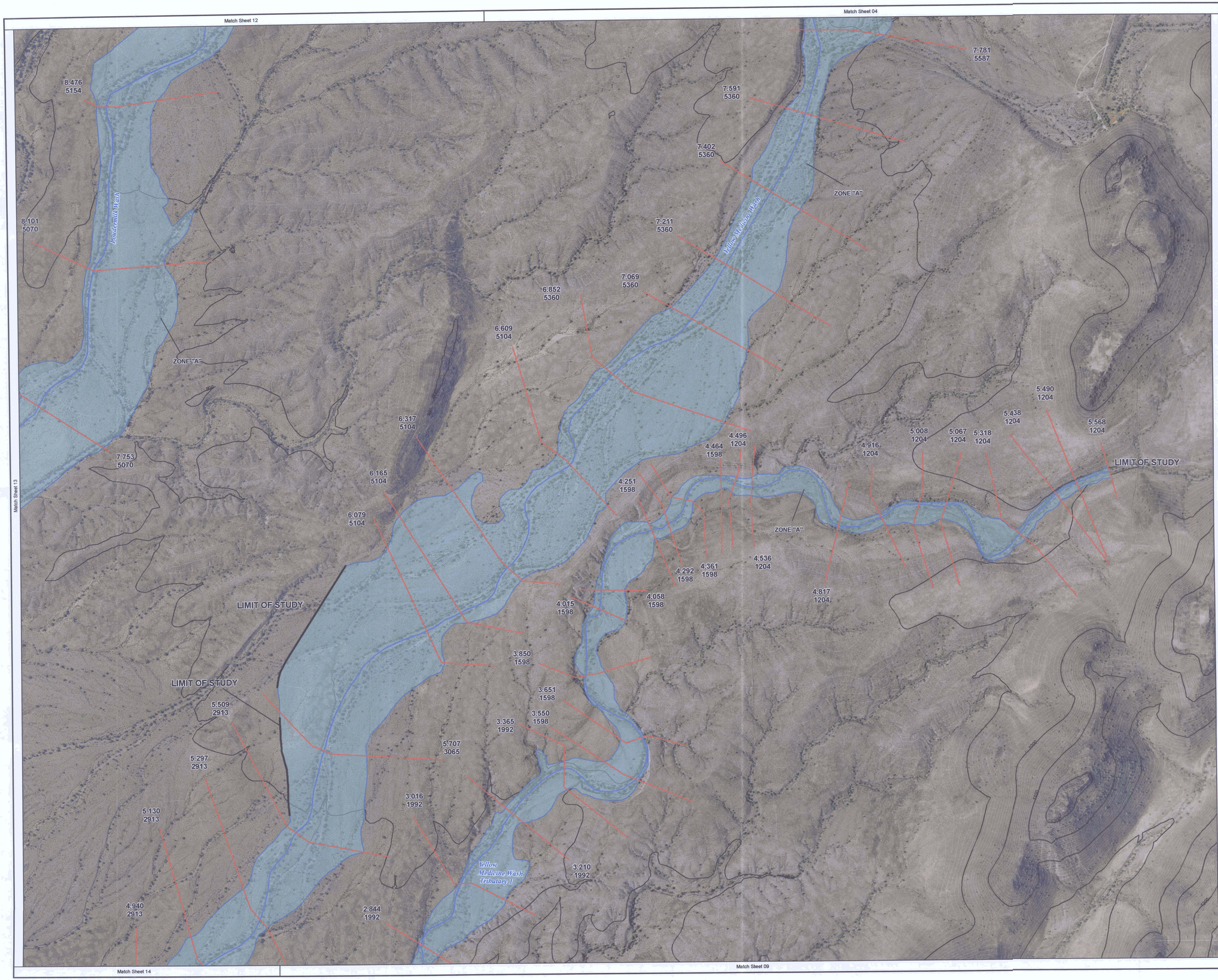
Sheet 07 of 23



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

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ELEVATION REFERENCE MARKS

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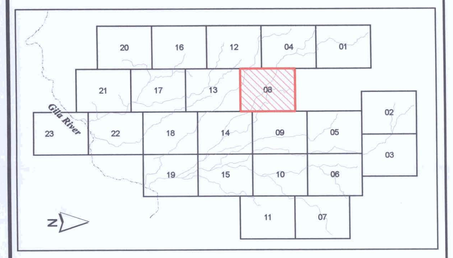

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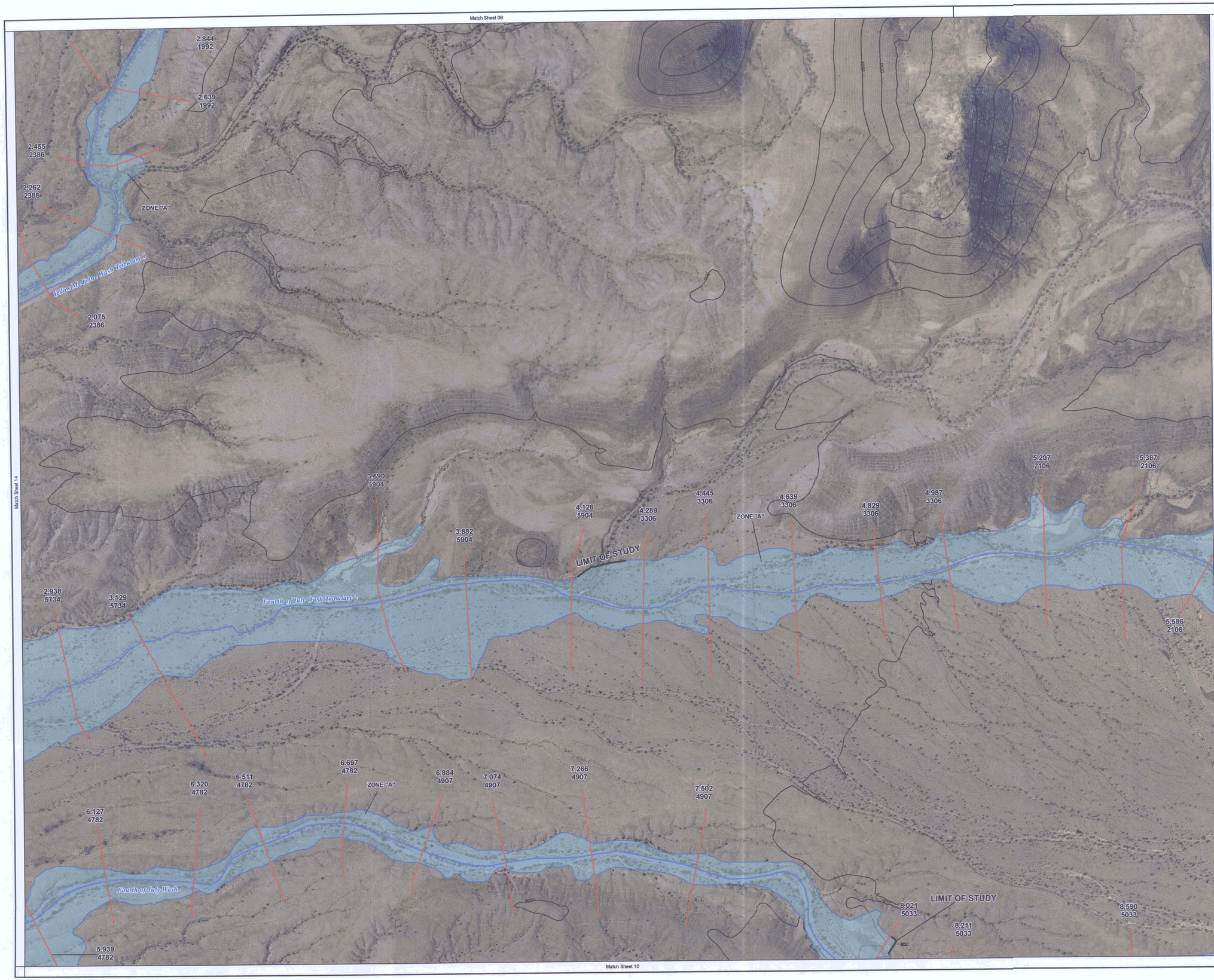

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

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ELEVATION REFERENCE MARKS

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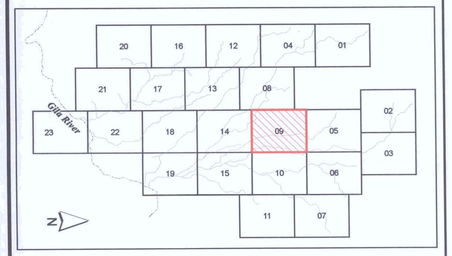

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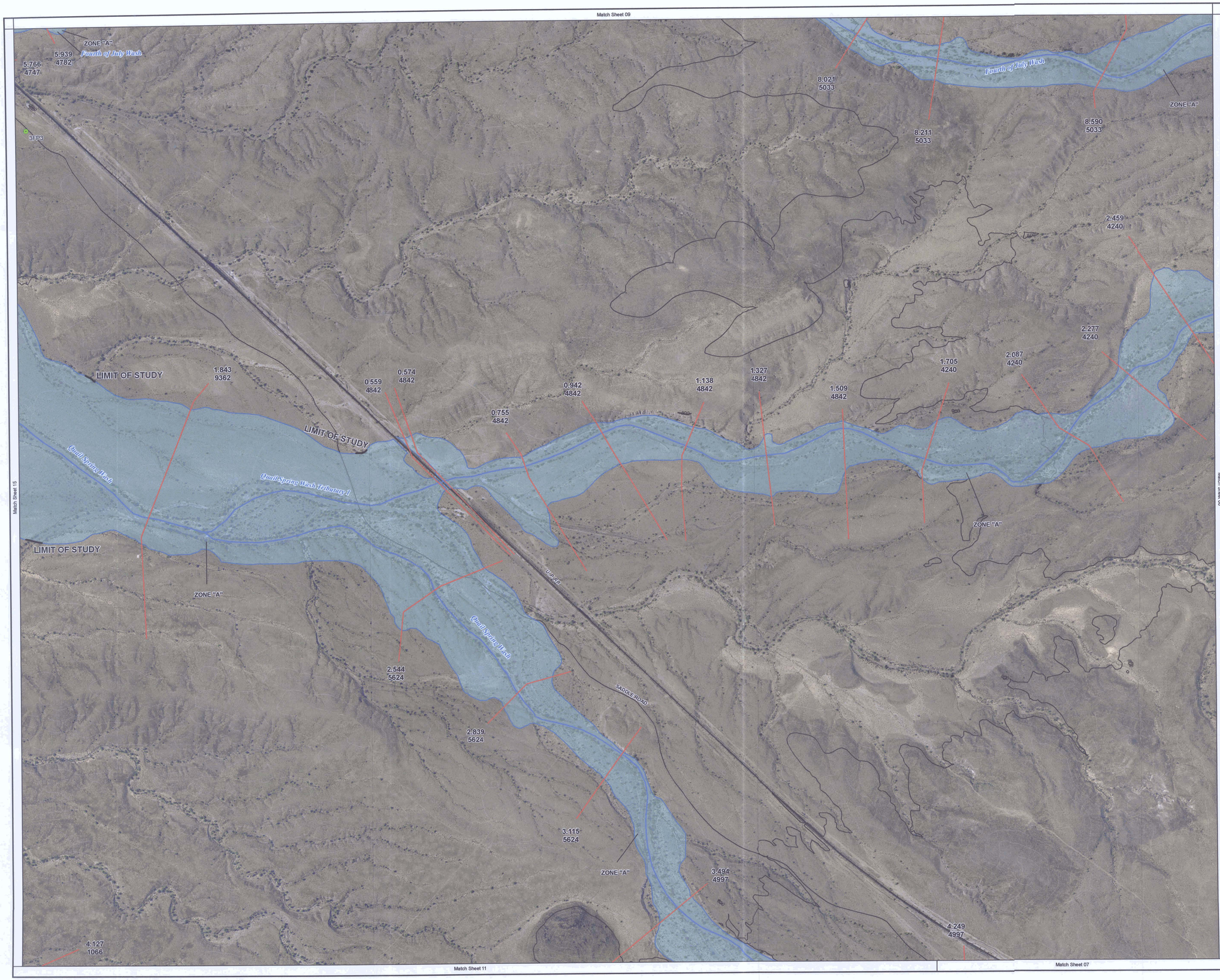
Sheet 09 of 23



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

- Roads
- Railroad (U.P.RR- Union Pacific Railroad)
- Cross Section
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ELEVATION REFERENCE MARKS

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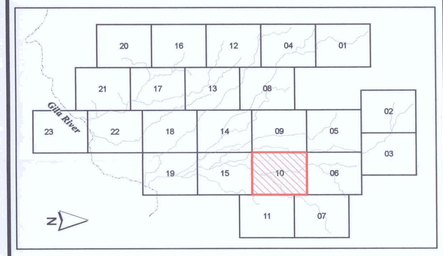

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Sheet 10 of 23

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

- Roads
- Railroad (U.P.RR- Union Pacific Railroad)
- Cross Section
- Flood Zone — ZONE "A"
- Cross Section Number — 1.031 9362
- Wash Name — *Yellow Medicine Wash*
- Stream Centerline
- Flood Hazard Boundary
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ELEVATION REFERENCE MARKS

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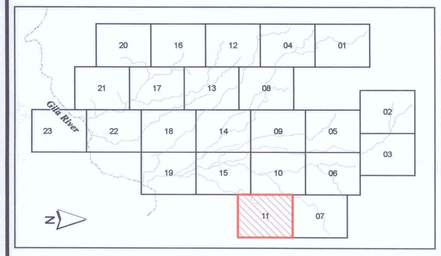

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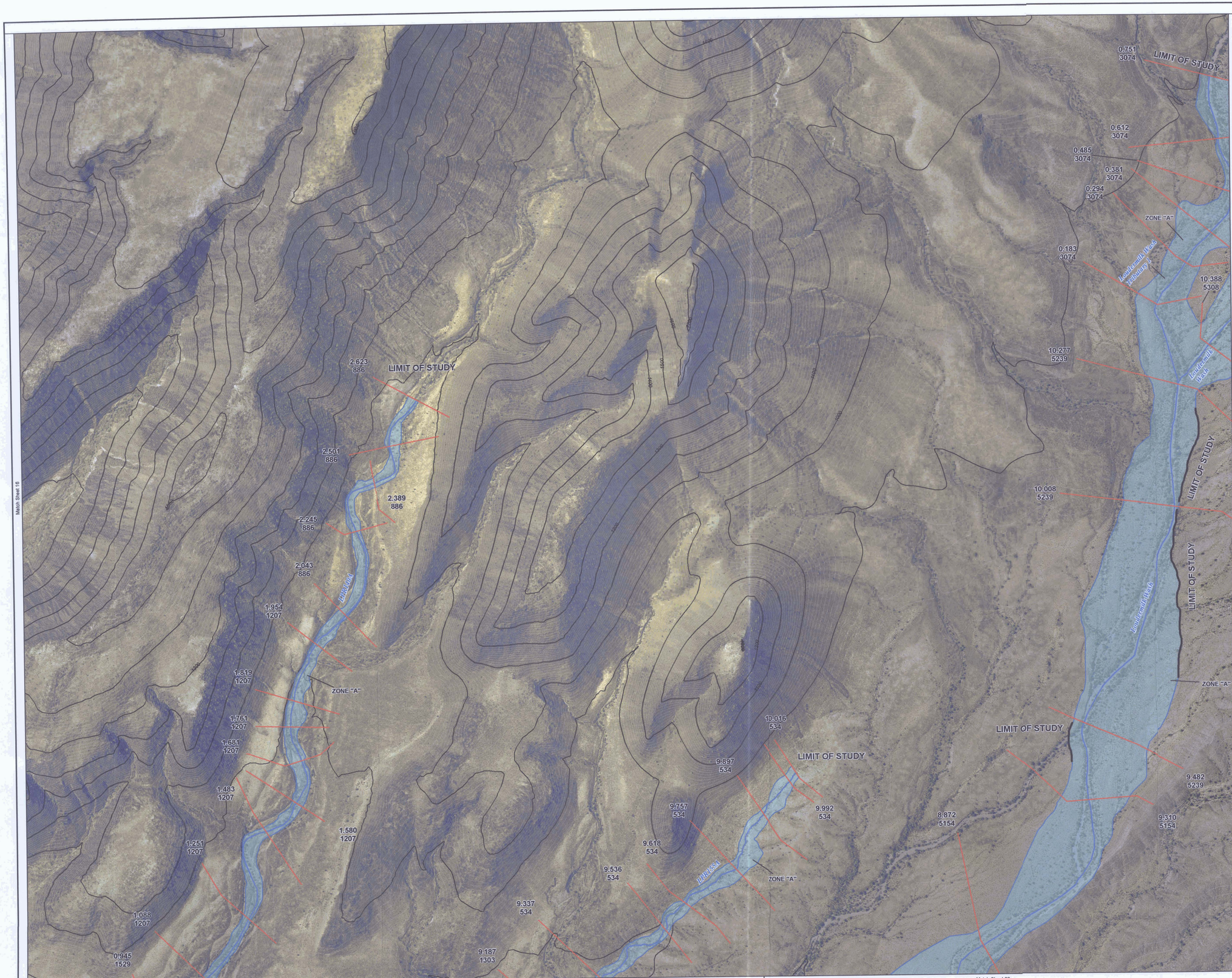

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

- Roads
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- Cross Section
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- Wash Name — *Yellow Medicine Wash*
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ELEVATION REFERENCE MARKS

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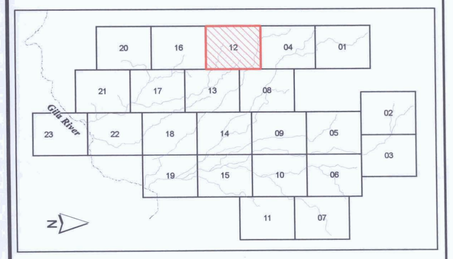

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Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	01/31/07
DESIGN CHK.	JTA	01/31/07
PLANS	ERS	01/31/07
PLANS CHK.	JTA	01/31/07

Sheet 12 of 23

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

- Roads
- Railroad (U.P.RR- Union Pacific Railroad)
- Cross Section
- Flood Zone — ZONE "A"
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ELEVATION REFERENCE MARKS

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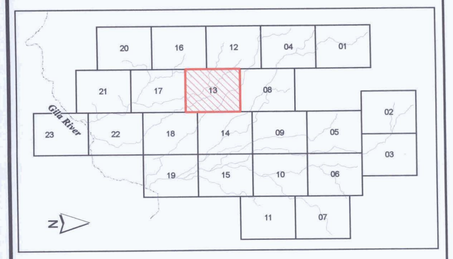

Contour Interval = 10 feet

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N

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	BY	DATE
DESIGN	NRE	01/31/07
DESIGN CHK.	JTA	01/31/07
PLANS	ERS	01/31/07
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Sheet 13 of 23

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

- Roads
- Railroad (U.P.RR- Union Pacific Railroad)
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ELEVATION REFERENCE MARKS

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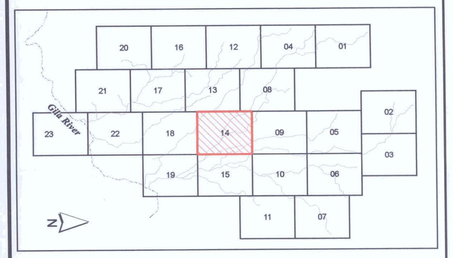

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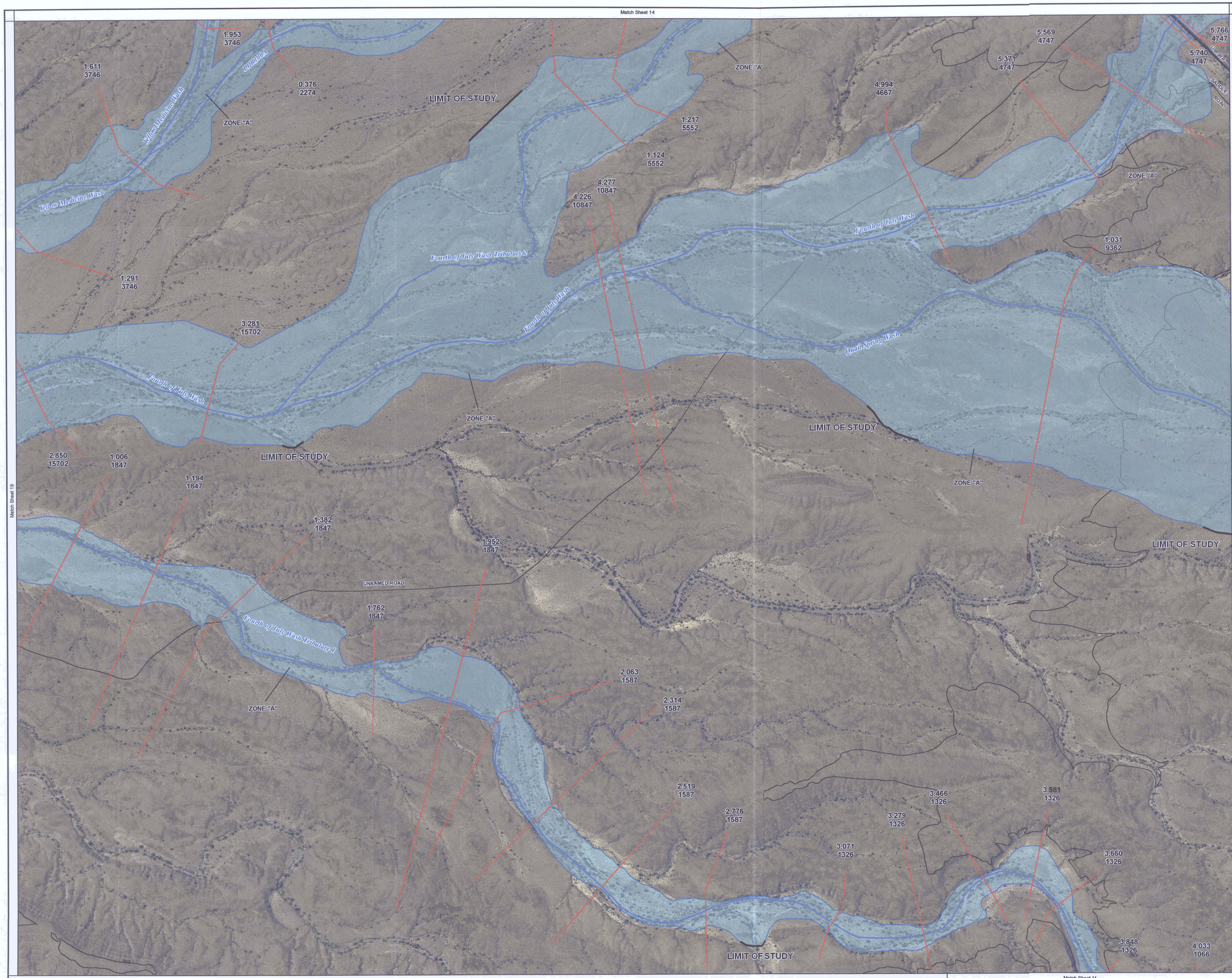
Sheet 14 of 23



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

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ELEVATION REFERENCE MARKS

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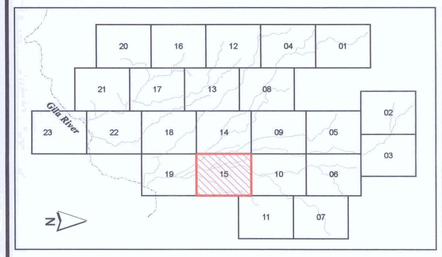

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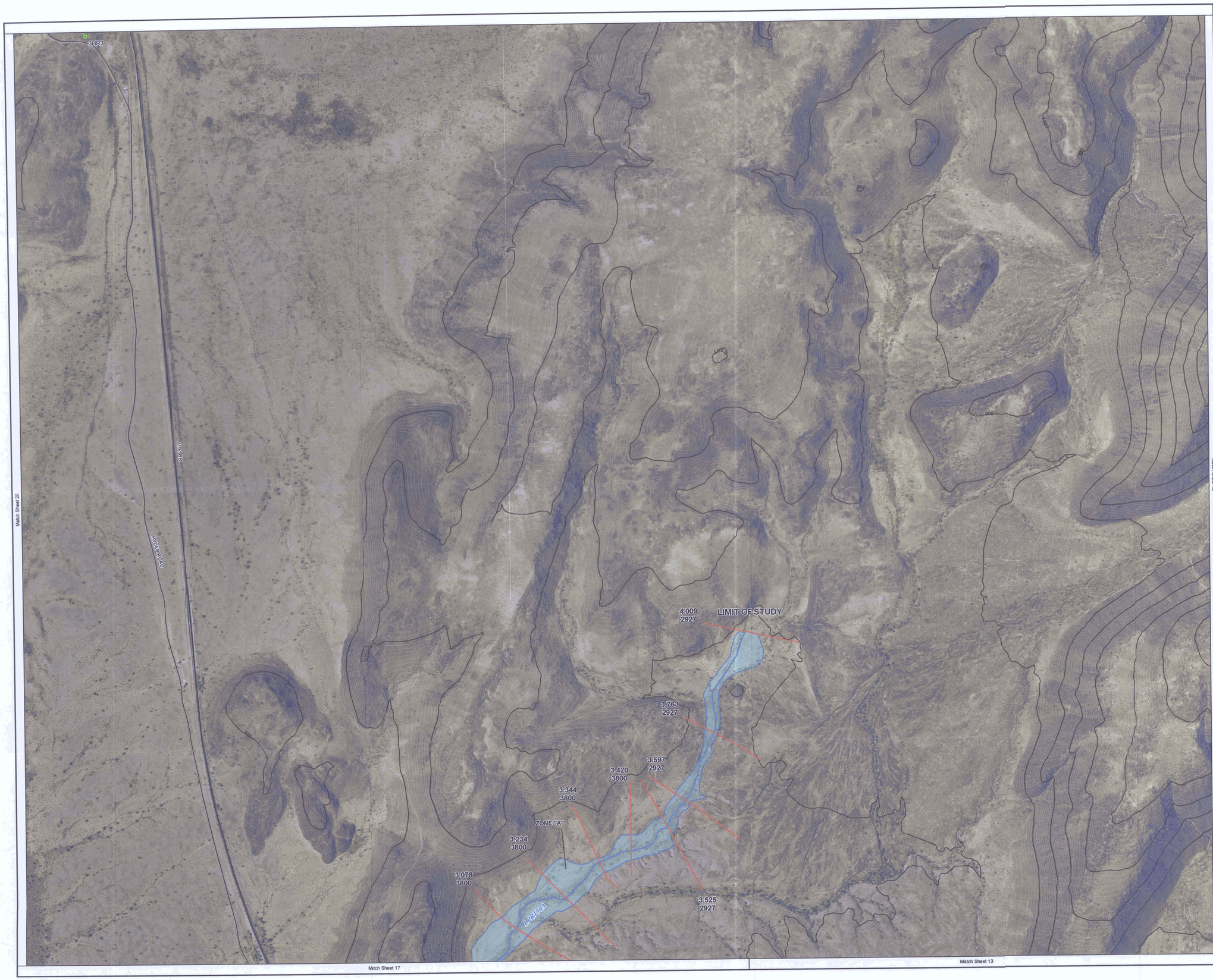

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
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F.C.D. Contract No. 2004C065

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ELEVATION REFERENCE MARKS

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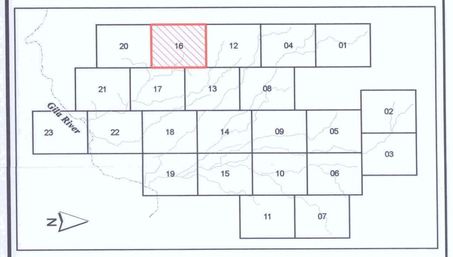

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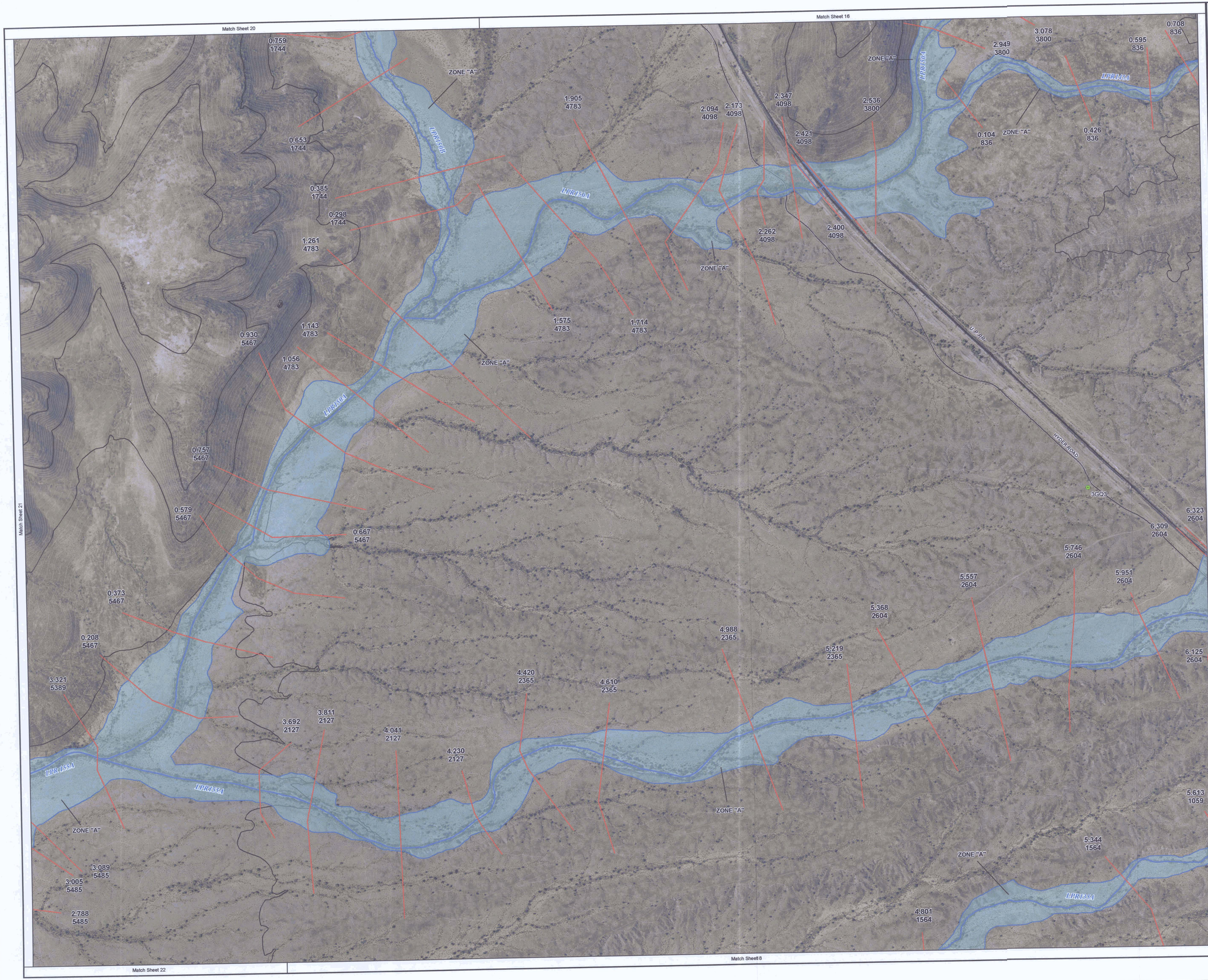

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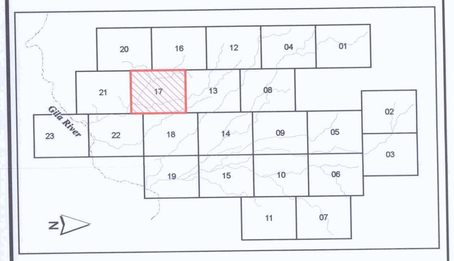

Contour Interval = 10 feet

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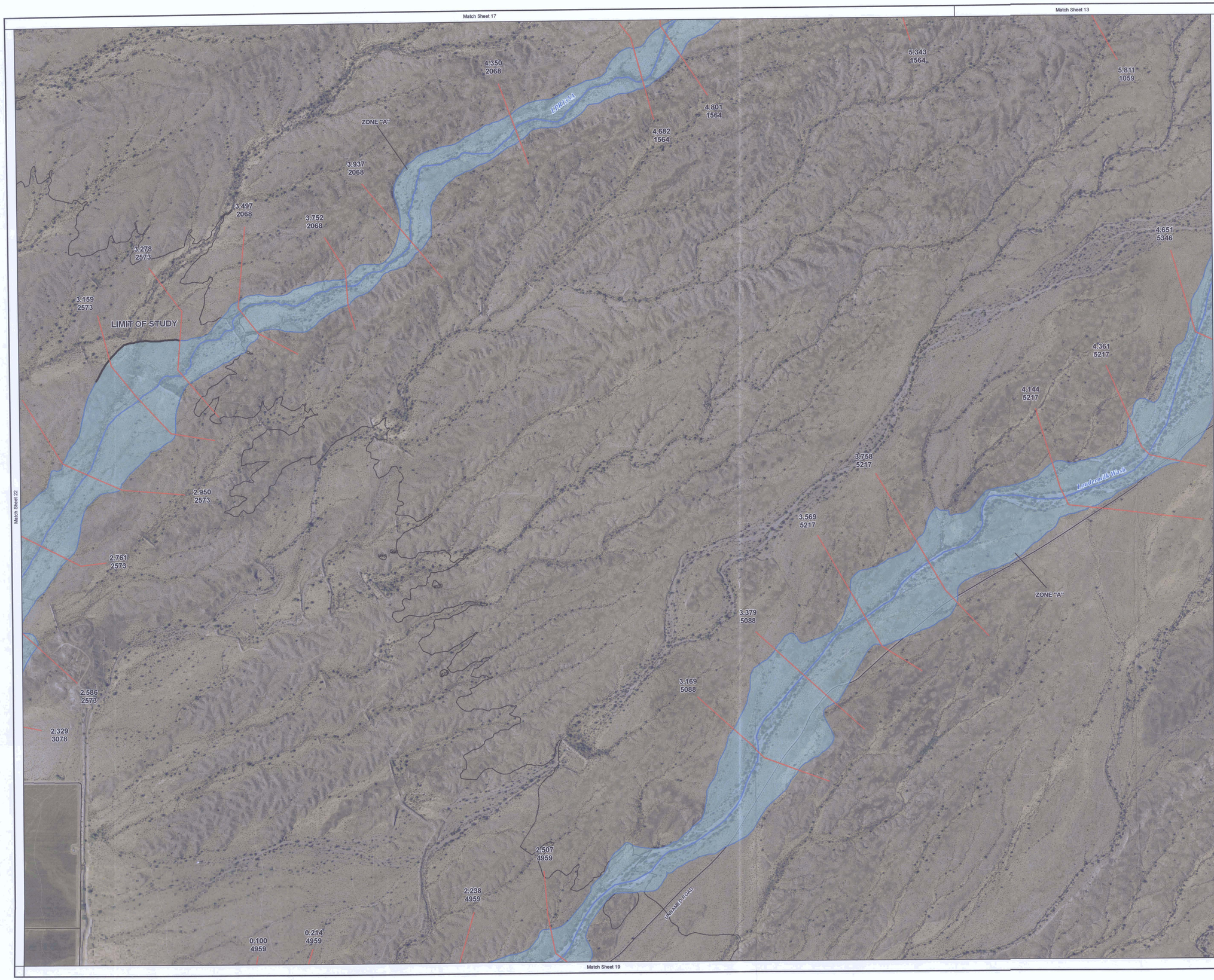

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
East Watershed

F.C.D. Contract No. 2004C065

Legend

- Roads
- Railroad (U.P.RR- Union Pacific Railroad)
- Cross Section
- Flood Zone — ZONE "A"
- Cross Section Number — 1.031 / 9362
- Wash Name — *Yellow Medicine Wash*
- Stream Centerline
- Flood Hazard Boundary
- Gila River Baseline
- GDAC Point/Number — 3PF3

ELEVATION REFERENCE MARKS

NOTES

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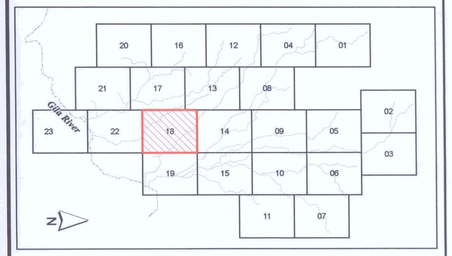

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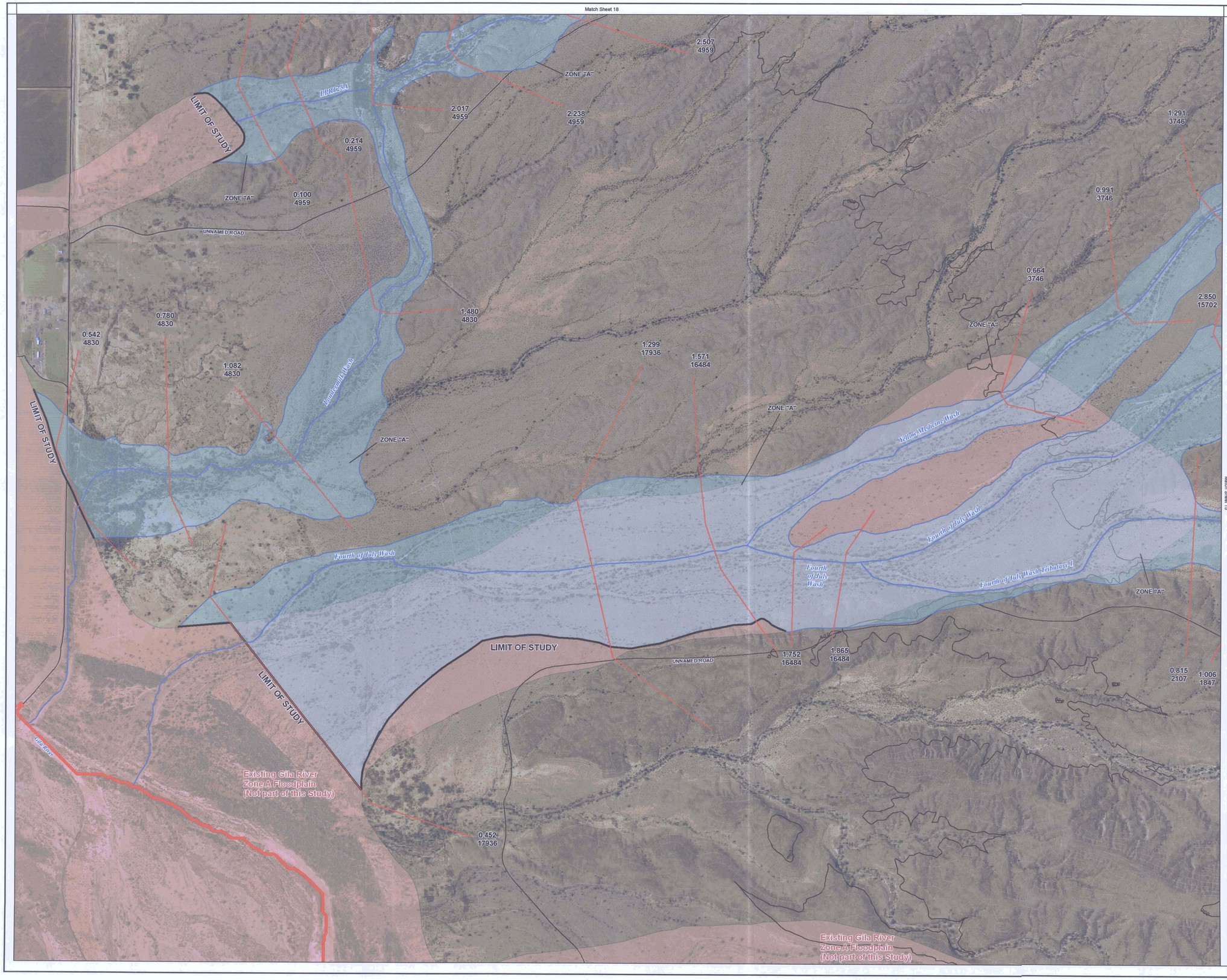

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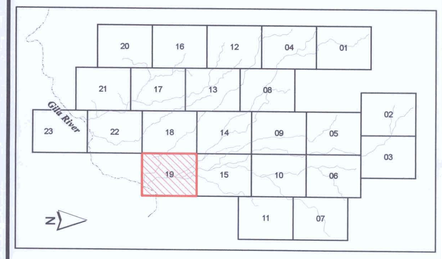

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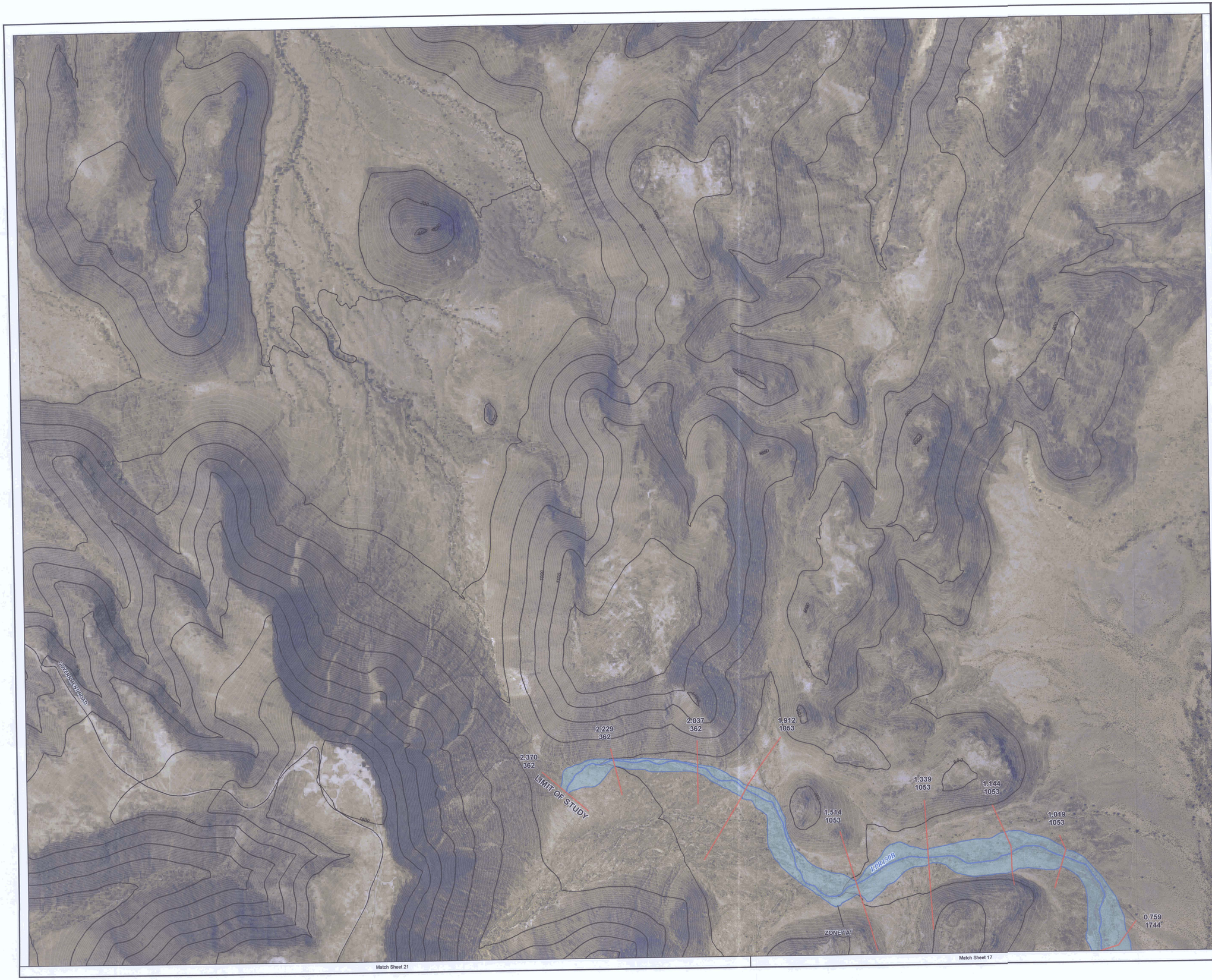

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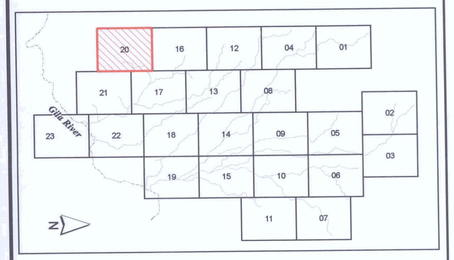

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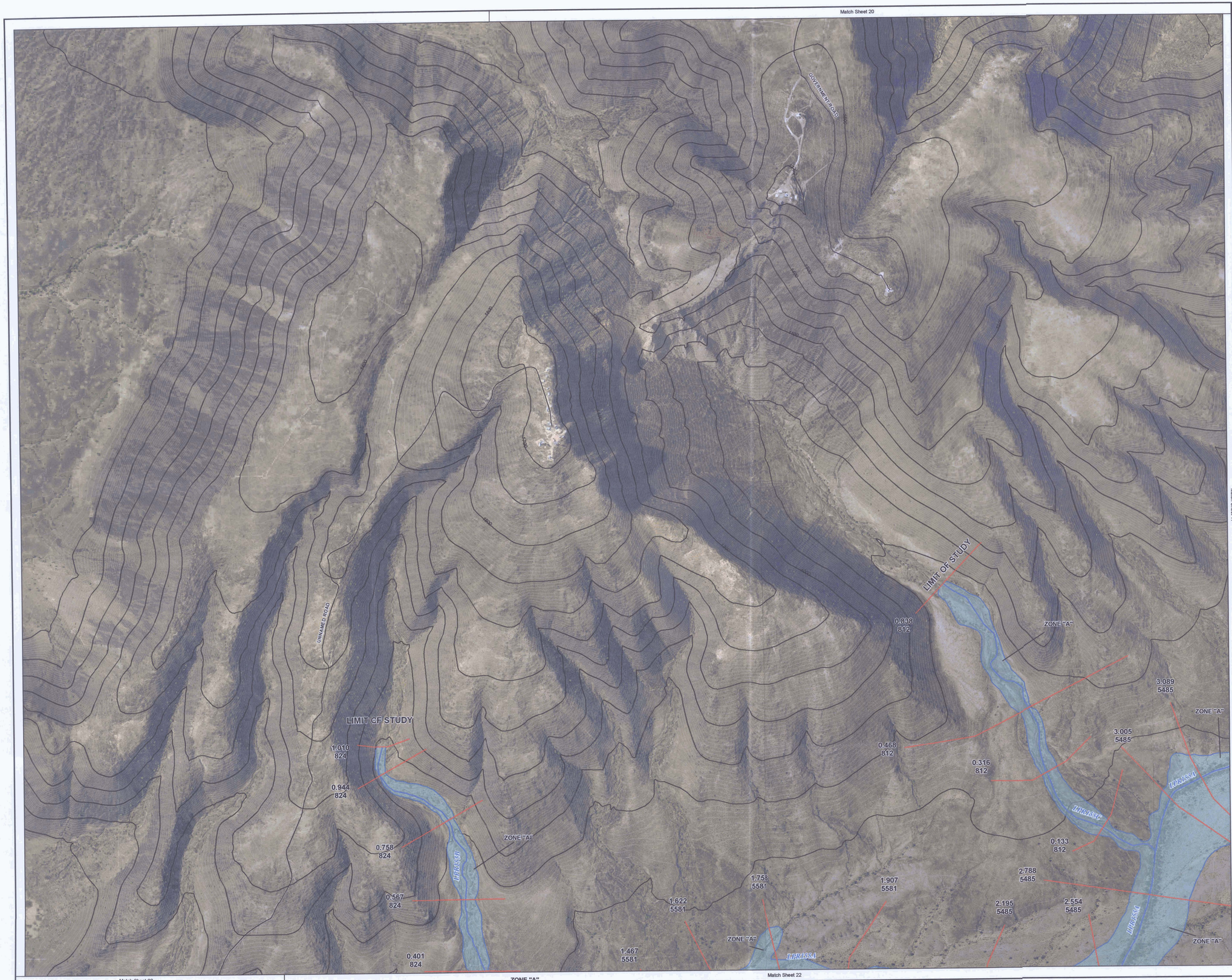

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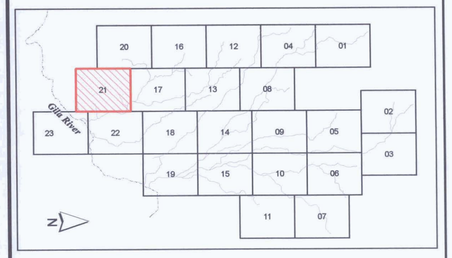

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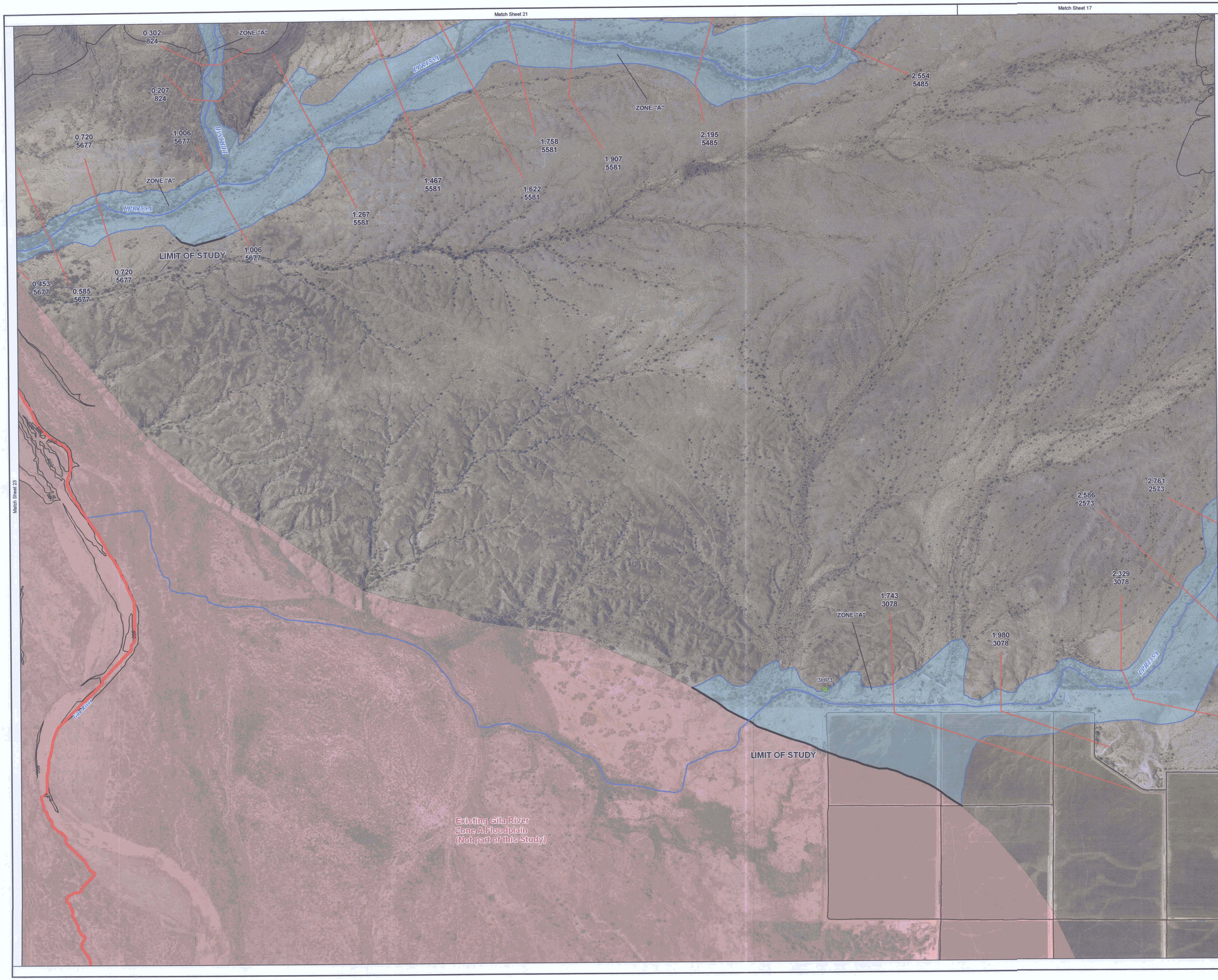

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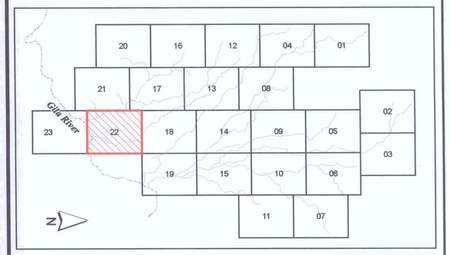

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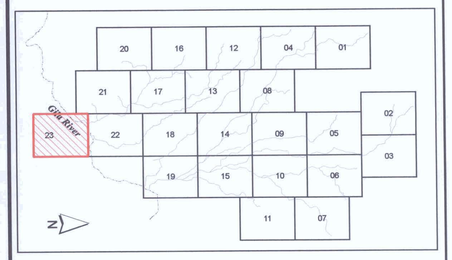

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