VOLUME 2 of 2

Technical Data Notebook for Lower Painted Rock Watershed Zone A

Floodplain Delineation Study

West Watershed

Maricopa County, Arizona

FCD 2004C065

September 13, 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 West Watershed Maricopa County, Arizona

Volume 2 of 2

Prepared for:

2801 West Durango Street
Phoenix, Arizona 85009

Prepared by:
Kimley-Horn and Associates, Inc.
7878 North 16th Street, Suite 300
Phoenix, Arizona 85020

In Association with:
LTM Engineering, Inc.
3923 E. Thunderbird, Suite 26-121
Phoenix, AZ 85032

Registered Professional Engineer (Civil)
CERTIFICATE NO.
34141
JON T.
AHERN
Date Signed 9/13/07
ARIZONA, U.S.A.

September 13, 2007
KHA Project #091131013

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 authorization and adaptation by Kimley-Horn and Associates, Inc. shall be without liability to Kimley-Horn and Associates, Inc.

Table of Contents

	Page No.	Volume No.
1. Introduction	**1-1**	**1 of 2**
1.1 Purpose of Study	1-1	1 of 2
1.2 Authority for the Study	1-1	1 of 2
1.3 Site Location and Description	1-1	1 of 2
1.4 Methodology	1-3	1 of 2
1.4.1 Hydrology	1-3	1 of 2
1.4.2 Hydraulics and Floodplain Delineation	1-3	1 of 2
1.5 Summary of Results	1-3	1 of 2
2. FEMA Forms	**2-1**	**1 of 2**
2.1 Study Documentation Abstract for FEMA Submittals	2-1	1 of 2
2.2 FEMA Forms	2-3	1 of 2
3. Survey and Mapping Information	**3-1**	**1 of 2**
3.1 Field Survey Information	3-1	1 of 2
3.2 Mapping	3-1	1 of 2
4. Hydrology	**4-1**	**1 of 2**
4.1 Method Description	4-1	1 of 2
4.2 Parameter Estimation	4-1	1 of 2
4.2.1 Drainage Area Boundaries	4-1	1 of 2
4.2.2 Watershed Work Maps	4-1	1 of 2
4.2.3 Gage Data	4-1	1 of 2
4.2.4 Statistical Parameters	4-2	1 of 2
4.2.5 Precipitation	4-2	1 of 2
4.2.6 Physical Parameters	4-2	1 of 2
4.3 Problems Encountered During the Study	4-3	1 of 2
4.3.1 Special Problems and Solutions	4-3	1 of 2
4.3.2 Modeling Warning and Error Messages	4-4	1 of 2
4.4 Calibration	4-4	1 of 2
4.5 Final Results	4-5	1 of 2
4.5.1 Hydrologic Analysis Results	4-5	1 of 2
4.5.2 Verification of Results	4-21	1 of 2
5. Hydraulics	**5-1**	**1 of 2**
5.1 Method Description	5-1	1 of 2
5.2 Work Study Maps	5-1	1 of 2
5.3 Parameter Estimation	5-1	1 of 2
5.3.1 Roughness Coefficients	5-1	1 of 2
5.3.2 Expansion and ContractionCoefficients	5-2	1 of 2
5.4 Cross Section Description	5-2	1 of 2
5.5 Modeling Considerations	5-2	1 of 2
5.5.1 Hydraulic Jump and Drop Analysis	5-2	1 of 2
5.5.2 Bridges and Culverts	5-2	1 of 2
5.5.3 Levees and Dikes	5-3	1 of 2
5.5.4 Islands and Flow Splits	5-3	1 of 2
5.5.5 Ineffective Flow Areas	5-3	1 of 2
5.5.6 Supercritical Flow	5-3	1 of 2
5.6 Floodway Modeling	5-3	1 of 2

Table of Contents (Continued)

	Page No.	Volume No.
5.7 Problems Encountered During the Study	5-3	1 of 2
5.7.1 Modeling Warning and Error Messages	5-6	1 of 2
5.8 Calibration	5-6	1 of 2
5.9 Final Results	5-6	1 of 2
5.9.1 Hydraulic Analysis Results	5-6	1 of 2
5.9.2 Verification of Results	5-13	1 of 2
6. Erosion and Sediment Transport	**6-1**	**1 of 2**
7. Draft FIS Report Data	**7-1**	**1 of 2**
7.1 Summary of Discharges	7-1	1 of 2
7.2 Floodway Data and Flood Profiles	7-4	1 of 2
7.3 Annotated FIRMS	7-4	1 of 2

Table of Contents (Continued)

		Volume No.
List of Appendices		
APPENDIX A	**References**	**1 of 2**
A.1	Data Collection Summary	1 of 2
A.2	Referenced Documents	1 of 2
APPENDIX B	**General Documentation and Correspondence**	**1 of 2**
B.1	Special Problem Reports	1 of 2
B.2	Contact (Telephone Reports)	1 of 2
B.3	Meeting Minutes or Reports	1 of 2
B.4	General Correspondence	1 of 2
B.5	Contract Documents	1 of 2
B.6	Public Information	1 of 2
B.7	FEMA Correspondence	1 of 2
APPENDIX C	**Survey Field Notes**	**1 of 2**
APPENDIX D	**Hydrologic Analysis Supporting Documentation**	**1 of 2**
D.1	Precipitation Data	1 of 2
D.2	Physical Parameter Calculations	1 of 2
D.3	Hydrograph Routing Data	1 of 2
D.4	Reservoir Routing Data	1 of 2
D.5	Flow Splits and Diversion Data	1 of 2
D.6	Hydrologic Calculations	1 of 2
D.7	Figures	1 of 2
APPENDIX E	**Hydraulic Analysis Supporting Documentation**	**2 of 2**
E.1	Roughness Coefficient Estimation	2 of 2
E.2	Cross Section Plots	2 of 2
E.3	Expansion and Contraction Coefficients	2 of 2
E.4	Analysis of Structures	2 of 2
E.5	Hydraulic Calculations	2 of 2

List of Figures

Figure 1: Location Map		1 of 2
Figure 2: Sub-Basin Boundaries		1 of 2
Figure 3: Soils Map		1 of 2
Figure 4: Land Use Map		1 of 2
Figure 5: Drainage Flow Path (Lag)		1 of 2
Figure 6: HEC-1 Schematic		1 of 2
Figure 7: HEC-1 Model Results		1 of 2
Figure 8: Comparison of Results for Lower Painted Rock Watershed-East Watershed		1 of 2
Figure 9: Local Regression Sub Basins		1 of 2
Figure 10: Bridge Locations	Appenxdix E.4	2 of 2

Table of Contents (Continued)

	Volume No.
List of Tables	
Table 4-1A: HEC-1 Summary of Peak Discharge for Without Railroad Model	1 of 2
Table 4-1B: HEC-1 Summary of Peak Discharge for With Railroad Model	1 of 2
Table 5-1: Discharges used in HEC-RAS Modeling	1 of 2
Table 5-2: Discharges used in HEC-RAS Modeling from HEC-1 Model	1 of 2
Table 7-1: Summary of Discharges	1 of 2
Table D-1: Precipitation and Stage Gages within the Lower Painted Rock Watershed	1 of 2
Table D-2: Depth-Area Relationships used in the 24-hour HEC-1 Model	1 of 2
Table D-3: Soils Characteristics Used to Compute Green-Ampt Parameters	1 of 2
Table D-4: Land Use Characteristics Used to Compute Green-Ampt Parameters	1 of 2
Table D-5: Green-Ampt for without and with Railroad Models	1 of 2
Table D-6: Sub-Basin Lag Time for without and with Railroad Models	1 of 2
Table D-7A: Channel Routing Parameters for Normal Depth for without Railroad Model	1 of 2
Table D-7B: Channel Routing Parameters for Normal Depth for with Railroad Model	1 of 2
Table D-8: Diversion Parameters	1 of 2
Table E-1: HEC-RAS Summary Table	2 of 2

Appendix E Hydraulic Analysis Supporting Documentation

E.1 Roughness Coefficient Estimation

E.2 Cross Section Plots

E.3 Expansion and Contraction Coefficients

E.4 Analysis of Structures

E.5 Hydraulic Calculations

E.1 Roughness Coefficient Estimation

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

March 19, 2007

Prepared for:

2801 West Durango Street
Phoenix, Arizona 85009

and

Kimley-Horn and Associates, Inc.
7878 North 16th Street, Suite 300
Phoenix, Arizona 85009

Prepared by:

LTM Engineering, Inc.

4727 E. Bell Road, Suite 45-310
Phoenix, Arizona 85032

Copyright © 2006 LTM Engineering, Inc.
September 2006
KHA Project #091131013

(this page intentionally left blank)

LTM Engineering, Inc.

DRAFT TECHNICAL MEMORANDUM

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

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 West 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 West Watershed at the end of this Technical Memorandum.

The natural 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 all but one type ranged from 0.03 to 0.053. The channel banks and overbanks for these wash types were vegetated with short grasses, brush, and trees. Overbank roughness for these wash types ranged from 0.04 to 0.07.

The exception within the natural wash types noted above was Wash Type 6, which is located within rugged terrain and contains significant large cobbles and boulders. The channel and overbank roughness for this wash type was 0.08 and 0.075, respectively.

Wash Type 2 represents constructed washes within the active farming areas. This wash type has comparatively well-groomed, uniform features. The channel and overbank roughness for this wash type was 0.028 and 0.025, respectively.

Estimation of Manning's "n" Values

(this page intentionally left blank)

Photo Template

Photographs are arranged in the following sequence:

Left Overbank	Bed Material
Main Channel	Right Overbank

Wash Type 1 (Nottbusch Wash)

Wash Type 1 (Nottbusch Wash)

Project: Lower Painted Rock Zone A FDS
Stream: Nottbusch Wash
Location: N33° 01' 34.56" W113° 20' 00.18" 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		0.025	
	Course Sand		.026 - .035	.03		.03
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n_i	0	0		0
	Minor		.001 - .005		.005	
	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			
$n = m(n_b + n_i + n_o + n_v + n_a)$				**.04**	**.03**	**.04**

Wash Type 2 (Columbus Wash)

Photo Unavailable	

Wash Type 2 (Columbus Wash)

Project: Lower Painted Rock Zone A FDS
Stream: Columbus Wash
Location: N33° 04' 26.23" W113° 18' 07.30"

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	.025		.025
	Course Sand		.026 - .035		.026	
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n_i	0	0	0	0
	Minor		.001 - .005			
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n_o	.000 - .004	0	0	0
	Minor		.005 - .015			
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n_v	.002 - .010	n/a	.002	n/a
	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			
$n = m(n_b + n_i + n_o + n_v + n_a)$				**.025**	**.028**	**.025**

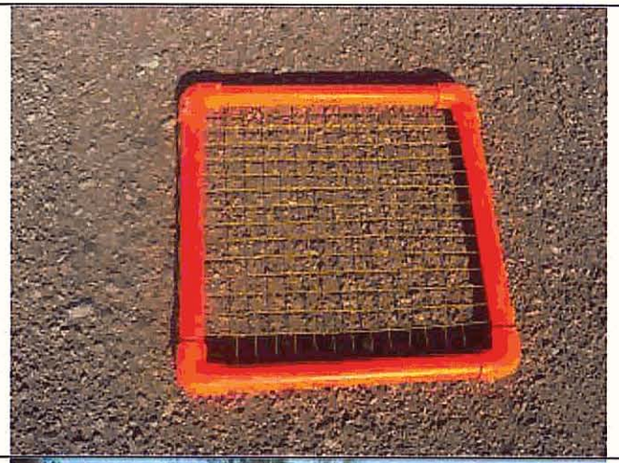
Wash Type 3 (Copper Wash Tributary 1A)

Wash Type 3 (Copper Wash Tributary 1A, Montezuma Wash, Gibson Wash)

Project: Lower Painted Rock Zone A FDS
Stream: Copper Wash Tributary 1A
Location: N33° 06' 57.89" W113° 17' 07.85"

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	.025	.025	.025
	Course Sand		.026 - .035			
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n_i	0			
	Minor		.001 - .005	.002		.002
	Moderate		.006 - .010		.008	
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n_o	.000 - .004	0	0	0
	Minor		.005 - .015			
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n_v	.002 - .010			
	Medium		.010 - .025	.02	.02	.02
	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			
$n = m(n_b + n_i + n_o + n_{v+} n_a)$				**.047**	**.053**	**.047**

Wash Type 4 (Copper Wash)



Wash Type 4 (Copper Wash)

Project: Lower Painted Rock Zone A FDS
Stream: Copper Wash
Location: N33° 07' 59.39" W113° 15' 23.76"

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	.026	.03
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n_i	0			
	Minor		.001 - .005	.005		.002
	Moderate		.006 - .010		.005	
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n_o	.000 - .004		0	
	Minor		.005 - .015	.015		.01
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n_v	.002 - .010	.005	-	.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			
$n = m(n_b + n_i + n_o + n_v + n_a)$				**.055**	**.036**	**.044**

Wash Type 5 (Copper Wash Tributary 2B1)

Photo Unavailable	

Wash Type 5 (Copper Wash Tributary 2B1)

Project: Lower Painted Rock Zone A FDS
Stream: Copper Wash Tributary 2B1
Location: N33° 04' 29.39" W113° 12' 33.74"

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	.025	.03
	Course Sand		.026 - .035			
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n_i	0			
	Minor		.001 - .005	.005		.005
	Moderate		.006 - .010		.008	
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n_o	.000 - .004			
	Minor		.005 - .015		.01	
	Appreciable		.020 - .030	.03		.03
	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			
$n = m(n_b + n_i + n_o + n_v + n_a)$				**.07**	**.043**	**.07**

Wash Type 6 (Wash LPR505A)

Photo Unavailable	

Wash Type 6 (Wash LPR505A)

Project: Lower Painted Rock Zone A FDS
Stream: **Wash LPR505A**
Location: N33° 01' 44.30" W113° 09' 09.40"

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			
	Boulder		.040 - .070	.04	.045	.04
Degree of Irregularity	Smooth	n_i	0			
	Minor		.001 - .005			
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n_o	.000 - .004			
	Minor		.005 - .015	.01	.015	.01
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n_v	.002 - .010			
	Medium		.010 - .025	.015	.02	.015
	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			
$n = m(n_b + n_i + n_o + n_v + n_a)$				**.075**	**.08**	**.075**

(this page intentionally left blank)

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. 091131001 3	

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

SCALE (H):
SCALE (V):
DESIGNED BY:
DRAWN BY: ERS
CHECKED BY: JTA
DATE: August 2007

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

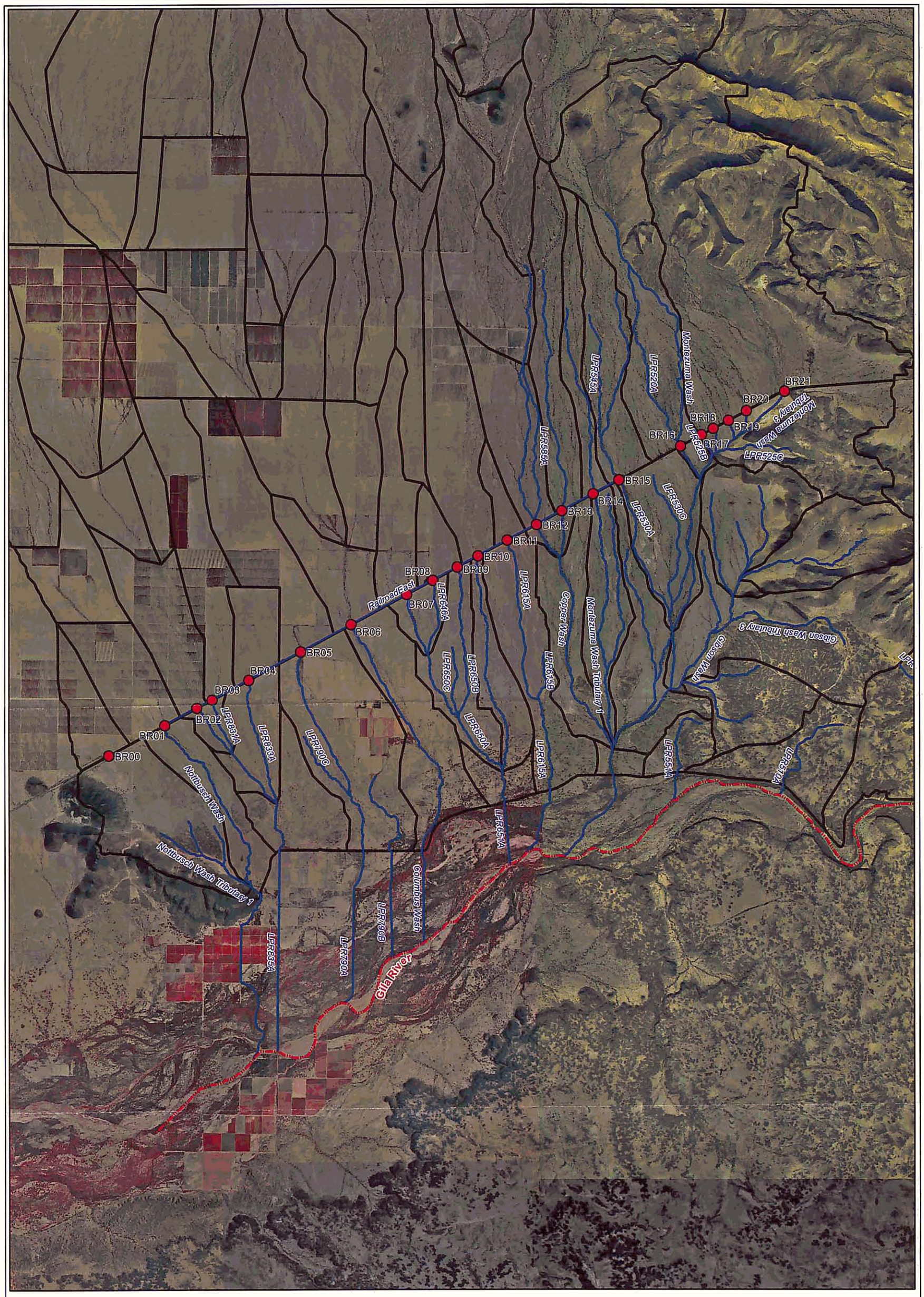


Figure 10
Railroad Bridge Locations
Lower Painted Rock
Watershed Zone A Floodplain Delineation Study
West Watershed

SCALE (H):
SCALE (V):
DESIGNED BY: MDC
DRAWN BY: MDC
CHECKED BY: JTA
DATE: August 2007

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.

OF
DRAWING NAME
PROJECT NO.

BR01

BR02

Kimley-Horn and Associates, Inc.
7878 N. 16th Street, Suite 300
Phoenix, Arizona 85020
Phone: (602) 944-5500 / Fax: (602) 906-1131

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed
Maricopa County, Arizona

Job No. 091131013
August 2007

BR03

BR04

BR05

BR06

BR07

BR08

BR09

BR10

BR11

BR12

BR13

BR14

BR15

BR16

BR17

BR18

BR19

BR20

BR21

Kimley-Horn and Associates, Inc.
7878 N. 16th Street, Suite 300
Phoenix, Arizona 85020
Phone: (602) 944-5500 / Fax: (602) 906-1131

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed
Maricopa County, Arizona

Job No. 091131013
August 2007

Railroad structure rating curves from the HY8 or Flowmaster program for BR00 through BR16 are located in **Appendix D.5**.

Railroad structure rating curves from the HY8 or Flowmaster program for BR17 through BR21 are located in this Appendix.

Worksheet for BR17

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.008200	ft/ft
Discharge	71.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	10.00
0+00	3.60
0+13	3.60
0+13	10.00
0+15	10.00
0+15	3.30
0+28	3.30
0+28	10.00
0+30	10.00
0+30	4.40
0+43	4.40
0+43	10.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 10.00)	(0+43, 10.00)	0.045

Results

Normal Depth	1.24	ft
Elevation Range	3.30 to 10.00 ft	
Flow Area	30.30	ft²
Wetted Perimeter	43.66	ft
Top Width	39.00	ft
Normal Depth	1.24	ft

Worksheet for BR17

Results

Critical Depth		0.76	ft
Critical Slope		0.03915	ft/ft
Velocity		2.34	ft/s
Velocity Head		0.09	ft
Specific Energy		1.33	ft
Froude Number		0.47	
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	1.24	ft
Critical Depth	0.76	ft
Channel Slope	0.00820	ft/ft
Critical Slope	0.03915	ft/ft

Worksheet for BR18

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.007200	ft/ft
Discharge	115.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	10.00
0+00	3.90
0+13	3.90
0+13	10.00
0+15	10.00
0+15	3.70
0+28	3.70
0+28	10.00
0+30	10.00
0+30	3.50
0+43	3.50
0+43	10.00
0+45	10.00
0+45	3.70
0+58	3.70
0+58	10.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 10.00)	(0+58, 10.00)	0.040

Results

Normal Depth	1.05	ft
Elevation Range	3.50 to 10.00 ft	

Worksheet for BR18

Results

Flow Area		44.15	ft²
Wetted Perimeter		58.79	ft
Top Width		52.00	ft
Normal Depth		1.05	ft
Critical Depth		0.73	ft
Critical Slope		0.03193	ft/ft
Velocity		2.60	ft/s
Velocity Head		0.11	ft
Specific Energy		1.15	ft
Froude Number		0.50	
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	1.05	ft
Critical Depth	0.73	ft
Channel Slope	0.00720	ft/ft
Critical Slope	0.03193	ft/ft

Worksheet for BR19

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.007200	ft/ft
Discharge	150.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	10.00
0+00	6.30
0+13	6.30
0+13	10.00
0+15	10.00
0+15	5.30
0+28	5.30
0+28	10.00
0+30	10.00
0+30	4.10
0+43	4.10
0+43	10.00
0+45	10.00
0+45	4.10
0+58	4.10
0+58	10.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 10.00)	(0+58, 10.00)	0.040

Results

Normal Depth	1.61	ft
Elevation Range	4.10 to 10.00 ft	

Worksheet for BR19

Results

Flow Area		47.04	ft^2
Wetted Perimeter		46.24	ft
Top Width		39.00	ft
Normal Depth		1.61	ft
Critical Depth		1.01	ft
Critical Slope		0.02817	ft/ft
Velocity		3.19	ft/s
Velocity Head		0.16	ft
Specific Energy		1.76	ft
Froude Number		0.51	
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	1.61	ft
Critical Depth	1.01	ft
Channel Slope	0.00720	ft/ft
Critical Slope	0.02817	ft/ft

Worksheet for BR20

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.009700	ft/ft
Discharge	403.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	10.00
0+00	6.70
0+13	6.70
0+13	10.00
0+15	10.00
0+15	5.20
0+28	5.20
0+28	10.00
0+30	10.00
0+30	4.50
0+43	4.50
0+43	10.00
0+45	10.00
0+45	5.00
0+58	5.00
0+58	10.00
0+60	10.00
0+60	5.00
0+73	5.00
0+73	10.00
0+75	10.00
0+75	5.00
0+87	5.00
0+87	10.00

Roughness Segment Definitions

Worksheet for BR20

Input Data

(0+00, 10.00)	(0+87, 10.00)	0.040

Results

Normal Depth		1.95	ft
Elevation Range	4.50 to 10.00 ft		
Flow Area		96.47	ft²
Wetted Perimeter		79.06	ft
Top Width		64.00	ft
Normal Depth		1.95	ft
Critical Depth		1.51	ft
Critical Slope		0.02800	ft/ft
Velocity		4.18	ft/s
Velocity Head		0.27	ft
Specific Energy		2.22	ft
Froude Number		0.60	
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	1.95	ft
Critical Depth	1.51	ft
Channel Slope	0.00970	ft/ft
Critical Slope	0.02800	ft/ft

HY-8 Culvert Analysis Report for BR21

Culvert Summary Table: BR21

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
320.00	320.00	4.18	1.675	1.675	1-S2n	1.120	1.168	1.132	1.152	6.423	3.473
640.00	640.00	5.16	2.656	1.257	1-S2n	1.769	1.866	1.776	1.757	8.189	4.553
960.00	960.00	6.03	3.534	1.752	1-S2n	2.329	2.452	2.342	2.252	9.316	5.329
1280.00	1280.00	6.79	4.292	2.188	1-S2n	2.841	2.972	2.842	2.688	10.236	5.953
1600.00	1600.00	7.63	5.129	2.583	5-S2n	3.323	3.448	3.338	3.083	10.893	6.487
1920.00	1920.00	8.60	6.104	2.952	5-S2n	3.784	3.893	3.792	3.452	11.507	6.953
2240.00	2240.00	9.66	7.163	3.299	5-S2n	4.230	4.314	4.239	3.799	12.011	7.371
2560.00	2560.00	10.85	8.328	8.350	7-M2c	5.000	4.729	4.729	4.128	12.304	7.753
2880.00	2880.00	12.19	9.694	9.410	5-S2n	5.000	5.000	5.000	4.442	13.091	8.104
2969.00	2969.00	12.59	10.088	9.718	5-S2n	5.000	5.000	5.000	4.527	13.495	8.198

****

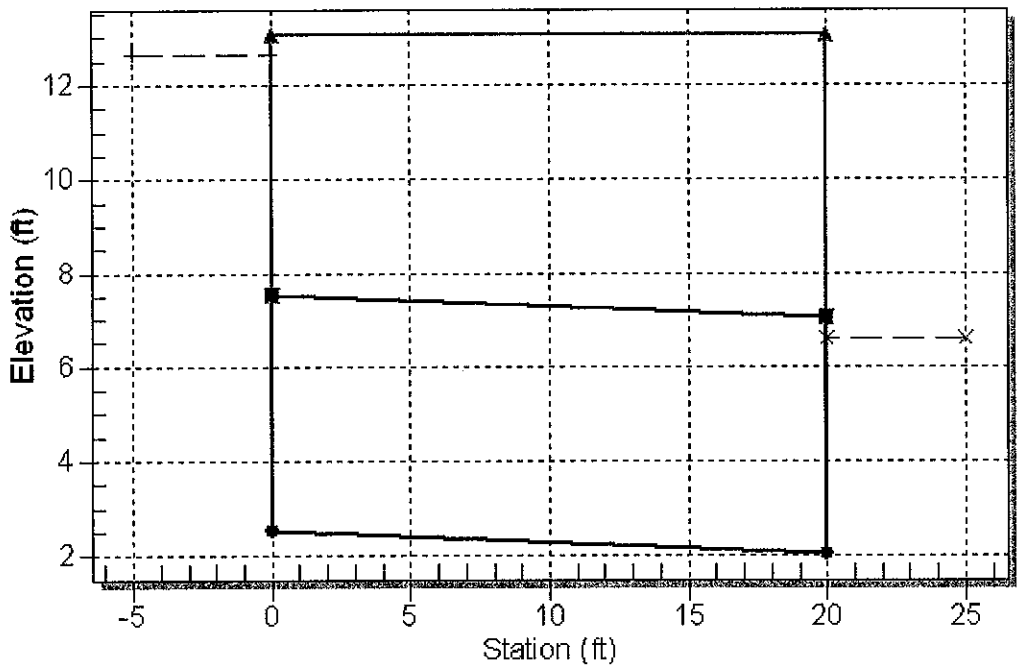
Inlet Elevation (invert): 2.50 ft, Outlet Elevation (invert): 2.00 ft

Culvert Length: 20.01 ft, Culvert Slope: 0.0250

Water Surface Profile Plot for Culvert: BR21

Crossing - BR21, Design Discharge - 2969.0 cfs

Culvert - BR21, Culvert Discharge - 2969.0 cfs



Site Data - BR21

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2.50 ft

Outlet Station: 20.00 ft

Outlet Elevation: 2.00 ft

Number of Barrels: 4

Culvert Data Summary - BR21

Barrel Shape: User Defined

Barrel Span: 11.00 ft

Barrel Rise: 5.00 ft

Barrel Material: Corrugated Metal Riveted or Welded

Barrel Manning's n: 0.0350 (top and sides)

Manning's n: 1.4lf (bottom)

Inlet Type: Conventional

Inlet Edge Condition: Square Edge with Headwall

Inlet Depression: None

Tailwater Channel Data - BR21

Tailwater Channel Option: Rectangular Channel

Bottom Width: 80.00 ft

Channel Slope: 0.0075

Channel Manning's n: 0.0400

Channel Invert Elevation: 2.00 ft

Roadway Data for Crossing: BR21

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 13.00 ft

Roadway Surface: Gravel

Roadway Top Width: 20.00 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
ColumWsh	Reach 1	4.766	PF 1	9440	545.61	548.93	548.93	550.02	0.009805	8.39	1136.76	543.48	0.99
ColumWsh	Reach 1	4.653	PF 1	9440	540.25	544.23	543.63	544.76	0.003569	6.09	1837.72	1031.41	0.62
ColumWsh	Reach 1	4.473	PF 1	9440	536.6	539.01	538.92	539.73	0.008815	6.84	1421.66	932.02	0.9
ColumWsh	Reach 1	4.275	PF 1	9440	529.22	531.6	531.32	532.1	0.006003	5.74	1757.14	1186.02	0.75
ColumWsh	Reach 1	4.084	PF 1	9333	525.42	528.04		528.28	0.002527	3.94	2487.4	1509.19	0.49
ColumWsh	Reach 1	3.706	PF 1	9333	516.41	518.44	518.44	519.07	0.010742	6.44	1540.12	1377.25	0.96
ColumWsh	Reach 1	3.516	PF 1	9333	510.01	513.55		513.87	0.002267	4.55	2199.9	1129.62	0.49
ColumWsh	Reach 1	3.327	PF 1	9333	506.33	508.95	508.95	509.75	0.009338	7.31	1386.57	960.76	0.94
ColumWsh	Reach 1	3.137	PF 1	9226	499.24	503.07	502.29	503.35	0.002964	4.2	2211.68	1247.83	0.53
ColumWsh	Reach 1	2.948	PF 1	9226	496.37	498.87	498.56	499.27	0.005894	5.11	1832.56	1306.25	0.72
ColumWsh	Reach 1	2.759	PF 1	9226	490.51	494.24		494.65	0.003709	5.14	1809.59	881.13	0.61
ColumWsh	Reach 1	2.569	PF 1	9226	485.75	489.81	489.37	490.28	0.005212	5.53	1682.03	948.47	0.7
ColumWsh	Reach 1	2.2	PF 1	9119	475.81	480.6	480.16	481.25	0.004153	6.75	1654.85	1051.13	0.68
ColumWsh	Reach 1	1.923	PF 1	9119	467.67	471.09	471.09	471.89	0.011075	7.21	1267.68	821.23	1
ColumWsh	Reach 1	1.622	PF 1	9119	459.31	462.61		462.73	0.00107	2.79	3266.88	1472.73	0.33
ColumWsh	Reach 1	1.251	PF 1	9119	456.15	459.12	458.42	459.43	0.003002	4.49	2109.71	1817.87	0.54
MontzmWshTb3	Reach 6	1.694	PF 1	3074	619.93	621.04	621.04	621.51	0.025671	5.54	578.95	668.12	0.98
MontzmWshTb3	Reach 6	1.504	PF 1	3074	610	612.67		612.7	0.000442	1.34	2302.36	930.61	0.15
MontzmWshTb3	Reach 6	1.315	PF 1	3536	610	612.15		612.17	0.000618	1.43	2986.16	1427.26	0.17
MontzmWshTb3	Reach 6	1.126	PF 1	3536	607.95	609.69	609.69	610.28	0.023995	6.23	590.57	558.77	0.98
MontzmWshTb3	Reach 6	1.027	PF 1	3536	604.42	607.26	605.78	607.39	0.001855	2.93	1275.22	519.72	0.31
MontzmWshTb3	Reach 5	0.792	PF 1	3536	599.21	602.61		603.02	0.008973	5.14	691.91	373.91	0.65
MontzmWshTb3	Reach 5	0.774	PF 1	3536	598.83	602.14		602.35	0.004897	3.72	965.52	566.36	0.47
MontzmWshTb3	Reach 4	0.687	PF 1	3536	596.75	599.9	599	600.09	0.004887	3.46	1026.29	648.06	0.47
MontzmWshTb3	Reach 4	0.653	PF 1	3536	595.6	597.69	597.69	598.35	0.025061	6.55	541.79	436.3	1.01
MontzmWshTb3	Reach 3	0.534	PF 1	3536	590.7	595.57		595.6	0.000296	1.47	2454.71	710.92	0.13
MontzmWshTb3	Reach 3	0.472	PF 1	3536	590	595.32		595.43	0.001163	2.61	1365.35	447.73	0.25
MontzmWshTb3	Reach 2	0.41	PF 1	3536	590	594.87		595.01	0.001388	3.05	1234.5	423.85	0.28
MontzmWshTb3	Reach 2	0.398	PF 1	3536	590.01	594.76		594.91	0.001535	3.14	1199.6	433.74	0.29
MontzmWshTb3	Reach 1	0.277	PF 1	3455	587.86	593.04	591.43	593.46	0.003605	5.3	695.82	207.41	0.46
MontzmWshTb3	Reach 1	0.189	PF 1	3455	586.33	589.16	589.16	590	0.022627	7.36	475.26	313.28	1
MontzmWshTb2	Reach 2	2.518	PF 1	180	563.08	563.55	563.37	563.58	0.006434	1.33	135.69	421.95	0.41
MontzmWshTb2	Reach 2	2.413	PF 1	180	559.9	560.57	560.34	560.59	0.004561	1.18	153.43	446.73	0.35
MontzmWshTb2	Reach 2	2.247	PF 1	180	555.47	555.98	555.81	556.01	0.006047	1.24	146.13	485.02	0.39
MontzmWshTb2	Reach 2	2.058	PF 1	180	549.51	550.13	549.91	550.16	0.005676	1.37	131.21	350.8	0.39
MontzmWshTb2	Reach 2	1.868	PF 1	180	545.18	545.76		545.77	0.003476	0.93	194.05	648.04	0.3
MontzmWshTb2	Reach 2	1.697	PF 1	180	539.62	540.05	539.95	540.09	0.014608	1.65	109.26	475.84	0.58
MontzmWshTb2	Reach 2	1.49	PF 1	278	534.61	535.37		535.39	0.002543	1.06	262.62	573.72	0.27
MontzmWshTb2	Reach 2	1.298	PF 1	278	528.13	528.69	528.69	528.87	0.037946	3.37	82.59	233.59	1
MontzmWshTb2	Reach 2	1.033	PF 1	278	519.15	520.09	519.59	520.1	0.001368	0.93	301.25	515.11	0.21
MontzmWshTb2	Reach 2	0.9	PF 1	278	516.83	517.2	517.2	517.32	0.043317	2.81	99.89	429.59	1
MontzmWshTb2	Reach 1	0.62	PF 1	959	507.5	509.51		509.57	0.003019	1.95	493.08	502.85	0.34
MontzmWshTb2	Reach 1	0.543	PF 1	959	506.13	507.63	507.26	507.73	0.007393	2.52	381.11	488.96	0.5
MontzmWshTb2	Reach 1	0.397	PF 1	959	503.1	504.46	503.98	504.5	0.002664	1.57	631.99	890.17	0.3
MontzmWshTb2	Reach 1	0.164	PF 1	959	494.81	496.29	496.29	496.72	0.029249	5.25	182.71	216.8	1.01
MontzmWshTb1/	Reach 1	2.546	PF 1	42	590.76	591.17	591.01	591.18	0.002988	0.88	47.69	200.29	0.31
MontzmWshTb1/	Reach 1	2.408	PF 1	42	585.92	586.08	586.08	586.11	0.030693	1.46	28.9	339.71	0.85

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
MontzmWshTb1A	Reach 1	2.241	PF 1	42	579.86	580.26	580.11	580.26	0.002037	0.7	59.85	258.86	0.26
MontzmWshTb1A	Reach 1	2.093	PF 1	42	575.79	575.97	575.97	576.02	0.040073	1.85	22.72	214.71	1
MontzmWshTb1A	Reach 1	1.97	PF 1	107	569.97	570.52	570.34	570.56	0.005681	1.62	66.37	187.72	0.47
MontzmWshTb1A	Reach 1	1.804	PF 1	107	565.54	565.95		565.97	0.004843	1.13	94.79	397.22	0.4
MontzmWshTb1A	Reach 1	1.596	PF 1	107	558.73	559.11	559.01	559.14	0.008263	1.56	69.28	280.39	0.53
MontzmWshTb1A	Reach 1	1.373	PF 1	107	551.95	552.38	552.22	552.4	0.004185	1.25	87.58	307.86	0.39
MontzmWshTb1A	Reach 1	1.211	PF 1	107	546.48	546.9	546.82	546.95	0.010996	1.76	60.74	238.82	0.61
MontzmWshTb1A	Reach 1	1.018	PF 1	107	539.17	539.75	539.57	539.79	0.004858	1.59	69.91	204.66	0.44
MontzmWshTb1A	Reach 1	0.817	PF 1	172	534.34	534.88		534.91	0.004433	1.34	131.57	437.33	0.4
MontzmWshTb1A	Reach 1	0.652	PF 1	172	529.57	530.04	529.92	530.06	0.007149	1.33	129.75	554.27	0.48
MontzmWshTb1A	Reach 1	0.493	PF 1	172	525.38	525.84	525.67	525.86	0.00371	1.1	156.63	565.29	0.36
MontzmWshTb1A	Reach 1	0.297	PF 1	172	518.51	519.02	518.95	519.1	0.014342	2.4	73.86	239.2	0.73
MontzmWshTb1A	Reach 1	0.119	PF 1	172	511.96	512.88		512.92	0.003758	1.67	103.83	207.93	0.4
MontzmWshTb1	Reach 2	6.226	PF 1	248	698.87	699.43		699.44	0.003662	0.78	319.18	1029.85	0.25
MontzmWshTb1	Reach 2	6.023	PF 1	248	688.47	688.97	688.97	689.09	0.068424	2.76	89.81	388.72	1.01
MontzmWshTb1	Reach 2	5.82	PF 1	248	678.97	679.93	679.51	679.96	0.003151	1.34	207.74	395.59	0.27
MontzmWshTb1	Reach 2	5.606	PF 1	248	669.92	670.45	670.45	670.63	0.059119	3.38	73.41	210.45	1.01
MontzmWshTb1	Reach 2	5.308	PF 1	356	658.03	659.01		659.04	0.003417	1.39	285.81	531.65	0.28
MontzmWshTb1	Reach 2	5.078	PF 1	356	648.32	648.98	648.93	649.13	0.039698	3.12	114.16	273.67	0.85
MontzmWshTb1	Reach 2	4.659	PF 1	356	631.87	632.84		632.86	0.002976	1.11	327.48	628.89	0.25
MontzmWshTb1	Reach 2	4.386	PF 1	464	619.98	620.88	620.88	621.09	0.032599	3.84	136.33	343.71	0.83
MontzmWshTb1	Reach 2	4.091	PF 1	464	607.61	609.51	608.64	609.55	0.00252	1.55	302.19	286.69	0.25
MontzmWshTb1	Reach 2	3.81	PF 1	464	599.13	599.8	599.8	599.95	0.040764	3.22	155.42	548.66	0.87
MontzmWshTb1	Reach 2	3.595	PF 1	655	590.04	591.12		591.14	0.001903	1.05	612.21	833.1	0.21
MontzmWshTb1	Reach 2	3.523	PF 1	655	589.07	589.76	589.51	589.8	0.008416	1.64	402.22	846.93	0.41
MontzmWshTb1	Reach 2	3.291	PF 1	655	580	581.32	580.82	581.38	0.005744	1.98	335.47	427.95	0.37
MontzmWshTb1	Reach 2	2.955	PF 1	974	568.36	569.68		569.75	0.007185	2.23	475.02	734.64	0.41
MontzmWshTb1	Reach 2	2.738	PF 1	974	559.92	561.16	560.77	561.24	0.007671	2.21	443.57	546.25	0.42
MontzmWshTb1	Reach 2	2.576	PF 1	974	556.54	558.07		558.1	0.002132	1.48	716.45	850.18	0.24
MontzmWshTb1	Reach 2	2.289	PF 1	974	548.31	549.12	549.12	549.38	0.04917	4.09	241.29	491.9	0.99
MontzmWshTb1	Reach 2	2.008	PF 1	974	538.91	540.53		540.56	0.002005	1.43	743.55	920.17	0.23
MontzmWshTb1	Reach 2	1.721	PF 1	1294	529.41	530.72	530.72	531.01	0.035587	4.5	311.94	572.61	0.9
MontzmWshTb1	Reach 2	1.44	PF 1	1294	520.44	522.28	521.41	522.32	0.002126	1.52	885.62	973.54	0.24
MontzmWshTb1	Reach 2	1.272	PF 1	1294	516.12	516.96	516.96	517.23	0.045259	4.16	319.31	650.47	0.96
MontzmWshTb1	Reach 2	1.15	PF 1	1294	510	512.66		512.7	0.001262	1.63	830.25	498.87	0.2
MontzmWshTb1	Reach 1	1.052	PF 1	1294	509.82	512.02		512.04	0.001248	1.24	1051.96	814.69	0.18
MontzmWshTb1	Reach 1	0.979	PF 1	1613	508.55	509.96	509.96	510.38	0.041847	5.18	315.13	415.87	0.99
MontzmWshTb1	Reach 1	0.758	PF 1	1613	499.99	502.72	501.22	502.77	0.001549	1.77	921.17	506.15	0.22
MontzmWshTb1	Reach 1	0.568	PF 1	1613	496.74	498.44	498.32	498.84	0.022835	5.25	333.04	330.48	0.79
MontzmWshTb1	Reach 1	0.378	PF 1	1613	489.07	492.12		492.2	0.003052	2.19	741.12	479.46	0.3
MontzmWshTb1	Reach 1	0.189	PF 1	1613	485.92	488.3		488.43	0.004756	2.95	582.38	402.56	0.38
MontzmWsh	Reach 10	8.398	PF 1	282	746.64	747.52	747.38	747.66	0.016017	2.98	94.52	167.75	0.7
MontzmWsh	Reach 10	8.157	PF 1	282	737.95	738.94		738.99	0.003727	1.79	163.12	236.17	0.36
MontzmWsh	Reach 10	7.968	PF 1	282	729.39	730.35	730.35	730.66	0.032163	4.48	62.94	102.37	1.01
MontzmWsh	Reach 10	7.778	PF 1	282	723.07	724.07	723.59	724.09	0.001949	1.12	252.49	403.04	0.25
MontzmWsh	Reach 10	7.633	PF 1	282	719.64	720.31	720.31	720.46	0.023516	3.4	120.12	431.58	0.84
MontzmWsh	Reach 9	7.443	PF 1	629	712.82	713.97		714.02	0.004056	1.78	363.19	613.28	0.37
MontzmWsh	Reach 9	7.345	PF 1	629	708.48	709.16	709.16	709.42	0.032506	4.08	157.7	335.13	0.99

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
MontzmWsh	Reach 9	7.21	PF 1	629	701.14	702.48	702.01	702.55	0.00411	2.12	300	349.29	0.39
MontzmWsh	Reach 9	7.124	PF 1	629	696.94	698.18	698.18	698.6	0.02867	5.22	121.39	155.59	1
MontzmWsh	Reach 9	7.021	PF 1	629	690.02	691.43	690.96	691.53	0.005118	2.45	258.14	275.28	0.43
MontzmWsh	Reach 9	6.831	PF 1	629	684.64	685.48	685.21	685.55	0.007063	2.05	309.02	565.59	0.47
MontzmWsh	Reach 9	6.619	PF 1	629	676.45	677.83	677.41	677.88	0.006648	2.03	355.45	662.74	0.46
MontzmWsh	Reach 9	6.452	PF 1	629	669.07	670.69	670.49	670.85	0.009821	3.55	244.64	367.78	0.61
MontzmWsh	Reach 9	6.302	PF 1	629	660.87	662.54	662.24	662.76	0.010585	3.79	167.98	169.28	0.64
MontzmWsh	Reach 9	6.074	PF 1	629	654.36	656.51	655.68	656.58	0.002971	2.16	291.23	246.26	0.34
MontzmWsh	Reach 9	5.884	PF 1	629	648.48	650.28	650.09	650.62	0.01717	4.65	135.38	130.18	0.8
MontzmWsh	Reach 9	5.539	PF 1	629	635.25	637.66	636.82	637.78	0.003787	2.74	229.17	156.21	0.4
MontzmWsh	Reach 9	5.316	PF 1	629	626.6	627.49	627.49	627.8	0.032861	4.43	141.9	239.54	1.01
MontzmWsh	Reach 9	5.153	PF 1	629	619.26	620.88	620.29	620.95	0.003172	2.24	324.78	372.86	0.36
MontzmWsh	Reach 9	5.037	PF 1	629	615.41	616.08	616.08	616.31	0.036611	3.84	163.84	370.31	1.02
MontzmWsh	Reach 8	4.74	PF 1	686	607.06	608.8		608.83	0.001698	1.22	561.07	721.8	0.24
MontzmWsh	Reach 8	4.712	PF 1	1449	605.94	607.32	607.32	607.73	0.029291	5.11	283.56	353.05	1
MontzmWsh	Reach 8	4.629	PF 1	1449	598.66	600.76	600.15	600.84	0.003986	2.31	629.77	610.65	0.39
MontzmWsh	Reach 8	4.385	PF 1	1449	588.8	590.22	590.22	590.47	0.023914	4.47	444.27	923.98	0.9
MontzmWsh	Reach 7	4.205	PF 1	4153	580.68	583.47	582.35	583.53	0.001767	2.07	2014.88	1252.91	0.28
MontzmWsh	Reach 7	3.785	PF 1	4166	573.74	575.57	575.2	575.77	0.009953	3.55	1174.77	1135.32	0.61
MontzmWsh	Reach 7	3.59	PF 1	4166	567.68	570.24	569.32	570.36	0.003193	2.73	1543.2	1033.07	0.37
MontzmWsh	Reach 7	3.211	PF 1	4166	559.44	560.85		560.97	0.007627	3.51	1573.74	1057.95	0.55
MontzmWsh	Reach 6	2.741	PF 1	4064	546.92	549.33		549.54	0.00562	3.72	1173.2	873.62	0.5
MontzmWsh	Reach 6	2.471	PF 1	4064	539.99	542.45	541.72	542.63	0.004271	3.48	1366.28	1004.86	0.44
MontzmWsh	Reach 6	2.264	PF 1	4064	535.1	537.39	536.74	537.57	0.005002	3.42	1260.65	956.16	0.47
MontzmWsh	Reach 5	1.983	PF 1	4520	526.95	529.97		530.2	0.004914	3.93	1243.77	807.8	0.48
MontzmWsh	Reach 5	1.957	PF 1	4520	526.31	529.47		529.65	0.003246	3.4	1451.23	841.62	0.4
MontzmWsh	Reach 4	1.695	PF 1	4295	517.83	519.46	519.46	520.02	0.026009	6.02	719.66	700.38	1
MontzmWsh	Reach 4	1.485	PF 1	4295	509.98	513.21		513.33	0.002491	2.78	1546.66	781.9	0.34
MontzmWsh	Reach 3	1.184	PF 1	4336	504.5	507.46	506.68	507.71	0.005357	3.99	1098.53	602.82	0.5
MontzmWsh	Reach 3	0.926	PF 1	4336	498.73	503.18		503.35	0.002098	3.59	1444.35	466.66	0.34
MontzmWsh	Reach 3	0.736	PF 1	4336	494.08	496.97	496.97	498.09	0.027722	9.3	548.91	303.25	1.14
MontzmWsh	Reach 2	0.583	PF 1	4336	490	493.62		493.75	0.00186	2.87	1637.3	781.12	0.31
MontzmWsh	Reach 2	0.494	PF 1	4336	489.48	492.63		492.77	0.002341	3.08	1542.58	822.73	0.34
MontzmWsh	Reach 2	0.357	PF 1	4336	487.02	490.66		490.87	0.003053	3.87	1487.79	1092.76	0.4
MontzmWsh	Reach 2	0.285	PF 1	4336	485.26	488.9		489.31	0.005715	5.32	961.4	468.94	0.55
MontzmWsh	Reach 1	0.09	PF 1	4336	481.9	485.83		485.96	0.002018	2.99	1450.32	537.41	0.32
MontzmWsh	Reach 1	0.063	PF 1	4336	481.68	484.45	484.41	485.22	0.021417	7.04	616.16	372.33	0.96
LPR585A	Reach 1	1.974	PF 1	2705	656.35	658.25	657.95	658.5	0.007344	4.01	700.74	707.75	0.64
LPR585A	Reach 1	1.545	PF 1	2705	639.08	641.13	640.92	641.45	0.008451	5.97	758.99	704.32	0.75
LPR585A	Reach 1	1.241	PF 1	2705	627.69	629.89	629.33	630.12	0.005013	4.78	858.07	644.15	0.58
LPR585A	Reach 1	0.804	PF 1	2705	609.56	611.03	610.96	611.41	0.015263	4.94	557.13	657.9	0.89
LPR585A	Reach 1	0.682	PF 1	2705	604.75	606.5	606.05	606.63	0.004244	3.01	955.9	1013.81	0.49
LPR585A	Reach 1	0.467	PF 1	2705	596.23	597.31	597.31	597.68	0.019358	4.91	565.26	830.47	0.97
LPR585A	Reach 1	0.232	PF 1	2705	587.36	589.01	588.41	589.11	0.002786	2.58	1097.49	1090.58	0.4
LPR550A	Reach 1	0.44	PF 1	225	519.52	519.93	519.93	520.04	0.044243	2.67	84.19	377.66	1
LPR550A	Reach 1	0.189	PF 1	225	510	511.57		511.58	0.000626	0.89	254.43	253.76	0.15
LPR545A	Reach 1	1.741	PF 1	158	692.63	693.15	693.08	693.23	0.01358	2.29	71.09	239.4	0.7
LPR545A	Reach 1	1.405	PF 1	158	679.93	680.53		680.55	0.004397	1.22	140.9	499.07	0.39

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
LPR545A	Reach 1	1.172	PF 1	158	668.79	669.33	669.33	669.51	0.027434	3.38	46.76	134.56	1.01
LPR545A	Reach 1	0.97	PF 1	243	659.8	660.46	660.22	660.5	0.004224	1.68	146.09	314.24	0.42
LPR545A	Reach 1	0.758	PF 1	243	649.77	650.13	650.13	650.22	0.033705	2.49	97.48	516.68	1.01
LPR545A	Reach 1	0.568	PF 1	243	640.42	641.28		641.33	0.003272	1.74	142.59	244.45	0.39
LPR545A	Reach 1	0.267	PF 1	243	629.13	629.72	629.72	629.91	0.026774	3.49	69.69	187.87	1.01
LPR530C	Reach 1	1.932	PF 1	185	596.57	597.09		597.09	0.002425	0.74	251.98	907.89	0.24
LPR530C	Reach 1	1.735	PF 1	185	589.67	590.15	590.15	590.26	0.050152	3.24	76.53	313.82	1.1
LPR530C	Reach 1	1.404	PF 1	185	577.52	578.48	578.04	578.51	0.002459	1.19	156.08	271.29	0.28
LPR530C	Reach 1	1.215	PF 1	185	571.55	571.84	571.84	571.91	0.049957	2.19	84.28	556.35	0.99
LPR530C	Reach 1	0.836	PF 1	350	559.61	560.43		560.45	0.002311	1.12	313.68	569.87	0.27
LPR530C	Reach 1	0.527	PF 1	350	549.73	550.38	550.38	550.53	0.041984	3.15	111.07	374.06	1.02
LPR530C	Reach 1	0.192	PF 1	350	543.61	544.76	544.16	544.77	0.001011	0.87	406.21	644.58	0.18
LPR530B	Reach 2	0.554	PF 1	325	548.09	548.74	548.74	548.95	0.035954	3.68	88.41	210.36	1
LPR530B	Reach 2	0.451	PF 1	325	545.9	546.96	546.37	546.97	0.000778	0.88	438	670.83	0.17
LPR530B	Reach 1	0.158	PF 1	1089	537.56	538.68	538.56	538.89	0.018806	3.7	294.03	425.54	0.79
LPR530B	Reach 1	0.064	PF 1	1089	535	536.64		536.69	0.001874	1.86	686.43	471.08	0.28
LPR530A	Reach 3	5.023	PF 1	244	708.54	709.13	709.13	709.32	0.037942	3.5	69.99	193.31	1.01
LPR530A	Reach 3	4.924	PF 1	244	700.83	701.27	700.75	701.29	0.00485	1.02	210.93	411.95	0.34
LPR530A	Reach 3	4.743	PF 1	244	690.8	691.33	691.33	691.51	0.034202	3.52	73.23	217.98	0.97
LPR530A	Reach 3	4.54	PF 1	244	682.14	683.03	682.62	683.06	0.002692	1.27	192.4	323.46	0.29
LPR530A	Reach 3	4.333	PF 1	244	675.07	675.45	675.45	675.57	0.041196	2.71	92.4	446.55	0.97
LPR530A	Reach 3	4.175	PF 1	559	668.56	669.76	669.31	669.81	0.003127	1.79	352.98	578.21	0.33
LPR530A	Reach 3	3.939	PF 1	559	660.14	660.8	660.8	661	0.031362	4.08	194.29	503.5	0.97
LPR530A	Reach 3	3.709	PF 1	559	649.71	651.09		651.14	0.003306	1.79	314.86	399.05	0.34
LPR530A	Reach 3	3.607	PF 1	559	646.56	647.13	647.09	647.27	0.025366	3.04	187.17	509.95	0.84
LPR530A	Reach 3	3.394	PF 1	559	638.76	639.79		639.82	0.002989	1.46	462.92	884.81	0.31
LPR530A	Reach 3	3.134	PF 1	875	628.17	628.86	628.79	629.01	0.021653	3.06	286.02	625.83	0.79
LPR530A	Reach 2	2.923	PF 1	875	619.33	621.11		621.19	0.003412	2.25	410.02	437.39	0.37
LPR530A	Reach 2	2.85	PF 1	875	617.29	618.27	618.18	618.5	0.0205	3.86	231.03	374.85	0.82
LPR530A	Reach 2	2.66	PF 1	875	609.46	611.37	610.74	611.42	0.003496	1.91	458.99	517.3	0.35
LPR530A	Reach 2	2.47	PF 1	875	602.34	603.14	603.14	603.39	0.033821	4.06	217.23	461.53	1
LPR530A	Reach 2	2.314	PF 1	875	599.34	600.61		600.61	0.000507	0.66	1352.58	1835.75	0.13
LPR530A	Reach 2	2.27	PF 1	875	599.39	600.11	600.11	600.21	0.045988	2.54	347.52	1759	1
LPR530A	Reach 2	2.111	PF 1	875	589.87	591.12		591.18	0.002935	1.96	471.92	535.31	0.33
LPR530A	Reach 2	1.887	PF 1	875	583.16	583.99	583.88	584.11	0.018071	2.75	317.9	697.01	0.72
LPR530A	Reach 2	1.73	PF 1	875	578.84	579.97		580	0.002262	1.56	792.25	1101.32	0.29
LPR530A	Reach 2	0.955	PF 1	875	555.59	556.36	556.36	556.58	0.034153	3.81	235.66	595.85	0.99
LPR530A	Reach 2	0.766	PF 1	875	548.61	550.04		550.07	0.001985	1.37	637.76	784.91	0.26
LPR530A	Reach 2	0.584	PF 1	875	543.95	544.8	544.8	545.02	0.036688	3.78	231.34	535.79	1.01
LPR530A	Reach 2	0.41	PF 1	875	538.23	540.09	539.25	540.12	0.001796	1.54	573.36	611.37	0.26
LPR530A	Reach 1	0.171	PF 1	1964	532.66	534.17	533.83	534.32	0.008591	3.13	634.31	719.29	0.56
LPR530A	Reach 1	0.088	PF 1	1964	529.93	532.09		532.18	0.003091	2.44	837.22	713.08	0.36
LPR525E	Reach 1	0.379	PF 1	403	611.5	612.48	612.48	612.73	0.034832	4.07	99.12	197.95	1.01
LPR525E	Reach 1	0.271	PF 1	403	609.39	611.23	610.45	611.24	0.000748	0.77	528.27	789.04	0.16
LPR525D	Reach 1	0.246	PF 1	150	609.87	610.19	610.09	610.21	0.008359	1.17	131.62	603.77	0.43
LPR525D	Reach 1	0.134	PF 1	150	604.53	605.02	604.87	605.06	0.009178	1.57	95.84	294.88	0.48
LPR525C	Reach 1	0.96	PF 1	707	645.95	647.11	647.11	647.49	0.030612	4.93	143.47	194.93	1.01
LPR525C	Reach 1	0.757	PF 1	707	626.1	628.28	627.75	628.42	0.007965	3.03	238.87	254.22	0.54

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
LPR525C	Reach 1	0.582	PF 1	707	613.97	615.33	615.33	615.78	0.028467	5.35	132.08	150.11	1.01
LPR525C	Reach 1	0.392	PF 1	707	600.7	602.1		602.11	0.000392	0.81	869.69	671.56	0.13
LPR525C	Reach 1	0.203	PF 1	707	599.65	600.54	600.54	600.82	0.031806	4.27	169.01	320.73	0.99
LPR525B	Reach 1	0.314	PF 1	115	608.68	609.23		609.27	0.009111	1.42	80.94	292.18	0.47
LPR525B	Reach 1	0.214	PF 1	115	599.86	600.37	600.37	600.53	0.039034	3.21	35.82	111.06	1
LPR525A	Reach 1	0.296	PF 1	71	609.99	607.9	607.23	607.93	0.005974		48.2	56.38	0
LPR525A	Reach 1	0.181	PF 1	71	599.81	600.22	600.22	600.35	0.043244	2.9	24.46	95.23	1.01
LPR520A	Reach 1	2.518	PF 1	218	713.27	713.99	713.86	714.06	0.012808	2.14	103.73	293.45	0.59
LPR520A	Reach 1	2.462	PF 1	218	709.8	710.41	710.27	710.47	0.011242	1.98	131.42	362.72	0.55
LPR520A	Reach 1	2.273	PF 1	218	700.71	701.62	701.33	701.68	0.007076	1.97	110.68	198.4	0.46
LPR520A	Reach 1	2.12	PF 1	218	696.6	697.28		697.3	0.004276	1.32	196.12	512.59	0.35
LPR520A	Reach 1	1.951	PF 1	218	688.88	689.49	689.44	689.64	0.025246	3.05	71.42	172.32	0.84
LPR520A	Reach 1	1.715	PF 1	218	678.79	679.74		679.77	0.003806	1.43	152.2	276.38	0.34
LPR520A	Reach 1	1.515	PF 1	218	669.59	670.35	670.35	670.57	0.036392	3.8	57.38	131.16	1.01
LPR520A	Reach 1	1.326	PF 1	218	660.24	661.73	661.06	661.76	0.001803	1.47	151.15	166.59	0.26
LPR520A	Reach 1	1.195	PF 1	218	657.29	658.26	658.26	658.57	0.02813	4.54	52.06	92.57	0.96
LPR520A	Reach 1	0.947	PF 1	218	646.09	647.19	646.76	647.23	0.003444	1.67	133.71	199.1	0.34
LPR520A	Reach 1	0.758	PF 1	218	639.07	639.56	639.53	639.64	0.028521	2.3	96.59	431.65	0.81
LPR520A	Reach 1	0.572	PF 1	218	629.8	630.56	630.29	630.6	0.004502	1.54	145.26	298.92	0.37
LPR520A	Reach 1	0.379	PF 1	218	620	620.53	620.53	620.73	0.033673	3.65	62.08	163.95	0.97
LPR520A	Reach 1	0.076	PF 1	218	608.72	609.76		609.77	0.000904	0.81	270.4	395.43	0.17
GibsnWshTb5A	Reach 1	0.692	PF 1	70	568.96	569.42	569.18	569.42	0.002269	0.77	92.39	311.92	0.24
GibsnWshTb5A	Reach 1	0.535	PF 1	70	563.96	564.08	564.08	564.13	0.061764	1.7	41.23	469.01	1.01
GibsnWshTb5A	Reach 1	0.379	PF 1	70	557.98	558.35		558.35	0.001865	0.61	115.48	466.11	0.21
GibsnWshTb5A	Reach 1	0.223	PF 1	70	553.78	554.01	554.01	554.09	0.046999	2.32	30.61	193.64	0.98
GibsnWshTb5	Reach 2	1.445	PF 1	475	569.81	570.46	570.04	570.47	0.001422	0.94	506.96	831.62	0.21
GibsnWshTb5	Reach 2	1.136	PF 1	475	563.06	563.76	563.76	564	0.035568	3.91	121.45	261.25	1.01
GibsnWshTb5	Reach 2	0.947	PF 1	1232	559.92	561.32		561.32	0.000196	0.59	2087.74	1562.32	0.09
GibsnWshTb5	Reach 2	0.758	PF 1	1232	559.92	560.44	560.44	560.63	0.034607	3.53	370.27	1115.34	0.98
GibsnWshTb5	Reach 2	0.589	PF 1	1232	550.3	552.4		552.45	0.001622	1.87	677.21	500.24	0.26
GibsnWshTb5	Reach 2	0.436	PF 1	1232	550	551.15		551.18	0.001504	1.38	900.25	906.03	0.24
GibsnWshTb5	Reach 1	0.146	PF 1	1232	546.43	548.39	547.59	548.46	0.002144	2.06	647.85	539.98	0.3
GibsnWshTb5	Reach 1	0.069	PF 1	1232	544.94	545.93	545.93	546.31	0.026607	5.11	275.28	399.27	0.97
GibsnWshTb4	Reach 1	1.472	PF 1	119	579.56	580.09	579.85	580.1	0.002745	0.86	139.12	466.37	0.27
GibsnWshTb4	Reach 1	1.326	PF 1	119	574.4	574.64	574.64	574.71	0.047777	2.23	54.72	373.27	0.98
GibsnWshTb4	Reach 1	1.17	PF 1	119	569.38	570.2	569.75	570.21	0.000891	0.65	185.8	423.76	0.16
GibsnWshTb4	Reach 1	0.986	PF 1	264	565.63	566.08	566	566.15	0.018473	2.18	123.01	428.01	0.68
GibsnWshTb4	Reach 1	0.758	PF 1	264	558.64	559.59	559.16	559.62	0.002535	1.27	209.6	360.34	0.28
GibsnWshTb4	Reach 1	0.379	PF 1	264	548.87	549.46	549.35	549.55	0.014347	2.41	113.06	296.11	0.64
GibsnWshTb4	Reach 1	0.189	PF 1	264	543.19	544.01		544.04	0.002885	1.28	210.17	414.32	0.3
GibsnWshTb4	Reach 1	0.099	PF 1	264	539.96	540.51	540.51	540.69	0.036167	3.43	78.63	243.9	0.98
GibsnWshTb3	Reach 1	1.892	PF 1	927	586.35	587.05	587.05	587.28	0.033729	3.85	247.39	590.34	0.99
GibsnWshTb3	Reach 1	1.784	PF 1	927	582.34	583.97	583.14	584	0.001416	1.45	643.95	590.62	0.24
GibsnWshTb3	Reach 1	1.595	PF 1	927	577.69	579.64	579.64	580.21	0.0267	6.05	153.3	138.26	1.01
GibsnWshTb3	Reach 1	1.368	PF 1	927	569.89	571.09		571.11	0.000581	0.91	1015.45	884.98	0.15
GibsnWshTb3	Reach 1	1.138	PF 1	927	567.43	569.2	568.7	569.4	0.006706	3.67	268.75	222.73	0.53
GibsnWshTb3	Reach 1	0.947	PF 1	1418	559.7	562.63		562.96	0.006217	4.61	307.62	139.54	0.55
GibsnWshTb3	Reach 1	0.756	PF 1	1418	548.99	551.22	551.22	551.98	0.023361	7	204.74	145.39	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
GibsnWshTb3	Reach 1	0.562	PF 1	1418	540.02	542.24		542.33	0.003191	2.51	563.85	385.56	0.37
GibsnWshTb3	Reach 1	0.416	PF 1	1418	534.74	536.32	536.32	536.85	0.027087	5.83	243.04	233.88	1.01
GibsnWshTb3	Reach 1	0.183	PF 1	1418	529.99	531.71		531.72	0.000272	0.78	1809.99	1139.04	0.11
GibsnWshTb2	Reach 1	1.187	PF 1	57	558.29	558.47	558.47	558.54	0.063406	2.08	27.48	242.68	1.07
GibsnWshTb2	Reach 1	0.838	PF 1	154	549.35	549.95	549.66	549.96	0.002503	0.94	164.76	444.46	0.26
GibsnWshTb2	Reach 1	0.649	PF 1	154	543.88	544.22	544.17	544.29	0.022964	2.14	72.66	299.37	0.74
GibsnWshTb2	Reach 1	0.459	PF 1	154	537.32	538.04	537.72	538.06	0.002844	1.13	137.78	314.58	0.29
GibsnWshTb2	Reach 1	0.27	PF 1	154	530.55	530.96	530.96	531.09	0.041539	2.93	53.55	216.68	1
GibsnWshTb1A	Reach 1	0.989	PF 1	169	610.73	611.72	611.55	611.87	0.051247	3.14	53.84	83.44	0.69
GibsnWshTb1A	Reach 1	0.886	PF 1	169	598.45	599.43	599.03	599.47	0.012725	1.55	109.18	171.92	0.34
GibsnWshTb1A	Reach 1	0.758	PF 1	169	578.93	579.96	579.96	580.26	0.110689	4.45	37.95	61.98	1
GibsnWshTb1A	Reach 1	0.568	PF 1	169	552	553.85	553	553.92	0.00884	2.09	80.73	61.3	0.32
GibsnWshTb1A	Reach 1	0.379	PF 1	169	530.81	531.61	531.61	531.84	0.125655	3.85	43.87	98.01	1.01
GibsnWshTb1	Reach 2	1.299	PF 1	524	569.77	571.56	571.55	572.1	0.025826	5.92	88.55	80.4	0.99
GibsnWshTb1	Reach 2	1.136	PF 1	524	555.21	557.64	557.26	557.97	0.011375	4.63	113.28	80.39	0.69
GibsnWshTb1	Reach 2	0.947	PF 1	1009	537.36	538.85	538.85	539.35	0.025441	5.73	182.35	202.64	0.98
GibsnWshTb1	Reach 2	0.758	PF 1	1009	529.12	531.36	530	531.38	0.00037	0.96	1066.53	646.7	0.13
GibsnWshTb1	Reach 2	0.568	PF 1	1009	529.28	530.38	530.04	530.43	0.005394	1.91	529.14	812.54	0.42
GibsnWshTb1	Reach 2	0.379	PF 1	1009	518.12	519.4	519.4	519.82	0.029469	5.18	195.37	250.42	1.01
GibsnWshTb1	Reach 1	0.152	PF 1	1009	509.95	512.21		512.27	0.001817	2.01	535.55	435.88	0.28
GibsnWshTb1	Reach 1	0.09	PF 1	1009	509.15	511.33		511.42	0.003927	2.37	427.16	396.58	0.39
GibsnWsh	Reach 6	4.008	PF 1	318	633.88	634.76	634.76	635.06	0.046613	4.43	72.6	124.76	0.99
GibsnWsh	Reach 6	3.78	PF 1	730	609.16	611.43	610.89	611.61	0.008231	3.51	226.98	199.34	0.49
GibsnWsh	Reach 6	3.59	PF 1	730	599.17	600.73		600.88	0.014577	3.1	237.46	297.97	0.58
GibsnWsh	Reach 6	3.211	PF 1	730	578.84	580.4	580.4	580.74	0.029434	4.86	169.35	259.3	0.85
GibsnWsh	Reach 6	3.022	PF 1	730	572.15	574.99	573.47	575.03	0.001373	1.59	461.03	256.51	0.2
GibsnWsh	Reach 6	2.833	PF 1	1142	567.43	569.07	569.06	569.56	0.040048	5.61	203.41	203.18	0.99
GibsnWsh	Reach 6	2.643	PF 1	1142	559.94	560.52	560.21	560.54	0.00413	1.25	862.62	1525.63	0.29
GibsnWsh	Reach 6	2.454	PF 1	1142	555.68	557.97	556.88	558	0.00173	1.48	784.79	612.43	0.22
GibsnWsh	Reach 6	2.133	PF 1	1142	548.47	549.5	549.5	549.8	0.043956	4.4	266.01	483.96	0.96
GibsnWsh	Reach 5	1.958	PF 1	2268	540	542.42		542.44	0.000648	1.16	1950.42	942.54	0.14
GibsnWsh	Reach 5	1.837	PF 1	2268	540	540.9	540.79	541.17	0.027678	4.18	550.32	708.48	0.8
GibsnWsh	Reach 4	1.627	PF 1	2701	529.99	533.24		533.36	0.003486	2.86	954.93	446.22	0.33
GibsnWsh	Reach 4	1.473	PF 1	2701	529.99	531.83		531.86	0.00111	1.33	2038.59	1245.53	0.18
GibsnWsh	Reach 3	1.355	PF 1	2701	527.67	530.88		530.95	0.001952	2.23	1318.62	774.14	0.25
GibsnWsh	Reach 3	1.181	PF 1	2701	524.52	527.29	526.61	527.55	0.009609	4.15	670.01	400.47	0.54
GibsnWsh	Reach 2	0.945	PF 1	3566	520	523.85		523.94	0.001572	2.34	1555.76	588.35	0.24
GibsnWsh	Reach 2	0.768	PF 1	3566	516.87	519.4	519.4	520.07	0.026593	8.15	558.16	410.58	0.93
GibsnWsh	Reach 2	0.579	PF 1	3566	510.01	514.26		514.31	0.00086	1.75	2104.89	816.39	0.17
GibsnWsh	Reach 2	0.39	PF 1	3566	509.98	512.62		512.73	0.003857	2.57	1434.99	1006.95	0.34
GibsnWsh	Reach 1	0.2	PF 1	4336	505.66	510.2		510.29	0.001774	2.44	1835.05	762.61	0.25
GibsnWsh	Reach 1	0.166	PF 1	4336	505.45	509.95		510.02	0.001239	2.22	1989.8	692.82	0.21
CopprWshTb1	Reach 1	4.008	PF 1	3652	718	720.82	720.51	721.03	0.00683	3.64	1008.18	950.69	0.61
CopprWshTb1	Reach 1	3.775	PF 1	3652	709.67	711.15	710.89	711.35	0.00908	3.98	1087.45	1145.85	0.7
CopprWshTb1	Reach 1	3.569	PF 1	3514	700.03	702.39	701.95	702.67	0.007058	4.24	828.26	612.03	0.64
CopprWshTb1	Reach 1	3.228	PF 1	3514	688.09	689.76	689.47	689.93	0.007048	3.3	1065.38	1167.59	0.6
CopprWshTb1	Reach 1	2.652	PF 1	3376	664.71	666.39	666.09	666.64	0.008363	4.01	842.46	792.09	0.68
CopprWshTb1	Reach 1	2.474	PF 1	3376	657.04	659.54	659.08	659.79	0.006456	3.97	855.63	727.02	0.61

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
CopprWshTb1	Reach 1	2.273	PF 1	3376	648.2	651.27	651.07	651.56	0.009367	4.4	819.02	925.71	0.72
CopprWshTb1	Reach 1	2.083	PF 1	3376	641.63	643.7	643.29	643.89	0.006359	3.49	968.27	915.3	0.59
CopprWshTb1	Reach 1	1.561	PF 1	3238	619.48	621.12	620.95	621.39	0.01101	4.2	778.59	856.47	0.76
CopprWshTb1	Reach 1	1.326	PF 1	3238	610.31	612.9	612.34	613.03	0.004489	2.88	1128.18	1106.4	0.49
CopprWshTb1	Reach 1	1.055	PF 1	3238	599.29	600.87	600.87	601.22	0.019936	4.81	702.17	1028.63	0.98
CopprWshTb1	Reach 1	0.765	PF 1	3238	587.75	591.62		591.65	0.000483	1.28	2531.07	1510.35	0.17
CopprWshTb1	Reach 1	0.64	PF 1	3207	588.77	590.32	590.32	590.67	0.020755	4.72	680.63	968.4	0.99
CopprWshTb1	Reach 1	0.568	PF 1	3207	579.56	582.82	582.07	583.12	0.004312	4.4	741.74	409.41	0.54
CopprWshTb1	Reach 1	0.252	PF 1	3207	568.54	570.2	570.2	570.64	0.016022	5.36	632.12	810.05	0.93
CopprWshTb1	Reach 1	0.048	PF 1	3207	560.15	562.82		562.91	0.001792	2.46	1312.93	843.94	0.34
CopprWsh	Reach 5	8.714	PF 1	3091	715.58	717.47		717.65	0.004987	3.44	899.94	728.37	0.54
CopprWsh	Reach 5	8.568	PF 1	3091	709.2	710.91	710.91	711.42	0.015018	5.89	580.34	654.72	0.93
CopprWsh	Reach 5	8.379	PF 1	3376	701.56	703.75	703.17	703.89	0.003589	2.98	1142.22	931.15	0.46
CopprWsh	Reach 5	8.189	PF 1	3376	696.57	698.18	697.95	698.45	0.009151	4.15	819.48	822.57	0.7
CopprWsh	Reach 5	8.035	PF 1	3376	690.73	692.47	692.06	692.68	0.005586	3.64	948.92	861.21	0.57
CopprWsh	Reach 5	7.811	PF 1	3376	682.35	683.99	683.74	684.21	0.0095	3.77	897.37	1021.31	0.7
CopprWsh	Reach 5	7.639	PF 1	3376	674.71	676.5	676.16	676.75	0.007166	4.08	838.68	742.63	0.64
CopprWsh	Reach 5	7.503	PF 1	3376	669.18	670.87	670.69	671.16	0.008507	4.64	938.13	1189.84	0.7
CopprWsh	Reach 4	7.244	PF 1	671	657.52	658.54	658.18	658.59	0.003527	1.8	371.78	588.48	0.4
CopprWsh	Reach 4	6.784	PF 1	671	639.74	640.51	640.5	640.68	0.024107	3.33	203.5	563.39	0.96
CopprWsh	Reach 4	6.486	PF 1	671	626.62	627.67		627.73	0.004084	1.99	338.02	532.87	0.43
CopprWsh	Reach 4	6.297	PF 1	671	618.55	619.47	619.47	619.76	0.021678	4.38	156.62	289.67	0.99
CopprWsh	Reach 4	6.084	PF 1	671	610.15	611.16	610.79	611.22	0.003594	2.06	328.47	462.46	0.42
CopprWsh	Reach 4	5.931	PF 1	671	604.28	604.94	604.94	605.17	0.023814	3.8	179.67	437	0.99
CopprWsh	Reach 4	5.728	PF 1	671	596.03	597.06	596.68	597.1	0.003136	1.51	444.68	845.93	0.37
CopprWsh	Reach 4	5.539	PF 1	671	589.15	590.29	590.29	590.56	0.02069	4.48	185.73	398.76	0.97
CopprWsh	Reach 4	5.414	PF 1	671	586.53	587.7	587.07	587.71	0.000391	0.68	985.26	1306.09	0.14
CopprWsh	Reach 3	5.158	PF 1	3283	579.59	580.49	580.49	580.78	0.023302	4.36	753.68	1312.39	1.01
CopprWsh	Reach 3	4.918	PF 1	3283	568.63	571.14	570.36	571.28	0.003064	2.91	1137.1	876.17	0.43
CopprWsh	Reach 2	4.589	PF 1	5869	558.93	561.61	561.25	561.85	0.008149	3.93	1494.55	1381.49	0.67
CopprWsh	Reach 2	4.395	PF 1	5869	554.18	556.23	555.68	556.36	0.003746	2.91	2024.29	1725.17	0.46
CopprWsh	Reach 2	4.224	PF 1	5869	548.22	550.99	550.8	551.19	0.009778	3.64	1626.1	2018.56	0.7
CopprWsh	Reach 2	4.021	PF 1	5869	541	544.71		544.87	0.003933	3.21	1844.49	1449.52	0.48
CopprWsh	Reach 2	3.832	PF 1	5869	537.13	539.36	538.97	539.61	0.007361	4.03	1457.46	1201.97	0.64
CopprWsh	Reach 2	3.539	PF 1	5784	527.87	531.16		531.33	0.004025	3.31	1749.82	1256.16	0.49
CopprWsh	Reach 2	3.263	PF 1	5784	517.45	520.74	520.74	521.3	0.014286	6.25	1030.42	959.38	0.92
CopprWsh	Reach 2	3.126	PF 1	5784	512.57	516.08	514.57	516.19	0.001314	2.67	2197.14	1023.96	0.3
CopprWsh	Reach 2	2.788	PF 1	5784	506.93	509.9	509.8	510.65	0.013781	6.95	839.73	569.3	0.93
CopprWsh	Reach 2	2.551	PF 1	5699	499.73	502.94	501.9	503.13	0.003223	3.47	1651.36	948.1	0.46
CopprWsh	Reach 2	2.316	PF 1	5699	495.46	498.83	497.98	499.02	0.00339	3.51	1634.55	1030.35	0.47
CopprWsh	Reach 2	2.127	PF 1	5699	489.45	492.03	491.97	492.82	0.014332	7.16	797.35	471.98	0.96
CopprWsh	Reach 1	1.644	PF 1	9060	479.15	482.58		482.81	0.002275	3.83	2378.03	929.39	0.41
CopprWsh	Reach 1	1.564	PF 1	9060	478.13	481.49	480.46	481.7	0.003002	3.73	2431.38	1163.75	0.45
LPR505A	Reach 3	3.495	PF 1	1344	848.71	851.62	851.62	852.53	0.076583	7.65	176.73	100.45	1
LPR505A	Reach 3	3.3	PF 1	1344	800.04	803.04	802.31	803.35	0.024312	4.51	298.11	153.24	0.57
LPR505A	Reach 3	3.18	PF 1	1344	774.43	776.18	776.18	776.78	0.088956	6.22	216	181.4	1
LPR505A	Reach 2	2.912	PF 1	1344	726	729.04	728	729.15	0.014774	2.68	502.46	393.38	0.42
LPR505A	Reach 2	2.686	PF 1	1344	693.31	695.28	695.28	695.93	0.071332	6.57	214.81	175.81	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
LPR505A	Reach 2	2.298	PF 1	2370	628.63	633.49	632	633.84	0.01439	4.74	499.86	161.76	0.47
LPR505A	Reach 2	2.108	PF 1	2370	605.84	608.84	608.56	609.45	0.049329	6.31	376.29	207.97	0.81
LPR505A	Reach 2	2.033	PF 1	2370	592.1	596.07	595.2	596.52	0.02321	5.36	446.49	186.92	0.58
LPR505A	Reach 2	1.991	PF 1	2370	587.87	591.81	590.79	592.15	0.01669	4.7	519.59	227.28	0.5
LPR505A	Reach 1	1.88	PF 1	2370	570.01	572.78	572.78	573.62	0.080893	7.36	321.97	195.62	1.01
LPR505A	Reach 1	1.728	PF 1	2370	550.28	555.2	552.91	555.34	0.005469	3.06	775.31	233.13	0.3
LPR505A	Reach 1	1.518	PF 1	3396	535.68	538.49	538.16	539.06	0.047199	6.09	557.87	301.01	0.79
LPR505A	Reach 1	1.319	PF 1	3396	515.96	520.54	518.88	520.74	0.008906	3.59	958.82	367.79	0.37
LPR505A	Reach 1	1.241	PF 1	3396	510	511.82	511.82	512.62	0.07396	7.24	480.81	310.97	0.97
LPR505A	Reach 1	1.132	PF 1	3396	500	504.11		504.19	0.003339	2.27	1511.02	536.91	0.23
LPR505A	Reach 1	1.045	PF 1	3396	500	502.31	501.03	502.38	0.004704	2.07	1672.76	889.75	0.25
LPR505A	Reach 1	0.667	PF 1	3396	489.98	492.6	491.14	492.69	0.005005	2.33	1456.54	616.07	0.27
LPR505B	Reach 1	0.582	PF 1	273	609.73	610.28	610.27	610.47	0.114079	3.57	78.81	206.88	0.96
LPR505B	Reach 1	0.379	PF 1	273	597.45	599.51		599.53	0.00351	1.34	205.42	167.58	0.2
LPR505B	Reach 1	0.189	PF 1	273	587.79	589.08	589.08	589.49	0.103369	5.13	53.26	66.9	1.01
LPR505B	Reach 1	0.055	PF 1	273	578.44	582.02		582.03	0.000766	0.83	329.47	160.86	0.1
LPR505C	Reach 1	0.568	PF 1	209	971.12	972.97	972.97	973.45	0.099274	5.54	37.73	40.8	1.02
LPR505C	Reach 1	0.379	PF 1	209	880.12	881.37	881.16	881.62	0.049471	3.96	52.82	56.21	0.72
LPR505C	Reach 1	0.189	PF 1	209	810.21	811.27	811.27	811.58	0.106102	4.49	47.31	79.95	0.99
LPR510A	Reach 1	1.598	PF 1	614	666.39	668.09		668.14	0.006526	1.77	356.26	326.3	0.28
LPR510A	Reach 1	1.515	PF 1	614	659.86	660.84	660.8	661.03	0.098056	3.58	172.7	367.39	0.91
LPR510A	Reach 1	1.326	PF 1	614	650.25	652.27		652.29	0.002998	1.14	536.84	460.55	0.18
LPR510A	Reach 1	1.136	PF 1	1557	634.47	636.09	635.98	636.44	0.066582	4.78	331.17	357.73	0.84
LPR510A	Reach 1	0.947	PF 1	1557	618.54	620.39	619.53	620.44	0.006966	1.77	881.97	746.31	0.28
LPR510A	Reach 1	0.758	PF 1	1557	608.09	610.54	609.76	610.68	0.014629	3.03	516.77	354.01	0.43
LPR510A	Reach 1	0.565	PF 1	1557	594.33	597.37		597.52	0.011528	3.16	497.2	271.44	0.39
LPR510A	Reach 1	0.379	PF 1	1557	570.08	572.97	572.97	573.91	0.076617	7.79	199.85	106.9	1
LPR510A	Reach 1	0.181	PF 1	1557	484.24	491.77	488.5	491.98	0.005005	3.65	426.96	91.78	0.3
LPR551A	Reach 1	1.438	PF 1	107	539.7	540.87	540.19	540.88	0.001864	0.67	161.09	234.21	0.14
LPR551A	Reach 1	1.175	PF 1	652	517.92	519.81	519.45	520.05	0.029648	3.98	173.23	165.03	0.6
LPR551A	Reach 1	1.032	PF 1	652	510.01	512.86		512.93	0.004601	2.2	325.85	186.62	0.26
LPR551A	Reach 1	0.911	PF 1	652	506.06	509.31		509.41	0.006584	2.56	266.44	139.05	0.3
LPR551A	Reach 1	0.793	PF 1	652	497.95	500.6	500.25	500.98	0.04222	4.97	131.56	91.15	0.72
LPR551A	Reach 1	0.708	PF 1	652	491.54	495.38	493.72	495.47	0.005681	2.46	264.8	113.22	0.28
LPR551A	Reach 1	0.594	PF 1	652	487.82	489.63	489.09	489.76	0.018823	2.88	227.56	202.44	0.46
LPR551A	Reach 1	0.498	PF 1	652	479.35	481.96		482.12	0.012474	3.28	209	122.44	0.41
LPR551A	Reach 1	0.411	PF 1	652	475.31	478.58	477.52	478.62	0.005008	1.51	432.12	351.25	0.24
LPR615B	Reach 1	0.705	PF 1	178	520	521.1		521.11	0.001332	0.86	208.53	292.91	0.17
LPR615B	Reach 1	0.548	PF 1	178	517.21	517.62	517.62	517.69	0.067813	2.1	85.05	565.53	0.94
LPR615B	Reach 1	0.292	PF 1	178	509.7	510.73	510.22	510.74	0.001396	0.67	267.43	584.43	0.17
LPR615B	Reach 1	0.083	PF 1	178	506.16	506.56	506.5	506.63	0.034298	2.09	84.96	331.51	0.73
LPR615A	Reach 2	4.557	PF 1	522	570	570.94	570.6	570.99	0.006426	1.8	301.17	497.23	0.37
LPR615A	Reach 2	4.338	PF 1	522	565.44	566.55		566.57	0.00251	1.12	468.53	718.8	0.23
LPR615A	Reach 2	4.179	PF 1	522	559.66	560.42	560.42	560.57	0.07031	3.05	171.27	662.32	1.05
LPR615A	Reach 2	3.948	PF 1	739	552.12	553.36	552.74	553.39	0.002363	1.25	599.96	760.26	0.23
LPR615A	Reach 2	3.8	PF 1	739	547.61	548.27	548.25	548.47	0.046137	3.55	208.82	475.54	0.93
LPR615A	Reach 2	3.61	PF 1	739	539.95	541.63	540.83	541.65	0.002586	1.29	585.66	770.41	0.24
LPR615A	Reach 2	3.401	PF 1	739	535.05	535.84	535.63	535.92	0.015024	2.2	336.34	657.89	0.54

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
LPR615A	Reach 2	3.218	PF 1	739	529.17	530.71	530.09	530.74	0.002729	1.33	567.75	771.55	0.25
LPR615A	Reach 2	3.042	PF 1	739	522.95	523.77	523.77	524.03	0.050897	4.08	181.19	349.93	1
LPR615A	Reach 2	2.853	PF 1	957	517.63	519.56	518.58	519.59	0.001754	1.38	710.72	676.02	0.22
LPR615A	Reach 2	2.693	PF 1	957	515.03	515.92	515.75	516.03	0.020307	2.61	366.45	693.39	0.63
LPR615A	Reach 2	2.524	PF 1	957	509.93	511.47	510.7	511.5	0.002251	1.43	678.21	686.43	0.24
LPR615A	Reach 2	2.35	PF 1	957	506.68	507.77	507.45	507.84	0.008881	2.06	472.41	789.19	0.44
LPR615A	Reach 1	2.155	PF 1	957	500	501.68		501.75	0.004205	2.02	478.21	449.18	0.33
LPR615A	Reach 1	2.012	PF 1	957	498.01	500.11		500.13	0.001281	1.15	831.54	726.28	0.18
LPR615A	Reach 1	1.906	PF 1	1175	496.28	497.33	497.33	497.65	0.043868	4.59	260.9	435.34	0.97
LPR615A	Reach 1	1.717	PF 1	1175	489.77	492.24	491.11	492.28	0.00162	1.63	760.55	555.84	0.22
LPR615A	Reach 1	1.527	PF 1	1175	486.84	488.38	488.1	488.56	0.015506	3.41	351.14	434.61	0.61
LPR615A	Reach 1	1.338	PF 1	1175	479.98	482.18	481.25	482.24	0.003385	1.97	598.31	480.49	0.3
LPR615A	Reach 1	1.148	PF 1	1175	475.73	477.18	476.76	477.26	0.008056	2.2	537.32	719.22	0.43
LPR615A	Reach 1	0.966	PF 1	1175	470.2	471.18	470.83	471.21	0.005005	1.43	826.16	1400.96	0.32
LPR651A	Reach 2	4.42	PF 1	868	569.97	570.4	570.23	570.44	0.011476	1.64	531.23	1326.43	0.45
LPR651A	Reach 2	4.201	PF 1	822	563.15	564.52		564.55	0.002783	1.38	616.55	847.73	0.26
LPR651A	Reach 2	4.032	PF 1	822	556.92	557.78	557.78	558.06	0.047987	4.19	198.31	391.76	0.98
LPR651A	Reach 2	3.848	PF 1	822	548.67	551.24		551.27	0.001889	1.46	597.11	579.99	0.22
LPR651A	Reach 2	3.709	PF 1	822	546.07	547.06	547.06	547.37	0.049493	4.44	185.21	308.54	1.01
LPR651A	Reach 2	3.246	PF 1	775	530.35	532.16		532.19	0.00179	1.34	584.57	543.98	0.22
LPR651A	Reach 2	3.097	PF 1	775	527.17	527.94	527.94	528.21	0.048319	4.14	188.61	371.93	0.98
LPR651A	Reach 2	2.892	PF 1	775	520.21	521.79		521.82	0.001727	1.22	650.51	721.06	0.21
LPR651A	Reach 2	2.734	PF 1	775	516.7	517.46	517.46	517.69	0.050732	3.93	198.92	445.81	0.99
LPR651A	Reach 2	2.529	PF 1	775	509.66	511.13	510.34	511.15	0.001723	1.15	677.88	752.83	0.2
LPR651A	Reach 2	2.339	PF 1	775	505.82	506.55	506.46	506.68	0.028739	2.91	267.34	594.85	0.74
LPR651A	Reach 2	2.15	PF 1	729	498.73	500.34		500.36	0.002566	1.3	564.19	710.74	0.24
LPR651A	Reach 2	1.961	PF 1	729	493.65	494.44	494.32	494.56	0.023184	2.8	261.43	528.16	0.68
LPR651A	Reach 2	1.796	PF 1	729	488.18	489.7	488.96	489.73	0.002424	1.3	565.66	723.69	0.24
LPR651A	Reach 2	1.582	PF 1	729	481.42	482.14	482.14	482.37	0.048558	3.9	190.48	437.32	0.97
LPR651A	Reach 2	1.42	PF 1	729	477.83	479.45	478.46	479.46	0.00065	0.79	927.32	845.05	0.13
LPR651A	Reach 1	1.284	PF 1	2203	474.86	475.82	475.82	476.13	0.022685	4.52	488.38	809.13	1.01
LPR651A	Reach 1	1.203	PF 1	2203	470.21	472.81		472.96	0.00342	3.12	737.81	694.21	0.45
LPR651A	Reach 1	1.112	PF 1	2203	469.53	470.82	470.55	470.91	0.00532	2.36	935.85	1368.75	0.5
LPR651A	Reach 1	0.824	PF 1	2203	462.41	464.86	464.14	464.93	0.003006	2.18	1013.68	1149.41	0.4
LPR650C	Reach 1	1.006	PF 1	109	530.41	530.88	530.74	530.91	0.011516	1.35	81.78	309.92	0.43
LPR650C	Reach 1	0.799	PF 1	109	525.05	525.6		525.61	0.002642	0.73	150	440.48	0.21
LPR650C	Reach 1	0.611	PF 1	109	518.5	518.92	518.87	519	0.038411	2.32	47.06	177.15	0.78
LPR650C	Reach 1	0.422	PF 1	109	512.22	512.86	512.55	512.87	0.002396	0.72	152.54	421.82	0.21
LPR650C	Reach 1	0.284	PF 1	109	507.52	507.79	507.79	507.88	0.071872	2.41	45.23	249.13	1
LPR650B	Reach 1	2.113	PF 1	725	563.6	564.77	564.46	564.83	0.008117	1.93	375.74	562.71	0.42
LPR650B	Reach 1	1.889	PF 1	723	558.64	559.66		559.68	0.002699	1.15	632.75	956.42	0.24
LPR650B	Reach 1	1.645	PF 1	723	550.45	551.16	551.07	551.29	0.032576	2.97	243.3	540.65	0.78
LPR650B	Reach 1	1.323	PF 1	723	540.03	541.62		541.65	0.002264	1.41	565.42	732.87	0.24
LPR650B	Reach 1	1.086	PF 1	723	533.63	534.15	534.1	534.29	0.039486	3.01	240.31	606.91	0.84
LPR650B	Reach 1	0.876	PF 1	722	526.92	528.03	527.48	528.04	0.002129	1.04	697.31	1027.98	0.22
LPR650B	Reach 1	0.637	PF 1	722	519.68	520.49	520.47	520.7	0.04746	3.72	194.18	418.78	0.95
LPR650B	Reach 1	0.373	PF 1	722	509.9	511.16		511.18	0.002586	1.34	543.66	647.6	0.25
LPR650B	Reach 1	0.184	PF 1	722	504.64	505.49	505.32	505.6	0.019803	2.59	279.04	530.66	0.63

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
LPR650A	Reach 3	2.951	PF 1	570	549.77	550.41	550.18	550.44	0.006518	1.31	434.23	987.18	0.35
LPR650A	Reach 3	2.841	PF 1	570	544.6	545.56	545.3	545.62	0.010933	2.08	276.47	506.75	0.47
LPR650A	Reach 3	2.652	PF 1	570	540	541.35	540.66	541.38	0.002238	1.19	479.35	585.66	0.23
LPR650A	Reach 3	2.462	PF 1	570	534.47	534.99	534.99	535.18	0.05416	3.47	165.57	456.48	0.98
LPR650A	Reach 3	2.273	PF 1	570	529.93	531.37	530.45	531.38	0.000735	0.78	741.4	810.37	0.13
LPR650A	Reach 2	2.036	PF 1	1548	524.69	525.66	525.5	525.79	0.020842	2.89	538.15	965.53	0.66
LPR650A	Reach 2	1.894	PF 1	1417	519.85	521.96	520.96	521.99	0.002085	1.41	1007.27	918.18	0.23
LPR650A	Reach 2	1.705	PF 1	1417	516.55	517.95	517.58	518.04	0.010118	2.41	593.74	838.78	0.48
LPR650A	Reach 2	1.515	PF 1	1417	510.14	512.85	511.75	512.92	0.003066	2.09	687.84	544.6	0.29
LPR650A	Reach 2	1.141	PF 1	1417	502.43	503.81	503.35	503.88	0.00751	2.1	674.8	858.22	0.41
LPR650A	Reach 1	1.025	PF 1	1436	499.66	501.43		501.46	0.002401	1.41	1020.39	1021.63	0.24
LPR650A	Reach 1	0.947	PF 1	1926	498.17	500.74	499.38	500.77	0.001351	1.23	1585.12	1348.14	0.19
LPR650A	Reach 1	0.758	PF 1	1926	495.05	496.46	496.45	496.91	0.037306	5.46	360.18	410.1	0.96
LPR650A	Reach 1	0.568	PF 1	1926	488.47	490.75	489.72	490.79	0.002348	1.6	1202.09	976.79	0.25
LPR650A	Reach 1	0.444	PF 1	1926	485.23	486.37	486.36	486.66	0.046657	4.31	446.83	744.11	0.98
LPR650A	Reach 1	0.304	PF 1	1926	480.33	483.17	481.8	483.2	0.001622	1.32	1462.82	1177.08	0.21
LPR646A	Reach 1	1.028	PF 1	1551	559.59	560.18	560.18	560.36	0.054539	3.34	464.3	1276.73	0.98
LPR646A	Reach 1	0.763	PF 1	1551	549.64	551.16		551.19	0.002399	1.51	1116.09	1286.56	0.25
LPR646A	Reach 1	0.462	PF 1	1551	539.81	540.72	540.72	540.95	0.049607	3.88	405.13	950.4	0.98
LPR646A	Reach 1	0.196	PF 1	1551	530.06	531.93	531.03	531.97	0.002345	1.52	1038.15	1042.04	0.25
LPR790C	Reach 1	1.088	PF 1	63	512.12	512.41	512.29	512.42	0.002251	0.87	75.65	402.55	0.32
LPR790C	Reach 1	0.962	PF 1	120	509.08	509.47	509.39	509.51	0.007022	1.61	78.14	397.32	0.58
LPR790C	Reach 1	0.774	PF 1	120	504.96	505.25	505.14	505.27	0.002861	1.01	121.82	575.54	0.37
LPR790C	Reach 1	0.583	PF 1	120	498.63	498.87	498.87	498.95	0.023299	2.32	51.95	314.74	0.99
LPR790C	Reach 1	0.394	PF 1	120	494.82	495.75	495.05	495.75	0.000047	0.26	478.78	857.55	0.06
LPR790A	Reach 2	5.068	PF 1	3851	540	541.96	541.28	542.08	0.001945	2.82	1374.38	983.32	0.41
LPR790A	Reach 2	4.781	PF 1	3851	534.42	535.55	535.53	535.89	0.013267	4.68	833.99	1245.51	0.96
LPR790A	Reach 2	4.591	PF 1	3851	529.19	530.84	530.38	530.96	0.002512	2.87	1502.67	1516.47	0.45
LPR790A	Reach 2	4.402	PF 1	3851	525.28	526.67	526.52	526.96	0.007281	4.34	947.83	1163.92	0.75
LPR790A	Reach 2	4.212	PF 1	3851	518.98	520.77	520.45	521	0.004936	3.88	1009.25	963.02	0.63
LPR790A	Reach 2	4.053	PF 1	3729	515.95	517.73	517.21	517.86	0.002841	2.91	1293.54	1232.92	0.48
LPR790A	Reach 2	3.834	PF 1	3729	510	511.94	511.88	512.26	0.009885	4.54	877.77	1476.42	0.85
LPR790A	Reach 2	3.645	PF 1	3729	505.17	506.83		506.98	0.00326	3.1	1219.23	1182.51	0.51
LPR790A	Reach 2	3.454	PF 1	3729	499.17	500.83	500.8	501.21	0.012369	4.95	762.62	962.45	0.95
LPR790A	Reach 2	3.265	PF 1	3729	493.54	495.72	495.15	495.88	0.002924	3.23	1161.29	939.77	0.49
LPR790A	Reach 1	2.903	PF 1	3606	485.91	487.72		487.97	0.006342	4	900.96	896.04	0.7
LPR790A	Reach 1	2.737	PF 1	3606	479.96	481.68	481.48	482	0.007342	4.49	802.69	751.83	0.76
LPR790A	Reach 1	2.66	PF 1	3606	478.08	479.96	479.51	480.1	0.003111	2.99	1218.85	1218.15	0.5
LPR790A	Reach 1	2.484	PF 1	3606	473.08	474.39	474.39	474.85	0.012966	5.43	676.35	834.08	0.98
LPR790A	Reach 1	2.402	PF 1	3606	470	472.08		472.24	0.002873	3.24	1115.62	872.36	0.49
LPR790A	Reach 1	2.278	PF 1	3606	466.79	468.21	468.21	468.71	0.013279	5.69	634.11	654.25	1.01
LPR790A	Reach 1	2.119	PF 1	3606	460	461.57	461.04	461.71	0.003001	3.03	1191.24	1019.29	0.49
LPR790B	Reach 1	2.76	PF 1	359	489.45	490.05	489.9	490.12	0.005465	2.05	177.55	464.97	0.56
LPR790B	Reach 1	2.651	PF 1	359	486.77	487.54	487.31	487.61	0.003559	2.02	180.55	357.2	0.47
LPR790B	Reach 1	2.571	PF 1	359	484.11	484.53	484.53	484.67	0.018989	3.01	120.8	456.44	0.98
LPR790B	Reach 1	2.411	PF 1	489	477.85	478.98	478.62	479.06	0.002731	2.25	221.75	312.66	0.44
LPR790B	Reach 1	2.337	PF 1	489	476.35	476.94	476.9	477.11	0.011958	3.36	152.99	373.44	0.85
LPR790B	Reach 1	2.234	PF 1	489	472.17	473.54	473.2	473.65	0.003914	2.62	187.38	262.71	0.52

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
LPR790B	Reach 1	2.122	PF 1	489	469.3	470.25	470.15	470.36	0.00849	2.58	190.22	476.23	0.7
LPR790B	Reach 1	1.946	PF 1	489	466.24	467.09	466.76	467.12	0.001866	1.45	338.69	642.84	0.34
LPR790B	Reach 1	1.813	PF 1	489	463.5	463.96	463.96	464.13	0.017967	3.28	150.89	473.88	0.98
LPR790B	Reach 1	1.714	PF 1	489	460.05	461.29		461.31	0.001126	1.26	387.74	594.53	0.27
LPR790B	Reach 1	1.419	PF 1	489	457.58	458.95	458.44	459.02	0.002001	2.06	238.1	280.05	0.38
LPR835A	Reach 3	5.05	PF 1	5256	529.96	531.87	531.6	532.32	0.00636	5.36	990.6	659.49	0.75
LPR835A	Reach 3	4.645	PF 1	5256	521.75	524.94	523.99	525.11	0.002043	3.25	1629.98	1026.89	0.43
LPR835A	Reach 2	4.252	PF 1	7321	510.89	515.04	515.04	515.92	0.009957	7.55	991.07	661.44	0.97
LPR835A	Reach 2	4.179	PF 1	7321	509.82	513.59		513.85	0.002049	4.1	1878.56	972.78	0.46
LPR835A	Reach 2	3.989	PF 1	7321	506.58	509.13	509.13	509.9	0.010139	7.1	1087.04	802.2	0.96
LPR835A	Reach 2	3.8	PF 1	7321	500.04	504.21		504.53	0.002392	4.73	1867.12	1175.17	0.5
LPR835A	Reach 2	3.703	PF 1	7321	499.37	501.82	501.8	502.36	0.009494	6.12	1369.56	1324.99	0.9
LPR835A	Reach 1	3.302	PF 1	7612	488.85	491.89		492.15	0.002931	4.1	1869.56	1060.85	0.53
LPR835A	Reach 1	3.23	PF 1	7612	487.55	489.78	489.66	490.31	0.009037	5.85	1317.23	1060.53	0.88
LPR835A	Reach 1	3.033	PF 1	7612	483.26	485.87	485.02	486.04	0.00224	3.33	2293.88	1418.71	0.45
LPR835A	Reach 1	2.656	PF 1	7612	476.35	479.34	478.75	479.64	0.005	4.38	1738.55	1243.86	0.65
LPR833A	Reach 1	1.742	PF 1	449	539.87	540.28	540.17	540.34	0.006138	1.96	229.41	641.57	0.58
LPR833A	Reach 1	1.485	PF 1	449	529.37	529.97	529.88	530.05	0.009629	2.35	192.04	604.7	0.71
LPR833A	Reach 1	1.343	PF 1	449	525.76	526.42	526.21	526.45	0.002844	1.34	335.19	968.31	0.39
LPR833A	Reach 1	1.107	PF 1	449	519.77	520.56	520.47	520.65	0.00892	2.37	191.01	568.56	0.7
LPR833A	Reach 1	0.917	PF 1	500	514.96	515.7		515.74	0.00322	1.62	309.31	726.78	0.43
LPR833A	Reach 1	0.728	PF 1	500	509.34	509.94	509.9	510.05	0.012559	2.69	187.2	593.25	0.82
LPR833A	Reach 1	0.538	PF 1	500	504.13	504.92		504.96	0.002732	1.62	310.2	666.01	0.41
LPR833A	Reach 1	0.393	PF 1	500	499.86	500.45	500.45	500.64	0.017448	3.6	141.26	381.09	0.99
LPR831A	Reach 1	0.775	PF 1	3161	529.88	531.18	531.18	531.66	0.013583	5.57	567.64	598.87	1.01
LPR831A	Reach 1	0.261	PF 1	3161	519.82	521.95	521.05	522.02	0.001193	2.03	1558.07	1206.29	0.31
NotbuschWshTb1B	Reach 1	0.494	PF 1	263	503.56	503.92	503.92	504.04	0.018816	2.8	97.78	437.55	0.96
NotbuschWshTb1B	Reach 1	0.379	PF 1	263	499.81	500.54		500.57	0.00131	1.25	216.54	427.85	0.29
NotbuschWshTb1B	Reach 1	0.189	PF 1	263	496.54	497.22	497.22	497.46	0.01433	4.06	71.55	162.79	0.95
NotbuschWshTb1B	Reach 1	0.059	PF 1	263	489.93	491.43		491.45	0.000517	1.14	230.46	233	0.2
NotbuschWshTb1A	Reach 1	0.568	PF 1	184	498.17	498.83	498.61	498.86	0.002456	1.45	132.5	357.8	0.38
NotbuschWshTb1A	Reach 1	0.379	PF 1	184	494.6	495.33		495.37	0.005384	1.65	111.71	366.13	0.53
NotbuschWshTb1A	Reach 1	0.189	PF 1	184	485.52	486.15	486.15	486.36	0.017966	3.67	50.18	123.17	1.01
NotbuschWshTb1	Reach 3	1.485	PF 1	1039	507.2	508	508	508.23	0.015935	3.93	276.05	626.92	0.98
NotbuschWshTb1	Reach 3	1.326	PF 1	1039	499.91	500.82		500.83	0.000413	0.94	1112.64	1261.4	0.17
NotbuschWshTb1	Reach 3	1.136	PF 1	1039	498.34	499.27	499.27	499.59	0.014354	4.6	233.57	391.03	0.98
NotbuschWshTb1	Reach 3	0.947	PF 1	1651	490.64	493.16		493.37	0.002347	3.69	463.75	286.67	0.47
NotbuschWshTb1	Reach 3	0.875	PF 1	1651	489.23	491.55		491.97	0.006342	5.21	324.43	242.99	0.75
NotbuschWshTb1	Reach 2	0.821	PF 1	1651	487.77	490.42	489.76	490.66	0.003228	3.89	425.81	274.29	0.54
NotbuschWshTb1	Reach 2	0.758	PF 1	1651	486.53	488.16	488.16	488.7	0.013022	5.89	281.04	278.02	1.01
NotbuschWshTb1	Reach 2	0.591	PF 1	1651	479.92	481.47		481.5	0.000489	1.4	1177.3	812.68	0.21
NotbuschWshTb1	Reach 1	0.47	PF 1	1651	479.92	481.23		481.25	0.000334	1.07	1553.01	1231.39	0.17
NotbuschWshTb1	Reach 1	0.379	PF 1	1651	479.92	480.97	480.36	481.01	0.000852	1.47	1132.24	1134.33	0.26
NotbuschWshTb1	Reach 1	0.189	PF 1	1651	476.11	478.15	478.15	478.81	0.012306	6.52	253.4	197.96	1.01
NotbuschWsh	Reach 2	5.488	PF 1	6907	532.24	535.17		535.27	0.000858	2.59	2738.85	1304.73	0.3
NotbuschWsh	Reach 2	5.442	PF 1	6907	531.92	534.64	533.92	534.87	0.002762	3.87	1812.97	1184.51	0.51
NotbuschWsh	Reach 2	5.253	PF 1	6907	528.8	531.9	531.09	532.17	0.002622	4.24	1651.46	839.48	0.51
NotbuschWsh	Reach 2	5.063	PF 1	6907	525.21	526.82	526.82	527.37	0.011342	6.02	1233.09	1359.56	0.96

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

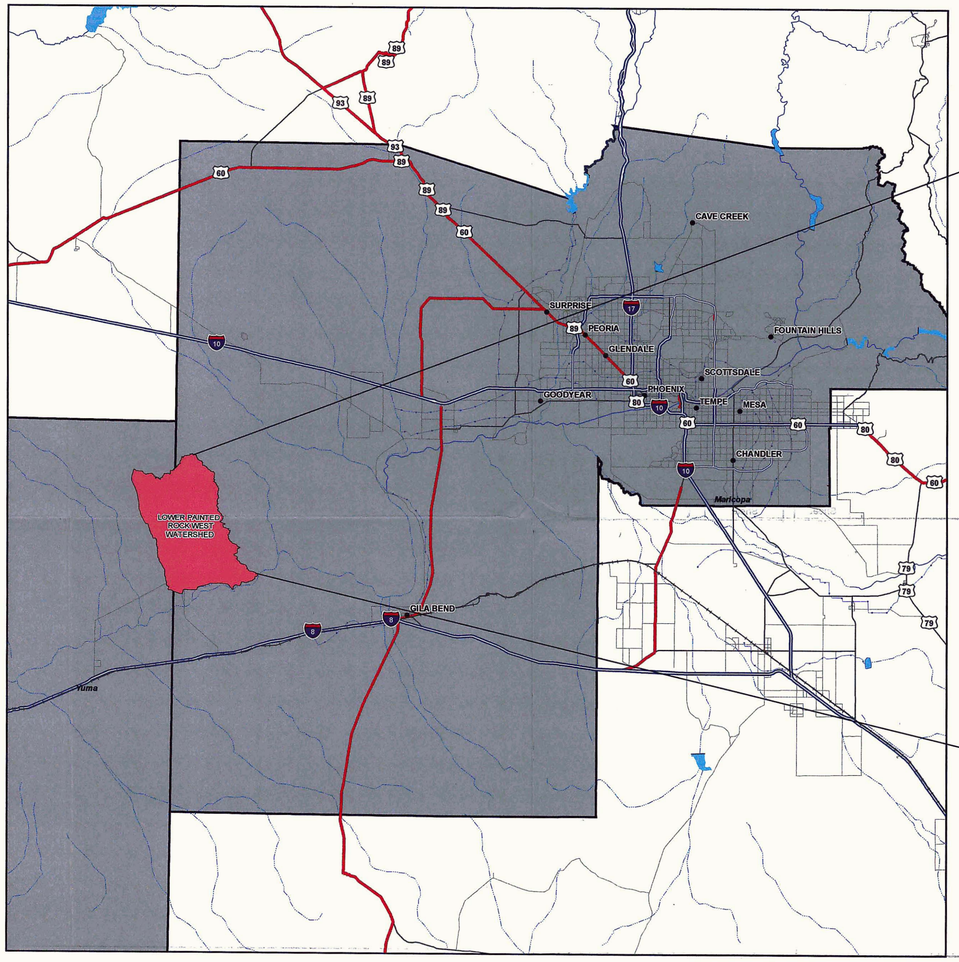
River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
NotbuschWsh	Reach 2	4.874	PF 1	6907	519.97	522.53	521.85	522.68	0.002259	3.09	2257.19	1619.4	0.44
NotbuschWsh	Reach 2	4.684	PF 1	6907	517.12	519.35	518.94	519.64	0.00425	4.45	1751.93	1854.15	0.62
NotbuschWsh	Reach 2	4.444	PF 1	6826	509.98	512.73	512.43	513.19	0.006143	5.43	1285.1	923.29	0.74
NotbuschWsh	Reach 2	4.305	PF 1	6826	507.76	510.49	509.78	510.65	0.002111	3.26	2224.28	1615.45	0.44
NotbuschWsh	Reach 2	4.116	PF 1	6826	504.37	505.89	505.89	506.41	0.012247	5.78	1212.59	1302.45	0.98
NotbuschWsh	Reach 2	3.927	PF 1	6826	499.98	502.73	501.89	502.84	0.001587	2.66	2587.37	1800.01	0.37
NotbuschWsh	Reach 2	3.548	PF 1	6826	494.31	497.58	497.13	497.97	0.004177	5.09	1501.27	1112.57	0.63
NotbuschWsh	Reach 2	3.359	PF 1	6745	488.55	491.14	491.1	491.74	0.010198	6.26	1121.19	980.67	0.93
NotbuschWsh	Reach 2	3.169	PF 1	6745	484.48	486.96		487.14	0.002501	3.44	2026.15	1467.01	0.47
NotbuschWsh	Reach 2	2.983	PF 1	6745	480.01	482.05	482.05	482.57	0.010716	6.4	1313.15	1316.23	0.95
NotbuschWsh	Reach 1	2.66	PF 1	6743	469.99	473		473.29	0.001841	4.3	1598.16	595.96	0.45
NotbuschWsh	Reach 1	2.594	PF 1	6743	469.99	472.44		472.65	0.001711	3.68	1867.33	818.72	0.42
NotbuschWsh	Reach 1	2.543	PF 1	6743	469.99	471.56	471.19	471.9	0.005002	4.73	1473.81	991.67	0.67
RailroadWest	Reach 1	0.717	PF 1	6459	532.24	541.09		541.1	0.000051	0.8	8082.28	1411.58	0.06
RailroadWest	Reach 1	0.56	PF 1	6459	535.78	540.93		540.98	0.000855	1.85	3488.92	1406.84	0.21
RailroadWest	Reach 1	0.44	PF 1	7284	536.01	539.76		539.95	0.003604	3.49	2084.43	958.5	0.42
RailroadWest	Reach 1	0.389	PF 1	7284	535.21	538.98		539.13	0.002474	3.17	2298.02	931.66	0.35
RailroadWest	Reach 1	0.142	PF 1	2028	530	538.87		538.87	0.000013	0.35	5766.45	1242.71	0.03
RailroadWest	Reach 1	0.083	PF 1	2028	530	538.86	531.93	538.86	0.000016	0.4	5124.15	1115.64	0.03
RailroadEast	Reach 1	6.029	PF 1	333	595.99	597		597.03	0.00238	1.28	261.41	409.89	0.28
RailroadEast	Reach 1	5.969	PF 1	333	594.12	594.91	594.91	595.14	0.034921	3.82	88.72	217.41	1
RailroadEast	Reach 1	5.757	PF 1	401	590.01	592.52		592.54	0.000525	1.08	373.23	257.99	0.15
RailroadEast	Reach 1	5.65	PF 1	401	590	592.36		592.37	0.000185	0.63	639.53	418.34	0.09
RailroadEast	Reach 1	5.209	PF 1	1719	583.8	585.24	585.24	585.71	0.027832	5.5	314.01	348.96	1
RailroadEast	Reach 1	5.116	PF 1	1719	580	584.04		584.09	0.000916	1.85	937.07	439.98	0.21
RailroadEast	Reach 1	4.762	PF 1	2133	577.59	580.65		580.76	0.003786	2.68	796.2	562.92	0.4
RailroadEast	Reach 1	4.68	PF 1	2133	576.13	579.15		579.26	0.003181	2.57	828.88	546.32	0.37
RailroadEast	Reach 1	4.411	PF 1	1982	571.57	574.6		574.7	0.003239	2.57	772.89	538.38	0.37
RailroadEast	Reach 1	4.279	PF 1	1982	570.16	573.74		573.77	0.000705	1.49	1336.21	666.06	0.18
RailroadEast	Reach 1	3.94	PF 1	1703	569.91	572.3		572.33	0.000944	1.47	1159.51	721.96	0.2
RailroadEast	Reach 1	3.899	PF 1	1703	569.52	571.88		571.97	0.003748	2.42	705.21	590.43	0.39
RailroadEast	Reach 1	3.584	PF 1	1238	563.22	565.57		565.67	0.003837	2.49	499.83	422.71	0.39
RailroadEast	Reach 1	3.521	PF 1	1238	562.12	564.4	563.61	564.48	0.003316	2.3	539.01	442.49	0.36
RailroadEast	Reach 1	3.208	PF 1	1693	556.7	559.1		559.19	0.003136	2.3	737.51	577.9	0.36
RailroadEast	Reach 1	3.127	PF 1	1693	553.94	555.66	555.66	556.15	0.027523	5.63	303.3	337.41	1.01
RailroadEast	Reach 1	2.81	PF 1	1333	550	554.22		554.23	0.000184	0.84	1582.44	655.39	0.1
RailroadEast	Reach 1	2.62	PF 1	1333	550	553.98		553.99	0.000322	1.01	1313.77	626.93	0.12
RailroadEast	Reach 1	2.431	PF 1	1333	549.84	553.71		553.73	0.000223	0.9	1475.57	637.14	0.1
RailroadEast	Reach 1	2.327	PF 1	1333	548.69	553.64		553.65	0.000093	0.65	2041.52	744.52	0.07
RailroadEast	Reach 1	1.863	PF 1	4473	548.67	552.53		552.58	0.001003	1.9	2349.62	1023.87	0.22
RailroadEast	Reach 1	1.673	PF 1	4473	546.9	551.24	549.56	551.33	0.001618	2.37	1885.92	861.93	0.28
RailroadEast	Reach 1	1.507	PF 1	4473	544.47	546.99	546.99	547.66	0.025167	6.58	679.4	515.96	1.01
RailroadEast	Reach 1	1.221	PF 1	783	540.06	543.15		543.15	0.000053	0.48	1652.89	675.55	0.05
RailroadEast	Reach 1	1.105	PF 1	783	540	543.05		543.08	0.000583	1.2	660.45	423.07	0.16
RailroadEast	Reach 1	0.916	PF 1	783	540	542.17		542.21	0.001408	1.56	503.03	405.07	0.24
RailroadEast	Reach 1	0.747	PF 1	783	539.29	540.78		540.8	0.001778	1.38	567.96	627.57	0.25
RailroadEast	Reach 1	0.627	PF 1	783	537.87	539.39		539.43	0.002722	1.71	457.46	494.46	0.31
RailroadEast	Reach 1	0.347	PF 1	373	534.81	538.86		538.86	0.00007	0.52	727.24	324.76	0.06

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
RailroadEast	Reach 1	0.158	PF 1	373	531.62	538.86	532.88	538.86	0.000001	0.08	4483.55	1304.17	0.01

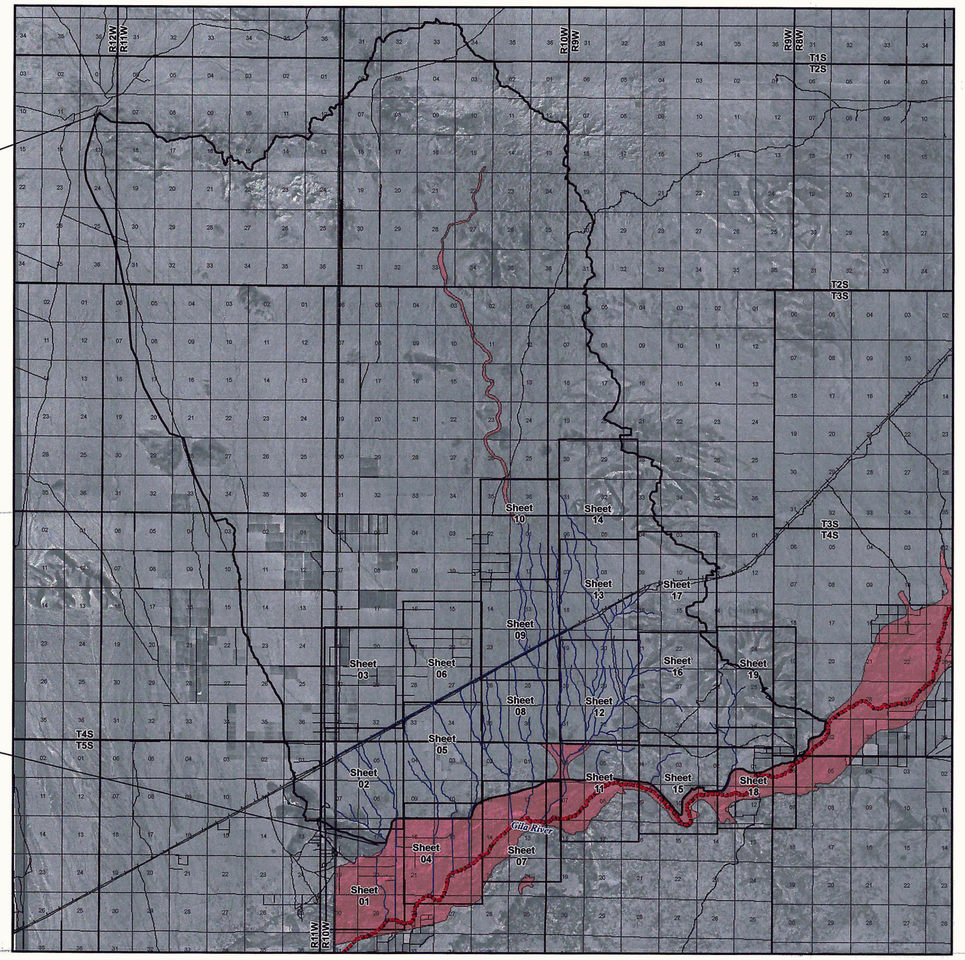
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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



N

Not to Scale



N

Not to Scale

Legend

- Gila River Baseline
- Railroad
- Existing FEMA Zone A
- West Watershed Boundary
- Stream Centerline

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 1-19 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
West Watershed
FCD Contract No. 2004C065

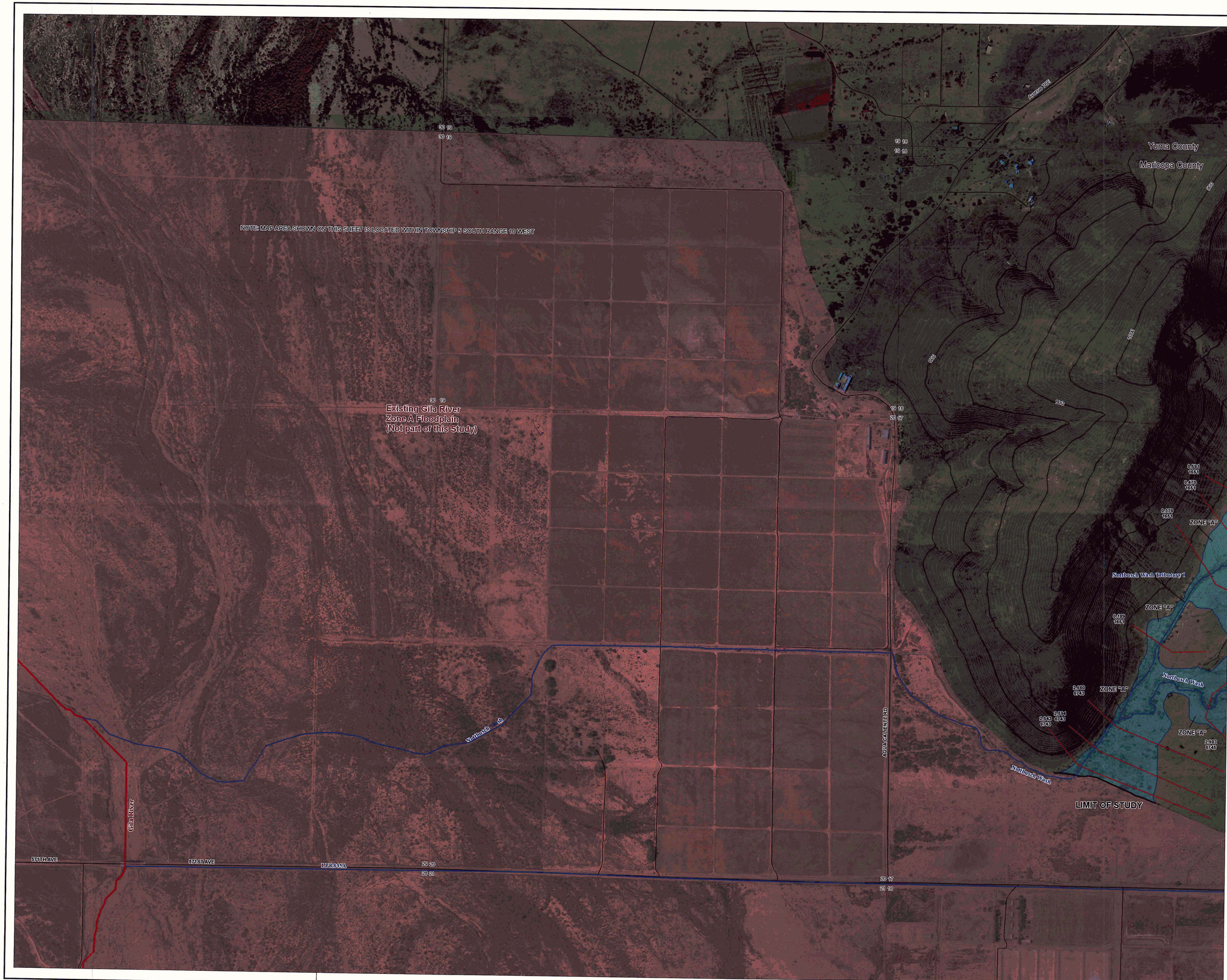
Kimley-Horn and Associates, Inc.

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

LAYOUT	DRAFTED	CHECKED
DRAWING SCALE(S)		
ORIGINAL PLAN DATE		SHEET NO.
LATEST REVISION		COVER
PROJECT NUMBER		OF 19 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
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number	1.031
Q100	9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

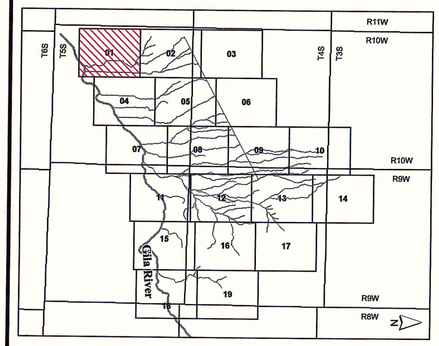
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 9/13/07 ARIZONA, U.S.A.

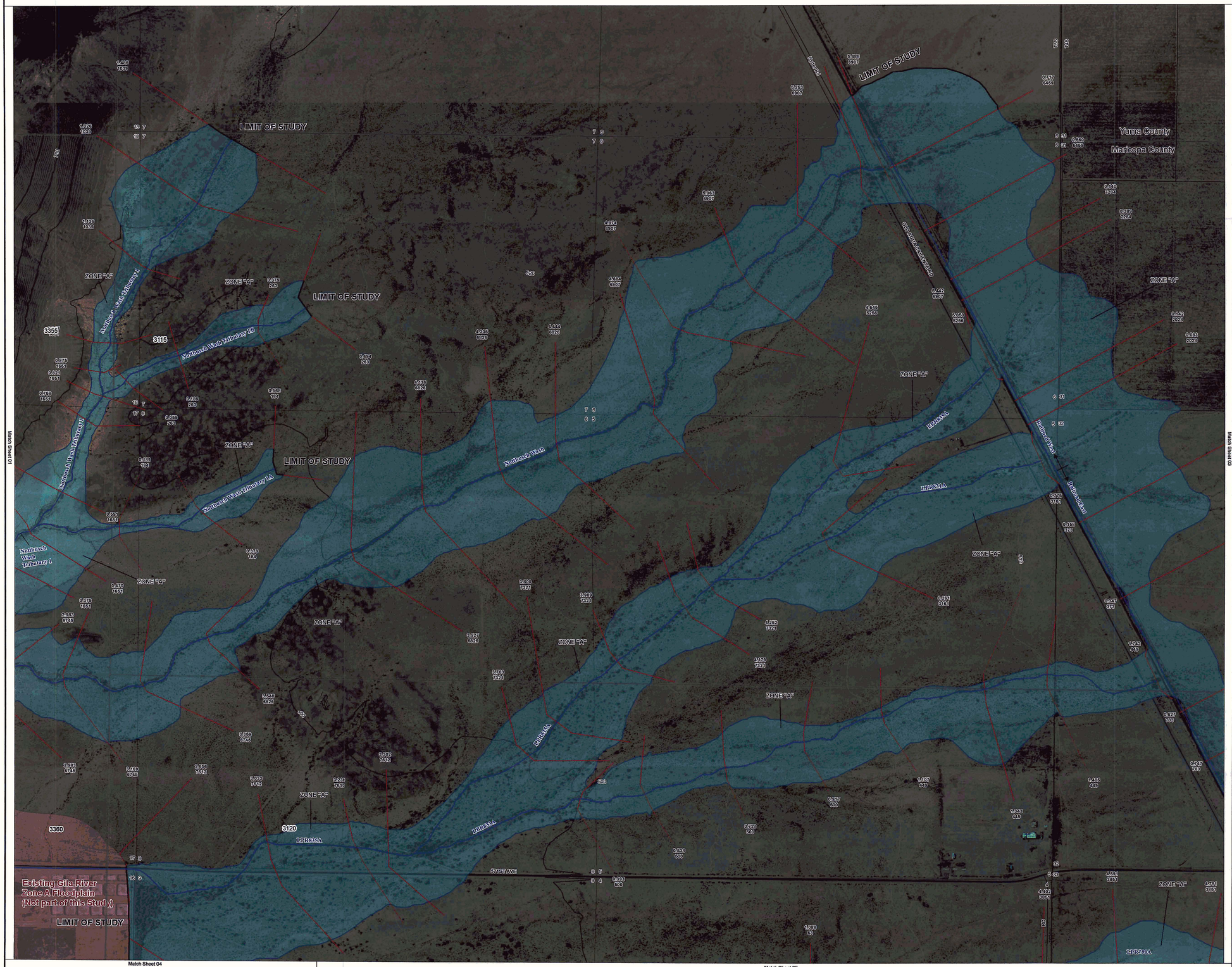
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 01 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

- Flood Hazard Boundary
- Stream Centerline
- Wash Name — Copper Wash
- Cross Section
- Cross Section Number — 1.031 / 9362 / Q100
- Zone Designation — ZONE "A"
- Roads
- Railroad (U.P.RR- Union Pacific Railroad)
- Gila River Baseline
- County Boundary
- GDAC Point/Number — 3PF3

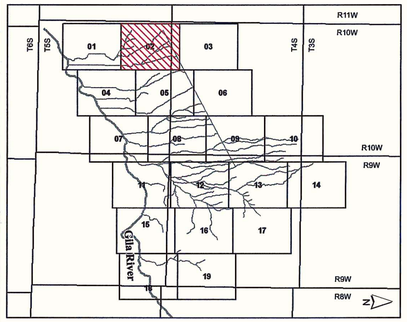
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) — CERTIFICATE NO. 34141 — JON T. AHERN — Date Signed 9/13/07 — ARIZONA, U.S.A.

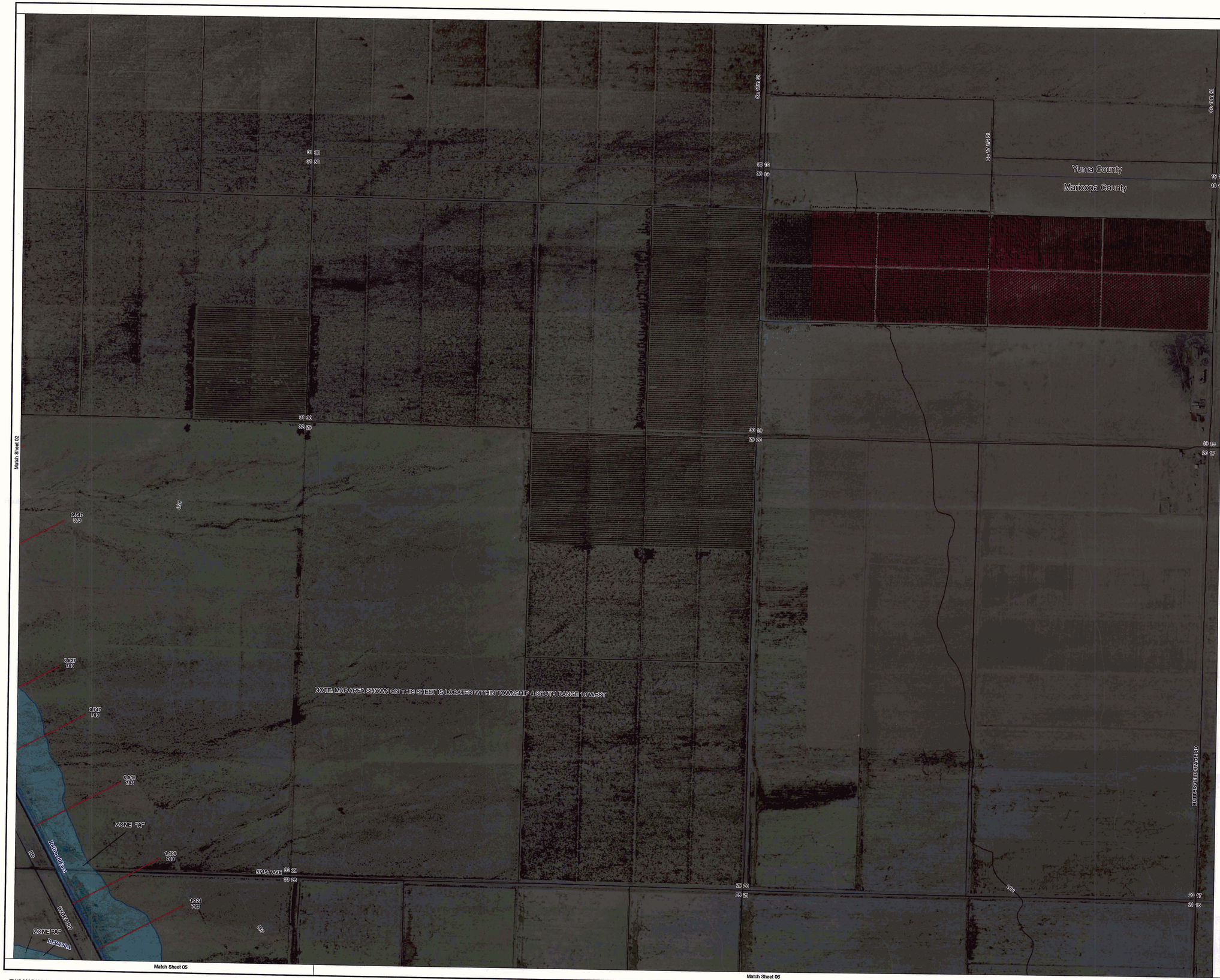
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 02 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number	1.031
Q100	9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

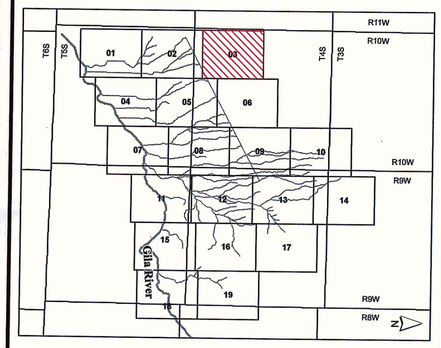
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	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 9/13/07 ARIZONA, U.S.A.

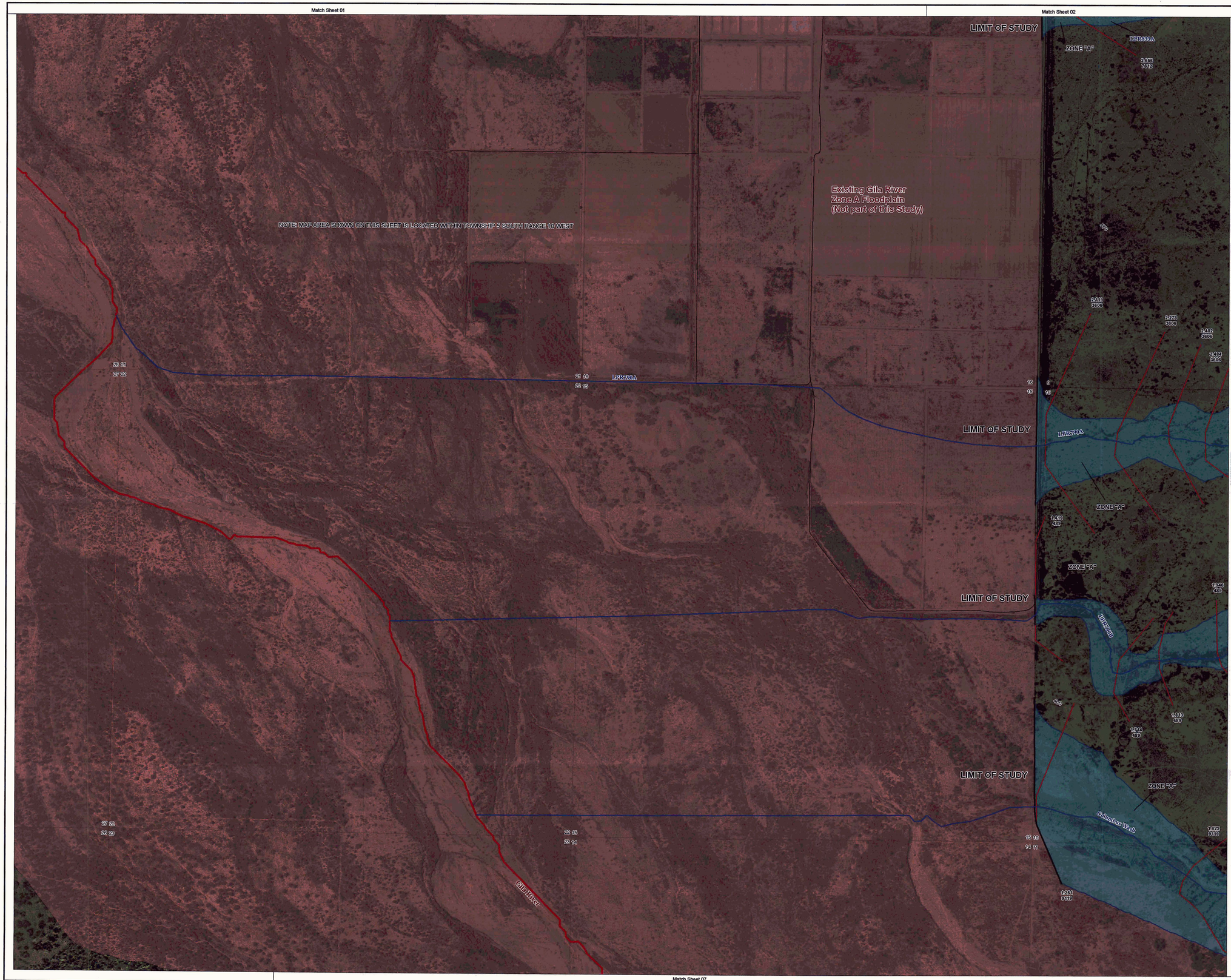
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 03 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number Q100	1.031 9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

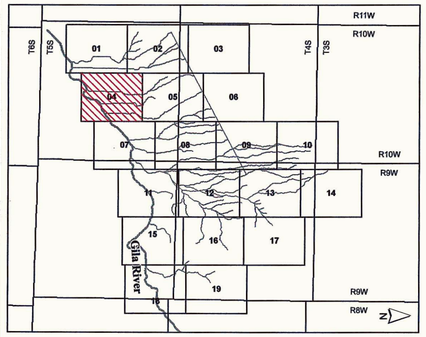
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 9/13/07 ARIZONA, U.S.A.

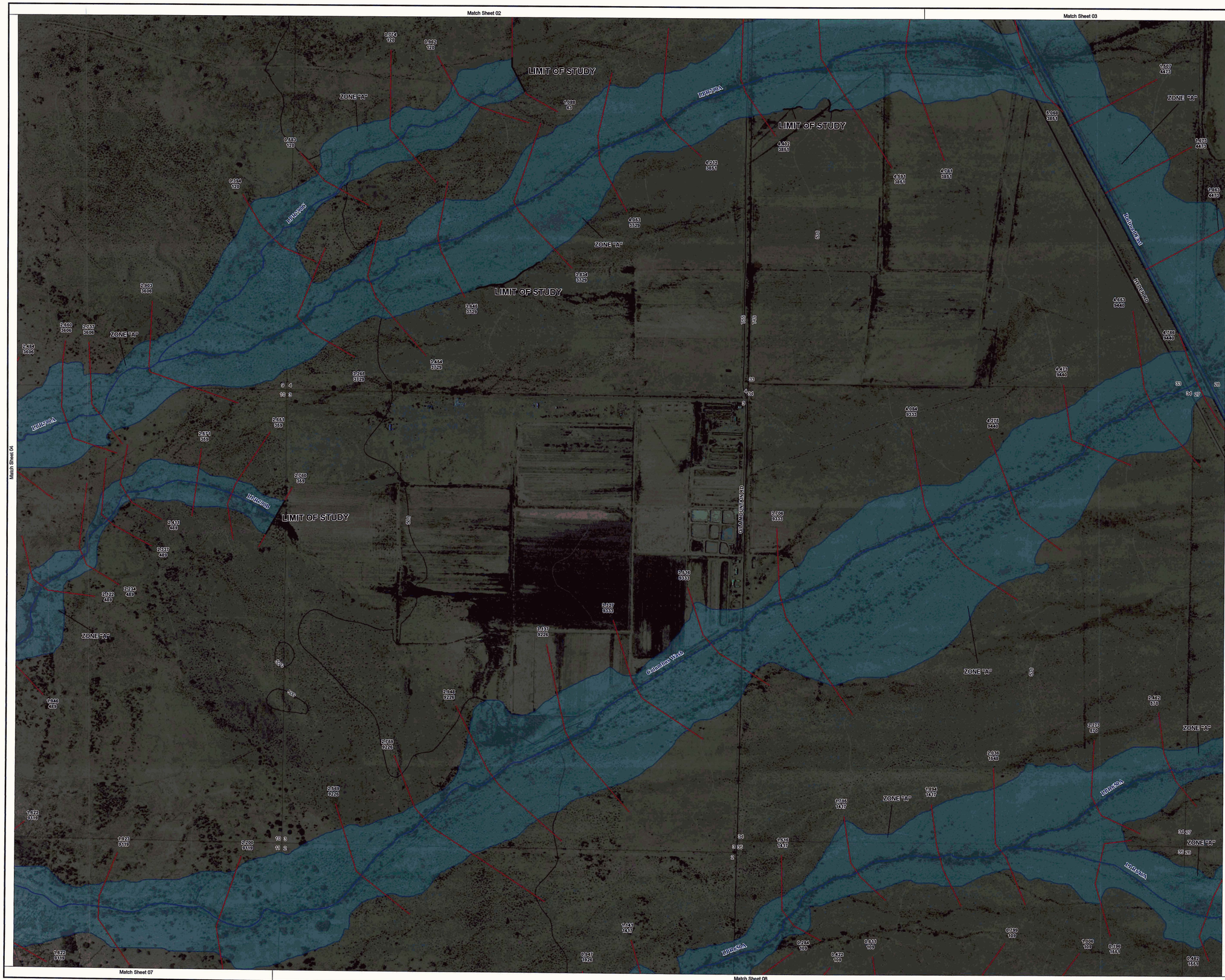
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 04 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number Q100	1.031 9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

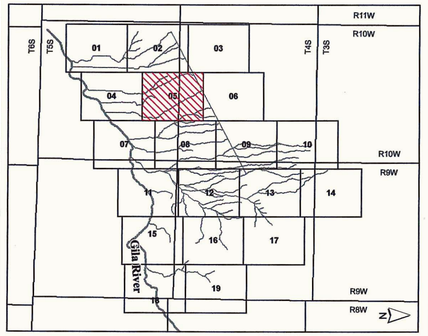
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 9/13/07 ARIZONA, U.S.A.

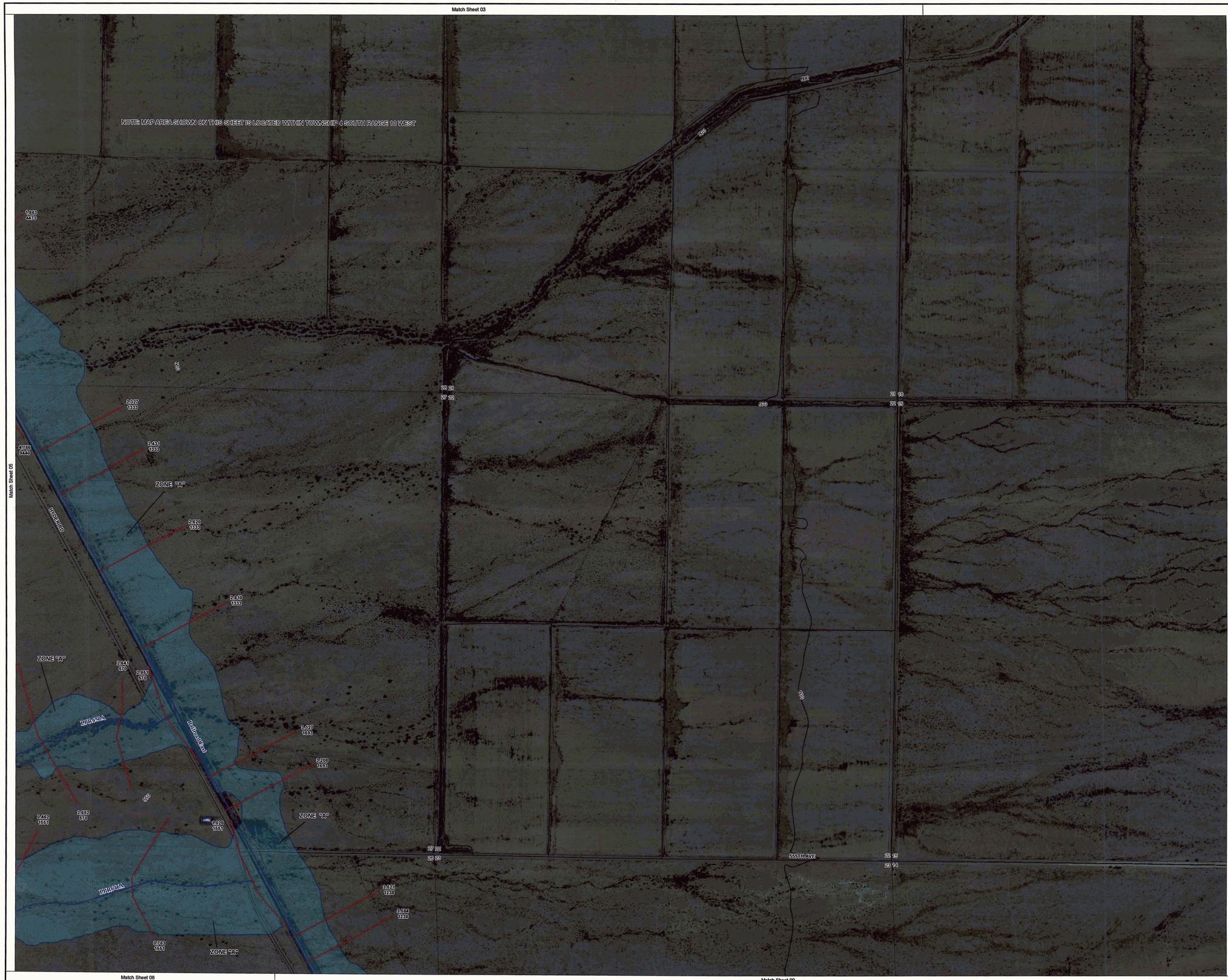
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 05 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number	1.031
Q100	9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

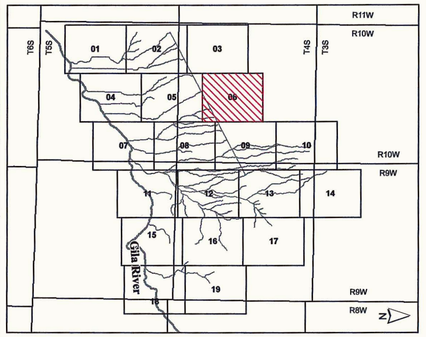
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 9/13/07 ARIZONA, U.S.A.

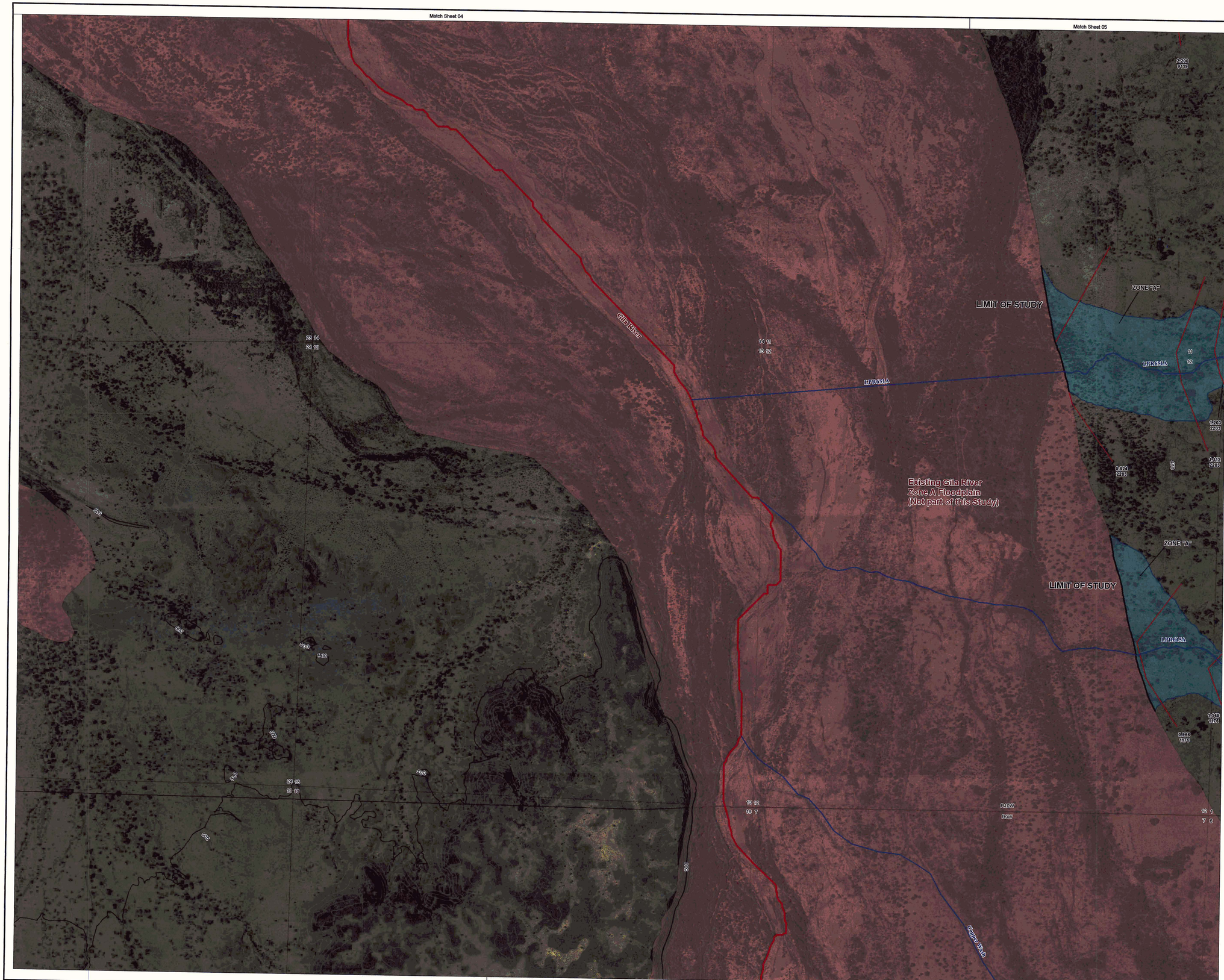
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 06 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number Q100	1.031 9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

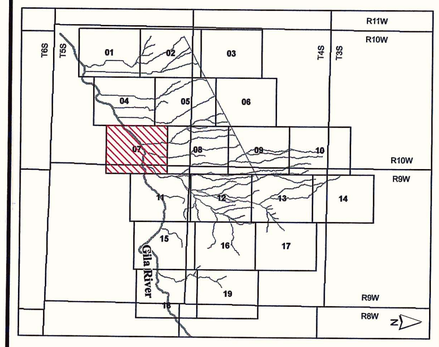
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 9/13/07 ARIZONA, U.S.A.

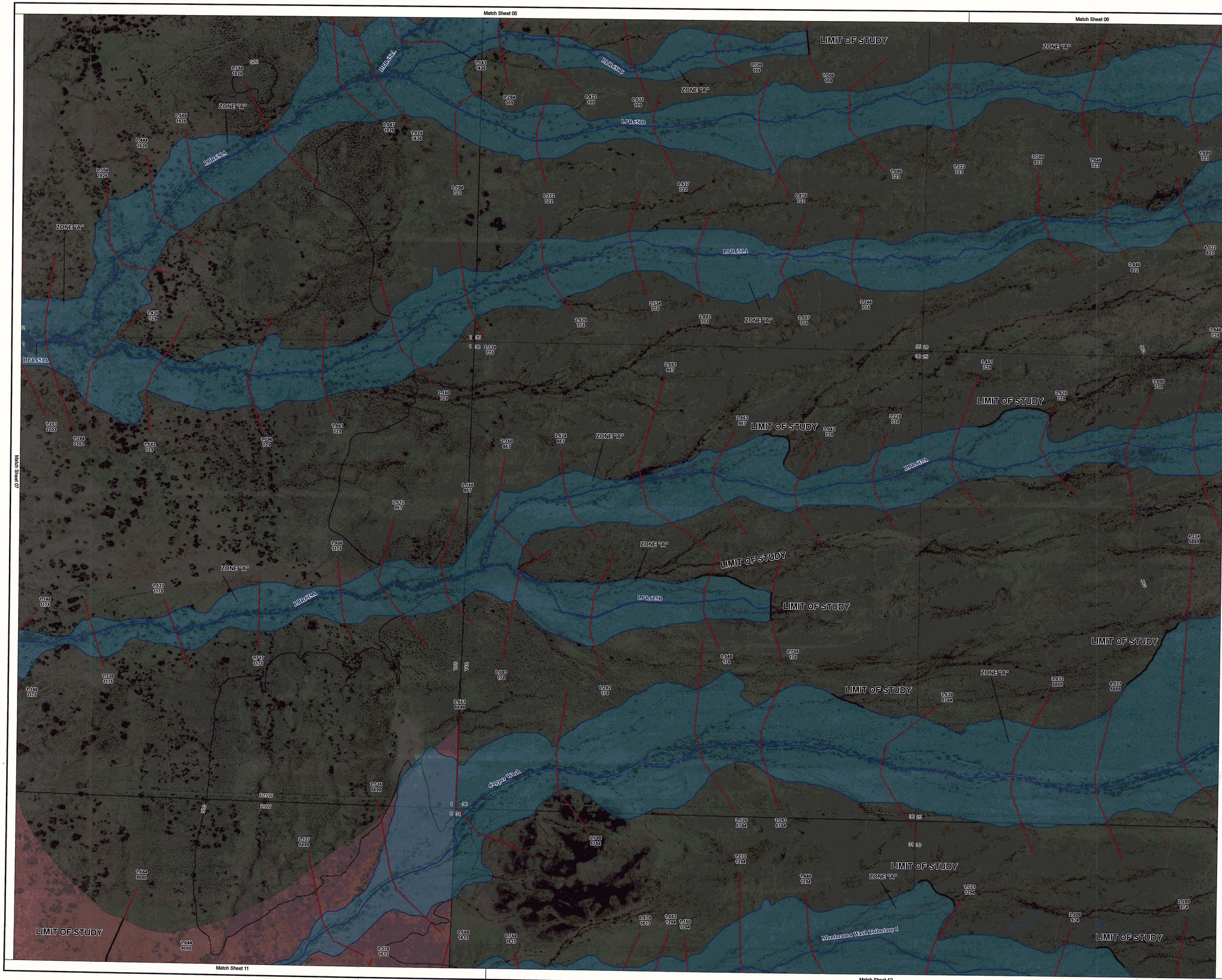
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 07 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number Q100	1.031 9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

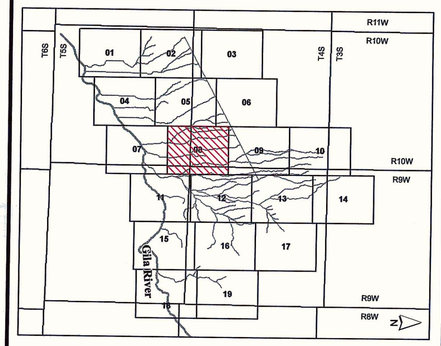
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 9.13.07 ARIZONA, U.S.A.

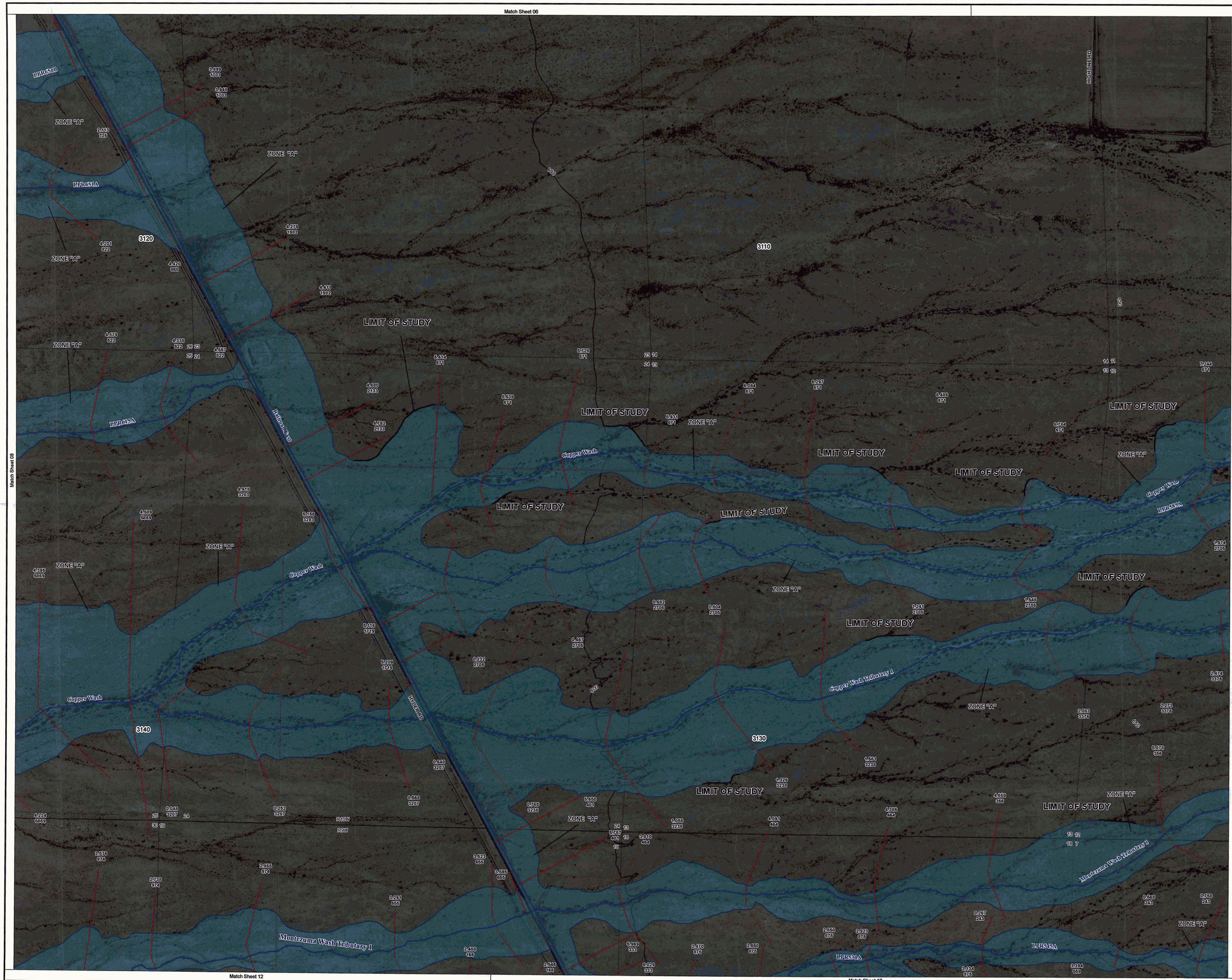
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 08 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number Q100	1.031 9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

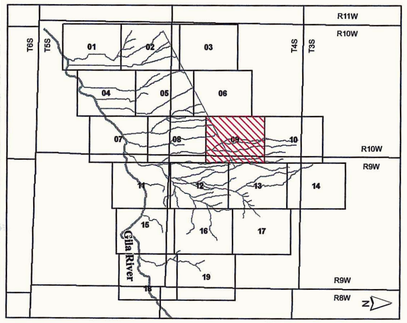
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 9.18.07 ARIZONA, U.S.A.

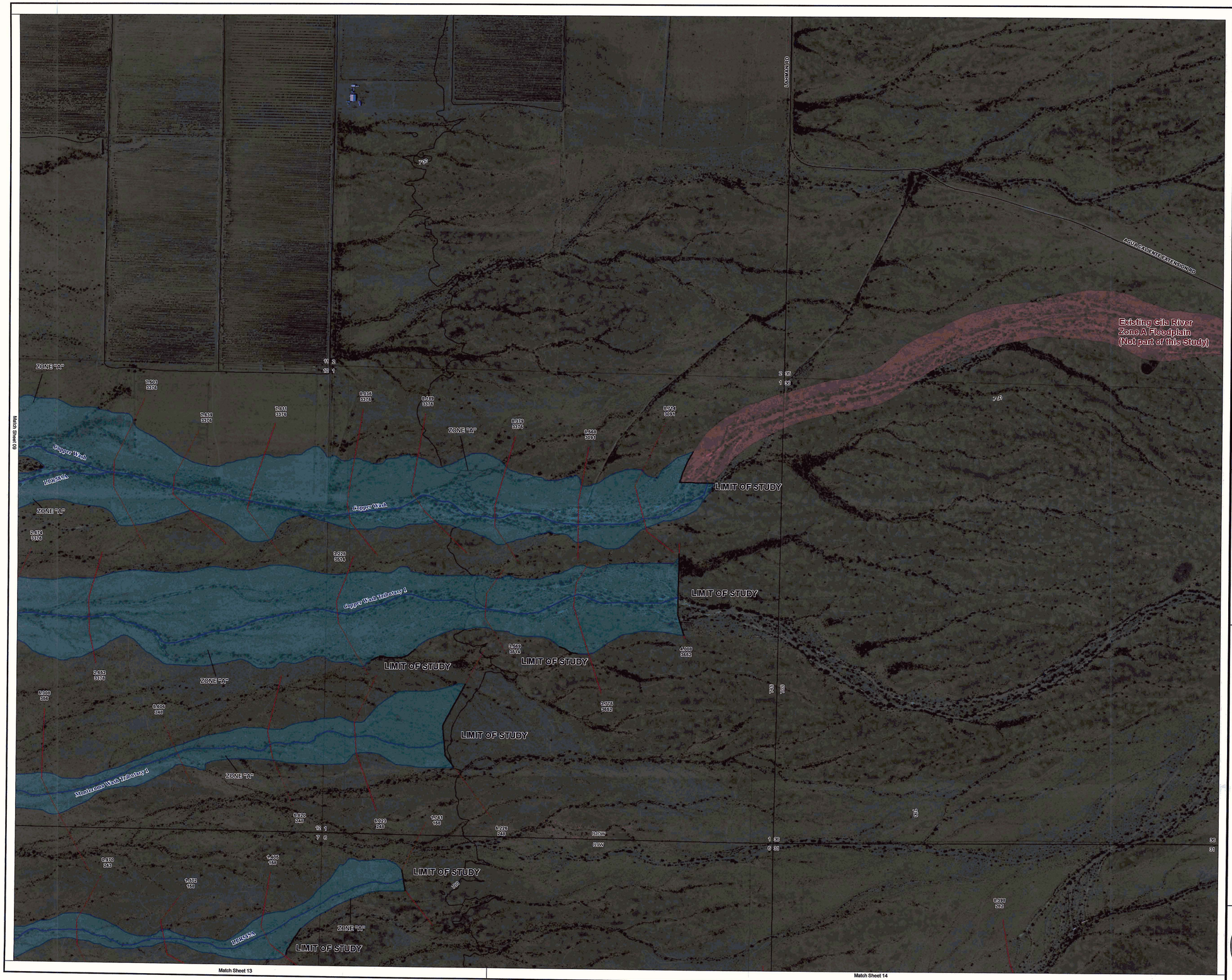
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 09 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

- Flood Hazard Boundary
- Stream Centerline
- Wash Name — Copper Wash
- Cross Section
- Cross Section Number — 1.031 / 9362 / Q100
- Zone Designation — ZONE "A"
- Roads
- Railroad (U.P.RR- Union Pacific Railroad)
- Gila River Baseline
- County Boundary
- GDAC Point/Number — 3PF3

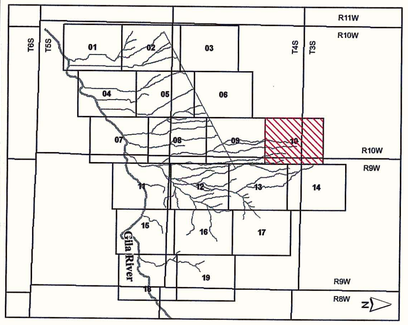
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date signed 7/29/07 ARIZONA, U.S.A.

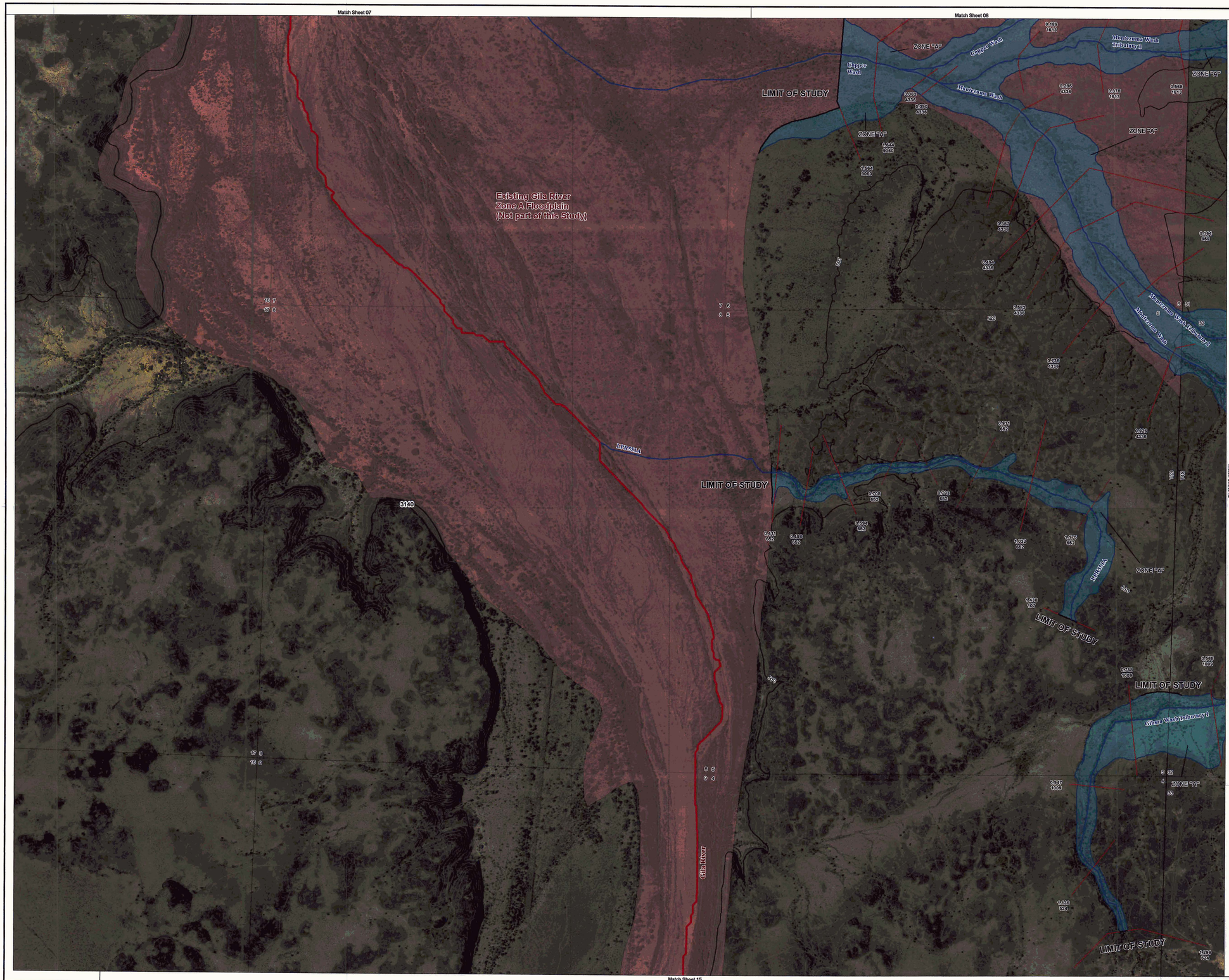
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 10 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number Q100	1.031 9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

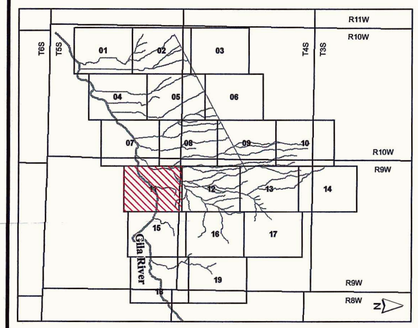
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 11-13-07 ARIZONA, U.S.A.

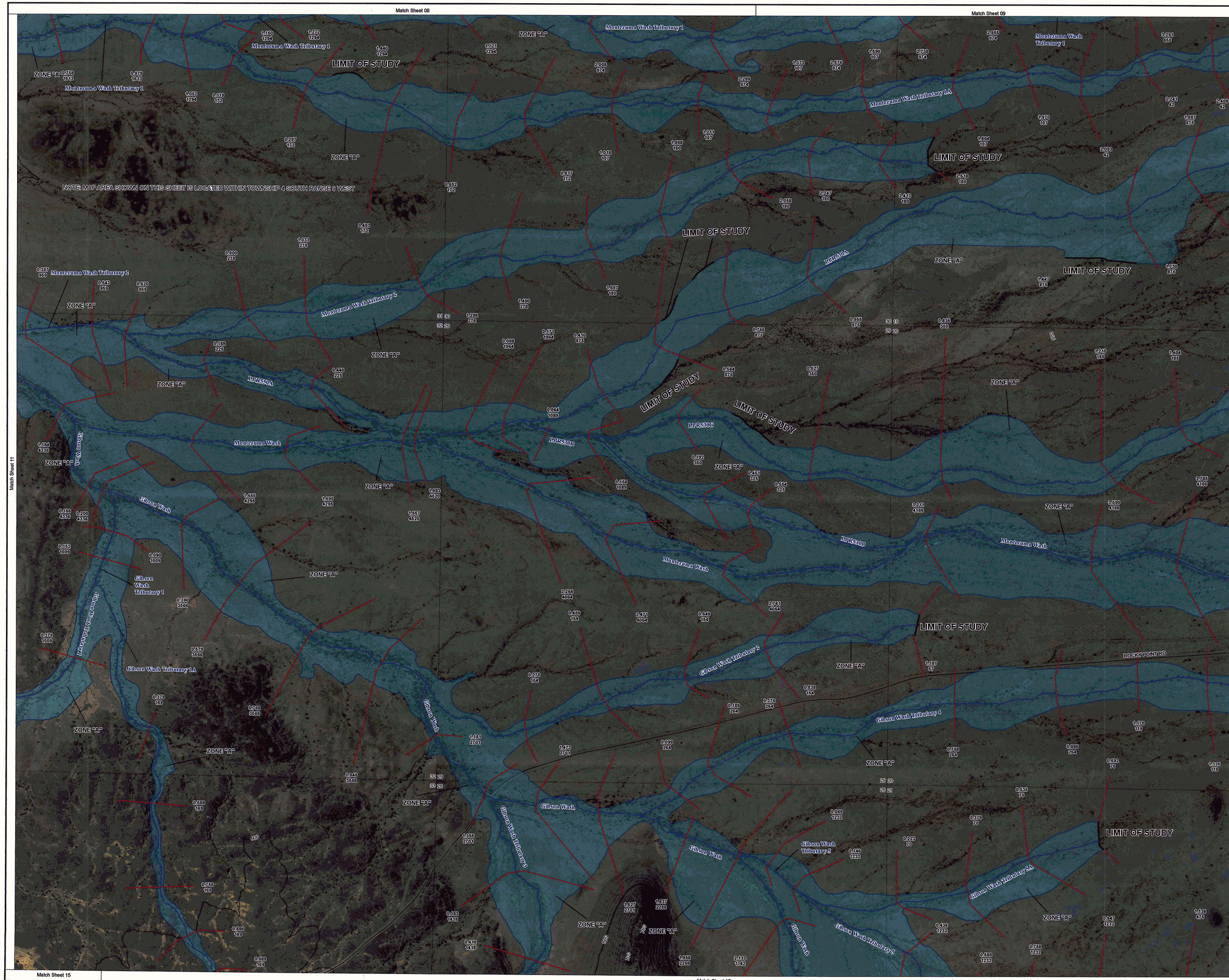
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 11 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number	1.031
Q100	9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

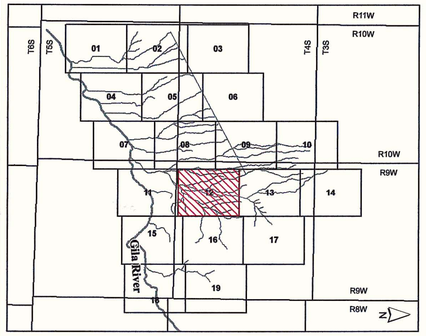
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 9/13/07 ARIZONA, U.S.A.

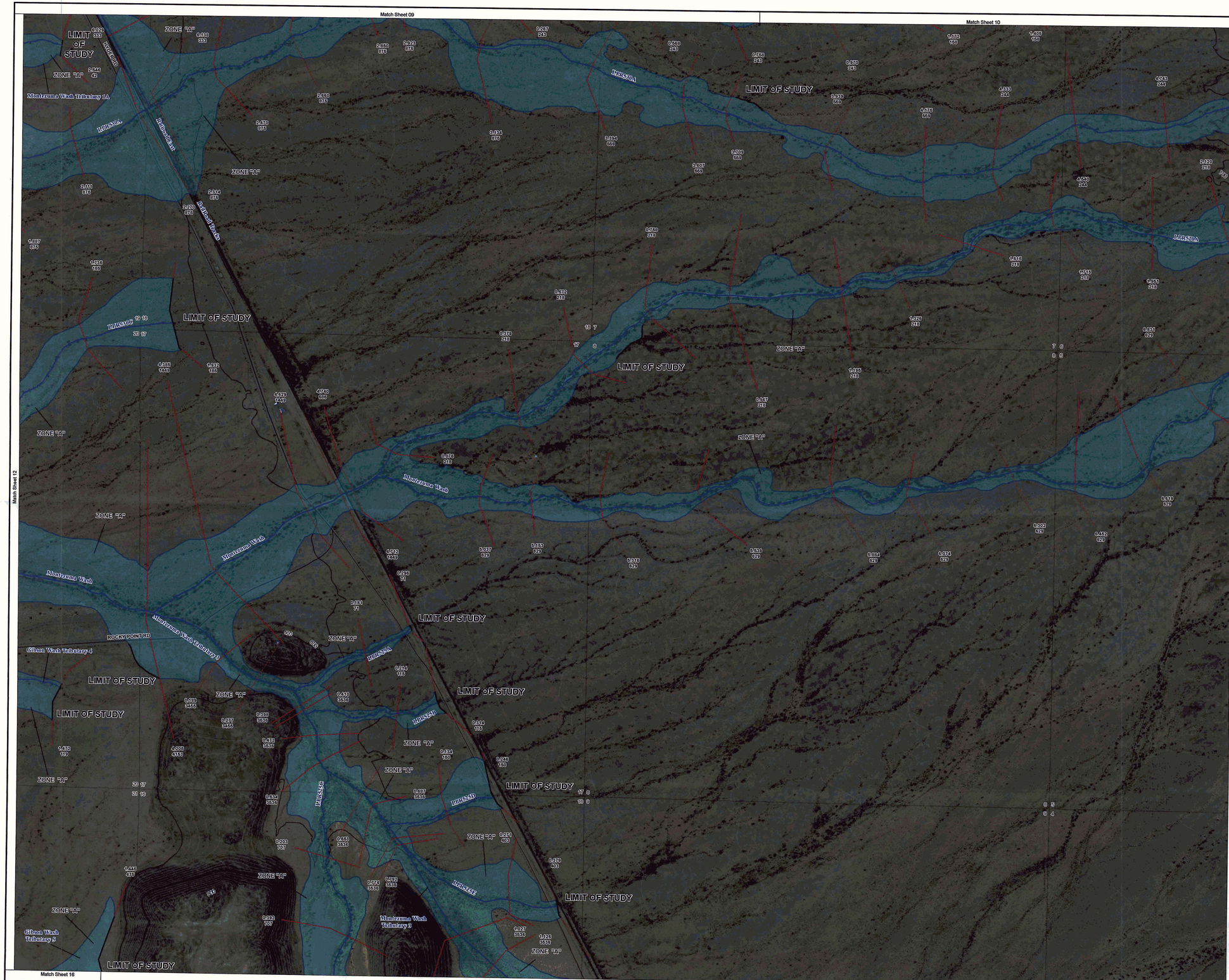
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 12 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number	1.031
Q100	9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

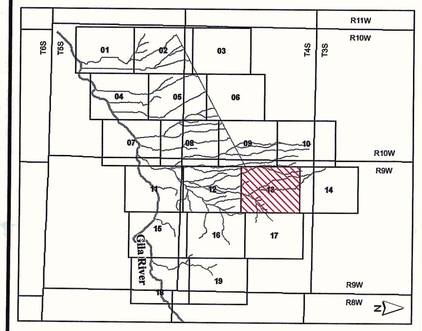
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 9.13.07 ARIZONA, U.S.A.

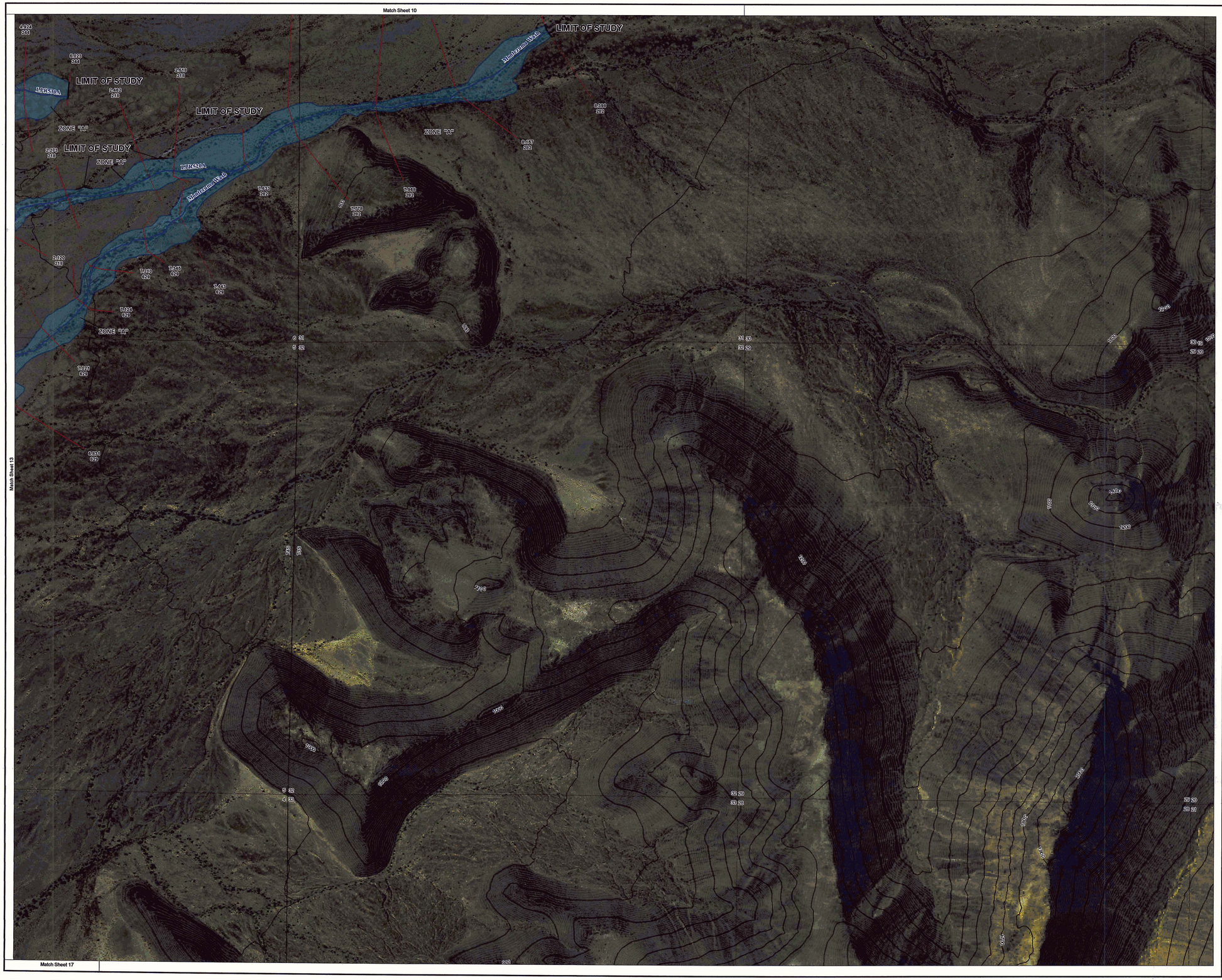
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 13 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number	1.031
Q100	9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

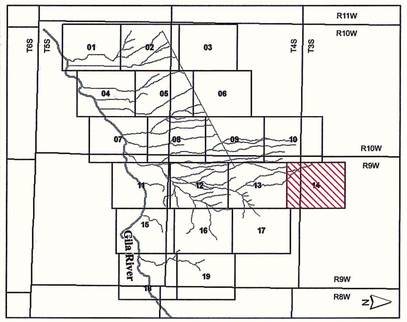
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	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 9/13/07 ARIZONA, U.S.A.

Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 14 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number Q100	1.031 9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

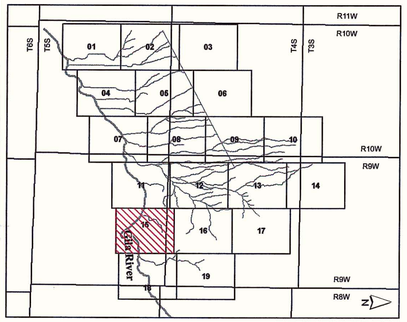
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) Certificate No. 34141 JON T. AHERN Date Signed 9/13/07 ARIZONA, U.S.A.

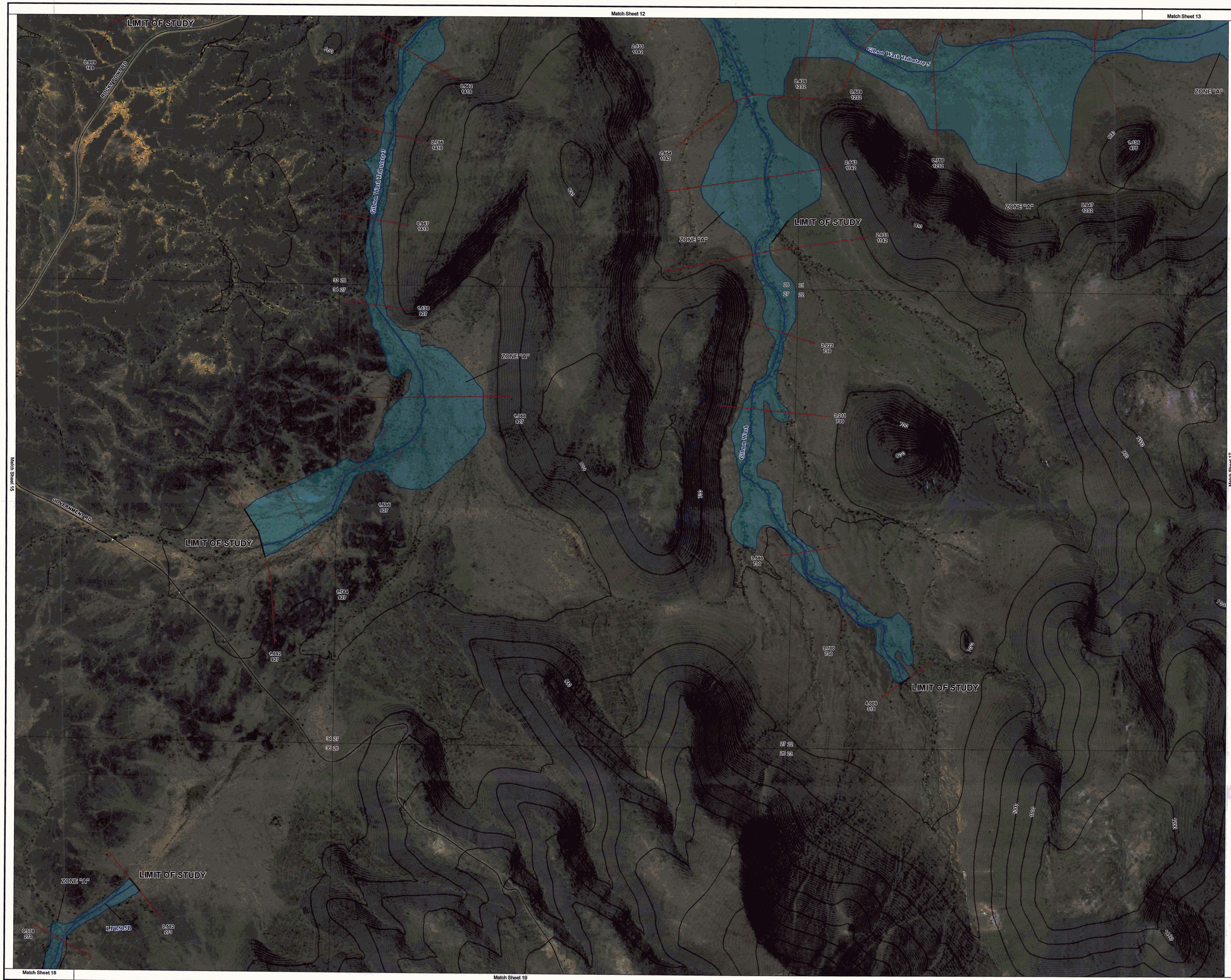
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 15 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number	1.031 / 9362
Q100	
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

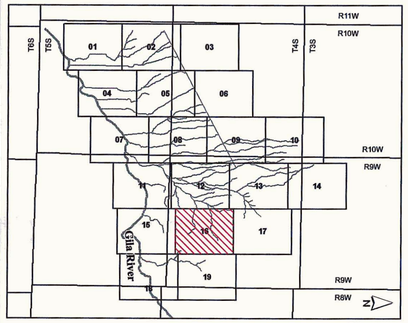
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 4/12/07 ARIZONA, U.S.A.

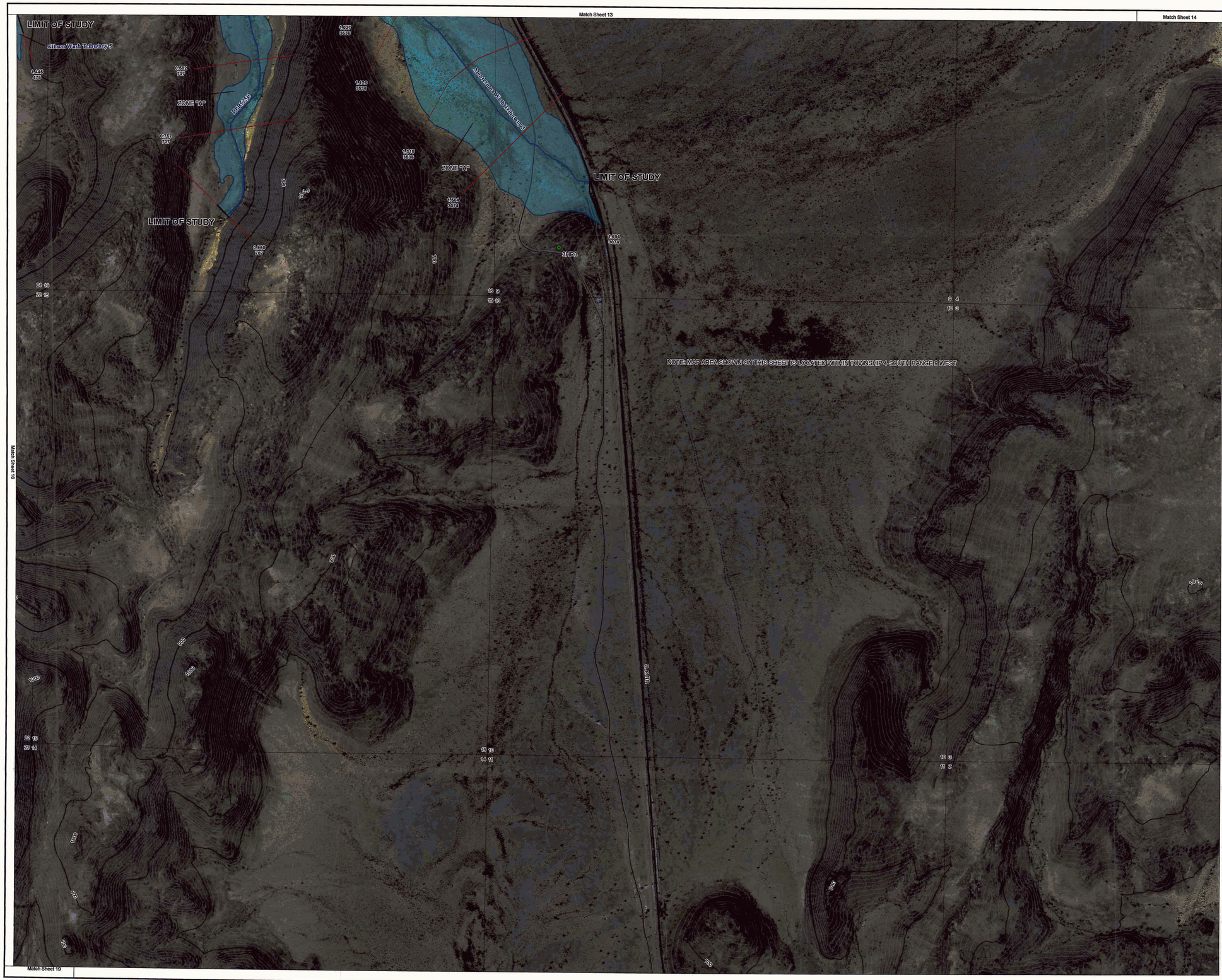
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 16 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number Q100	1.031 9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

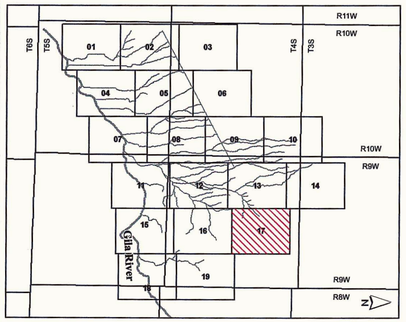
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 9/13/07 ARIZONA, U.S.A.

Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 17 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

Flood Hazard Boundary	
Stream Centerline	
Wash Name	Copper Wash
Cross Section	
Cross Section Number	1.031
Q100	9362
Zone Designation	ZONE "A"
Roads	
Railroad (U.P.RR- Union Pacific Railroad)	
Gila River Baseline	
County Boundary	
GDAC Point/Number	3PF3

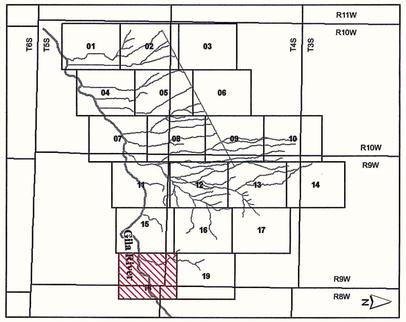
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	651.99

SHEET INDEX MAP



Contour Interval = 10 feet

500 250 0 500 Feet

1 inch equals 500 feet

Registered Professional Engineer (Civil) CERTIFICATE NO. 34141 JON T. AHERN Date Signed 9-13-07 ARIZONA, U.S.A.

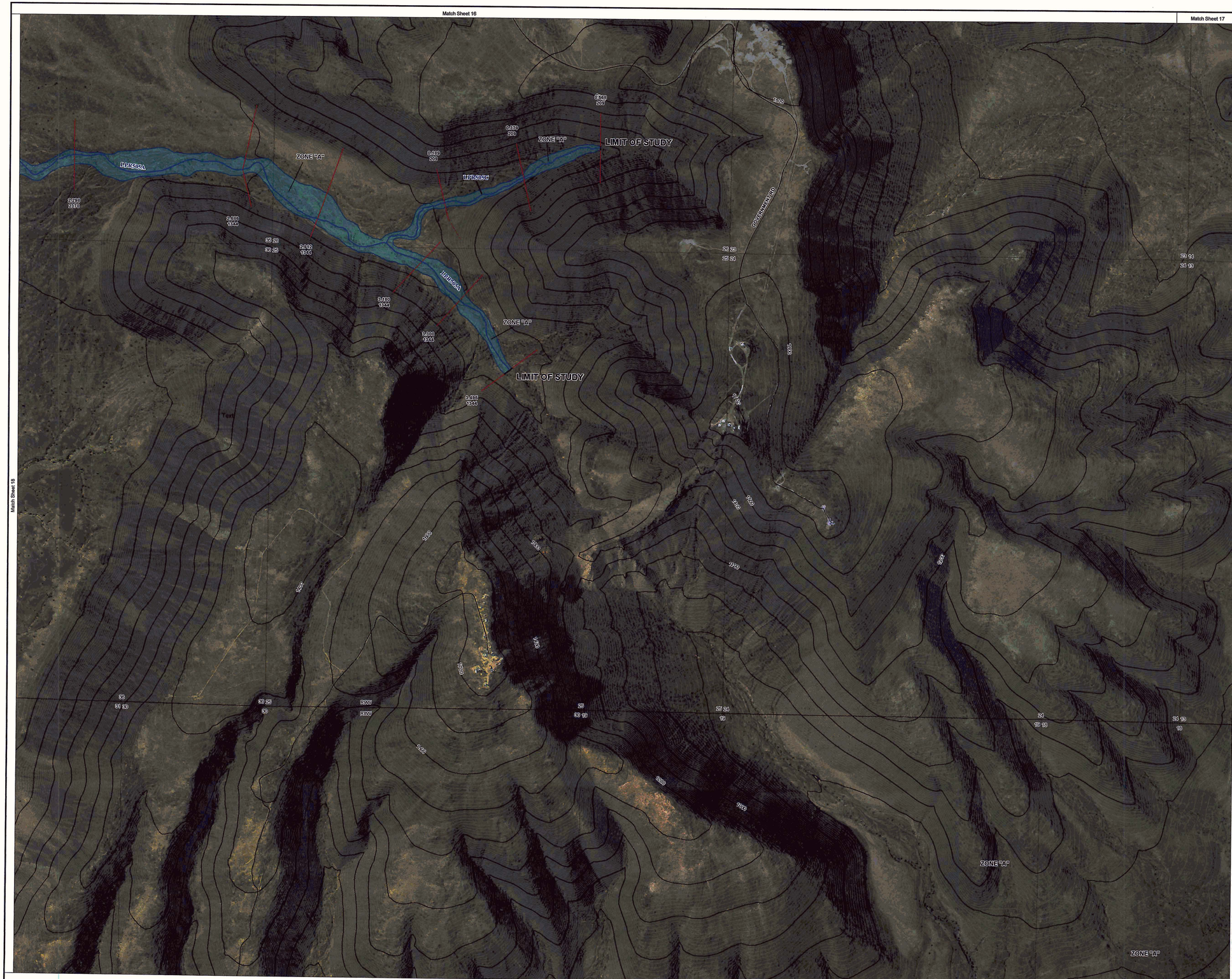
Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 18 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Lower Painted Rock Watershed
Zone A Floodplain Delineation Study
West Watershed

F.C.D. Contract No. 2004C065

Legend

- Flood Hazard Boundary
- Stream Centerline
- Wash Name — Copper Wash
- Cross Section
- Cross Section Number — 1.031 / Q100 / 9362
- Zone Designation — ZONE "A"
- Roads
- Railroad (U.P.RR- Union Pacific Railroad)
- Gila River Baseline
- County Boundary
- GDAC Point/Number — 3PF3

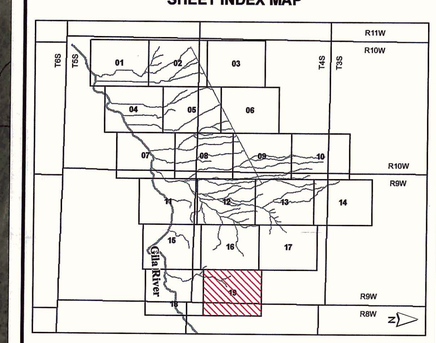
ELEVATION REFERENCE MARKS

NOTES

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

GDAC NUMBER	ELEVATION (FT)
3HR3 (see Sheet 17)	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 ARIZONA, U.S.A.

Kimley-Horn and Associates, Inc.

	BY	DATE
DESIGN	NRE	09/13/07
DESIGN CHK.	JTA	09/13/07
PLANS	ERS	09/13/07
PLANS CHK.	JTA	09/13/07

Sheet 19 of 19

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 10' CONTOUR INTERVALS

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