

Technical Data Notebook

Final Field Reconnaissance Report

Upper Rawhide Wash

Floodplain Delineation Study

FCD 98-12

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KHA 091131.02
June, 1999

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**REVIEW OF DRAFT FIELD RECONNAISSANCE REPORT
FOR FLOOD DELINEATION STUDY
FCD CONTRACT NO. 98-12
BY
R.W. CRUFF, P.E.
MARCH 4, 1999**

I do not have any significant comments on the Field Reconnaissance Report. I might disagree with some of the N-values, but without going in the field, it would be only nitpicking, as I believe that we wouldn't disagree in final by more than + or -0.005. It looks to me like they have done a very professional job of looking at the N-values and documenting their work.

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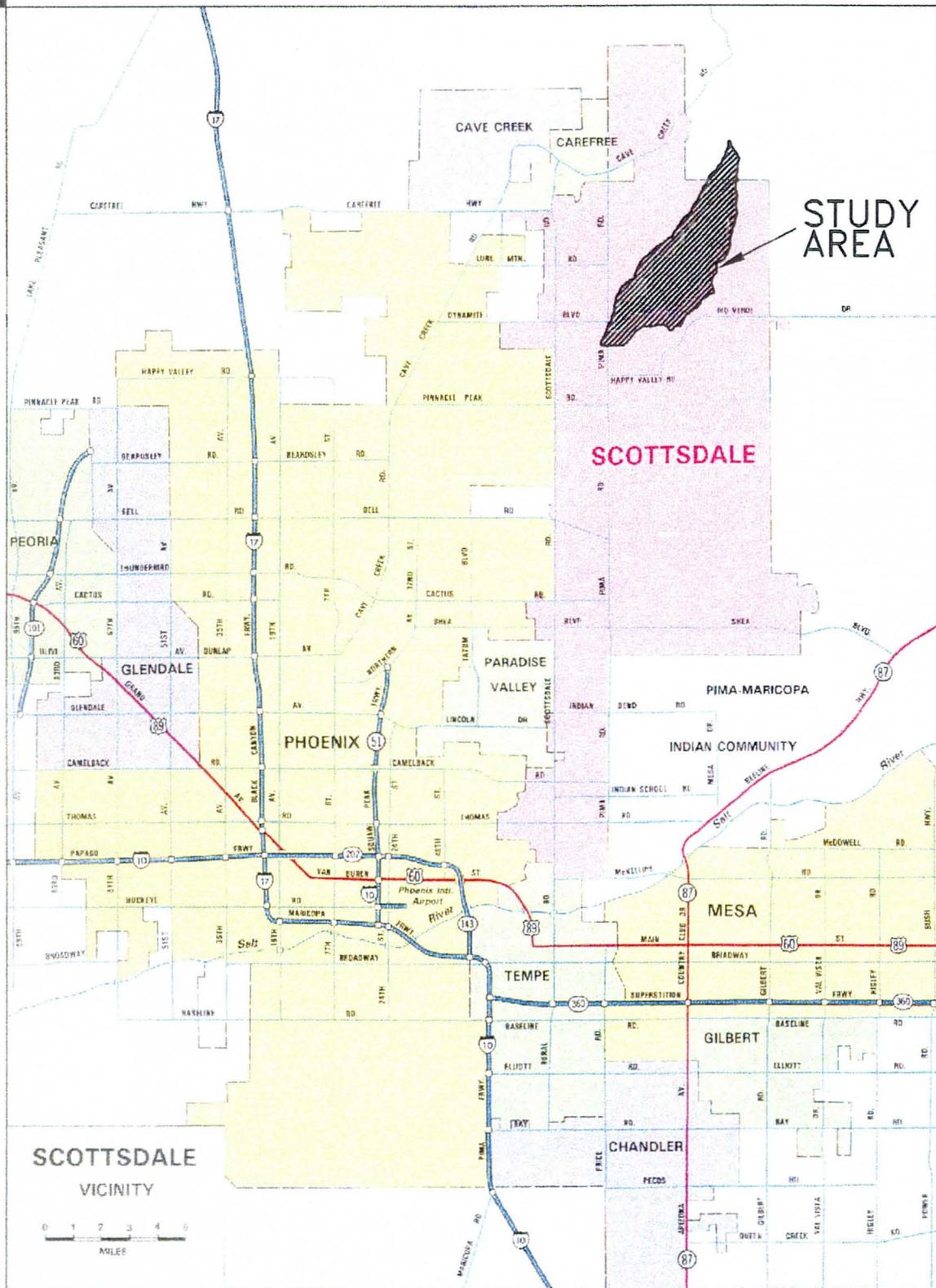
APPENDIX A Reach Limits and Photograph Location Map

Kimley-Horn and Associates, Inc. (KHA) and the Flood Control District (FCD) of Maricopa County conducted a reconnaissance field trip of Upper Rawhide Wash from 2000 feet south of Dynamite Boulevard to the Carefree Highway alignment. The field trip was conducted on December 1st, 2nd, 8th, and 9th, 1998. The FCD attended the field trip on December 1st, only.

The purpose of the field trip was to review the existing field conditions of the wash in order to assist in the evaluation of Manning's roughness coefficients. KHA photo-documented the main channel of the wash, overbank areas, and culvert crossings of Upper Rawhide Wash and the four tributaries. The field trip on December 1st began at the proposed location of the Rawhide Wash Detention Basin and ended approximately at the confluence of Upper Rawhide Wash with Tributary No. 1 (RW20). The field trip on December 2nd covered the entire Tributary No. 1 from the confluence of Upper Rawhide Wash with Tributary No. 1 to approximately 1.2 miles upstream. The field trip on December 8th covered the entire Tributary No. 2 (RW18) and No. 3 (RW17) from the confluence of Upper Rawhide Wash with Tributary No. 2 for a total reconnaissance of approximately 2.4 linear miles. The field trip on December 9th covered the entire Tributary No. 4 (RW16) from the confluence of Tributary 4 with Tributary No. for a total reconnaissance of approximately 1.1 linear miles.

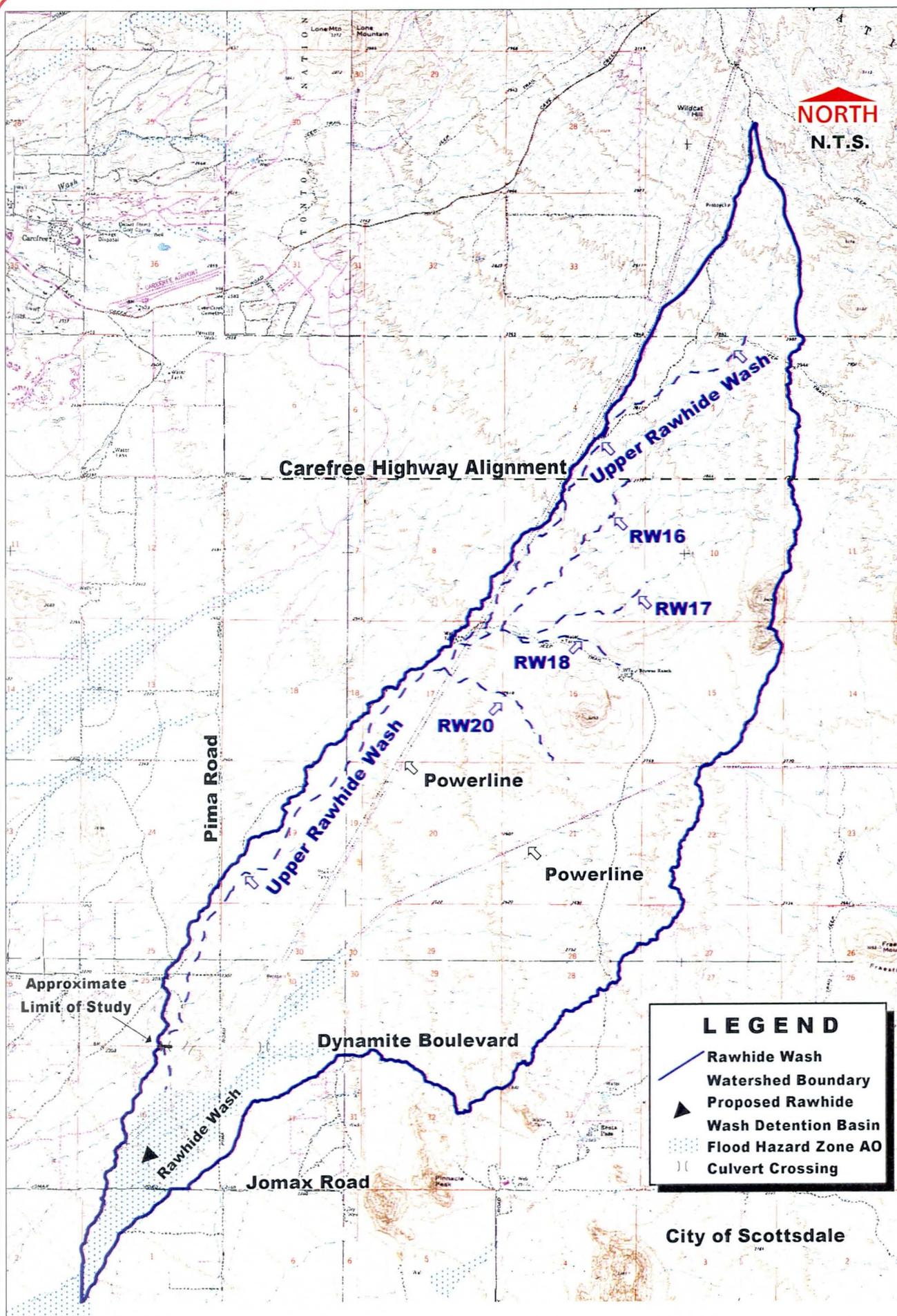
The Upper Rawhide Wash watershed is approximately 13.6 square miles in area. The watershed is predominately undeveloped with the exception of Troon Village located along Dynamite Boulevard, east of Pima Road. The watershed is typical native Sonoran desert with ephemeral sandy washes. Washes within the study area generally flow to the southwest and are ephemeral in nature, flowing only in response to rainfall events. Vegetation found along the washes and watercourses consists of palo verde, mesquite, and ironwood. In the overbank areas and hillslopes are cacti of various sorts (saguaros, prickly pear, barrel cactus), ocotillo, bursage, creosote, yucca, agave, and various grasses and shrubs.

The project consists of approximately twelve (12) river miles of the Upper Rawhide Wash and four (4) of its major tributaries. The study area is located as follows: (see Figures 1 and 2: Vicinity Map and Location Map, respectively).



**Kimley-Horn
and Associates, Inc.**

FIGURE 1 VICINITY MAP



NORTH
N.T.S.

Carefree Highway Alignment

Upper Rawhide Wash

RW16

RW17

RW18

RW20

Powerline

Powerline

Pima Road

Upper Rawhide Wash

Approximate
Limit of Study

Dynamite Boulevard

Rawhide Wash

Jomax Road

LEGEND

- Rawhide Wash
- Watershed Boundary
- Proposed Rawhide Wash Detention Basin
- Flood Hazard Zone AO
- Culvert Crossing

City of Scottsdale

FIGURE 2 LOCATION MAP

Rawhide Wash (main stem): Starting at the current FIS limit of detailed study for Wash 4D (Rawhide Wash approximately 1,800 feet south of Dynamite Boulevard) and extending upstream approximately 6.9 miles to the Tonto National Forest Boundary/City of Scottsdale corporate boundary from Township 5 North, Range 4 East to Township 6 North, Range 5 East.

Tributary RW20: Starting at its confluence with Rawhide Wash and extending upstream approximately 1.1 miles to the south section line of Section 16 (Lone Mountain Road alignment), Township 5 North, Range 5 East.

Tributary RW18: Starting at its confluence with Rawhide Wash and extending upstream approximately 1.3 miles to a confluence located approximately 1,100 feet west of the east section line of Section 16 (112th Street alignment), Township 5 North, Range 5 East.

Tributary RW17: Starting at its confluence with Tributary RW18 and extending upstream approximately 1.1 miles to the east section line of Section 9 (112th Street alignment), Township 5 North, Range 5 East.

Tributary RW16: Starting at its confluence with Tributary RW18 and extending upstream approximately 1.6 miles to the north section line of Section 9 (Carefree Highway alignment), Township 5 North, Range 5 East.

Upper Rawhide Wash and the four tributaries were subdivided for the purposes of this study into reaches of similar Manning's roughness coefficients. Locations of the reaches and reach limits are provided in Appendix A.

The following section of this report derives the Manning's roughness coefficients for Upper Rawhide Wash and the four tributaries. The method is based on the USGS report titled "Estimated Manning's Roughness Coefficients for Stream Channels and Floodplains in Maricopa County, Arizona" (April, 1991).

Manning's roughness coefficients ("n" values) were derived based on the visual inspection conducted in December 1998 and from the procedure given in the USGS document described above. The following sets of site information consist of the location of the cross section, the reach number, the applicable cross sections to which the derivation applies, a description of the channel, a table showing the values of "n" for the channel, left and right overbanks for the 100-year flood, and a photograph depicting typical channel forms, banks, vegetation, and bed materials. Photographs of the study area were taken in early December 1998. The frame of the square grid show in several photographs is 1.5-foot outside dimension on a side with an internal square of 1-foot on a side and a grid spacing on 1-inch.

For most sites, a photograph was taken of typical bed materials. The photographs of the channels and floodplains were used in comparison in the document illustrations by the USGS and other references.

The description of each reach/cross section includes the location of the channel cross section, the description of the channel, and the evaluation of the estimated "n" value. Changes in channel geometry and type and distribution and density of vegetation are described. The channel cross section and the photographs are used in conjunction with the site description to assess how "n" was defined.

The table shows the components of the roughness coefficient for the 100-year flood that were estimates for the channel and the overbanks. The total "n" values are the sum of the base value of "n" for a straight uniform channel (n_b); surface irregularities (n_1); obstruction (n_2); and vegetation (n_3). A blank indicates that a roughness coefficient of zero was used. A meander ratio was applied based on the ratio of the meander length to the straight length of the channel reach. The meander adjustment values apply to flow confined in the channel and not to downvalley flow crossing meanders.

Location of Cross Section: Mainstem Uppper Rawhide 1200 ft downstream of Dynamite Blvd
Reach Number: Rawhide Wash Reach 1
Applicable Cross Sections: 7.606 to 8.092
Description of Channel: Alluvial coarse sandy bed broad, flat, clear, relatively straight considering width of channel trapezoidal in shape, banks lined with medium dense stands of shrubs/trees.

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.07	nb	0.028	nb	0.07
n1		n1	0.001	n1	
n2		n2	0.002	n2	
n3		n3		n3	
n	0.07	n	0.031	n	0.07
		Meander	1		
lobn	0.07	chn	0.031	robn	0.07



Photo No. 1/7 Mainstem Rawhide looking north. Approximately 1200 ft downstream from Dynamite Blvd.

Location of Cross Section: Mainstream Upper Rawhide 1050 ft upstream of Dynamite Blvd
Reach Number: Rawhide Wash Reach 2
Applicable Cross Sections: 8.186 to 8.47
Description of Channel: alluvial coarse sandy bed channel, broad, flat, some medium brush in channel, slight meander, trapezoidal in shape, banks lined with medium sized trees/shrubs

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.07	nb	0.028	nb	0.07
n1		n1	0.002	n1	
n2		n2	0.001	n2	
n3		n3	0.002	n3	
n	0.07	n	0.033	n	0.07
		Meander	1.15		
lobn	0.07	chn	0.038	robn	0.07



Photo 1/11. Mainstem Rawhide looking west. Approximately 2000 ft upstream of Dynamite.

Location of Cross Section: Mainstem Upper Rawhide 2600 ft upstream of Dynamite Blvd
Reach Number: Rawhide Wash Reach 3
Applicable Cross Sections: 8.565 to 8.851
Description of Channel: Alluvial coarse sandy bed channel, relatively broad, flat, fairly straight, flat trapezoidal in shape. Tree/shrubs lined banks

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.06	nb	0.028		0.06
n1		n1	0.001	n1	
n2		n2	0.005	n2	
n3		n3	0.01	n3	
n	0.06	n	0.044	n	0.06
		Meander	1		
lobn	0.06	chn	0.044	robn	0.06



Photo 1/20. Mainstem Rawhide. Looking north. Approximately 450 ft south of Via Donna.

Location of Cross Section: Mainstream Upper Rawhide S/W corner of Pima and Dixileta
Reach Number: Rawhide Wash Reach 4
Applicable Cross Sections: 8.893 to 9.13
Description of Channel: 40 acre parcel with 8-foot perimeter wall. Multiple barrel culverts u/s and d/s crossings of wash. Alluvial sandy bed channel. Graded. Vegetation cleared. Hay bales stacked within channel

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.04	nb	0.028	nb	0.04
n1		n1	0.001	n1	
n2		n2	0.03	n2	
n3		n3		n3	
n	0.04	n	0.059	n	0.04
		Meander	1		
lobn	0.04	chn	0.059	robn	0.04

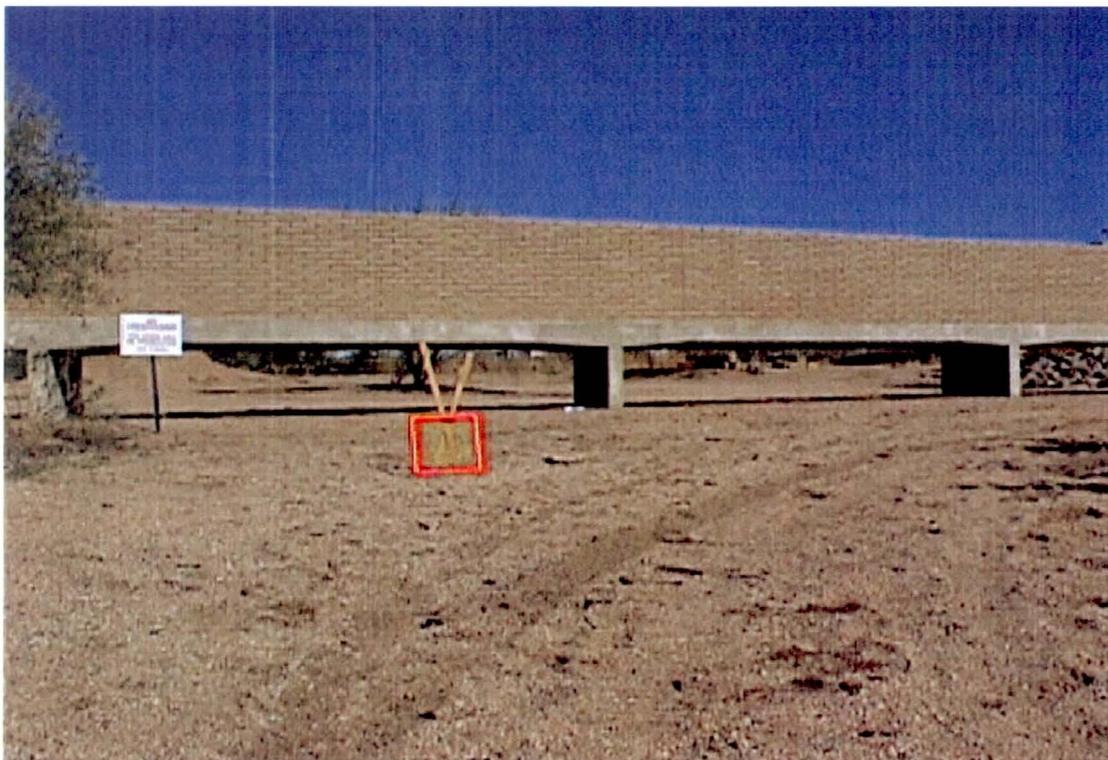


Photo 2/6. Mainstem Rawhide looking north at downstream culvert crossing at Constatine property.

Location of Cross Section: Mainstem Upper Rawhide 2600 ft Upstream of Pima Rd crossing
Reach Number: Reach 5. Mainstem Upper Rawhide upstream of Pima Road
Applicable Cross Sections: 9.157 to 9.892
Description of Channel: Alluvial sandy bed channel, medium degree of braiding, vegetation low to medium sized shrubs, medium density, flat, broad, tree-lined banks

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.07	nb	0.028	nb	0.07
n1		n1	0.002	n1	
n2		n2	0.015	n2	
n3		n3	0.01	n3	
n	0.07	n	0.055	n	0.07
		Meander	1		
lobn	0.07	chn	0.055	robn	0.07

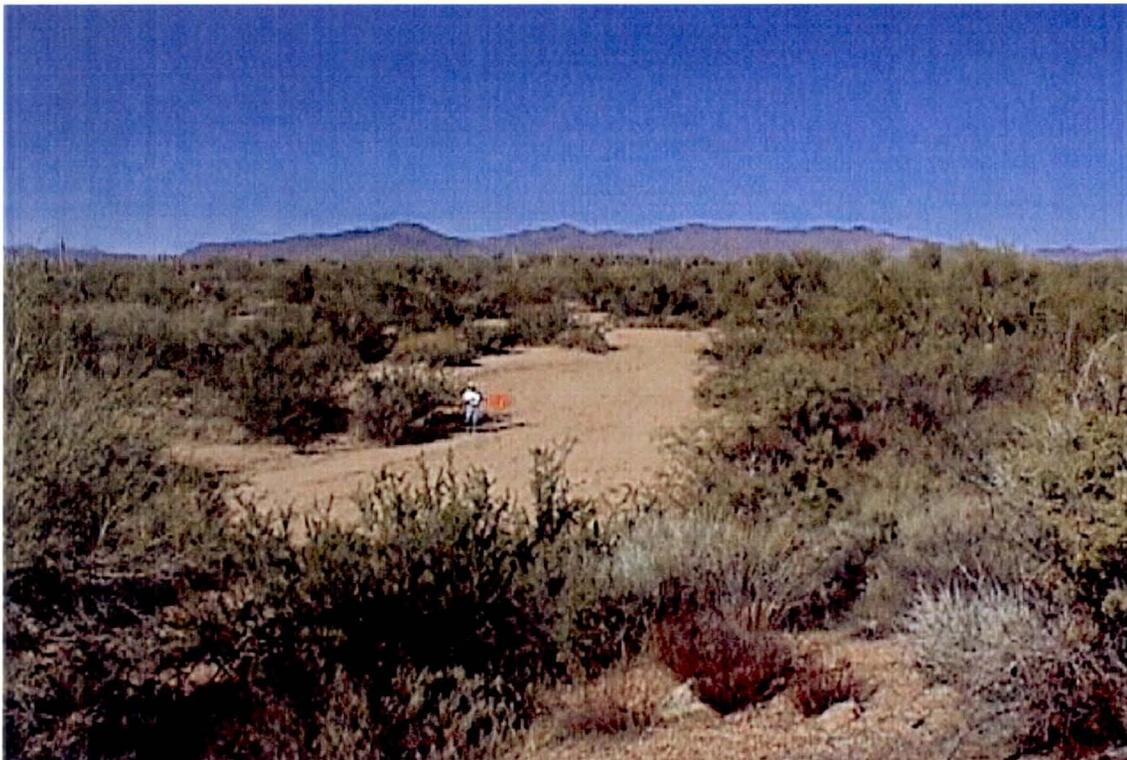


Photo 2/20. Mainstem Rawhide looking north. Approximately 2400 ft north of Pima Road crossing.

Location of Cross Section: Mainstem Upper Rawhide 6700 ft u/s from Pima Road crossing
Reach Number: Rawhide Wash Reach-6 Straight, broad, sandy bottom
Applicable Cross Sections: 9.987 to 11.881
Description of Channel: Alluvial sandy bottom channel, broad, flat, tree-lined banks, in-channel vegetation medium shrubs light density. Local regions of braiding, trapezoidal in shape

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.07	nb	0.028	nb	0.07
n1		n1	0.001	n1	
n2		n2	0.005	n2	
n3		n3	0.01	n3	
n	0.07	n	0.044	n	0.07
		Meander	1		
lobn	0.07	chn	0.044	robn	0.07



Photo 3/1. Mainstem Rawhide looking southwest approximately 1400 ft downstream of Lone Mountain Road.

Location of Cross Section: Mainstem Upper Rawhide 750 ft U/S confluence with Trib #2
Reach Number: Rawhide Wash Reach-7 Confluence area of Rawhide w/Tributaries
Applicable Cross Sections: 11.976 to 12.07
Description of Channel: Alluvial sandy bottom channel. Shrubs with trees, grasses, medium density, braided

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.07	nb	0.03	nb	0.07
n1		n1	0.005	n1	
n2		n2	0.005	n2	
n3		n3	0.01	n3	
n	0.07	n	0.05	n	0.07
		Meander	1		
lobn	0.07	chn	0.05	robn	0.07

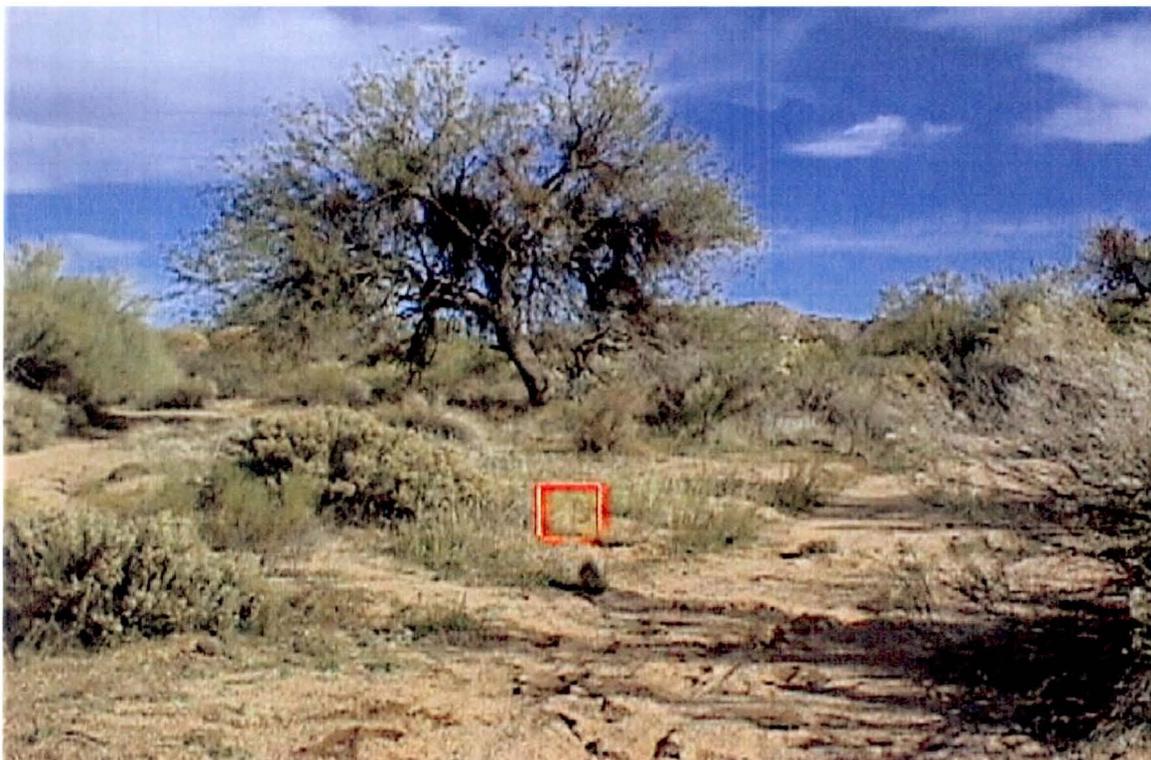


Photo 5/15. Mainstem Rawhide at confluence area with Tributary 2 approximately 450 ft south of Dove Valley Road alignment.

Location of Cross Section: Mainstem Upper Rawhide 2100 ft u/s confluence with Trib #2
Reach Number: Rawhide Wash Reach-8 Mainstem Upper Rawhide
Applicable Cross Sections: 12.09 to 13.775
Description of Channel: Sandy bottom channel with outcrops of rock, fairly confined, shrub lined banks, trapezoidal in shape, some meander

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.065	nb	0.03	nb	0.065
n1		n1	0.001	n1	
n2		n2	0.004	n2	
n3		n3	0.005	n3	
n	0.065	n	0.04	n	0.065
		Meander	1		
lobn	0.065	chn	0.04	robn	0.065



Photo 5/12. Mainstem Rawhide Wash looking south approximately 400 ft upstream of confluence.

Location of Cross Section: Mainstem Upper Rawhide 2100 ft u/s Carefree Highway alignment
Reach Number: Rawhide Wash Reach-9
Applicable Cross Sections: 13.869 to 14.059
Description of Channel: Location of split flow out of watershed, braided sandy bottom channel with medium density brush, tall trees

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.065	nb	0.03	nb	0.065
n1		n1	0.005	n1	
n2		n2	0.005	n2	
n3		n3	0.01	n3	
n	0.065	n	0.05	n	0.065
		Meander	1		
lobn	0.065	chn	0.05	robn	0.065



Photo 6/10. Mainstem Rawhide Wash looking northeast approximately 1400 ft upstream of Carefree Highway alignment.

Location of Cross Section: Mainstem Upper Rawhide 4450 ft u/s Carefree Highway alignment
Reach Number: Rawhide Wash Reach-10
Applicable Cross Sections: 14.154 to 15.29
Description of Channel: Sandy bottom channel, fairly confined trapezoidal, some brush in channel, clear to light density, tree/shrub lined banks and overbanks

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.065	nb	0.03	nb	0.065
n1		n1	0.001	n1	
n2		n2	0.004	n2	
n3		n3	0.005	n3	
n	0.065	n	0.04	n	0.065
		Meander	1		
lobn	0.065	chn	0.04	robn	0.065



Photo 5/19. Mainstem Rawhide Wash looking northeast approximately 1600 ft downstream of forest boundary.

Location of Cross Section: Tributary #1 1350 ft u/s confluence with Rawhide
Reach Number: Tributary 1 Reach 1. (T1-1)
Applicable Cross Sections: 0.095 to 0.429
Description of Channel: Sandy bed channel, braided, medium dense shrub and trees, meandering

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.065	nb	0.028	nb	0.065
n1		n1	0.002	n1	
n2		n2	0.003	n2	
n3		n3	0.005	n3	
n	0.065	n	0.038	n	0.065
		Meander	1		
lobn	0.065	chn	0.038	robn	0.065



Photo 3/19. Tributary 1 (RW 20) looking west approximately 1300 upstream of Rawhide Wash.

Location of Cross Section: Tributary #1 3450 ft u/s from confluence with Rawhide
Reach Number: Tributary 1 Reach 2 (T1-2)
Applicable Cross Sections: 0.473 to 1.136
Description of Channel: Sandy bed channel, trapezoidal, fairly confined, defined banks gradual meanders

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.06	nb	0.028	nb	0.06
n1		n1	0.001	n1	
n2		n2	0.002	n2	
n3		n3	0.002	n3	
n	0.06	n	0.033	n	0.06
		Meander	1		
lobn	0.06	chn	0.033	robn	0.06



Photo 4/2. Tributary 1 Reach 2 (RW20) looking upstream toward end of delineation.

Location of Cross Section: Tributary #2 1500 ft u/s from confluence with Tributary #4
Reach Number: Tributary 2 Reach 1 (T2-1)
Applicable Cross Sections: 0.334 to 0.947
Description of Channel: Sandy braided channel, medium to high density of thick brush/shrubs

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.065	nb	0.03	nb	0.065
n1		n1	0.005	n1	
n2		n2	0.002	n2	
n3		n3	0.006	n3	
n	0.065	n	0.043	n	0.065
		Meander	1		
lobn	0.065	chn	0.043	robn	0.065



Photo 4/12. Tributary 2 Reach 1 (RW18) looking east approximately 2800 ft east of Rawhide Wash confluence.

Location of Cross Section: Tributary #2 4750 ft u/s with confluence of Tributary #4
Reach Number: Tributary 2 Reach 2 (T2-2)
Applicable Cross Sections: 1.044 to 1.423
Description of Channel: Sandy bed channel, straight, confined channel, tree-lined banks, overbanks heavy vegetation

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.07	nb	0.03	nb	0.07
n1		n1	0.001	n1	
n2		n2	0.002	n2	
n3		n3	0.002	n3	
n	0.07	n	0.035	n	0.07
		Meander	1		
lobn	0.07	chn	0.035	robn	0.07



Photo 4/15. Tributary 2 Reach 2 looking west from upstream end of delineation.

Location of Cross Section: Tributary #3 1700 ft u/s confluence of Tributary #2
Reach Number: Tributary 3 Reach 1 (T3-1)
Applicable Cross Sections: New to 0.758
Description of Channel: Sandy bottom, slight meander, some braiding, in-channel vegetation medium brush, tree/brush-lined banks

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.065	nb	0.03	nb	0.065
n1		n1	0.002	n1	
n2		n2	0.002	n2	
n3		n3	0.005	n3	
n	0.065	n	0.039	n	0.065
		Meander	1		
lobn	0.065	chn	0.039	robn	0.065

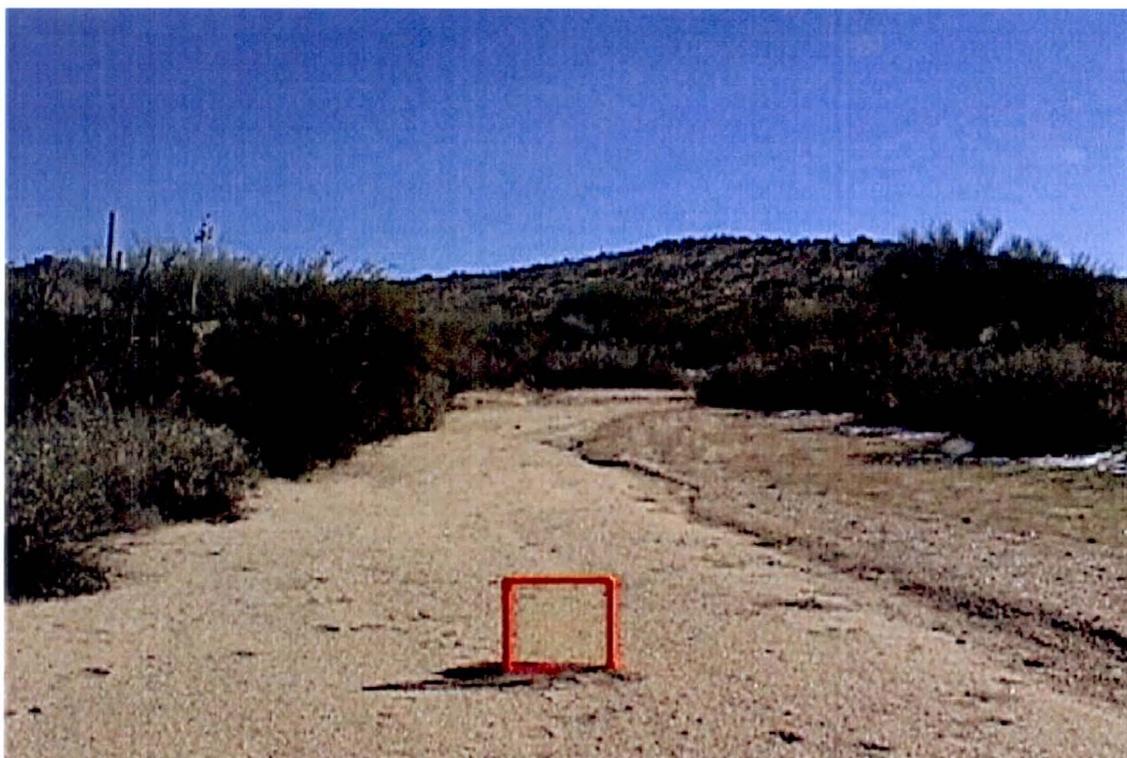


Photo 4/20. Looking northeast up Tributary 3 Reach 1 approximately 2100 ft from confluence with Tributary 2.

Location of Cross Section: Tributary #3 4200 ft u/s of confluence with Tributary #2
Reach Number: Tributary 3 Reach 2 (T3-2)
Applicable Cross Sections: .852 to 1.136
Description of Channel: Sandy braided channel, flat, wide, medium to heavy brush, tree-lined banks

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.065	nb	0.03	nb	0.065
n1		n1	0.002	n1	
n2		n2	0.005	n2	
n3		n3	0.01	n3	
n	0.065	n	0.047	n	0.065
		Meander	1		
lobn	0.065	chn	0.047	robn	0.065



Photo 5/5. Tributary 3 Reach 2 looking downstream from upstream end of delineation.

Location of Cross Section: Tributary #4 400 ft u/s confluence with Tributary #2
Reach Number: Tributary 4 Reach 1 (T4-1)
Applicable Cross Sections: 0.0947 to 0.663
Description of Channel: Sandy alluvial bed channel, straight, fairly clear, tree/shrub-lined banks

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.065	nb	0.03	nb	0.065
n1		n1	0.001	n1	
n2		n2	0.005	n2	
n3		n3	0.002	n3	
n	0.065	n	0.038	n	0.065
		Meander	1		
lobn	0.065	chn	0.038	robn	0.065



Photo 6/12. Tributary 4 Reach 1 looking upstream approximately 400 ft from confluence with Tributary 1.

Location of Cross Section: Tributary # 4 4800 ft u/s confluence with Tributary # 2
Reach Number: Tributary 4 Reach 2 (T4-2)
Applicable Cross Sections: 0.758 to 1.61
Description of Channel: Sandy bed channel, fairly confined, some meander, medium density shrub and trees along banks and within channel

Manning's Roughness Coefficient Calculation for the 100-year event:

Left Overbank		Channel		Right Overbank	
nb	0.065	nb	0.03	nb	0.065
n1		n1	0.003	n1	
n2		n2	0.003	n2	
n3		n3	0.002	n3	
n	0.065	n	0.038	n	0.065
		Meander	1		
lobn	0.065	chn	0.038	robn	0.065



Photo 6/18. Tributary 4 Reach 2 looking northeast approximately 500 ft upstream from Westland Drive Road alignment.

-
1. United States Geological Survey, Water Resources Division, "Estimated Manning's Roughness Coefficients for Stream Channels and Floodplains in Maricopa County, Arizona," (April, 1991). Prepare for Flood Control District of Maricopa County.
 2. Chow, V.T., "Open Channel Hydraulics." McGraw-Hill, 1959.
 3. Flood Control District of Maricopa County, "Drainage Design Manual Volume II – Hydraulics," January, 1996.
 4. B.N. Aldridge and J.M. Garret, "Roughness Coefficients for Stream Channels in Arizona," United States Department of the Interior Geological Survey, February, 1973.



APPENDIX A

Reach Limits and
Photograph Location Maps

**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY**
FLOOD DELINEATION STUDY OF
UPPER RAWHIDE WASH

F.C.D. CONTRACT NO. 98-12

LEGEND

100-YR FLOODPLAIN BOUNDARY	-----
FLOODWAY BOUNDARY	-----
HYDRAULIC BASE LINE WITH RIVER MILE	M 8.0 M 9.0
CROSS SECTION	(A) F-100 YR WSE FW-Floodway WSE
ELEVATION REFERENCE MARK	EMAS X
BASE FLOOD ELEVATIONS	-----
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary
PHOTO LOCATION AND DIRECTION (ENK #/PHOTO #)	(en)

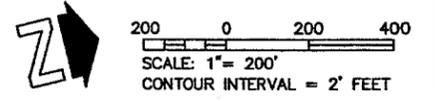
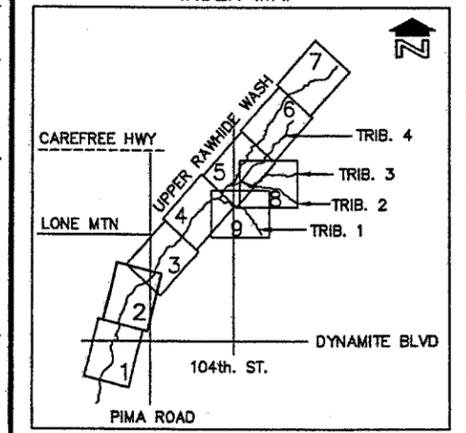
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1988

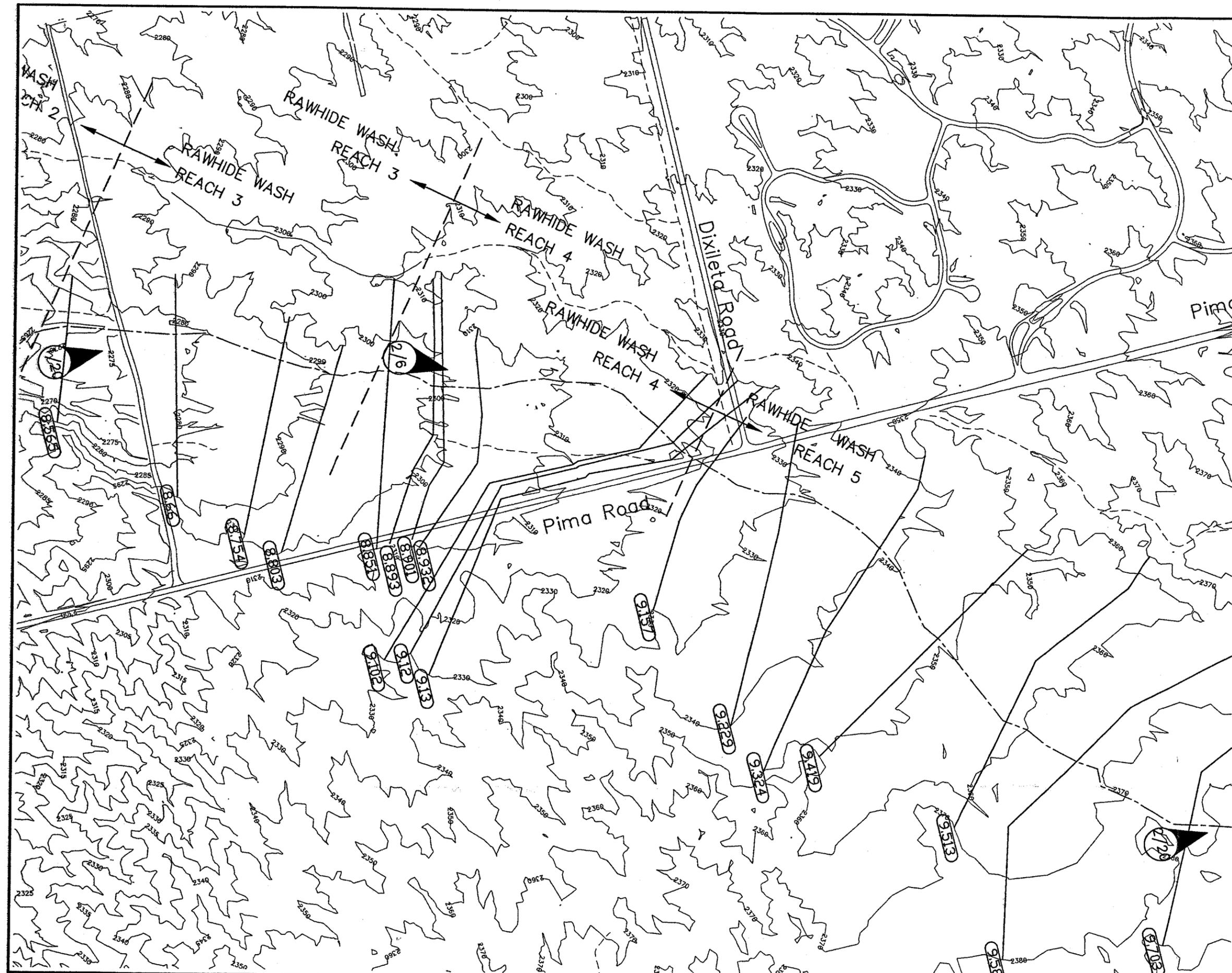
ID. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
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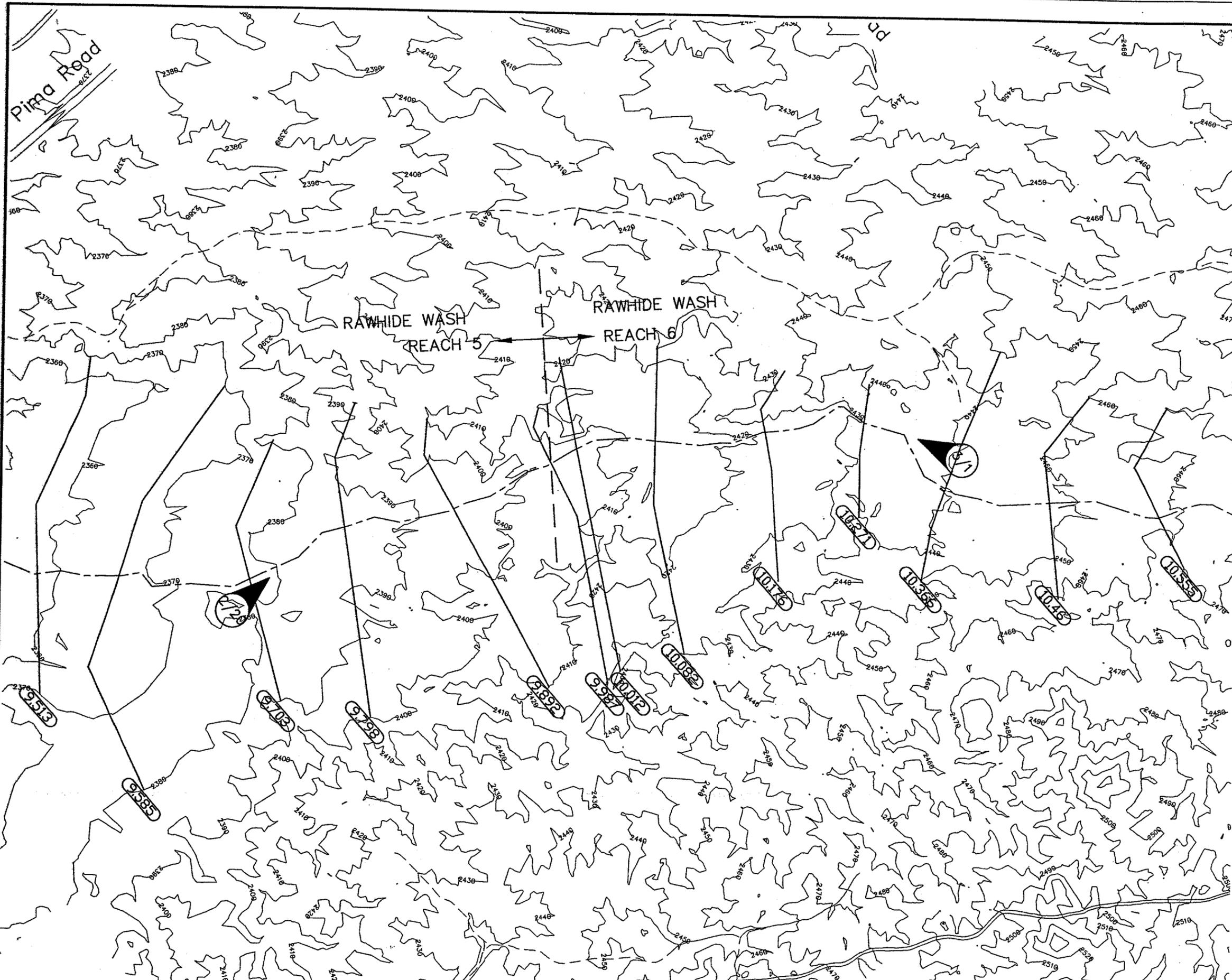
INDEX MAP



		Kimley-Horn and Associates Inc	
DESIGN	BY JTA	DATE FEB 99	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	RAE	FEB 99	
PLANS	SH	FEB 99	RECOMMENDED BY: DATE
PLANS CHK.	RAE	FEB 99	APPROVED BY: DATE
SUBMITTED BY:	DRAFT		CHEF ENGINEER AND GENERAL MANAGER
		DATE:	SHEET 2 of 9



THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS 1" = 200' HORIZONTAL SCALE AND 1" CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY DATA PROVIDED BY NAME OF COMPANY.



**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY**
FLOOD DELINEATION STUDY OF
UPPER RAWHIDE WASH

F.C.D. CONTRACT NO. 98-12

LEGEND

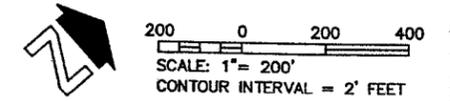
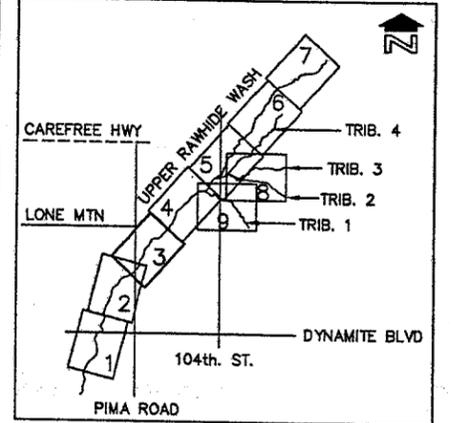
- 100-YR FLOODPLAIN BOUNDARY
- FLOODWAY BOUNDARY
- HYDRAULIC BASE LINE WITH RIVER MILE
- CROSS SECTION
- ELEVATION REFERENCE MARK
- BASE FLOOD ELEVATIONS
- ZONE DESIGNATIONS
- CORPORATE LIMITS
- COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY
- PHOTO LOCATION AND DIRECTION (DARK #/PHOTO #)

ELEVATION REFERENCE MARKS
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODEIC VERTICAL DATUM OF 1988

ID. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
99513	2380	
9702	2380	
9798	2390	
9822	2410	
9927	2410	
0002	2410	
0032	2410	
0045	2440	
0035	2440	
0045	2440	
0053	2440	

NOTES

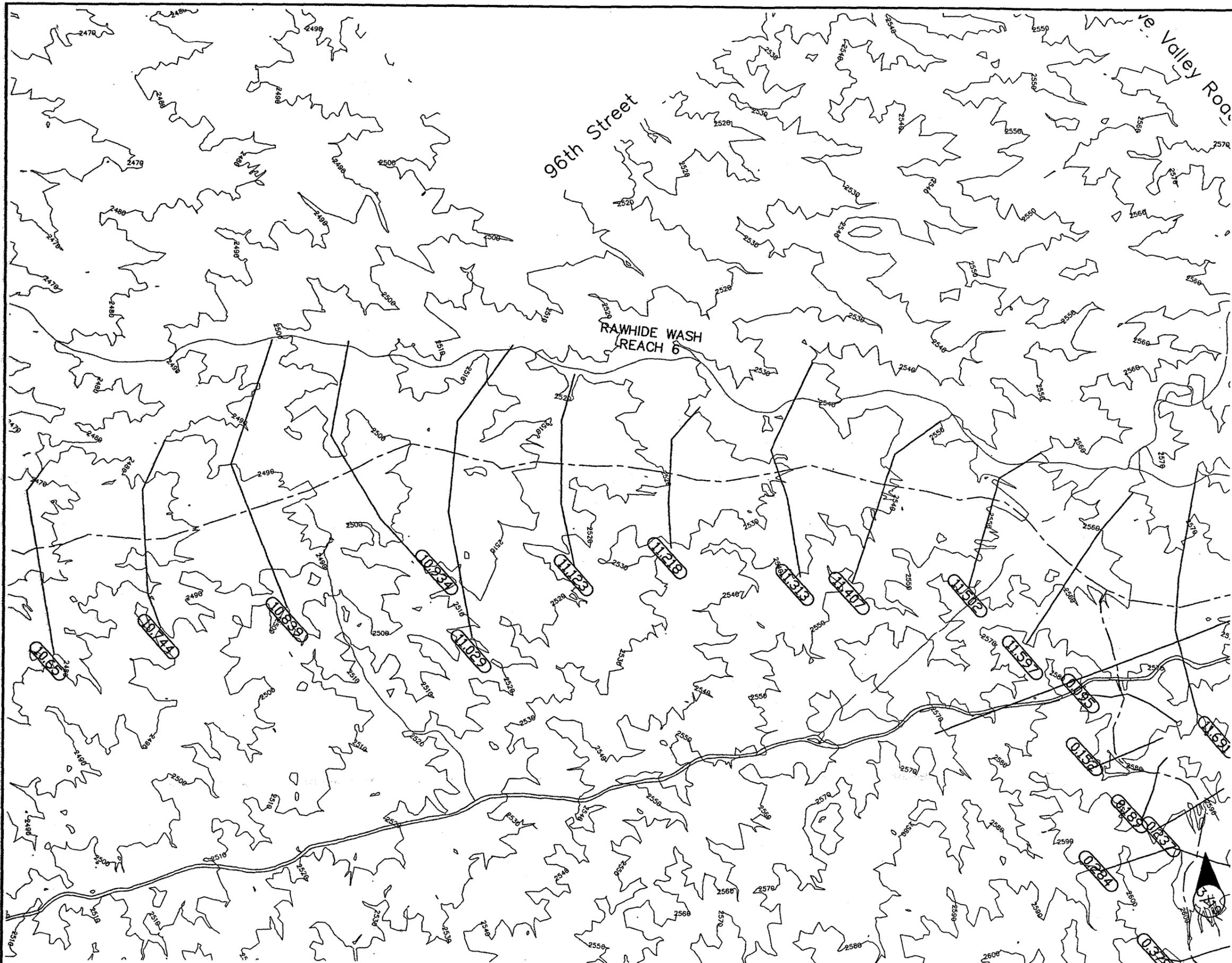
INDEX MAP



				Kimley-Horn and Associates Inc	
				FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	
DESIGN	JTA	FEB 99	RECOMMENDED BY:	DATE	
DESIGN CHK.	RAE	FEB 99		DATE	
PLANS	SH	FEB 99	APPROVED BY:	DATE	
PLANS CHK.	RAE	FEB 99		DATE	
SUBMITTED BY:			CHIEF ENGINEER AND GENERAL MANAGER		
DRAFT			SHEET 3 of 9		

ANIMAL MAPPING COMPANY,
SURVEYING COMPANY AND
RIGHT DATA SOURCE

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 1" CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY: NAME OF COMPANY



**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY**
FLOOD DELINEATION STUDY OF
UPPER RAWHIDE WASH

F.C.D. CONTRACT NO. 98-12

LEGEND

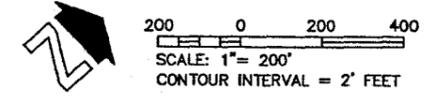
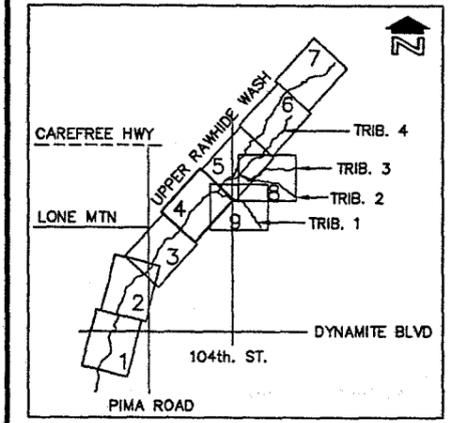
- 100-YR FLOODPLAIN BOUNDARY
- FLOODWAY BOUNDARY
- HYDRAULIC BASE LINE WITH RIVER MILE
- CROSS SECTION
- ELEVATION REFERENCE MARK
- BASE FLOOD ELEVATIONS
- ZONE DESIGNATIONS
- CORPORATE LIMITS
- COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY
- PHOTO LOCATION AND DIRECTION (ENK #/PHOTO #)

ELEVATION REFERENCE MARKS
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1988

ID. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION

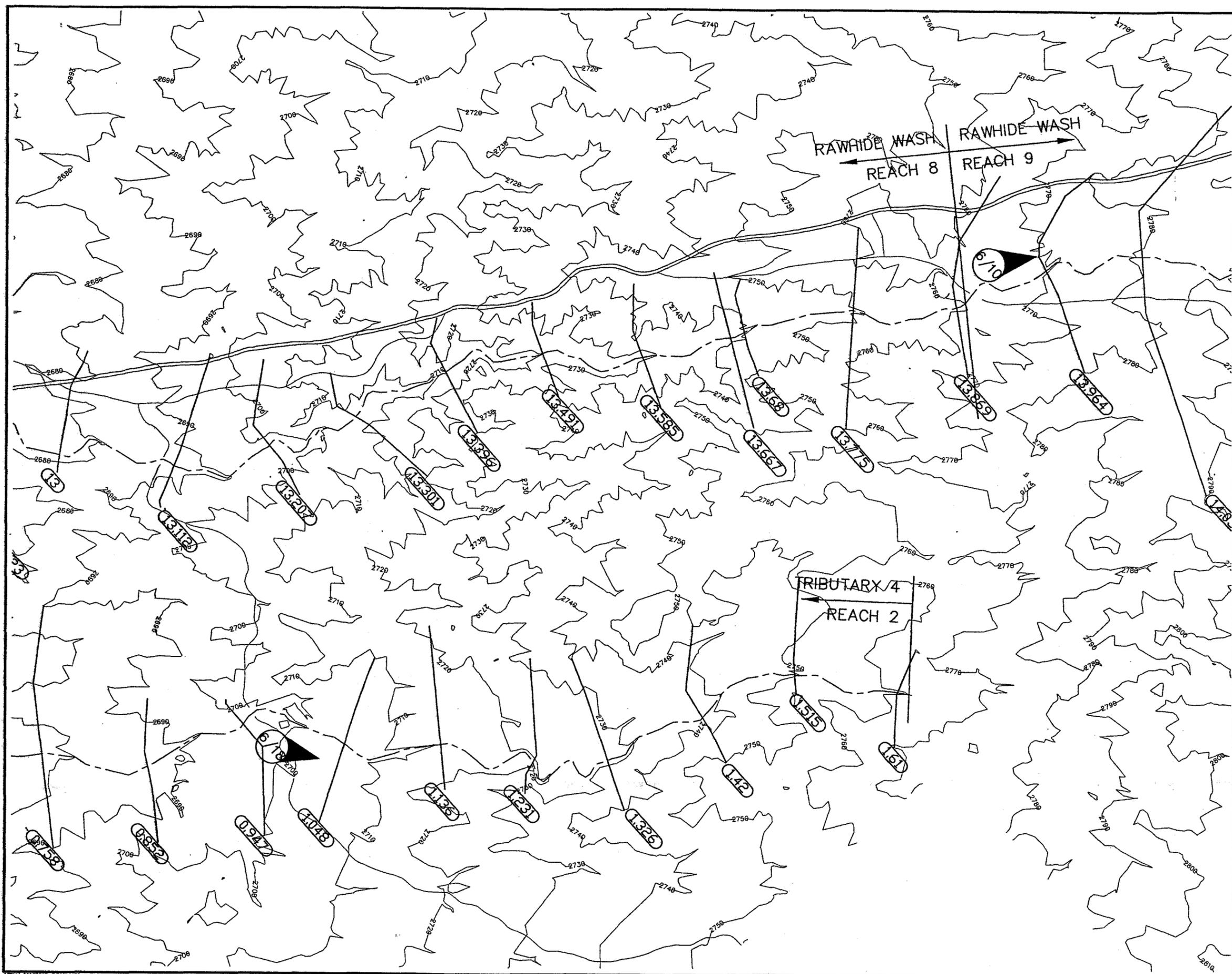
NOTES

INDEX MAP



		Kimley-Horn and Associates Inc		
		DESIGN	BY JTA	DATE FEB 99
DESIGN CHK.	RAE	FEB 99	RECOMMENDED BY:	DATE:
PLANS	SH	FEB 99	APPROVED BY:	DATE:
PLANS CHK.	RAE	FEB 99	CHIEF ENGINEER AND GENERAL MANAGER	
SUBMITTED BY:	DRAFT	DATE:	SHEET 4 OF 9	

ANIMAL MAPPING COMPANY, SURVEYING COMPANY AND RIGHT DATA CO. INC. THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS 1" = 200' HORIZONTAL SCALE AND 1" CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY DATA PROVIDED BY: NAME OF COMPANY



**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY**
FLOOD DELINEATION STUDY OF
UPPER RAWHIDE WASH

F.C.D. CONTRACT NO. 98-12

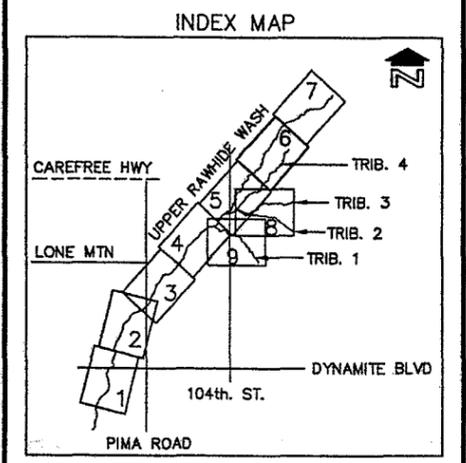
LEGEND

100-YR FLOODPLAIN BOUNDARY	—
FLOODWAY BOUNDARY	—
HYDRAULIC BASE LINE WITH RIVER MILE	M 8.0 — M 9.0
CROSS SECTION	A FF-100 Yr WSE A FW-Floodway WSE
ELEVATION REFERENCE MARK	ERM X
BASE FLOOD ELEVATIONS	2330
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary
PHOTO LOCATION AND DIRECTION (DIR #/PHOTO #)	6/110

ELEVATION REFERENCE MARKS
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1988

ID. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
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NOTES



SCALE: 1" = 200'
CONTOUR INTERVAL = 2' FEET

				FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	
				DESIGN	BY
DESIGN	JTA	FEB 99	RAE	FEB 99	
DESIGN CHK.	RAE	FEB 99	SH	FEB 99	
PLANS	SH	FEB 99	RAE	FEB 99	
PLANS CHK.	RAE	FEB 99			
SUBMITTED BY:			CHEF ENGINEER AND GENERAL MANAGER		
DRAFT					
				SHEET	6 of 9

AERIAL MAPPING COMPANY, SURVEYING COMPANY AND PHOTO DATA SOURCE
THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 1" CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
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**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY**
FLOOD DELINEATION STUDY OF
UPPER RAWHIDE WASH

F.C.D. CONTRACT NO. 98-12

LEGEND

100-YR FLOODPLAIN BOUNDARY	---
FLOODWAY BOUNDARY	---
HYDRAULIC BASE LINE WITH RIVER MILE	M 8.0 M 9.0
CROSS SECTION	(A) P-100 Yr WBE (A) FW-Floodway WBE
ELEVATION REFERENCE MARK	ERM X
BASE FLOOD ELEVATIONS	2330
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary
PHOTO LOCATION AND DIRECTION (DWK #/PHOTO #)	(e1a)

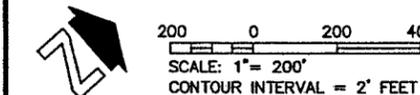
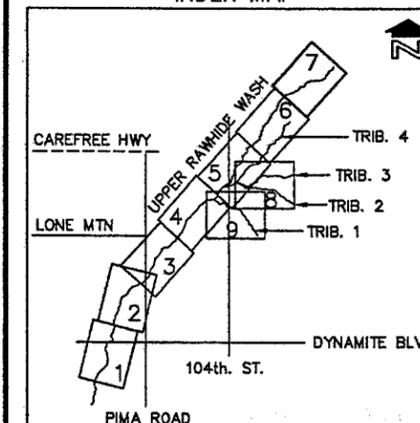
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETTIC VERTICAL DATUM OF 1988

ID. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
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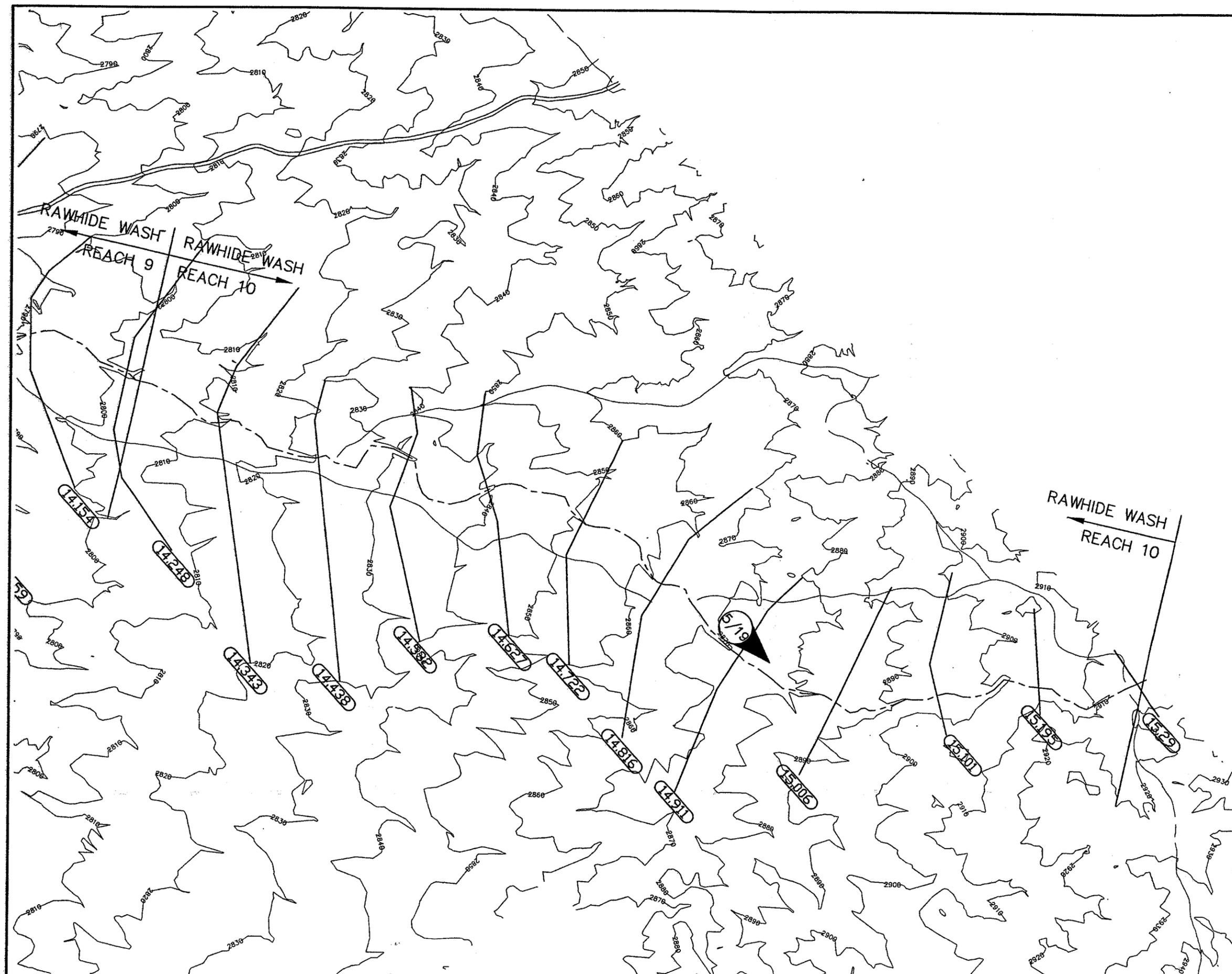
NOTES

INDEX MAP

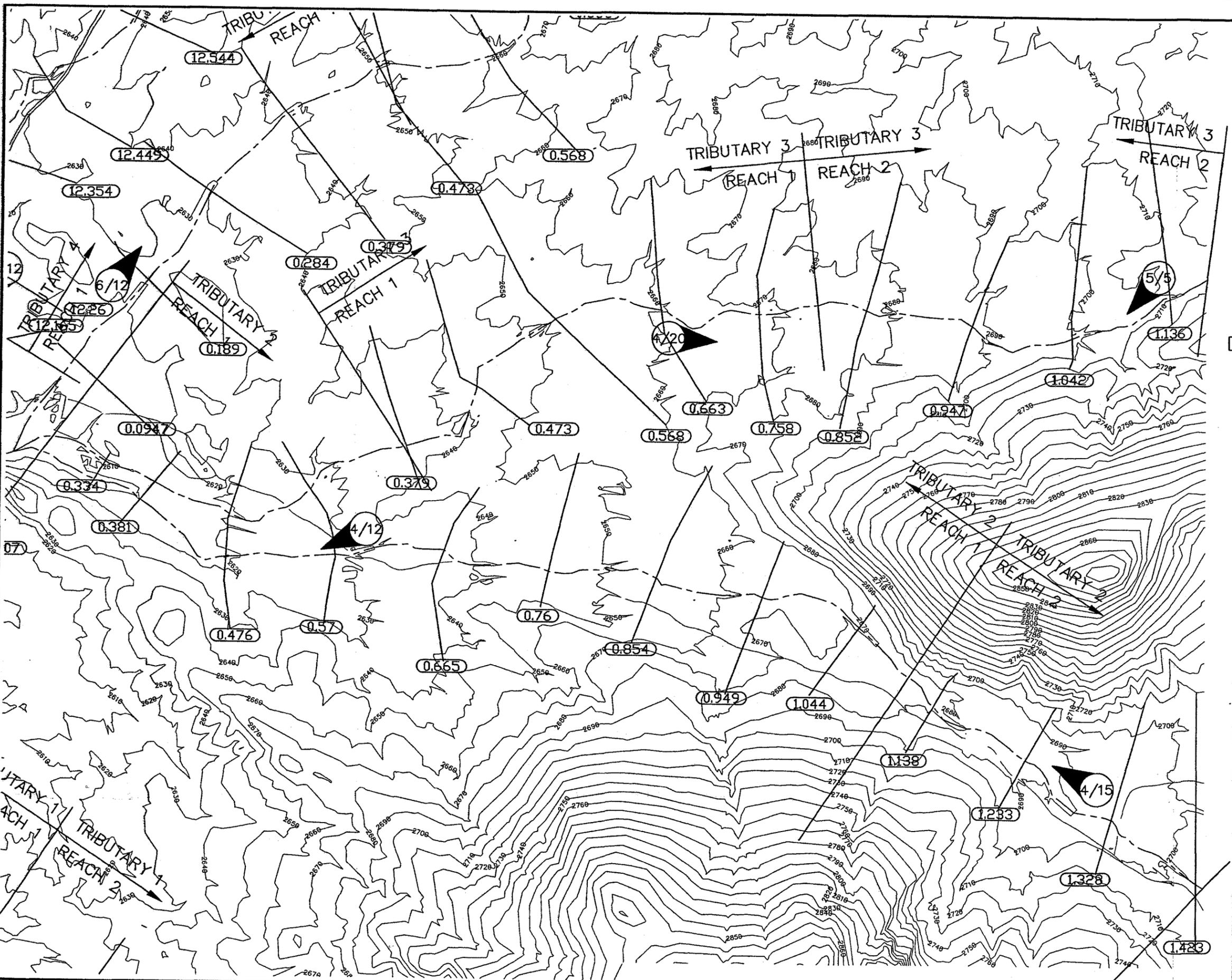


**Kimley-Horn
and Associates Inc**

DESIGN	JTA	DATE	FEB 99	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	RAE	DATE	FEB 99	
PLANS	SH	DATE	FEB 99	RECOMMENDED BY: _____
PLANS CHK.	RAE	DATE	FEB 99	APPROVED BY: _____
SUBMITTED BY:				CHEF ENGINEER AND GENERAL MANAGER
DRAFT		DATE		SHEET 7 of 9



THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 1" CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY NAME OF COMPANY



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FLOOD DELINEATION STUDY OF UPPER RAWHIDE WASH

F.C.D. CONTRACT NO. 98-12

LEGEND

100-YR FLOODPLAIN BOUNDARY	---
FLOODWAY BOUNDARY	---
HYDRAULIC BASE LINE WITH RIVER MILE	M 8.0 M 9.0
CROSS SECTION	(A) FP-100 YR WSE (A) FW-Roadway WSE
ELEVATION REFERENCE MARK	EMMS X
BASE FLOOD ELEVATIONS	2330
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary
PHOTO LOCATION AND DIRECTION (DATE & PHOTO #)	(A/B)

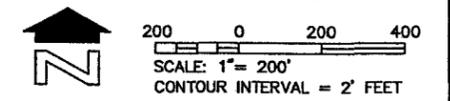
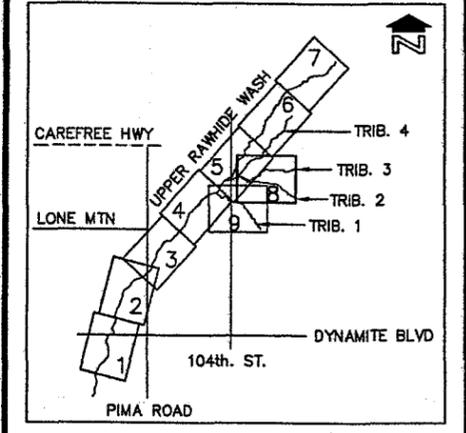
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1988

ID. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
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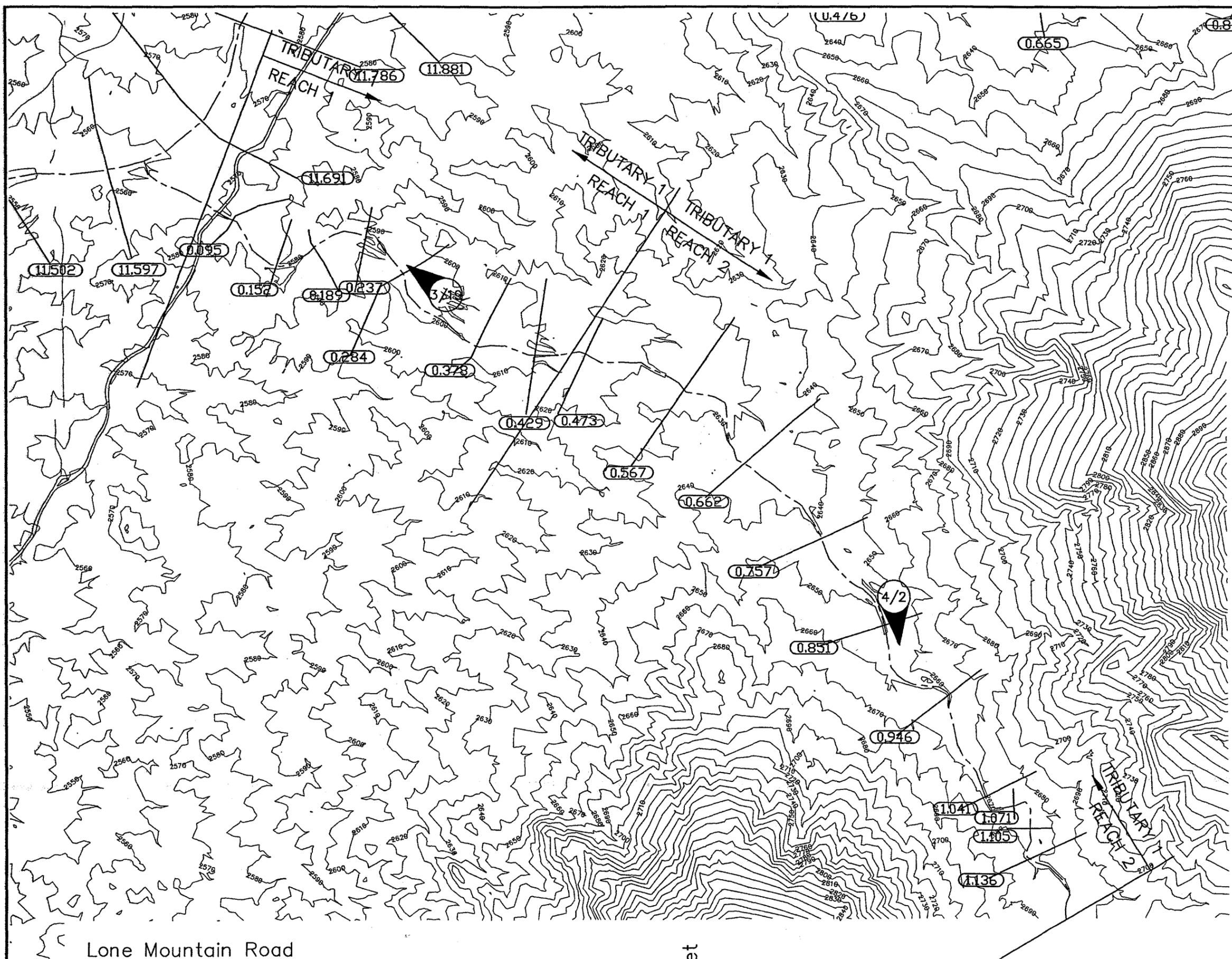
NOTES

INDEX MAP



		Kimley-Horn and Associates Inc		
		DESIGN	BY JTA	DATE FEB 99
DESIGN CHK.	RAE	FEB 99	RECOMMENDED BY:	DATE
PLANS	SH	FEB 99	APPROVED BY:	DATE
PLANS CHK.	RAE	FEB 99	CHEF ENGINEER AND GENERAL MANAGER	
SUBMITTED BY:	DRAFT	DATE:	SHEET	8 of 9

AERIAL MAPPING COMPANY, SURVEYING COMPANY AND PHOTO DATA, GO. HERE
 THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS AT 1" = 200' HORIZONTAL SCALE AND 1' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY DATA PROVIDED BY NAME OF COMPANY



**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY**
FLOOD DELINEATION STUDY OF
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LEGEND

100-YR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE WITH RIVER MILE	
CROSS SECTION	
ELEVATION REFERENCE MARK	
BASE FLOOD ELEVATIONS	
ZONE DESIGNATIONS	
CORPORATE LIMITS	
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	
PHOTO LOCATION AND DIRECTION (MARK #/PHOTO #)	

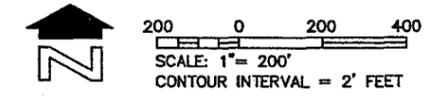
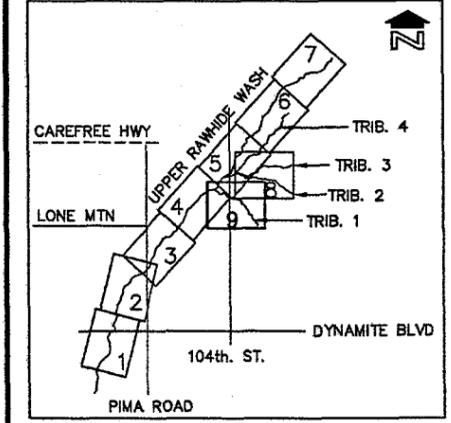
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1988

ID. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
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NOTES

INDEX MAP



			Kimley-Horn and Associates Inc
DESIGN	JTA	FEB 99	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	RAE	FEB 99	
PLANS	SH	FEB 99	RECOMMENDED BY: _____ DATE: _____
PLANS CHK.	RAE	FEB 99	APPROVED BY: _____ DATE: _____
SUBMITTED BY:	DRAFT		CHIEF ENGINEER AND GENERAL MANAGER
	DATE:		SHEET 9 OF 9

Lone Mountain Road

set