

**FLOOD INSURANCE STUDY  
FOR  
TRILBY WASH**

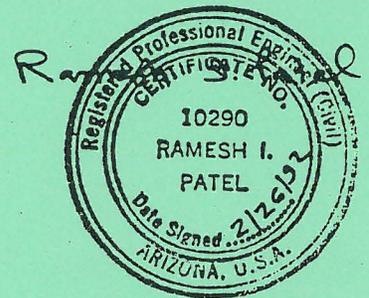
**COMMUNITY: UNINCORPORATED AREA OF  
MARICOPA COUNTY  
COUNTY: MARICOPA  
STATE: ARIZONA**

*PREPARED FOR:*

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY  
2801 W. DURANGO STREET  
PHOENIX, ARIZONA 85009  
CONTRACT FCD 90-24  
P&D TECHNOLOGIES PROJECT NO. 10320.00**

**TECHNICAL DATA NOTEBOOK**

**BOOK 1 OF 3**



*SUBMITTED BY:*

**P&D TECHNOLOGIES  
1702 E. HIGHLAND AVENUE  
SUITE 200  
PHOENIX, AZ 85016  
(602) 264-3335**

**FEBRUARY 1992**

**FLOOD INSURANCE STUDY  
FOR  
TRILBY WASH**

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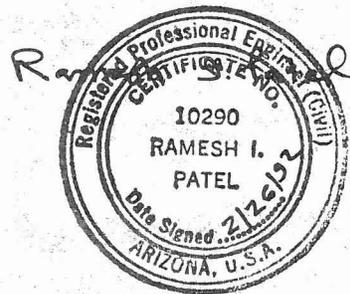
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**SECTION 1: GENERAL DOCUMENTATION AND CORRESPONDENCE**

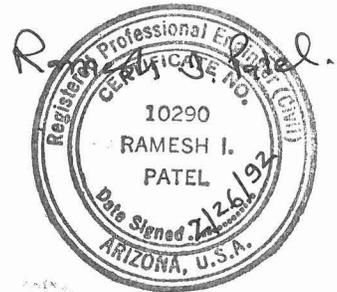
- 1.1 Special Problem Reports.
- 1.2 Contact (Telephone) Reports.
- 1.3 Meeting Minutes or Reports.
- 1.4 General Correspondence.
  - 1.4.1 Community
  - 1.4.2 State Coordinator
  - 1.4.3 Other Agencies
  - 1.4.4 FEMA Regional Office
  - 1.4.5 FEMA Washington
  - 1.4.6 FEMA Technical Consultant
  - 1.4.7 Copy of public notices
- 1.5 Contract Documents

**SECTION 2: MAPPING AND SURVEY INFORMATION**

- 2.1 Mapping and survey information.
- 2.2 Index of maps.
- 2.3 Survey field notes.
- 2.4 Watershed maps, hydrologic analysis maps.
- 2.5 Hydraulic analysis maps.
- 2.6 FIRM, FHBM draft maps.
- 2.7 Community maps.
- 2.8 Misc. maps.

**SECTION 3: HYDROLOGIC ANALYSIS**

- 3.1 Method description.
- 3.2 Parameter estimation.
  - 3.2.1 Drainage area boundaries
  - 3.2.2 Physical parameters



- 3.2.3 Statistical parameters
- 3.2.4 Precipitation
- 3.2.5 Gage data
- 3.3 Calibration
- 3.4 Special problems/solutions
- 3.5 Final results/computer runs.
- 3.6 Final modeling results on diskette(s).

**SECTION 4: HYDRAULIC ANALYSIS**

- 4.1 Method description.
- 4.2 Parameter estimation.
  - 4.2.1 Manning's "n" value.
  - 4.2.2 Expansion and contraction coefficients
  - 4.2.3 Hydraulic jump/drop analysis
- 4.3 Cross-section description
  - 4.3.1 Channel and Overbank
  - 4.3.2 Bridge or Constriction
  - 4.3.3 Grade Control Structures
- 4.4 Calibration
- 4.5 Special problems/solutions
- 4.6 Floodway modeling
- 4.7 Final results/computer runs.
- 4.8 Final modeling.

**SECTION 5: EROSION/SEDIMENT TRANSPORT**

- 5.1 Erosion/sediment transport methodology.
- 5.2 Parameter estimation.
- 5.3 Calibration
- 5.4 Final results/computer runs.

**SECTION 6: REFERENCE MATERIALS**

- 6.1 Other published flood studies.
- 6.2 Previous FEMA studies.
- 6.3 Other applicable studies.
- 6.4 Published/Unpublished historical flood information.
- 6.5 Referenced documents.

**SECTION 7: CROSS-REFERENCING AND LABELING INFORMATION**

- 7.1 Other studies impacted.
- 7.2 Key to cross-section labeling.

**SECTION 8: DRAFT FIS REPORT - REVISED TEXT**

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**SECTION 1: GENERAL DOCUMENTATION AND  
CORRESPONDENCE**

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**SECTION 1: GENERAL INFORMATION**

A	COMMUNITY	MARICOPA COUNTY, (UNINCORPORATED AREAS), ARIZONA
1B	COMMUNITY NUMBER	040037
1C	COUNTY	MARICOPA COUNTY
1D	STATE	ARIZONA
1E	DATE STUDY ACCEPTED	
1F	STUDY CONTRACTOR CONTACT(S) ADDRESS	P+D TECHNOLOGIES RAMESH I. PATEL, P.E. 1702 E. HIGHLAND AVENUE, SUITE 200 PHOENIX, AZ 85016
	PHONE	(602) 264-3335
	INTERNAL REF #	P.N. # 10320.00
1G	TECH. REVIEWER (FEMA) PHONE	
1H	FEMA REGIONAL REVIEWER PHONE	
1I	STATE REVIEWER PHONE	
J	LOCAL REVIEWER PHONE	MR. GEAVE "BESIAN" KHATIBLOU, P.E. FCO OF MC, 2801 W. DURANGO ST. PHX, AZ 85009 (602) 506-1501
1K	RIVER OR STREAM NAME	TRILBY WASH
1L	REACH DESCRIPTION (FIRM PANEL & EPA REACH #)	PANELS 1110, 695, 690, 687 AND 679 * PANEL NOT PRINTED - AREA IN ZONE 'D'
1M	STUDY TYPE (Riverine, Alluvial Fan, etc)	RIVERINE FLOOD INSURANCE STUDY

**SECTION 2: MAPPING INFORMATION**

2A	USGS QUAD SHEET(S)	1.) WITTMANN (1981) - 7.5' MIN. 2.) WHITE TANK MTS., N.E. (1978) 7.5'
2B	MAPPING FOR HYDROLOGIC STUDY	USGS QUAD MAPS AS REFERENCED ABOVE
	TYPE/SOURCE	
	SCALE	1" = 2000'
	DATE	WITTMANN 1981; WHITE TANK MTS. N.E. 1978
2C	MAPPING FOR HYDRAULIC STUDY	NEW MAPPING SPECIFICALLY FOR THIS STUDY
	TYPE/SOURCE	1" = 200' SCALE W/ 2' CONTOUR INTERVAL
	SCALE	
	DATE	11/26/90
	SUBCONTRACTOR (AERIAL)	COOPER AERIAL MAPPING OF PHOENIX
	DATE OF AERIAL MAPPING	9/13/90 (602) 266-2279

## SECTION 3: HYDROLOGY

	MODEL OR METHOD USED (including vendor and version description)	U.S. ARMY CORPS OF ENGINEERS HEC-1 (1985 VERSION) WITH 900 ORDNATE CAPABILITY
3B	STORM DURATION	6 HR.
3C	HYETOGRAPH TYPE	SCS TYPE II, 24 HR. RAINFALL DIST.
3D	FREQUENCIES DETERMINED	100 YEAR
3E	LIST OF GAGES USED IN FREQUENCY ANALYSIS OR CALIBRATION (Location, Years of Record, Gage Ownership)	
3F	RAINFALL AMOUNTS AND REFERENCE	100 YEAR 6 HR. STORM TOTAL = 4.21" NOAA'S ATLAS NO. 2 PRECIPITATION-FREQUENCY ATLAS OF WESTERN UNITED STATES, VOL. VIII - ARIZONA - DATED 1973.
3G	UNIQUE CONDITIONS AND PROBLEMS	
	COORDINATION OF Q'S (agency, date, comments)	

## SECTION 4: HYDRAULICS

4A	MODEL OR METHOD USED (including vendor and version description)	HEC-2, VERSION 4.6.0) 2/91 BOSS HEC-2, VERSION 2.50 (608) 258-9910
4B	REGIME	SUBCRITICAL FLOW
4C	FREQUENCIES FOR WHICH PROFILES WERE COMPUTED	100 YEAR EVENT
4D	METHOD OF FLOODWAY CALCULATION	METHOD 4 FOLLOWED BY METHOD 1
4E	UNIQUE CONDITIONS AND PROBLEMS	NUMEROUS WATERWAY BRANCHING AND RETURN TO MAIN CHANNEL  PRESENCE OF POINT BAR "ISLANDS"  AREAS OF SHALLOW FLOODING, WATER IS NOT ALWAYS CONTAINED IN MAIN STREAM CHANNEL.



**1.1 SPECIAL PROBLEM REPORTS**

- **There are several areas of lateral flooding which occurs in this reach of Trilby Wash. In these areas, the flow is not contained within the banks and under present condition, run-off will leave the Trilby Wash and the watershed reach. In these areas, Encroachment Method 1, which specifies the location of encroachment for a given cross-section is used to calculate flood profile under natural condition. At these cross-sections, encroachment for natural condition are specified in field seven and eight of the ET. card. This methodology allows the most conservative water surface elevation profile.**
- **Split flow of Trilby Wash occurs between cross-section 15.581 and 16.254. Trilby Wash split into westerly branch which is referred as a west channel at approximately 15.581 cross-section. West channel again split into another branch that run toward the Main Trilby Wash which is referred to as a middle channel at approximately 15.842 cross-section. Middle Channel meet the Trilby Wash at cross-section 16.112 while the West Channel meet the Trilby Wash at cross-section 16.254.**

**Flood Profiles for each branch are calculated by trial and error method. Flow is split in each branch with trial and error method such that water surface elevations at upstream end (where the branches meet together again) is approximately the same. Under natural condition, run-off is contained within each branch by the used of Encroachment Method 1. Encroachment for natural condition are specified in field seven and eight of the ET card.**

**For the encroached (floodway) condition, flow is also split in each branch with trial and error method, such that water surface elevations at upstream end (where branches meet together again) is approximately the same. Under floodway condition, Encroachment Method 1 is used and the encroachments are specified in field nine and ten of the ET card. For the floodway condition, no additional encroachment of the interior portion of the island (i.e., west side of main channel, east side of west channel and both sides of middle channel), is allowed. Therefore, encroachment station for floodway condition on west side of main channel, eastside of west channel and both sides of middle channel are from natural condition run where the water surface intersects the ground.**

**1.2 CONTACT (TELEPHONE) REPORTS**



By LTMV Date 11/8/90 Client FCD

Sheet No. 1 Of 2

Conversation With BARB WARBURTON Date 11/8/90  
Representing MC. HIGHWAY DEPT Project Number 10320  
3325 W. DULANGO  
Phone Number 233-8794 Subject TRILBY WASH  
Items Discussed AS-BUILT PLANS /AL 233-8672

- RESEARCHED CENTRAL FILES FOR AS-BUILT PLANS OF ROADWAYS CROSSING TRILBY WASH. ONLY MAJOR ROADWAY CROSSING IS PATTON RD. WEST OF CROZIER

- THERE ARE NO AS-BUILT PLANS OR IMPROVEMENT PLANS ON FILE FOR THIS PORTION OF THE ROADWAY (SEE ATTACHED COPY OF CARD FILE ON PATTON ROAD FROM THE HIGHWAY DEPT.

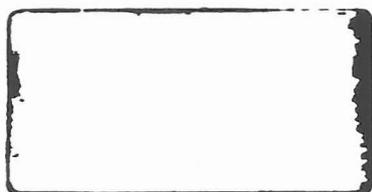
- THIS IS THOUGHT TO BE AN "OVER-LAY" "EYE BALE" - JOB BY M.C. OPERATIONS

Action To Be Taken NONE

SHE SUGGESTED THAT MAYBE AL DESHAZO COULD TELL ME MORE ABOUT THE OVERLAY; HOWEVER, THERE ARE XIU PLANS

By LTMV Copies To Filb

FROM	TO	W.O. #	Trac ing. Dwr. #	R/W Strip Map Tube #	On Mi- cro Fim	Map Key #	Proj. File #	Field Book #	Box # In Whse.	REMARKS
Avenue	207th Avenue	49000 & 49001								
Crozier Road	203rd Avenue	68095	25		*		*	*		
243rd Ave.	Crozier	68591								NOTHING ON FILE 11/8/90
3 Mi. W. of Crozier	3 Mi. W. of Croz.	68610								
267th Ave.	267th Ave.	83416								





Conversation With DAVE CREIGHTON Date 11/7/90  
Representing ADWR Project Number 10320  
Phone Number 542-1541 Subject TRILBY WASH  
Items Discussed EXISTING DATA

1953 TRILBY WASH DAM WAS STARTED  
(WHICH IS THE SAME AS T. W.  
DETENTION BASIN AND MC MIKEN DAM)

IN THE 70'S CRACKS WERE FOUND IN THE  
DAM DURING AN INSPECTION

THE US ARMY CORP BUILT IT

MCFLD REPAIRED IT

GAUGE MAY HAVE BEEN INSTALLED @ DAM.

NO OTHER INFO. ON FILE

Action To Be Taken NONE

By LTMV

Copies To

File

PHONE MEMO



Conversation With JIM MCINTYRE Date 11/7/90  
 Representing CENTRAL AZ WATER Project Number 10320  
CONSERV. DISTRICT  
 Phone Number 870-2343 Subject TRILBY WASH  
 Items Discussed EXISTING INFO @ CAP

- REFERRED ME TO:

- 1.) CLIFF GATLAN 870-2854  
+/OR  
DAVE GUN 870-2857

- 2.) JES WARREN 870-2823

Action To Be Taken CALL OTHERS - ABOVE

By LTMV

Copies To File



Conversation With JOHN CAHOON Date 11/7/90  
Representing Cooper Aerial Project Number 10320  
Phone Number 266-2279 Subject TRUBY WASH  
Items Discussed EXISTING PHOTO. INFO

Q - IS THERE ANY PAST PHOTOGRAPHY  
OF THIS AREA DURING A FLOOD  
EVENT?

A - THERE'S SOME PHOTOGRAPHY AVAILABLE  
① 1" = 2000', BUT NOT DURING  
A FLOOD EVENT, FOR:

1977 - SHOWING McMIKEN DAM W/  
STANDING WATER COVERING AN  
AREA ROUGHLY 300' x 200'

1986 - AREA LOOKS DRY

Action To Be Taken NONE

By

CTM ✓

Copies To



Conversation With CINDY CROXDALE Date 11/7/90  
 Representing FEMA Project Number 10320  
 Phone Number (202) 646-3445/58 <sup>FAX:</sup> Subject TRILBY WASH  
 Items Discussed EXISTING DATA

Q - Any LOMR or LOMA Requested for this wash?

A - One, from MCFCD on 5/2/89 re:

Wittmann Area Drainage Master Study:  
 (Master Listing is all inclusive and extends  
 from the time the approx. study was  
 completed in 1/79.)

- FEMA concurred w/ request for map  
 revision from MCFCD in a letter dated  
 11/7/89. This info. is now on preliminary  
 FEMA maps and is in the 90 day appeal  
 period. To the best of her knowledge no  
 other requests or appeals have been rec.,  
 especially in our area of interest.

- For the record "This is the best available  
 technical information to date".

Action To Be Taken NONE

By CTMV

Copies To

Gib



Conversation With HARRY MILSARS Date 11/7/90  
Representing SCS Project Number 10320.  
Phone Number 640-2547 Subject TRILBY WASH  
Items Discussed EXISTING DATA

- TO THE BEST OF HIS KNOWLEDGE  
NO "NEW" WORK HAS BEEN  
COMPLETED IN THE AREA - WILL  
SEND "CURRENT PROJECT STATUS"  
MAP

- REFER TO: "SOIL SURVEY (MAPS)  
OF AGUILA - CAREFREE AREA, PARTS  
OF MARICOPA AND PINAL COUNTIES,  
AZ " : USDA, SCS ; 1985

Action To Be Taken NONE

By LTMV

Copies To



Conversation With BOB HALL Date 11/7/90  
(CHIEF OF DESIGN)  
Representing U.S. ARMY CORPS/CA Project Number 10320  
Phone Number (213) 894-5466 Subject TRILBY WASH  
Items Discussed EXISTING DATA

- MC MICKEN DAM HAD CRACKED  
DUE TO LAND SUBSIDENCE IN  
THE AREA (1970'S)

- ARMY CORPS BLEACHED THE  
DAM TO MITIGATE THE  
POTENTIAL FOR FAILURE

- TO THE BEST OF HIS KNOWLEDGE  
MCFCD REPAIRED IT AND NO  
FURTHER WORK WAS DONE ON  
IT OR THE AREA BY THE  
CORPS

ADDITIONAL REFERENCE:

HYDROLOGY - DENNIS MARRICE, CHIEF

Action To Be Taken (213) 894-4753

By LTMV

Copies To

Filo

# Phone Memo



Conversation With CORA LOUIE Date 11/7/90  
Representing USGS Project Number 10320  
Phone Number 379-3086 Subject TRILBY WASH  
Items Discussed EXISTING DATA

NO INFO. ON FILE FOR TRILBY  
WASH, IN THE AREA OF CIRCLE  
CITY

Action To Be Taken NONE

By LTMV Copies To File

# Phone Memo



Conversation With MARK GAVIN Date 11/7/90  
Representing THE WLB GROUP Project Number 10320  
Phone Number 279-7427 Subject TILBY WASH  
Items Discussed EXISTING DATA

- NO <sup>ACTUAL</sup> STREAM GAUGE DATA WAS USED IN THEIR STUDY MODEL
- NO RAIN GAUGES ARE PRESENT EITHER - TO HIS KNOWLEDGE
- MAPPING OF WITTMANN AREA DRAINAGE MASTER STUDY WAS DONE @ 400 SCALE + IS BEST DESCRIBED AS APPROX.
- NOTE: It appears from previous work done that there are "splits or islands" in the wash. It is unclear whether or not these were taken into account in the sizing of the CAP Canal Overcuts.

Action To Be Taken NONE

By LDMV

Copies To File

PHONE MEMO



Conversation With MR. HOIT Dates CALLED: 11/6,7,8,9/90  
 Representing LUKE AFB/ENG. Project Number 10320  
 Phone Number 856-3635/1634 Subject TRILBY WASH  
 Items Discussed EXISTING DATA

- LEFT MESSAGES

- LEFT MESSAGE AGAIN 11/13/90

Action To Be Taken CALL BACK

By LPMV

Copies To File



Conversation With ERIC HODGINS Date 11/12/90  
 Representing KENNET AERIAL MAP. Project Number 10320.  
 Phone Number 258-6471 Subject TRILBY WASH  
 Items Discussed EXISTING PHOTOGRAPHY

- WILL CHECK AND CALL BACK

- 11/13/90 MARGE DUNLAP  
 NO PHOTO. OF THIS SITE  
 ON FILE

Action To Be Taken NONE

By JTMU

Copies To Gib



Conversation With DAVE GUNN Date 11/9/90  
Representing CAWCD Project Number 10320  
Phone Number 870-2857 Subject TRILBY WASH  
Items Discussed TRILBY WASH @ CAP

- DOESN'T HAVE ANY DESIGN  
INFORMATION ON CAP REFERRED  
TO: KEVIN ADAMS @ BOR  
870-2493

- DID TELL ME THAT THE  
CAP IS FLOWN EVERY THREE  
WEEKS AND HAS BEEN ~~FOR~~  
SINCE APPROX. 1981

- HE WILL RESEARCH EXISTING  
PHOTO'S FOR AREA, IF  
ANY AND CALL BACK...

- NO PHOTOS OF OUR AREA ON FILE 11/13/90

Action To Be Taken CALL K. ADAMS 870-2493

By

LTM

Copies To

Gil



Conversation With KEVIN ADAMS Date 11/9/90  
 Representing B.O.R. Project Number 10320  
 Phone Number 870-2493 Subject TRILBY WASH  
 Items Discussed DESIGN INFO FOR CAP @ "

- SHOULD HAVE DESIGN Q AND V  
 INFO. WILL DO RESEARCH AND  
 FAX ANY APPLICABLE DATA...

FAX REC. 11/9/90 (ORIGINALS TO FOLLOW IN  
 MAIL)

SEE ATTACHED

Action To Be Taken REVIEW INFO.

By LTMV Copies To File

( INFORMAL )  
FAXOGRAM

DATE : 11/9/90  
TO : LISA VOMERO  
FROM : 241-1334  
PHONE NO: \_\_\_\_\_

NAME : KEVIN ADAMS

BUREAU OF RECLAMATION, ARIZONA PROJECTS OFFICE  
OFFICE ENGINEERING, CONSTRUCTION OFFICE  
P.O. BOX 9980  
PHOENIX, AZ 85068

PHONE NO : FTS 765-1137 or (602) 870-2137

PHONE NO: 870-2493

SUBJECT : Hydrology Parameters - Hayden Rhodes Reach 8

TOTAL PAGES (including cover sheets): 6

REMARKS : For your information

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

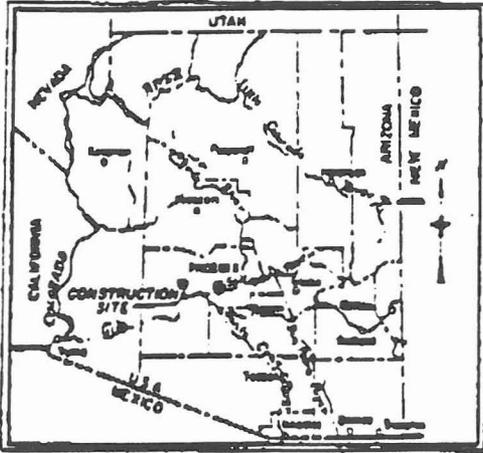


**BUREAU OF RECLAMATION**  
**Arizona Projects Office**

**K. Kevin Adams, P.E.**  
**Chief, Design Data Branch**

23636 N. 7th Street  
P.O. Box 9980  
Phoenix, Arizona 85068

Bus. (602) 870-2493  
FTS 765-1493  
Engineering Division



KEY MAP

EXPLANATION

- OPEN ABUEDUCT AND BRIDGE
- CREEK
- OVERCUT
- WASH SIPHON
- DRAINAGE INLET
- FLOATWELL
- DIKE
- DRAINAGE DITCH
- CATTLE CROSSING
- OBSERVATION WELL

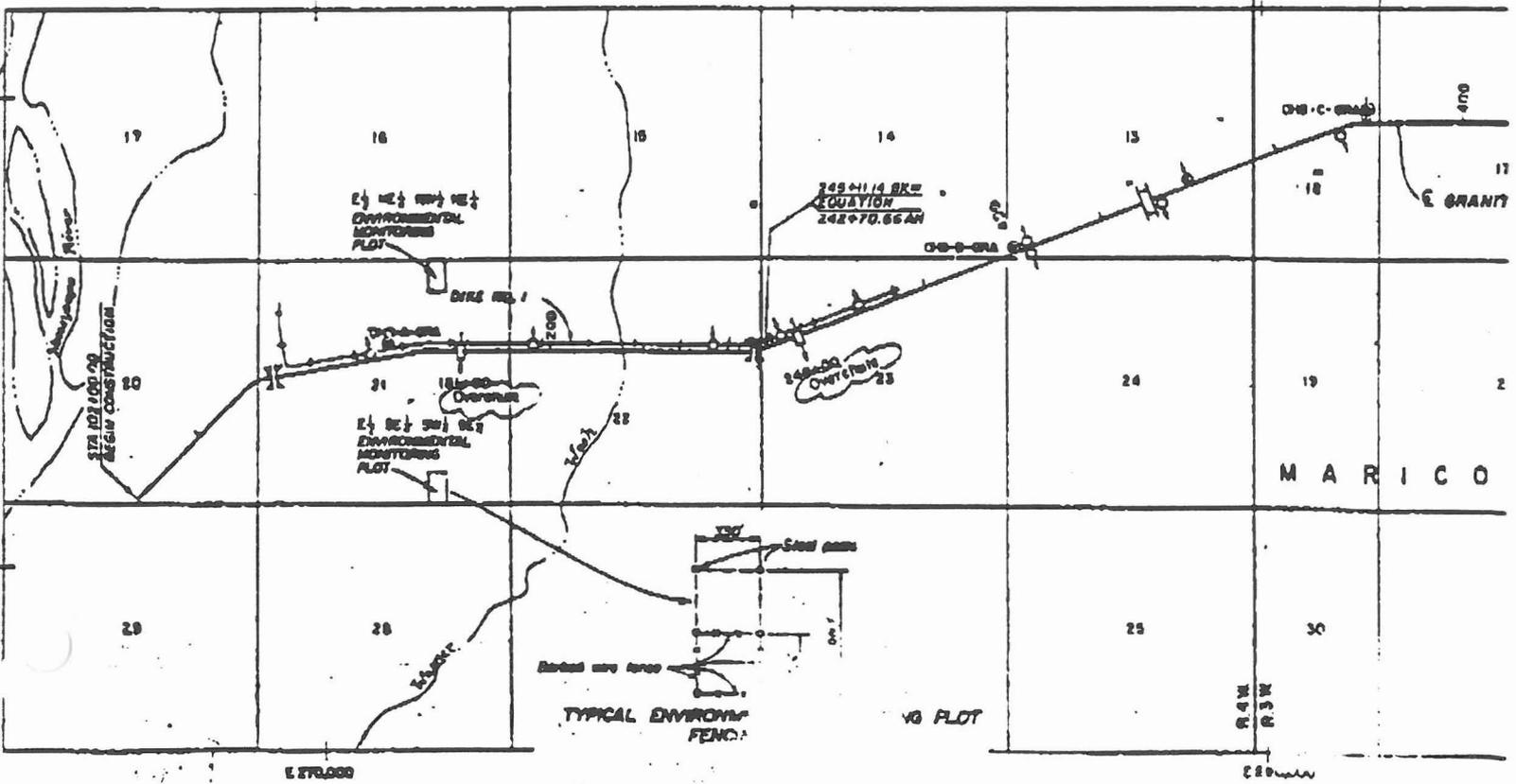


CROSS DRAINAGE STRUCTURES

STATION	SIZE	PEAK DISCH (cfs)	STORAGE CAPACITY (cu ft)	PEAK DISCH (cfs)	DESIGN STORM
100+00	10' x 5'-0" OVERCUT	3350	300	300	100% BIENNIAL STORM
240+00	10' x 6'-0" OVERCUT			300	"
140+00	WASH SIPHON	3365	737	2300	"
370+00	47'-4" x 8' OVERCUT	1000	100	4000	"
61	135'-10" x 8'-6" OVERCUT	2000	0	1000	"
60	87'-2" x 6'-0" OVERCUT	3304	73	2000	"
60	87'-2" x 6'-0" OVERCUT	3715	91	3200	"

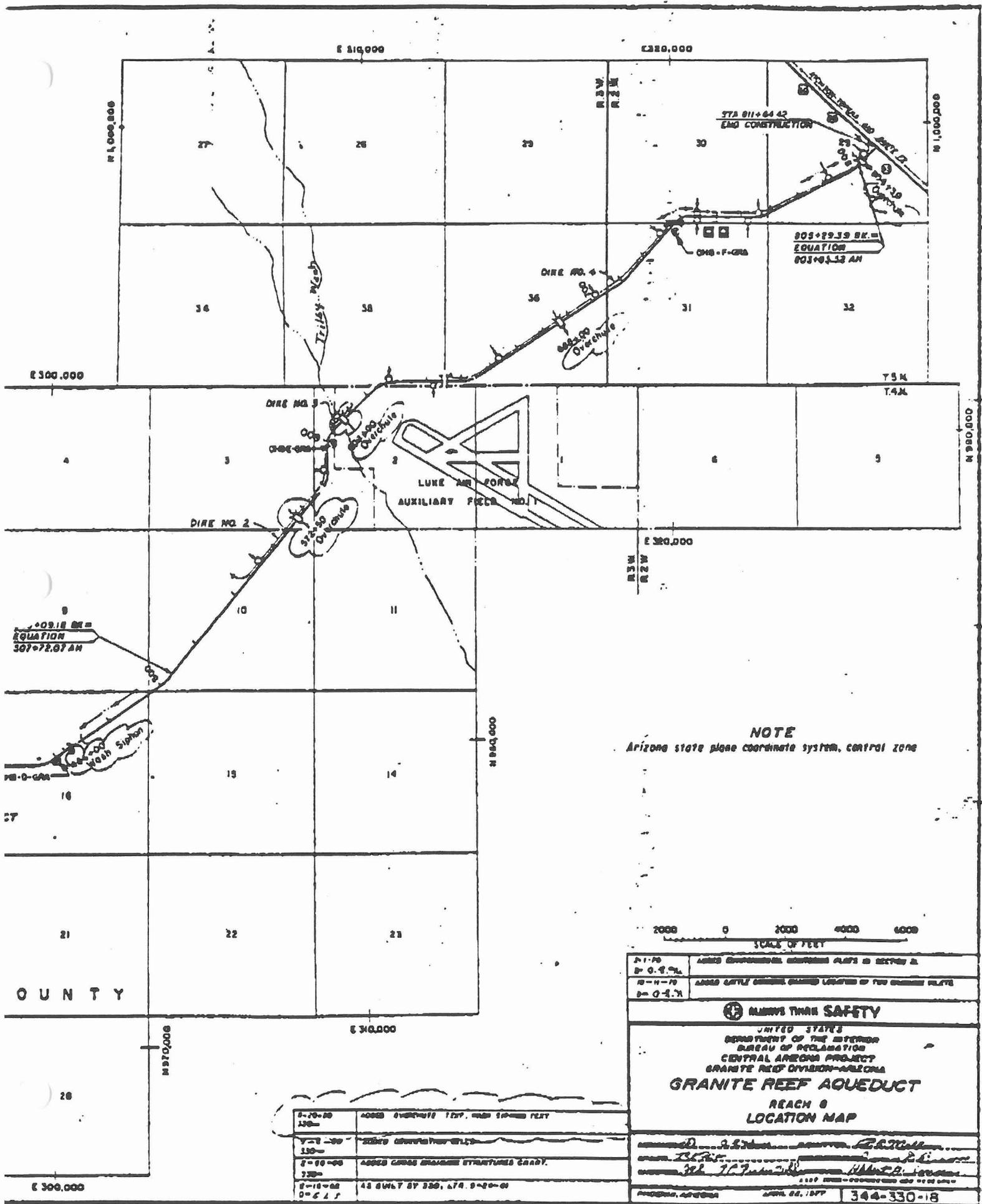
6903.  
Tribby Wash 609+00 Assume: NO STORAGE

135' 10" x 8' 6"



M A R I C O

TYPICAL ENVIRONMENTAL FENCE



**NOTE**  
 Arizona state plane coordinate system, control zone



8-1-70 D-0-4.7K	ADDED OVERSIGHTS AND/OR ALIEN PLANTS IN REACH 8
8-11-70 D-0-4.7K	ADDED CATTLE CORRAL CHANGED LOCATION OF FEED CHUTES PLANTS
<b>⊕ RUMBLE THUMB SAFETY</b>	
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION CENTRAL ARIZONA PROJECT GRANITE REEF DIVISION-ARIZONA <b>GRANITE REEF AQUEDUCT</b> <b>REACH 8</b> <b>LOCATION MAP</b>	
PREPARED BY: <i>[Signature]</i> CHECKED BY: <i>[Signature]</i> DATE: <i>[Signature]</i>	
PROJECT NO. 344-330-18	

8-20-70 130-	ADDED OVERSIGHTS TEXT, AND 10' FEET
7-1-69 130-	ADDED OVERSIGHTS TEXT
8-10-68 130-	ADDED CROSS BRIDGE STRUCTURES CADD.
8-18-68 0-6.1.1	AS SHOWN BY 330, 274, 9-20-68

C O U N T Y

E 300,000

INPUT DATA FOR FLOOD ROUTING  
HAYDEN-RHODES AQUEDUCT REACH 8

STATION	STRUCT. TYPE	SIZE	INVERT ELEV.	CREST ELEV.	STORAGE CAPACITY DATA			
					ELEV.	AC.FT	ELEV.	AC.FT.
181+00	Flume	18'W	1548.50	1554.0	1546	0	1548	92
248+00	Flume	18'W	1547.95		1550	464	1552	1266
466+00	Wash S	67'W	1535.6	1545.09	1536	0	1538	9
					1540	33	1542	97
					1544	436	1546	912
					1548	1539	1550	2334
572+50	Flume	47'-4"W	1545.19	1552.0	1545.2	0	1546	7
					1548	31	1550	69
					1552	288	1554	518
609+00	Flume	135'10"	1544.90	1553.4	No routing this structure.			
688+00	Flume	87'2"W	1544.67	1534.0	1545	0	1546	10
					1548	31	1550	292
					1552	498		
804+50	Flume	67'6"W	1543.23	1551.7	1546	0	1548	3
					1550	18	1552	114
					1554	413		

UBY  
34

INPUT DATA FOR UNIT HYDROGRAPHS  
 HAYDEN-RHODES AQUEDUCT - REACH 8

STATION	AREA Sq.Mi.	GRAPH SCS/PV	CHANNEL Miles	CENTROID Miles	SLOPE ft/mi.	CURVE No.	PRECIPITATION		
							100-yr	50-yr	3-hr
181+00 248+00	12.7	SCS	6.10	2.64	35	78	3.14	2.74	
466+00	13.5	SCS	7.70	3.80	36	78	3.30	2.90	
572+50	7.00	SCS	7.10	2.40	36	78	3.30	2.90	
609+00	57.8	SCS	21.2	7.40	36	78	2.98	2.60	
688+00	17.50	SCS	12.30	4.50	36	78	3.10	2.72	
804+50	20.8	SCS	12.00	5.60	41	78	3.09	2.70	

# Phone Memo



Conversation With BARRY LONG Date 11/9/90  
Representing BLM Project Number 10320  
Phone Number 863-4464 Subject TRILBY WASH  
Items Discussed EXISTING DATA

- TO HIS KNOWLEDGE THE MAJORITY  
OF LAND BELONGS TO THE STATE  
~~BE~~ AND IS STATE TRUST LAND.

- THERE IS NO INFORMATION ON  
TRILBY WASH FROM HIS  
OFFICE

Action To Be Taken CALL STATE LAND DEPT.

By LTMV

Copies To

File



Conversation With SHIELA McCAFFERTY Date 11/9/90  
 Representing RIGHTS-OF-WAY Project Number 10320  
AZ STATE LAND DEPT.  
 Phone Number 542-3681 Subject TRILBY WASH  
 Items Discussed EXISTING DATA - DATTON RD.

- LEFT MESSAGE 11/9/90

- CALLED AGAIN 11/13/90 NOT IN

Action To Be Taken

By

Copies To



Conversation With DEMPOSEL HELMS Date 11/9/90  
 Representing HYDRO. / FLOOD CONTROL Project Number 10320  
AZ STATE LAND DEPT.  
 Phone Number 542-2671 Subject TRILBY WASH

Items Discussed EXISTING DATA

- LEFT MESSAGE 11/9/90
- NO INFORMATION ON FILE 11/13/90

Action To Be Taken

By \_\_\_\_\_ Copies To \_\_\_\_\_

**1.3 MEETING MINUTES OR REPORTS**

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Interoffice Memorandum

Subject: TRILBY WASH DELINEATION MAPS

File:

To: BKH

From: MWP

Date: 01-08-92

Info: RGN



I have reviewed the maps supplied by P&D for the Trilby Wash Delineation and have the following comments:

1. The cover sheet (panel 1) indicates White Wing Road as the major east/west cross street for panel 6. Panel 6 shows the street as Lone Mountain Road. I believe that White Wing Road would be more correct for this area than Lone Mountain and suggest that panel 6 be changed to "White Wing Road".
2. The alignment of 227th Avenue as shown on panel 6 appears to be incorrect. The natural extension would intersect the common section corners of 14, 15, 22 and 23. Please have this verified by P&D for local conditions since the delineation does not show this particular section to be an extension. -02-11  
OK
3. On panels 8 and 9, please label the west and middle channels as depicted on the index (panel 1). In addition, there appears to be another channel to the east of these two channels, and I feel it should also be given a name or other type of identification. ~~2-02-11~~  
OK
4. As we have discussed, the underlying topo needs to be screened to a lower intensity so that the delineation will be more apparent. If possible, the screening should affect only the topo lines and not the ERM's and other supporting informational data. OK

All in all I found these maps to be very complete for the given area and I appreciate the effort put forth by P&D.

TRILBY WASH 11/15/92

- 1) - Highlight the legend in your mapping.  
 2) - Floodway is outside of floodplain in the following areas:

... Sheet # 5 X-sec 13.141  
 ... Sheet # 8 X-sec 15.298 & 15.749  
 ... Sheet # 9 X-sec 16.254 & 16.714

- 3) - Sheet # 5 Sec 13.223 & 13.286, why are the left banks of the section inside of F/W.

- 4) - Sheet # 8 & 9 show the inside F/P boundary as dash line.

5)	X-sec	Computed Top width	On the map Topwidth
...	10.683	184.66	180 ✓ OK
...	10.815	136.00	160
...	10.945	256.00	240
...	11.006	157.00	180
...	10.062	194.00	205
...	11.426	228.00	230 ✓ OK
...	11.626	140.00	160
...	11.688	144.00	160
...	12.325	162.00	170
...	12.484	164.00	175
...	12.822	120.00	135
...	13.000	126.00	165
...	13.079	221.00	230
...	13.141	494.82	515
...	13.519	345.57	380
...	13.691	426.35	430 ✓ OK,
...	13.841	531.74	600
...	14.197	328.13	350
...	14.310	384.00	400
...	14.481	160.00	175
...	14.569	160.00	145
...	14.656	156.00	175
...	14.754	164.00	180
...	14.845	232.00	250

X-Sec	Computed Topwidth	on the map Topwidth
15.379	294.00	320
15.443	351.37	320
16.254	154.00	170
16.345	119.96	130
16.421	118.00	130
16.936	65.64	95
17.135	91.34	120
17.262	88.00	100
17.319	95.00	110
17.364	96.00	110

6) Computed vs Copied

Sec. #	Computed	Copied
10.683	F/w width = 185 ft F/w Sec. Area = 819	179 ft 816
11.426	F/w sec Area = 956 mean velocity = 4.0 WSEL w/F/w = 1578.1 WSEL w/o F/w = 1577.3 W.S.El Diff = .8	912 4.2 1577.9 1577.2 .7
11.515	W.S.El w/F/w = 1580.0 WSEL w/o F/w = 1579.0	1580.1 1579.1
11.688	WSEL w/F/w = 1586.1 WSEL Diff = .5	1586.2 .6
17.425	WSEL w/o F/w = 1853.1	1858.1



**P&D Technologies**

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October 25, 1991

Flood Control District  
of Maricopa County  
3335 W. Durango Street  
Phoenix, Az 85009

Attn: Mr. Geave "Besian" Khatiblou

**RE: TRILBY WASH**

Dear Besian:

Enclosed please find a revised schedule for the above referenced project. Completion date for this project has been extended due to the following reasons.

- o Extreme difficulties were encountered in modeling the split flow areas. This has added, additional design time, submittals and review time.
- o Difficulties in modeling BOSS HEC-2 program with multiple encroachment target.
- o Error in Army Corps. of Engineers HEC-2 program (September 1990 Edition, Version 4.5.1) software in culvert routine.

If you have any comments on the revised schedule, please do not hesitate to call me at 264-3335.

Sincerely,

**P&D TECHNOLOGIES**

*Ramesh S. Patel.*

Ramesh I. Patel, P.E., L.S.  
Project Manager



**P&D Technologies**

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**TRILBY WASH**  
**MEETING & MILESTONE DATES**  
(Completion of Task 1.3)

**Updated: October 25, 1991**

**I. PREVIOUS MEETINGS LIST & MILESTONE DATES:**

<u>DATE</u>	<u>PURPOSE</u>
04/19/90	Initial Presentation (for Gila Canal) @ FCDMC
05/08/90	Saddleback FIS Site Inspection
06/05/90	Trilby Wash FIS Site Inspection
06/06/90	Review @ FCD previously submitted FIS
06/19/90	Fee Proposal Due
06/22/90	Scope Adjustment Meeting @ FCDMC
06/27/90	Fee Negotiation Committee Meeting @ FCDMC
07/23/90	Anticipated Board of Supervisors Approval Date
08/06/90	Actual Board of Supervisors Approval Date
08/13/90	Verbal Notice to Proceed
08/14/90	Notification Letters Sent (dated 7/27/90) (Completion of Task 2.1)
08/15/90	Receipt of written Notice to Proceed
08/19/90	Announcement of Flood Elevation Study Published - Arizona Republic
08/22- 09/05/90	Announcement of Flood Elevation Study Published - Daily Sun News
08/23/90	Survey started
09/13/90	Site flown by Cooper Aerial Mapping
10/3/90	Receipt of contact prints from Cooper (Completion of Task 2.2)
10/15/90	Ground Control was completed (Task 2.2.2)
10/26/90	Meeting regarding: billing, schedule adjustment., contact prints & Task 1.0. (Begin Task 6.1)
11/13/90	Written Summary of Data Collection Submittal (Completion of Task 1.0)

**TRILBY WASH  
MEETING & MILESTONE DATES  
(Completion of Task 1.3)  
Updated October 25, 1991  
(continued Page 2)**

<u>DATE</u>	<u>ITEM</u>
11/20/90	Field Inspection for Manning's "n" values
11/14/90	Final Approval of Project Base Sheet by FCD
11/27/90	P&D to submit written summary of Manning's "n" values for the FCD's review and approval (Completion of Task 4.4.1)
11/26/90	P&D to receive the 100-Year Peak Discharge Values from the FCD to be used in the FIS (Task 3.0)
11/26/90	P&D to receive preliminary topographic mapping from Cooper Aerial Mapping (Completion of Task 2.2.1, 2.2.2 & 4.1)
11/28/90	Delineate thalweg & cross-sections (Preliminary completion of Task 4.3)
11/29/90	Meeting with FCD to review thalweg & cross-sections
12/10/90	Resubmit cross-section information to Cooper digitizing
12/15/90	P&D to complete Field Survey (Completion of Tasks 4.2 & 4.4)
12/17/90	Meeting with FCD regarding re-formatting of topo sheets 5-8
01/04/91	P&D to receive digitized data from Cooper in HEC-2 Format & review with FCD. Begin Floodplain & Floodway Delineation (Task 5.0)
01/10/91	Hydraulic Analysis Coordination Meeting with FCD (Task 6.1)
01/17/91	Hydraulic Analysis Coordination Meeting with FCD
01/24/91	Hydraulic Analysis Coordination Meeting with FCD
02/12/91	Hydraulic Analysis Coordination Meeting with FCD
02/26/91	Hydraulic Analysis Coordination Meeting with FCD (Complete Task 4.3)
03/14/91	Hydraulic Analysis Coordination Meeting with FCD
03/28/91	Hydraulic Analysis Coordination Meeting with FCD
04/11//91	Submittal of HEC-2 Model to FCD
04/25/91	Hydraulic Analysis Coordination Meeting with FCD. Receive FCD comments of HEC-2 Model (4/11/91 Submittal)
05/10/91	Hydraulic Analysis Coordination Meeting.

**TRILBY WASH  
MEETING & MILESTONE DATES  
(Completion of Task 1.3)  
Updated October 25, 1991  
(continued Page 3)**

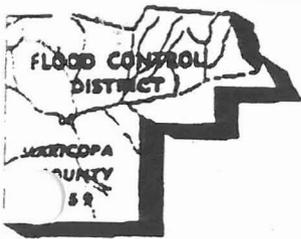
<u>DATE</u>	<u>ITEM</u>
05/31/91	Submittal of HEC-2 Model to FCD
06/26/91	Hydraulic Analysis Coordination Meeting. Receive FCD comments of HEC-2 Model (5/31/91 Submittal)
07/18/91	Submittal of HEC-2 Model to FCD
07/22/91	Hydraulic Analysis Coordination Meeting. Receive FCD comments of HEC-2 Model (7/18/91 Submittal)
07/26/91	Submittal of HEC-2 Model to FCD
08/16/91	Hydraulic Analysis Coordination Meeting. Received FCD comments of HEC-2 Model (7/26/91 Submittal).
08/27/91	Submittal of HEC-2 Model to FCD
09/05/91	Hydraulic Analysis Coordination Meeting. Flood Plain Modeling accepted. FCD asked P&D to proceed with encroachment
09/24/91	Submittal of HEC-2 Model with encroachment (Method 1) to FCD
10/03/91	Hydraulic Analysis Coordination Meeting. Receive comments of HEC-2 Model (9/24/91 Submittal)
10/21/91	Submittal of HEC-2 Model with encroachment (Method 1) to FCD.

**II. PROPOSED TENTATIVE SCHEDULE OF MEETINGS & MILESTONES**

<u>DATE</u>	<u>ITEM</u>	<u>NOTES</u>
11/01/91	Hydraulic Analysis Coordination Meeting. Receive comments of HEC-2 Model (10/21/91 Submittal)	
11/08/91	Submittal of proposed final HEC-2 model & mapping. (Completion of Tasks 5.1 to 5.7)	
11/11/91	P&D to start draft final report	
11/18/91	P&D to submit to FCD draft final report for review. (Preliminary completion of Task 5.8)	
11/15/91	P&D to receive from the FCD final comments regarding HEC-2 computer model & floodplain/floodway mapping	

**TRILBY WASH  
MEETING & MILESTONE DATES  
(Completion of Task 1.3)  
Updated October 25, 1991  
(continued Page 4)**

<u>DATE</u>	<u>ITEM</u>	<u>NOTES</u>
11/18/91	Final point out of HEC-2 model & inking of final maps to begin	
11/27/91	Final mapping to be completed as well as completion of all final products & submittal to FCD. Completion of Tasks 2.2.3, 2.3.4, 2.2.5, 2.2.6, 5.8, 7.1 to 7.6).	
12/06/91	P&D to receive final comments regarding changes to the HEC-2 Model or mapping limits.	
12/2/0/91	Final submittal & fulfillment of final contract. Completion of Tasks 6.1 & 6.2.	



# FLOOD CONTROL DISTRICT

of

Maricopa County

3335 West Durango Street • Phoenix, Arizona 85009  
Telephone (602) 262-1501

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D. E. Sagramoso, P.E., Chief Engineer and General Manager

APR 25 1991

Mr. Ramesh I. Patel, P.E., R.L.S.  
P & D Technologies  
1702 East Highland Avenue  
Suite 410  
Phoenix, Arizona 85016

SUBJECT: Trilby Wash Flood Control Study  
Contract FCD 90-24  
(P&D P.N.: 10320)

Dear Ramesh:

We have completed our preliminary review of the April 11, 1991 HEC-2 modeling. Since the project is still in the preliminary stage of hydraulic modeling, our review is only considering an overview of the modeling process; therefore, we are not examining the quality of the mapping and other aspects of the project.

Based on our review, your office has been able to address some of our concerns of our first review. However, most of the following comments are repeats from the first review.

1. The HEC-2 modeling is considering ponding areas as part of the active flow areas of the cross section. In order to compute the water surface elevations more accurately at these locations, ponding areas should be eliminated from the cross-sectional area.
2. The Manning "n" values that are used do not correctly address the main channel, left overbank, and right overbank.
3. The discharges are reduced at some of the cross section locations. The discharge reductions are not matching the working maps.
4. Some of the HEC-2 cross sections are indicating the weir flow. However, the modeling does not appropriately reflect this condition. The HEC-2 cross sections should be revised to correct this error.
5. The X3 records which are used in some of the cross sections do not appear to contribute any effect to the modeling results. You may need to eliminate these ineffective records.

Letter to: Mr. Ramesh I. Patel, P.E., R.L.S.  
Subject: Trilby Wash FCD 90-24  
Page 2

6. See our review red marks for some of the HEC-2 cross sections which do not simulate the wash according to the working map.
7. Revise the index map to identify townships, ranges, sections, and discharge reduction locations.
8. From cross section 79 to 92, there is clear evidence of split flow which must be modeled and reflected according to the working maps.
9. The HEC-2 model shows a discharge reduction for cross section 106. Please review to insure the reduction discharge.

If you have any questions, please contact me at 262-1501.

Sincerely,



Besian Khatiblou, P.E.  
Hydrologist



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March 29, 1991

Mr. Geave "Besian" Khatiblou, P.E.  
Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, Arizona 85009

**RE: Trilby Wash Meeting Summary  
FCD Contract No. 90-24  
P & D P.N. No: 10320**

Dear Besian:

The purpose of this letter is to summarize the topics discussed at the Trilby Wash Meeting in P & D Technologies' Office on Thursday, March 28th, 1991, at 2:45 P.M. The meeting was attended by:

G.B. Khatiblou  
Ramesh Patel  
Lisa T.M. Vomero

FCD of MC,  
P & D Technologies, and  
P & D Technologies.

- I. The following items were discussed and given to the FCD for review and comment, they include:
1. The preliminary submittal of the Technical Data Notebooks. There was such a large volume of information that the data was divided into two (2), three (3) inch binders.
  2. An example of a proposed final product cross section, at a size of 8 1/2" x 11", was also given to the FCD. The cross section was produced using Word Perfect Graphics (WPG) and a Laser printer on bond paper. The example given was oriented in two different directions: the first, normally and the second rotated 90 degrees with the X axis elongated along the 11" length of the paper. We would like to request that this be substituted for the pen plotter as required per our contract. This reason for this request, is that the WPG method allows one to custom annotate and label the figure which, in our opinion greatly enhances the quality of the end product. We await your response to this request.

H:\1032000\MEETINGS\MTG3.28

## Trilby Wash Meeting Summary

March 29, 1991

Page 2

- II. In regards to the previously submitted HEC-2 Model on 3/14/91, the following items were discussed:
- 1.A. The peak discharge values and thalweg will be put on the bluelines for the next submittal; we apologize for this as they were inadvertently omitted;
  - B. The location of the bank stations need to be reviewed and where necessary, constricted in order to assure that the ponding areas are excluded from the main channel conveyance width; in addition, the Manning's "n" values will be adjusted accordingly;
  - C. The preliminary data set incorporated a vast majority of "X3" lines which were used for the purpose of artificially setting encroachment limits. Per our discussion it was decided that the ground profile data extending beyond the previously defined "X3" lines will be omitted; however, the original data will be saved in a separate HEC-2 data file named: "submittal.dat". There was also some discussion of the impact on the other encroachment methods to be employed in regards to the incorporation of the X3 line. This matter will be addressed further if necessary, at a later time.
  - D. The area of edge matching on both the north and south sides were again discussed. The current status of the mapping is that the area of overlap south of the CAP Aqueduct has been eliminated due to the presence of this structure. To the north, the water surface elevations match within 0.15' by the fifth (5th) overlapping cross section; although, the floodplain and floodway boundaries do not match exactly. P & D has asked the FCD to review these areas in detail and give direction in how to address this issue before the final submittal.
  - E. The last item discussed in terms of the model, is the review of the resulting conveyance in areas where the wash physically splits and later reunites. Before submitting the next model, this will be reviewed for the purpose of discussion and direction.
2. Per request the mapping will be annotated in regards to the following: the addition of elevation numbering where scars as well as the addition of street names and other labelling information.

**Trilby Wash Meeting Summary**

**March 29, 1991**

**Page 3**

3. Per request, the new HEC-2 Manual (9/90) which contains the new culvert routine documentation will be copied and sent to the FCD as a courtesy.
4. Our next meeting is scheduled for April 10, 1991; however, due to a conflicting seminar the meeting will be rescheduled, after the FCD has reviewed the second submittal.

These Meeting Minutes taken and respectfully submitted by:

**P & D TECHNOLOGIES**

Sincerely,



Lisa T.M. Vomero  
Senior Hydrologist



**P&D Technologies**

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March 15, 1991

Mr. Geave "Besian" Khatiblou, P.E.  
Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, Arizona 85009

**RE: Trilby Wash Meeting Summary**  
**FCD Contract No. 90-24**  
**P & D P.N. No: 10320**

Dear Besian:

This purpose of this letter is to summarize the topics discussed at the Trilby Wash Meeting in the Flood Control District's Office on Thursday, March 15<sup>th</sup>, 1991, at 3:00 P.M. The meeting was attended by:

G.B. Khatiblou  
Ramesh Patel  
Lisa T.M. Vomero

FCD of MC,  
P&D Technologies, and  
P&D Technologies.

The following items were discussed in regards to this project:

1. The final sealed topographic mapping was completed and sent to the Flood Control District on March 8, 1991. As requested, another box will be added to the mapping for the engineer's seal adjacent to the existing surveyor's seal.

2. The HEC-2 model with accompanying redlined floodplain delineation maps were brought to the meeting for the purpose of discussion and submittal. This set of working drawings is the original and only set. The following comments were made in regards to assumptions and methods used in the development of this model.

A. Per our previous discussion, on February 12, 1991 there were some areas of the channel that were not well defined. As a result of the topography and geomorphology the channel produces large areas of shallow flooding and island areas where the water flows out of the channel and into adjacent washes and out of the watershed, essentially reducing the peak discharge.

Trilby Wash Meeting Summary

March 18, 1991

Page Two

- B. The bank elevations are not high enough to contain the flow given to us by the FCD. Per direction received from the FCD, P & D incorporated the use of the "X3 line" in which the boundaries of the flow were artificially set and extended upward. This approach was the most prudent as it results in a higher, more conservative water surface elevation. This data was then used to plot the area inundated outside the established bank stations and into the extensive low-lying adjacent overbank.
  
- C. Per our previous discussion, some sections were extended manually to pick up tributary and other special interest areas; however, once the model was run this approach was deleted due to the flatness of the channel cross section which resulted in the need for further cross section extensions to the point that it was merging into adjacent watersheds.
  
- D. "Island Areas" within the floodplain were discussed in terms of appropriateness and/or need for delineating them on the mapping. These areas appear to be unstable point bar deposits which in our opinion should NOT BE excluded from the floodplain delineation; although, under existing conditions and given peak discharge values they are computed to be above the high water elevation.
  
- E. The area of edge matching on the north side was discussed. The mapping and boundary delineation does not match. There appears to be several reasons for this, which include: a half a decade span in the time frame of the two maps; WLB's use of an assumed water surface elevation; arbitrary differences in the boundary delineation in the interpolated areas between the cross sections as well as differences in the HEC-2 version of software used. P & D has asked the FCD to review this area in detail and give direction in how to address this discrepancy.

3. It was stated at the meeting that P & D has received the new HEC-2 software with the new culvert routine revision, version 4.6.0. and it was used in preparing this submittal package. Further, it was stated that the FCD has not yet received this update. As a courtesy, P & D will provide the software to the FCD. In addition, P & D has requested a 3 week extension due to this software revision, as previously discussed. The FCD has approved this request resulting in a change in the final completion date to August 8, 1991. As a result, an updated "Meeting and Milestone Schedule" is attached for your review.

Trilby Wash Meeting Summary  
March 18, 1991  
Page Three

4. After discussion of the mapping, it along with a hard copy of the HEC-2 output file, and input file on diskette was given to the FCD for review.

5. Per request, P & D Technologies will print out the cross section plots. They will be delivered as soon as they are completed.

6. Our next meeting is scheduled for March 28, 1991 at 3:00 p.m.

Lastly, there was NO billing statement sent for February as there is NO AMOUNT due; however, work did progress. An explanatory letter was sent in lieu of a billing statement. Please feel free to call our office should you have any questions or concerns regarding this matter.

This Meeting Minutes taken and respectfully submitted by:

Sincerely,

**P & D TECHNOLOGIES**



Lisa T.M. Vomero  
Senior Hydrologist



**P&D Technologies**

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**TRILBY WASH**  
**MEETING & MILESTONE DATES**  
(Completion of Task 1.3)

**Updated: March 15, 1991**

**I. PREVIOUS MEETINGS LIST & MILESTONE DATES:**

<u>DATE</u>	<u>PURPOSE</u>
4/19/90	Initial Presentation (for Gila Canal) @ FCDMC
5/8/90	Saddleback FIS Site Inspection
6/5/90	Trilby Wash FIS Site Inspection
6/6//90	Review @ FCD previously submitted FIS
6/19/90	Fee Proposal Due
6/22/90	Scope Adjustment Meeting @ FCDMC
6/27/90	Fee Negotiation Committee Meeting @ FCDMC
7/23/90	Anticipated Board of Supervisors Approval Date
8/6/90	Actual Board of Supervisors Approval Date
8/13/90	Verbal Notice to Proceed
8/14/90	Notification Letters Sent (dated 7/27/90) (Completion of Task 2.1)
8/15/90	Receipt of written Notice to Proceed
8/19/90	Announcement of Flood Elevation Study Published - Arizona Republic
8/22- 9/5/90	Announcement of Flood Elevation Study Published - Daily Sun News
8/23/90	Survey started
9/13/90	Site flown by Cooper Aerial Mapping
10/3/90	Receipt of contact prints from Cooper (Completion of Task 2.2)
10/15/90	Ground Control was completed (Task 2.2.2)
10/26/90	Meeting regarding: billing, schedule adjustment., contact prints & Task 1.0. (Begin Task 6.1)

**TRILBY WASH  
MEETING & MILESTONE DATES  
(Completion of Task 1.3)  
Updated March 15, 1991  
(continued 2 of 4)**

**II. Proposed Tentative Schedule of Meetings & Milestones**

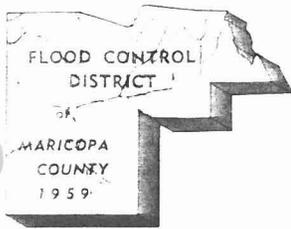
<u>DATE</u>	<u>ITEM</u>	<u>NOTES</u>
11/13/90	Written Summary of Data Collection Submittal (Completion of Task 1.0)	Completed on time
11/13/90	Field Inspection for Manning's "n" values	Changed to 11/20/90 Completed on time
11/14/90	Final Approval of Project Base Sheet by FCD	Completed on time
11/20/90	P&D to submit written summary of Manning's "n" values for the FCD's review and approval (Completion of Task 4.4.1)	Changed to 11/27/90 Completed on time
11/26/90	P&D to receive the 100-Year Peak Discharge Values from the FCD to be used in the FIS (Task 3.0)	Received 1/29/91
11/26/90	P&D to receive preliminary topographic mapping from Cooper Aerial Mapping (Completion of Task 2.2.1, 2.2.2 & 4.1)	Completed on time
11/28/90	Delineate thalweg & cross-sections (Preliminary completion of Task 4.3)	Completed on time
11/29/90	Meeting with FCD to review thalweg & cross-sections	Completed on time
12/5/90	Resubmit cross-section information to Cooper for digitizing	Changed to 12/10/90 Completed on time
12/15/90	P&D to complete Field Survey (Completion of Tasks 4.2 & 4.4)	Completed on time
12/17/90	Meeting with FCD regarding re-formatting of topo sheets 5-8	Coordination meeting added
1/2/91	P&D to receive digitized data from Cooper in HEC-2 Format & review with FCD. Begin Floodplain & Floodway Delineation (Task 5.0)	Received 1/4/91

**TRILBY WASH  
MEETING & MILESTONE DATES  
(Completion of Task 1.3)  
Updated March 15, 1991  
(continued 3 of 4)**

<u>DATE</u>	<u>ITEM</u>	<u>NOTES</u>
1/10/91	Hydraulic Analysis Coordination Meeting with FCD (Task 6.1)	Completed on time
1/17/91	Hydraulic Analysis Coordination Meeting with FCD	Completed on time
1/24/91	Hydraulic Analysis Coordination Meeting with FCD	Completed on time
1/31/91	HEC-2 program software has error in culvert routine, reported by Besian & confirmed. Correction to take minimum 2-3 weeks. Project extension to be requested...	EXTENSION GRANTED AT MTG 3/14/91 - COMPLETION DATE CHANGED TO 8/9/91
2/7/91	Hydraulic Analysis Coordination Meeting with FCD	Changed to 2/12/91
2/21/91	Hydraulic Analysis Coordination Meeting with FCD (Complete Task 4.3)	Changed to 2/26/91 Cancelled
3/14/91	Hydraulic Analysis Coordination Meeting with FCD	Completed on time - Completion date changed due to HEC-2 software. Remaining schedule revised by adding 3 weeks.
3/27/91	Hydraulic Analysis Coordination Meeting with FCD	
4/10/91	Hydraulic Analysis Coordination Meeting with FCD	Meeting added
4/23/91	Meeting with FCD for submittal of HEC-2 model & preliminary mapping (Preliminary completion of Tasks 5.1 through & including Task 5.7)	
5/7/91	P&D to receive FCD comments on HEC-2 model and corresponding preliminary mapping	
5/8/91	Finalization of HEC-2 model(s) & floodway mapping begins	
5/23/91	Meeting with FCD for submittal of proposed final HEC-2 model & mapping (Completion of Tasks 5.1 through & including Task 5.7)	
5/24/91	P&D to prepare draft Final Report	
5/31/90	P&D to submit to FCD draft Final Report for review (Preliminary completion of Task 5.8)	
5/31/91	P&D to receive from the FCD final comments regarding HEC-2 computer model and floodplain/floodway mapping (Preliminary completion of Task 6.2)	

**TRILBY WASH  
MEETING & MILESTONE DATES  
(Completion of Task 1.3)  
Updated March 15, 1991  
(continued 4 of 4)**

- 6/3/91 Final print out of HEC-2 model and inking of final maps to begin
- 6/14/91 Final mapping to be completed as well as completion of all final products and submittal to FCD  
(Completion of Tasks: 2.2.3, 2.2.4, 2.2.5, 2.2.6, 5.8, 7.1 through and including 7.6)
- 7/15/91 P&D to receive any comments regarding changes to the HEC-2 model or mapping limits prior to close of contract date 7/19/91.
- 7/16/91 P&D to begin revisions to model and/or mapping, if needed
- 8/9/91 Final submittal and fulfillment of final contract!  
Completion of Tasks 6.1 and 6.2.



# FLOOD CONTROL DISTRICT

of

Maricopa County

3335 West Durango Street • Phoenix, Arizona 85009  
Telephone (602) 262-1501

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FEB 20 1991

Mr. Ramesh I. Patel, P.E., L.S.  
Project Manager  
P & D Technologies  
Planners/Engineers  
1702 East Highland Avenue  
Suite 410  
Phoenix, Arizona 85016



SUBJECT: Trilby Wash Flood Control Study  
Contract FCD 90-4  
(P&D P.N.: 10320)

Dear Ramesh:

We have completed our review of your February 5, 1991 letter requesting an extension in the time frame of the subject project due to the HEC-2 program software error.

After carefully evaluating your five proposed options for resolving the problem, we have the following comments and recommendations:

Option number two recommends that the Flood Control District accept the P & D model "as is" without the culvert routine correction. The District is not able to accept this proposal. We realize that there is clear evidence of incorrect calculations and modeling assumptions in this project. Therefore, this option cannot satisfy our goals for the subject project.

Manual calculations of the water surface elevation upstream of the Patton Road culvert, which is stated as option number three, does not quite serve our modeling purpose. This methodology completely ignores the existence of the culvert crossing, which most likely has some effects on the characteristics of the floodplain and floodway. In the past we have used the HEC-2 model for the culvert crossings, unless there has been clear evidence that the HEC-2 program has not accurately evaluated a specific location. We believe that the HEC-2 model is a more consistent and acceptable methodology to FEMA, ADWR, and the District, than the manual calculations.

Option numbers four and five can essentially be the same, since the HEC-2 1990 version only includes a new methodology for evaluating the water surface elevation at the culvert crossing and there is no HEC-2 1990 version without culvert evaluation, as stated in your February 5, 1991 letter.

Letter to: Mr. Ramesh I. Patel, P.E., L.S.  
Subject: Trilby Wash Flood Control Study  
Page 2

We have no control over the time limit for the release of the 1990 HEC-2 version. We would rather complete this project as scheduled and not delay it due to the HEC-2 1990 version program software error.

Based on our February 12, 1990 conversation (at the P & D office), Ms. Lisa Vomero, your hydrologist, is currently debugging the HEC-2 model. Therefore, we recommend that the debugging and modeling process be continued based upon the previous time schedule, by using the latest available version of the HEC-2 (September 1988). If the 1990 version will be released prior to the final modeling approval by the District, it may be used for finalization of the project. Otherwise, we will finalize the project as is. This is a combination of options one and four, which are recommended in your above-referenced letter.

If you have any questions, please contact me at 262-1501.

Sincerely,



Besian Khatiblou, P.E.  
Hydrologist



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February 12, 1991

Mr. Geave "Besian" Khatiblou, P.E.  
Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, Arizona 85009

RE: Trilby Wash Meeting Summary  
FCD Contract No. 90-24  
P & D P.N. No: 10320

Dear Besian:

This purpose of this letter is to summarize the topics discussed at the Trilby Wash Meeting in P & D Technologies' Office on Tuesday, February 12th, 1991, at 2:30 P.M. The meeting was attended by:

G.B. Khatiblou  
Ramesh Patel  
Lisa T.M. Vomero

FCD of MC,  
P&D Technologies, and  
P&D Technologies.

It was stated that the following items have been mailed, some of which have not yet been received. The items sent out the week of February 4th, 1991, from P & D Technologies to the FCD include:

- A. The Meeting Minutes of January 25th, 1991;
- B. A letter regarding the error found in the HEC-2 software pertaining to the culvert routine; and finally,
- C. The updated Meeting and Milestone schedule.

The following items were discussed in regards to this project:

1. The final verification of the topographic mapping including cross section data, in accordance with Arizona Law and the FEMA specifications, is currently underway. The final, approved topographic mapping will be sealed in the right corner of the maps in a box adjacent to the existing box, as requested at the meeting. A set of bluelines of these final sealed topographic maps will be delivered to the Flood Control District as soon as they are completed.
2. Solutions to overcoming the HEC-2 software error regarding the new culvert routine (discussed in a P & D Memo, dated 2/5/91) was discussed. It was stated that P & D has already manually calculated the water surface elevation at the Patton Road Culvert and has already input this water surface at section 27 on an X5 card; however, it was decided that upon final submittal, if the software error has not been corrected, the special bridge method will be employed and will be satisfactory for final submittal. This will be done to minimize delay in the project schedule.
3. Cross sections 50 through 64 were discussed in terms of topography and geomorphology. The area represented by these cross sections is apparently a wide area of shallow flooding. As a result, the bank elevations are not high enough to contain the flow. Therefore, P & D has requested direction from the FCD in modelling these areas. The FCD will review this item and contact P & D on Wednesday, February 13th, 1991.
4. Per our discussion, some sections, such as: 60 through 64, will be extended manually to pick up tributary and other special interest areas. It was noted that there is a divergence of flow to the adjacent tributary area at cross section 63.

5. Cross section 61 was approved for deletion due to its configuration which will intersect cross section 60 after manual extension. It was noted that the resulting channel length between sections 60 and 62 will exceed 500 feet.
  
6. Lastly, the billing statement for January was discussed.

This Meeting Minutes taken and respectfully submitted by:

**P & D TECHNOLOGIES**

A handwritten signature in cursive script that reads "Lisa T.M. Vomero".

Lisa T.M. Vomero  
Senior Hydrologist



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**TRILBY WASH**  
**MEETING & MILESTONE DATES**  
(Completion of Task 1.3)

**Updated: February 7, 1991**

**I. PREVIOUS MEETINGS LIST & MILESTONE DATES:**

<u>DATE</u>	<u>PURPOSE</u>
4/19/90	Initial Presentation (for Gila Canal) @ FCDMC
5/8/90	Saddleback FIS Site Inspection
6/5/90	Trilby Wash FIS Site Inspection
6/6/90	Review @ FCD previously submitted FIS
6/19/90	Fee Proposal Due
6/22/90	Scope Adjustment Meeting @ FCDMC
6/27/90	Fee Negotiation Committee Meeting @ FCDMC
7/23/90	Anticipated Board of Supervisors Approval Date
8/6/90	Actual Board of Supervisors Approval Date
8/13/90	Verbal Notice to Proceed
8/14/90	Notification Letters Sent (dated 7/27/90) (Completion of Task 2.1)
8/15/90	Receipt of written Notice to Proceed
8/19/90	Announcement of Flood Elevation Study Published - Arizona Republic
8/22- 9/5/90	Announcement of Flood Elevation Study Published - Daily Sun News
8/23/90	Survey started
9/13/90	Site flown by Cooper Aerial Mapping
10/3/90	Receipt of contact prints from Cooper (Completion of Task 2.2)
10/15/90	Ground Control was completed (Task 2.2.2)
10/26/90	Meeting regarding: billing, schedule adjustment., contact prints & Task 1.0. (Begin Task 6.1)

**TRILBY WASH  
MEETING & MILESTONE DATES  
(Completion of Task 1.3)  
Updated February 7, 1991  
(continued 2 of 3)**

**II. Proposed Tentative Schedule of Meetings & Milestones**

<u>DATE</u>	<u>ITEM</u>	<u>NOTES</u>
11/13/90	Written Summary of Data Collection Submittal (Completion of Task 1.0)	Completed on time
11/13/90	Field Inspection for Manning's "n" values	Changed to 11/20/90 Completed on time
11/14/90	Final Approval of Project Base Sheet by FCD	Completed on time
11/20/90	P&D to submit written summary of Manning's "n" values for the FCD's review and approval (Completion of Task 4.4.1)	Changed to 11/27/90 Completed on time
11/26/90	P&D to receive the 100-Year Peak Discharge Values from the FCD to be used in the FIS (Task 3.0)	Received 1/29/91
11/26/90	P&D to receive preliminary topographic mapping from Cooper Aerial Mapping (Completion of Task 2.2.1, 2.2.2 & 4.1)	Completed on time
11/28/90	Delineate thalweg & cross-sections (Preliminary completion of Task 4.3)	Completed on time
11/29/90	Meeting with FCD to review thalweg & cross-sections	Completed on time
12/5/90	Resubmit cross-section information to Cooper for digitizing	Changed to 12/10/90 Completed on time
12/15/90	P&D to complete Field Survey (Completion of Tasks 4.2 & 4.4)	Completed on time
12/17/90	Meeting with FCD regarding re-formatting of topo sheets 5-8	Coordination meeting added
1/2/91	P&D to receive digitized data from Cooper in HEC-2 Format & review with FCD. Begin Floodplain & Floodway Delineation (Task 5.0)	Received 1/4/91
1/10/91	Hydraulic Analysis Coordination Meeting with FCD (Task 6.1)	Completed on time
1/17/91	Hydraulic Analysis Coordination Meeting with FCD	Completed on time
1/24/91	Hydraulic Analysis Coordination Meeting with FCD	Completed on time
1/31/91	HEC-2 program software has error in culvert routine, reported by Besian & confirmed. Correction to take minimum 2-3 weeks. Project extension to be requested...	

**TRILBY WASH**  
**MEETING & MILESTONE DATES**  
**(Completion of Task 1.3)**  
**Updated February 7, 1991**  
**(continued 3 of 3)**

<u>DATE</u>	<u>ITEM</u>	<u>NOTES</u>
2/7/91	Hydraulic Analysis Coordination Meeting with FCD	Changed to 2/12/91
2/21/91	Hydraulic Analysis Coordination Meeting with FCD (Complete Task 4.3)	Changed to 2/26/91
3/14/91	Hydraulic Analysis Coordination Meeting with FCD	
3/27/91	Hydraulic Analysis Coordination Meeting with FCD	
4/2/91	Meeting with FCD for submittal of HEC-2 model & preliminary mapping (Preliminary completion of Tasks 5.1 through & including Task 5.7)	
4/16/91	P&D to receive FCD comments on HEC-2 model and corresponding preliminary mapping	
4/17/91	Finalization of HEC-2 model(s) & floodway mapping begins	
5/2/91	Meeting with FCD for submittal of proposed final HEC-2 model & mapping (Completion of Tasks 5.1 through & including Task 5.7)	
5/3/91	P&D to prepare draft Final Report	
5/10/90	P&D to submit to FCD draft Final Report for review (Preliminary completion of Task 5.8)	
5/10/91	P&D to receive from the FCD final comments regarding HEC-2 computer model and floodplain/floodway mapping (Preliminary completion of Task 6.2)	
5/11/91	Final print out of HEC-2 model and inking of final maps to begin	
5/24/91	Final mapping to be completed as well as completion of all final products and submittal to FCD (Completion of Tasks: 2.2.3, 2.2.4, 2.2.5, 2.2.6, 5.8, 7.1 through and including 7.6)	
6/24/91	P&D to receive any comments regarding changes to the HEC-2 model or mapping limits prior to close of contract date 7/19/91.	
6/25/91	P&D to begin revisions to model and/or mapping, if needed	
7/19/91	Final submittal and fulfillment of final contract! Completion of Tasks 6.1 and 6.2.	



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February 5, 1991

Mr. Geave "Besian" Khatiblou, P.E.  
Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, Arizona 85009

RE: Trilby Wash FIS  
HEC-2 Program Software Error  
FCD Contract No. 90-24  
P & D P.N. No: 10320

Dear Besian:

This purpose of this letter is to summarize our phone conversation of January 31st, 1991, regarding the HEC-2 computer software. Per the phone conversation, it was stated that the new September, 1990 edition, version 4.5.1 contains a software program error in relationship to the new culvert routine.

This information has been verified by our distributor. Per our conversations about a revision to the error we were told that it would not be corrected until late February or even mid March. In addition, it would be one to two weeks before the new revised version could be distributed.

As a result, P & D Technologies is writing to request an extension in the time frame of the Trilby Wash FIS. At this time we would like to request an extension of three (3) to four (4) weeks. We would also like to discuss the possibilities of options to successfully complete the project in response to the current situation.

Trilby Wash FIS  
HEC-2 Program Software Error  
February 5, 1991  
Page Two

It should be noted at this time that, the Trilby Wash FIS contains only one (1) culvert crossing located at Patton Road.

The options available include but are not limited to the following:

1. Set a limited time frame in which to wait for the model correction;
2. Accept the P & D model "as is" without the culvert routine correction, duly and properly noted; since, the program "glitch" only affects one small area of the entire reach;
3. Manually calculate the water surface elevation upstream of the Patton Road culvert and use it to finish the study.
4. Substitute the Special Bridge Method in lieu of the culvert routine in the current HEC-2 program;
5. Use the previous HEC-2 program, September 1988 Version, Error Correction 4 (June, 1990). [This is the least acceptable alternative because this version does not have a working culvert model at all and the older special bridge routine would have to be employed - similar to item 3 above.]

Trilby Wash Meeting Summary  
January 24, 1991  
Page Three

Delays and revisions, however, resulting from this problem, which is beyond our control, is costing P & D Technologies additional manpower and use of our resources and therefore money. As a result, we would like to recommend item 3 as the most efficient and timely approach, as well as the least costly. In addition, once the new error correction software is available it could easily be rerun by personnel at the FCD, for comparison purposes.

It should also be emphasized that the above estimated time frames for release of the revised HEC-2 model from both the Hydrologic Engineering Center (HEC) as well as our software distributor are just that - ESTIMATES.

We are deeply concerned that this development will seriously affect the successful completion of this project on time and within budget; therefore, we would appreciate your feedback on this matter as well as your ideas in resolving it as quickly as possible.

Please feel free to contact us at your earliest possible convenience to discuss this matter.

**P & D TECHNOLOGIES**

*Ramesh I. Patel*

Ramesh I. Patel, P.E.  
Project Manager



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January 29, 1991

Mr. Geave "Besian" Khatiblou, P.E.  
Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, Arizona 85009

RE: Trilby Wash Meeting Summary  
FCD Contract No. 90-24  
P & D P.N. No: 10320

Dear Besian:

This purpose of this letter is to summarize the topics discussed at the Trilby Wash Meeting in P & D Technologies' Office on Friday, January 25th, 1991, 1:30 P.M. The meeting was attended by:

G.B. Khatiblou  
Ramesh Patel  
Lisa T.M. Vomero

FCD of MC,  
P&D Technologies, and  
P&D Technologies.

At the meeting, the preliminary hydrology was delivered on behalf of the Flood Control District to P & D Technologies.

Trilby Wash Meeting Summary  
January 24, 1991  
Page Two

The following items were discussed in regards to this project:

1. The cross section data from WLB and P&D was confirmed to differ by approximately 1.6 feet. This difference is apparently due to the mapping scale difference between these two studies as well as the method of data point collection. WLB's mapping scale was 400 feet with a contour interval of 4 feet; while, P & D's mapping is at 200 scale with a 2 foot contour interval. In addition, the method of cross section data collection was different. It appears that WLB "hand-pulled" their data points and interpolated between contours from the 400 scale, 4 foot contour interval mapping; while, P & D's cross section data was digitized from 200 scale mapping. For quality control, P & D was asked to verify their survey data. (This was done, per request, on 1/29/91. After double checking the survey data P & D confirmed that the data is good. In addition, P & D used and tied into the same ERM's as established by WLB and checked in within 12 hundredths.)
  
- 2). It was stated that after our meeting on the 25th and the review of the first draft HEC-2 model, the initial model assumptions and starting conditions would need to be revised. The revisions would be needed due to discrepancies in the data from the previous WLB study. Discrepancies in the data included: hydrology - Q's from previous studies which were not consistent with the FCD's independently generated Peak Discharge values, method of collecting data points, mapping scale and a 1.6 foot difference in the flow line elevations, which was previously discussed at the earlier meeting. (It should be noted that the WLB elevations are approximately 1.6 feet higher than the P & D study elevations and that the WLB study was done from 400 scale mapping, as previously discussed.) Please refer to Meeting Minutes from 1/24/91.

As a result, the following changes will be made to the starting conditions of the model:

- A. No overlapping sections will be incorporated in the starting conditions of the model at the south matching edge of this study (contradictory to the Meeting Minutes taken 1/24/91).
- B. P & D's first study cross section will be located on the south end of the CAP overchute. More specifically defined by the following description: immediately north and adjacent to the concrete energy dissipators and immediately south and adjacent to the south edge of the desilting basin. For clarity, please refer to the attached working drawing. The first cross section of the P & D study will be labelled Station 0 + 00. In addition, subsequent sections through cross section 4 as previously shown on the working maps will be relocated as shown on the attached working drawing. Moreover, these sections will be "hand-pulled" from the P & D "as-built" drawing of the CAP overchute; due to the fact that, the 200 scale mapping by Cooper Aerial could not pick up the approximately one foot wide vertical top of wall elevation of the overchute with any accuracy.
- C. It should also be noted that the total river mileage through the P & D study area differs from the river mileage shown on the WLB matching study to the north. As a result, P & D's river mileage stationing will NOT match or coincide with WLB's previous study on either the south or north end.
- D. An attempt, however, will be made to overlap the cross section data on the north end. The P & D cross section data will be used in the area of overlap. The results using this data will be reviewed with the Flood Control District, at which time we will request detailed direction be given to us regarding the resolution of discrepancies in that area.

- E. The starting water surface elevation will be estimated from existing information and critical depth will be assumed ( $J_{1.5} = -1$ ). The critical depth assumption will be employed due to the location of the first cross section in the concrete overchute. It should be noted that the last cross section in WLB's study is situated south of the overchute; therefore, there is no previous data for calculating and comparing the water surface elevation through or in the overchute structure.
3. As previously discussed, cross sections 25 and 27 will be revised by Cooper Aerial and incorporated into the model. In addition, the slope area method will be used ( $J_{1.5}$ ) and the energy slope will be calculated from P & D data instead of using previous WLB values.
  4. Per request, the three (3) standard pre-defined Floodway Summary Tables: 110, 155 and 200, will be provided.
  5. Lastly, through the course of the meeting a discrepancy was discovered in the hydrology data. The data will be checked and revised, as needed, with the final hydrology to be submitted to P & D on Tuesday, January 29th. (Final hydrology was received from the Flood Control District on 1/29/91.)

This Meeting Minutes taken and respectfully submitted by:

**P & D TECHNOLOGIES**



Lisa T.M. Vomero  
Senior Hydrologist



**P&D Technologies**

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January 24, 1991

Mr. Geave "Besian" Khatiblou, P.E.  
Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, Arizona 85009

RE: Trilby Wash Meeting Summary  
FCD Contract No. 90-24  
P & D P.N. No: 10320

Dear Besian:

This purpose of this letter is to summarize the topics discussed at the Trilby Wash Meeting in the Flood Control District's Office on Thursday, January 24th, 1991, 2:30 A.M. The meeting was attended by:

G.B. Khatiblou  
Ramesh Patel  
Lisa T.M. Vomero

FCD of MC  
P&D Technologies  
P&D Technologies.

At the meeting, the following items were delivered for review:

1. One set (9 sheets) aerial photo overlay bluelines;
2. One original Amended Meeting Minutes from 1/10/91;
3. One original Meeting Minutes from 1/17/91;
4. One diskette containing the HEC-2 input data; and finally
5. One hard copy of the complete, first draft, HEC-2 model.

Trilby Wash Meeting Summary  
January 24, 1991  
Page Two

The following items were discussed in regards to this project:

- 1). The complete, first draft, HEC-2 model was submitted for initial format review. This model incorporated the following conditions: subcritical flow, the split flow option was not employed, and no encroachment options were used. The initial hydrology and starting water surface elevation was taken from WLB's previous study. The starting data from WLB's previous study documents, including: maps reports and their model was not consistent; it was also not in agreement with the FCD's independently generated Peak Discharge Values. As a result Besian indicated that this solution would take some more thought and that the final hydrology from the FCD would be prorated to give the data consistency with the previously approved FEMA submittal. The hydrology data should be ready Friday 1/25/91.
- 2). Per our last meeting, a minimum of 3 overlapping sections were requested on both the north and south sides of the study. P & D cross sections were used. After discussing several discrepancies in the data: such as method of collecting data points, mapping scale and primarily a 1.6 foot difference in the flow line elevations, it was decided to use the WLB sections instead of the P & D sections in areas of overlap. (It should be noted that the WLB elevations are approximately 1.6 feet higher than the P & D study elevations.)
- 3). The following cross sections will need to be verified and edited, as needed: 1, 2, 3, 25 & 27, which represent the CAP overchute and Patton Road culvert crossing, respectively. For the purpose of a good culvert model, cross sections: 24, 26, and 28 have been omitted. In addition, the slope area method will be used (J1.5), the energy slope will be calculated from P & D data instead of using the WLB value of 0.001700.

- 4.) The model will be refined in the following manner: use WLB sections in areas of overlap, revise bank stations in regards to the calculated water surface elevations, incorporate the new and varied hydrology values from the FCD upon receipt, revise cross sections as outlined above and finally, calculate the starting energy slope value.

Lastly, P&D Technologies has not yet received the final hydrology data from the Flood Control District.

This Meeting Minutes taken and respectfully submitted by:

**P & D TECHNOLOGIES**



Lisa T.M. Vomero  
Senior Hydrologist



**P&D Technologies**

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January 21, 1991

Mr. Geave "Besian" Khatiblou, P.E.  
Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, Arizona 85009

RE: Trilby Wash Meeting Summary  
FCD Contract No. 90-24  
P & D P.N. No: 10320

Dear Besian:

This purpose of this letter is to summarize the topics discussed at the Trilby Wash Meeting in the Flood Control District's Office on Thursday, January 17th, 1991, 2:30 A.M. The meeting was attended by:

G.B. Khatiblou  
Ramesh Patel  
Lisa T.M. Vomero

MCFCD  
P&D Technologies  
P&D Technologies.

At the meeting, the final Cover/Face Sheet was delivered for review.

We are pleased to report that the initial draft version of the HEC-2 model is up and running. It was brought to the meeting and the following items were discussed:

1. Subcritical flow was assumed, the split flow option as well as the new culvert model was not employed, no encroachment was used, the hydrology and starting water surface elevation was taken from WLB's previous study.
2. Per our meeting, 2-3 overlapping sections will be incorporated into this model from the previous study. The overlapping sections taken from the previous study will be dashed on the maps for clarity.

3. Concerns regarding the matching of this HEC-2 model with the previous studies on both the north and south edge were discussed. The concern involves the anticipated differences between the previous study and this one due to the following items: incorporation of the new culvert method (9/90); hydrology values and application; mapping scale; river mileage; number and location of cross sections, etc.
4. Submittal of the HEC-2 model by P & D Technologies to the MCFCD will consist of a hard copy, data on diskette and will be accompanied by the working maps, per request.
5. The model will be refined in the following areas for the next meeting, hydrology, "n" values and the culvert modelling will be incorporated.

Lastly, P&D Technologies has not yet received the hydrology data from the MCFCD.

This Meeting Minutes taken and respectfully submitted by:

**P & D TECHNOLOGIES**

Lisa T.M. Vomero  
Senior Hydrologist



**P&D Technologies**

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January 18, 1991

Mr. Geave "Besian" Khatiblou, P.E.  
Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, Arizona 85009

RE: Amended Trilby Wash Meeting Summary  
FCD Contract No. 90-24  
P & D P.N. No: 10320

Dear Besian:

This purpose of this letter is to summarize the topics discussed at the Trilby Wash Meeting in the Flood Control District's Office on Thursday, January 10th, 1991, 9:30 A.M. The meeting was attended by:

G.B. Khatiblou  
Ramesh Patel  
Lisa T.M. Vomero

MCFCD  
P&D Technologies  
P&D Technologies.

At the meeting, the following items were delivered for review:

1. A revised preliminary cover sheet;
2. One set (9 sheets) of topographic mapping on blue-line paper representing the new sheet layout with cross sections, and;
3. One diskette containing HEC-2 Data as obtained from Cooper Aerial Mapping; and finally;
4. One cross-section summary list (2 pages).

The following items were discussed in regards to this project:

- 1). The aerial photograph overlay sheets on mylar will be forthcoming. Per our meeting, these sheets will contain limited legend information including the title and sheet number.
- 2). The topographic mapping will be verified, approved and sealed by the registered professional land surveyor in charge of the project.

- 3). Cross-section and profile data to accompany the HEC-2 runs will be detailed at a later meeting.
- 4). To begin the model; subcritical flow will be assumed, no split flow option will be used, the hydrology and starting water surface elevation will be from WLB's previous study. No culvert modelling or encroachment options will be employed until the final hydrology data has been provided.

In addition, the following items will be attended to in regard to the cover sheet:

- A.) The flow line of the wash will be highlighted;
- B.) Township and Range will be enlarged;
- C.) The coverage and index of the sheets will be delineated on the overall 2000 scale cover sheet map.

Lastly, P&D Technologies has not yet received the hydrology data from the MCFCD.

This Meeting Minutes taken and respectfully submitted by:

**P & D TECHNOLOGIES**

Lisa T.M. Vomero  
Senior Hydrologist

Attachment (1)



**P&D Technologies**

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January 14, 1991

Mr. Geave "Besian" Khatiblou, P.E.  
Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, Arizona 85009

RE: Trilby Wash Meeting Summary  
FCD Contract No. 90-24  
P & D P.N. No: 10320

Dear Besian:

This purpose of this letter is to summarize the topics discussed at the Trilby Wash Meeting in the Flood Control District's Office on Thursday, January 10th, 1991, 9:30 A.M. The meeting was attended by:

G.B. Khatiblou  
Ramesh Patel  
Lisa T.M. Vomero

MCFCFD  
P&D Technologies  
P&D Technologies.

At the meeting, the following items were delivered for review:

1. A revised preliminary cover sheet;
2. One set (9 sheets) of topographic mapping on blue-line paper representing the new sheet layout with cross sections, and;
3. One diskette containing HEC-2 Data as obtained from Cooper Aerial Mapping; and finally;
4. One cross-section summary list (2 pages).

The following items were discussed in regards to this project:

- 1). The aerial photograph overlay sheets on mylar will be forthcoming. Per our meeting, these sheets will contain limited legend information including the title and sheet number.
- 2). The topographic mapping will be sealed by the registered professional land surveyor in charge of the project, after the cross-sections have been verified and accepted.

- 3). Cross-section and profile data to accompany the HEC-2 runs will be detailed at a later meeting.
- 4). To begin the model; subcritical flow will be assumed, no split flow option will be used, the hydrology and starting water surface elevation will be from WLB's previous study. No culvert modelling or encroachment options will be employed until the final hydrology data has been provided.

In addition, the following items will be attended to in regard to the cover sheet:

- A.) The flow line of the wash will be highlighted;
- B.) Township and Range will be enlarged;
- C.) The coverage and index of the sheets will be delineated on the overall 2000 scale cover sheet map.

Lastly, P&D Technologies has not yet received the hydrology data from the MCFCD.

This Meeting Minutes taken and respectfully submitted by:

**P & D TECHNOLOGIES**



Lisa T.M. Vomero  
Senior Hydrologist

Attachment (1)



**P&D Technologies**

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December 19th, 1990

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  
c/o Mr. Geave "Besian" Khatiblou, P.E.  
3335 West Durango Street  
Phoenix, AZ 85009

RE: Trilby Wash Reports - Review Comments  
FCDMC Contract No. 90-24  
P&D Project No. 10320

Dear Besian:

The purpose of this letter is to address written comments prepared by the Flood Control District, dated December 4, 1990, resulting from their review of two (2) reports previously submitted by P&D, they are titled:

1. "Summary of Existing Data for Trilby Wash Flood Insurance Study" dated November 12, 1990; and
2. "Trilby Wash FIS - Manning's "n" Value Estimation from Field Inspection 11/20/90", dated November 27, 1990.

Per request by the MCFCD, the following revisions and/or changes have been made, representing all of the review comments listed:

Summary of Existing Data Report

1. The bibliography, page 4, has been numbered;
2. On page 5 of the Bibliography the reference cited which includes both the 50 and 100-Year storm events was revised to read 100-year storm;

Trilby Wash Reports - Review Comments  
Page Two

3. An index table was created to identify and summarize all the memos contained within "Attachment 1" which has been renamed "Contact Memos" and is located on page 6;
4. Supplemental information contained within the "Contact Memos" section will be "boxed" in areas that specifically pertain to Trilby Wash.

Manning's "n" Value Estimation... Report

5. Per request both "As-Built" Drawings, the Patton Road Culvert Crossing and the C.A.P. Overchute Drawing, will be included in Map Pockets at the back of the report; and finally,
6. The following note has been added to page 5 of the report, under the Section titled "5.0 SUMMARY":

"It should be noted that, the Manning's "n" Values are estimated based on field observation and water depth assumptions. The accuracy of these initial assumptions will be verified. If necessary, the "n" values will be adjusted during the course of HEC-2 modelling".

Enclosed are the revised pages for your review and approval. Please call should you have any questions or require additional information.

Sincerely,

P & D Technologies

*Ramesh I. Patel*

Ramesh I. Patel, P.E., R.L.S.  
Project Manager



**P&D Technologies**

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December 18, 1990

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  
c/o Mr. Geave "Besian" Khatiblou, P.E.  
3335 West Durango Street  
Phoenix, Arizona 85009

RE: Amended Trilby Wash Meeting Minutes  
FCD Contract No.: 90-24  
P & D P.N.: 10320

Dear Besian:

The purpose of this letter is to summarize the topics discussed at our meeting regarding Trilby Wash in the Flood Control District 's Office on Friday, December 7th, 1990, 11:00 A.M. The meeting was attended by:

Besian Khatiblou  
Ramesh Patel  
Lisa T.M. Vomero

MCFCFD  
P & D Technologies  
P & D Technologies.

The purpose of this meeting was to discuss comments from the Flood Control District regarding their review of the initial cross section delineations on blue line which they received on November 29th, 1990.

Each sheet was reviewed with respect to the cross-section locations, orientation and length. It was stated that the preferred distance between each cross-section should not exceed 500 feet.

In addition, special care was taken to evaluate the cross sections depicting the split flow into both a primary and secondary channel. After much review and discussion, it was decided that the cross-sections must extend to include both channels as well as the topography between them. This decision was made in the event that the secondary split flow channel requires a separate water surface profile run.

Amended Meeting Minutes 12/7/90  
Page Two

At the north and south edge of the projects P&D will tie into existing data provided by the Flood Control District representing work by others. In these overlap areas, the previous cross section data will be used in the HEC-2 model per instruction from the FCD.

Per request by the Flood Control District, we will ask Cooper Aerial Mapping to combine original sheet numbers 6 and 7 onto one sheet. In addition, there are two areas in the mapping that will need to be checked by Cooper regarding the merging of contours. From our review, we believe these two areas probably represent vertical channel banks and/or overlapping with the channel edge boundaries depicted on the topographic mapping by single-dashed lines having the same line weight as the contours. P&D realizes that this review by the MCFCD was for the cross section locations only and not for mapping quality. P&D will perform any editing needs resulting from the Flood Control District's mapping quality review.

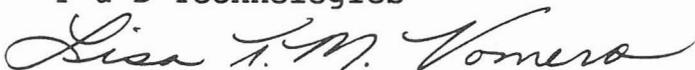
P&D Technologies were recently notified of a update to the HEC-2 program regarding culvert modelling. We informed the FCD staff of this and also noted that it is currently on order by our company. Providing the update reaches us in a timely manner we will be using this newly updated version.

Receipt of a letter from the Flood Control District to P&D Technologies was acknowledged regarding comments and requested changes to the two reports previously submitted, they are: the Data Collection Report and the Manning's "n" Value Determination Report. The letter will be reviewed and addressed in detail with a written response to the FCD by P&D.

Lastly, the previous meeting minutes from November 29th, 1990 were submitted, which included the Updated Project Schedule, also dated 11/29/90.

Meeting Minutes taken and respectfully submitted by:

P & D Technologies



Lisa T.M. Vomero  
Senior Hydrologist

December 11, 1990

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  
c/o Mr. Geave "Besian" Khatiblou, P.E.  
3335 West Durango Street  
Phoenix, Arizona 85009

RE: Trilby Wash Meeting Summary  
FCD Contract No.: 90-24  
P & D P.N.: 10320

Dear Besian:

The purpose of this letter is to summarize the topics discussed at our meeting regarding Trilby Wash in the Flood Control District 's Office on Friday, December 7th, 1990, 11:00 A.M. The meeting was attended by:

Besian Khatiblou  
Ramesh Patel  
Lisa T.M. Vomero

MCFCD  
P & D Technologies  
P & D Technologies.

The purpose of this meeting was to discuss comments from the Flood Control District regarding their review of the initial cross section delineations on blue line which they received on November 29th, 1990.

Each sheet was reviewed with respect to the cross-section locations, orientation and length. It was stated that the preferred distance between each cross-section should not exceed 500 feet.

In addition, special care was taken to evaluate the cross sections depicting the split flow into both a primary and secondary channel. After much review and discussion, it was decided that the cross-sections must extend to include both channels as well as the topography between them. This decision was made in the event that the secondary split flow channel requires a separate water surface profile run.

At the north and south edge of the projects P&D will tie into existing data provided by the Flood Control District representing work by others. In these overlap areas, the previous cross section data will be used in the HEC-2 model per instruction from the FCD.

Per request by the Flood Control District, we will ask Cooper Aerial Mapping to combine original sheet numbers 6 and 7 onto one sheet. In addition, there are two areas in the mapping that will need to be checked by Cooper regarding the merging of contours. From our review, we believe these two areas probably represent vertical channel banks and/or overlapping with the channel edge boundaries depicted on the topographic mapping by single-dashed lines having the same line weight as the contours.

P&D Technologies were recently notified of a update to the HEC-2 program regarding culvert modelling. We informed the FCD staff of this and also noted that it is currently on order by our company. Providing the update reaches us in a timely manner we will be using this newly updated version. In addition, it was stated that the Flood Control District has retained an outside consultant for review and evaluation of HEC-2 computer program changes as well as modelling data.

Receipt of a letter from the Flood Control District to P&D Technologies was acknowledged regarding comments and requested changes to the two reports previously submitted, they are: the Data Collection Report and the Manning's "n" Value Determination Report. The letter will be reviewed and addressed in detail with a written response to the FCD by P&D.

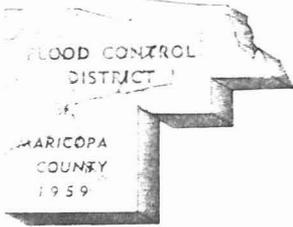
Lastly, the previous meeting minutes from November 29th, 1990 were submitted, which included the Updated Project Schedule, also dated 11/29/90.

Meeting Minutes taken and respectfully submitted by:

P & D Technologies

Lisa T.M. Vomero  
Senior Hydrologist

*P & D decide that the this review  
was for the location of cross-section  
and not for quality of mapping. Any clean  
up required on maps for final submitted*



# FLOOD CONTROL DISTRICT

of

Maricopa County

3335 West Durango Street • Phoenix, Arizona 85009  
Telephone (602) 262-1501

## BOARD OF DIRECTORS

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DEC 04 1990

Mr. Ramesh I. Patel, P.E., L.S.  
Project Manager  
P & D Technologies  
Planners/Engineers  
1702 East Highland Avenue, Ste. 410  
Phoenix, Arizona 85016

SUBJECT: Trilby Wash Flood Control Study  
FCDMC Contract No. 90-4  
P & D P.N. 10320

Dear Mr. Patel:

We have completed our review of the summary of existing data and the Manning's "n" value estimation reports for the subject project. Prior to the finalization of these two reports, the following comments must be addressed:

1. On page 4 of the summary report, use a numbering system to identify individual bibliography.
2. Trilby Wash Flood Insurance Study will use the 100-year frequency discharges to delineate the floodplain and floodway. Revise the bibliography of your summary report to reflect 100-year discharge frequency instead of 50-year discharge (page 4).
3. Provide an index table to identify all documents are gathered in "ATTACHMENT 1: PHONE MEMOS" section of the summary of the existing data report. The index should include columns for the source of information, description, page number of the document, and item number.
4. The "ATTACHMENT 1: PHONE MEMO" section of the summary of the existing data report should clearly identify discharges, time of concentrations, travel times, rainfall depths, etc., which are referring to this project.
5. Include the Patton Road Culvert as-built and C.A.P. Overchute plans as part of the Manning's "n" value estimation report.

Letter to: Mr. Ramesh I. Patel, P.E., L.S.  
Subject: FCD 90-4  
Page 2

6. The Manning's "n" values are estimated based on the field observations and the water depth assumptions. However, the engineer should verify the accuracy of these assumptions and perform a final "n" value adjustment during the course of the HEC-2 modeling.

If you have any questions, please call me at 262-1501.



Besian Khatiblou, P.E.  
Hydrologist



**P&D Technologies**

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December 5, 1990

Mr. Geave "Besian" Khatiblou, P.E.  
Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, Arizona 85009

RE: Trilby Wash Meeting Summary  
FCD Contract No. 90-24  
P & D P.N. No: 10320

Dear Besian:

This purpose of this letter is to summarize the topics discussed at the Trilby Wash Meeting in the Flood Control District's Office on Thursday, November 29th, 1990, 11:00 A.M. The meeting was attended by:

G.B. Khatiblou  
Ramesh Patel  
Lisa T.M. Vomero

MCFCFD  
P&D Technologies  
P&D Technologies.

At the meeting, the following items were delivered for review:

1. A revised and sealed "Field Inspection Location Map"; (Please remove and replace the previous map with the new one as found in the map pocket of the report, entitled: Trilby Wash FIS - Manning's "n" Value Estimation From Field Inspection (11/20/90), dated November 27, 1990;
2. a "clean" set of topographic mapping on blue-line paper completed by Cooper Aerial Mapping, and;
3. a second set of topographic blue-lines showing proposed cross-section locations (in pencil) to be used in the HEC-2 computer model.

Trilby Wash Meeting Summary

Page Two

The following items were discussed in regards to the thalweg and cross-sections:

A. The river mile designation will begin at the south end of the CAP Canal. This study matches into a previously completed study on both the north and south boundaries which was completed by The WLB Group. The beginning station will be river mile 10.444 and will increase upstream.

From our preliminary delineation of the thalweg, it appears that the ending river mile will differ from the previous determination. It was decided that this study will use the true river mileage determined and a note will be added to the study report, maps and other pertinent documentation regarding the numbering of the river miles. The ending river mile on the north end of the project, as delineated by the previous study is 17.262.

B. The split flow area, which is an area of special interest, was discussed in terms of proper orientation of the cross-section alignments as well as if the secondary channel flow should be treated as a separate analysis. The cross-section orientation was reviewed in terms of each channel: primary, secondary and tributary, as well as if it should include the entire area in between the split. It was decided that the cross-sections will be extended across the entire area depicting the main and secondary channels and the area in between; but that, the tributary area(s) should not be included. This will be the initial layout for model start-up, revisions to the sections will be made as needed after modelling begins. In addition, the general length of the sections was reviewed.

C. The thalweg and cross-section alignment bluelines were given to FCD staff for review and approval. The date due for submittal of cross-sections to Cooper Aerial Mapping per the tentative schedule shows a date of December 3rd, 1990; however, the date was changed per request by the Flood Control District to Friday, December 7th, 1990. At this time, it does not appear that this requested revision will adversely effect the remaining scheduled items.

Trilby Wash Meeting Summary  
Page Three

The following comments/revisions were discussed in regards to review of the data collection report, submitted 11/13/90.

1. Number the references;
2. Incorporate any additional data received over the duration of the study into the Final Data Collection Report;
3. Number ALL the pages, including the contact memos.
4. Summarize and list in table form, the contact memos included on the cover page of Attachment I with a notation regarding topic/data received. In addition, the pertinent data specifically relating to this project will be highlighted per request.
5. Include the as-built drawing of both the Patton Road/Trilby Wash crossing as well as the CAP flume structure in the Data Collection Report.

The tentative schedule, prepared 11/2/90, was reviewed for the next three (3) month period. Due to some conflicts the schedule was discussed and revisions made. As a result, the schedule has been Updated (11/29/90) and is attached for your review. The only outstanding item in the schedule, thus far, is the delivery of the hydrology data from the FCD to P&D Technologies.

Lastly, regarding the submittal of the report, entitled Manning's "n" Value Estimation from Field Inspection" conducted on November 20, 1990 (submitted and dated November 27, 1990), review comments will be forthcoming from the Flood Control District in letter form.

This Meeting Minutes taken and respectfully submitted by:

P & D Technologies

Lisa T.M. Vomero  
Senior Hydrologist

Attachment (1)



**P&D Technologies**

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**TRILBY WASH**

**MEETING AND MILESTONE DATES**  
(Completion of Task 1.3)

**Updated: 11/29/90**

**I. PREVIOUS MEETINGS LIST & MILESTONE DATES:**

<u>DATE</u>	<u>PURPOSE</u>
4/19/90	Initial Presentation (for Gila Canal) @ FCDMC
5/08/90	Saddleback FIS Site Inspection
6/05/90	Trilby Wash FIS Site Inspection
6/06/90	Review @ FCD previously submitted FIS
6/19/90	Fee Proposal Due
6/22/90	Scope Adjustment Meeting @ FCDMC
6/27/90	Fee Negotiation Committee Meeting @ FCDMC
7/23/90	Anticipated Board of Supervisors Approval Date
8/06/90	Actual Board of Supervisors Approval Date
8/13/90	Verbal Notice to Proceed
8/14/90	Notification Letters Sent (dated 7/27/90) (Completion of Task 2.1)
8/15/90	Receipt of written Notice to Proceed
8/19/90	Announcement of Flood Elevation Study Published-Arizona Republic
8/22-9/5/90	Announcement of Flood Elevation Study Published-Daily Sun News
8/23/90	Survey started
9/13/90	Site flown by Cooper Aerial Mapping
10/03/90	Receipt of contact prints from Cooper (Completion of Task 2.2)
10/15/90	Ground Control was completed (Task 2.2.2)
10/26/90	Meeting regarding:billing, schedule adjustment, contact prints & Task 1.0 (Begin Task 6.1)

TRILBY WASH  
 MEETING & MILESTONE DATES  
 (Completion of Task 1.3)  
 Updated 11/29/90  
 (continued 2 of 4)

II. Proposed Tentative Schedule of Meetings & Milestones

<u>DATE</u>	<u>ITEM</u>	<u>NOTES</u>
11/13/90	Written Summary of Data Collection Submittal (Completion of Task 1.0)	Completed on time
11/13/90	Field Inspection for Mannings "n" values.	Changed to 11/20/90 Completed on time
11/14/90	Final Approval of Project Base Sheet by FCD	Completed on time
11/20/90	P&D to submit written summary of Mannings "n" values for the FCD's review and approval (Completion of Task 4.4.1)	Changed to 11/27/90 Completed on time
11/26/90	P&D to receive the 100-Year Peak Discharge Values from the FCDMC to be used in the FIS (Task 3.0)	
11/26/90	P&D to receive preliminary topographic mapping from Cooper Aerial Mapping (Completion of Task 2.2.1, 2.2.2 & 4.1)	Completed on time
11/28/90	Delineate thalweg & cross-sections (Preliminary completion of Task 4.3)	Completed on time
11/29/90	Meeting with FCD to review thalweg & cross-sections.	On time
12/07/90	Resubmit cross-section information to Cooper for digitizing	
12/15/90	P&D to complete Field Survey (Completion of Tasks 4.2 & 4.4)	
1/02/91	P&D to receive digitized data from Cooper in HEC-2 Format & review with FCD. Begin Floodplain & Floodway Delineation (Task 5.0)	
1/10/90	Hydraulic Analysis Coordination Meeting with FCD (Task 6.1)	
1/17/90	Hydraulic Analysis Coordination Meeting with FCD	

TRILBY WASH  
MEETING & MILESTONE DATES  
(Completion of Task 1.3)  
Updated 11/29/90  
(continued 3 of 4)

<u>DATE</u>	<u>ITEM</u>	<u>NOTES</u>
1/24/91	Hydraulic Analysis Coordination Meeting with FCD	
2/07/91	Hydraulic Analysis Coordination Meeting with FCD	
2/21/91	Hydraulic Analysis Coordination Meeting with FCD (Complete Task 4.3)	
3/14/91	Hydraulic Analysis Coordination Meeting with FCD	
3/27/91	Hydraulic Analysis Coordination Meeting with FCD	
4/02/91	Meeting with FCD for submittal of HEC-2 model & preliminary mapping (Preliminary completion of Tasks 5.1 through and including Task 5.7)	
4/16/91	P&D to receive FCD comments on HEC-2 model and corresponding preliminary mapping	
4/17/91	Finalization of HEC-2 model(s) & floodway mapping begins	
5/02/91	Meeting with FCD for submittal of proposed final HEC-2 model & mapping (Completion of Tasks 5.1 through & including Task 5.7)	
5/03/91	P&D to prepare draft Final Report	
5/10/91	P&D to submit to FCD draft Final Report for review (Preliminary completion of Task 5.8)	
5/10/91	P&D to receive from the FCD final comments regarding HEC-2 computer model and floodplain/floodway mapping (Preliminary completion of Task 6.2)	
5/11/91	Final print out of HEC-2 model and inking of final maps to begin	

TRILBY WASH  
MEETING & MILESTONE DATES  
(Completion of Task 1,3)  
Updated 11/29/90  
(continued 4 of 4)

<u>DATE</u>	<u>ITEM</u>	<u>NOTES</u>
5/24/91	Final mapping to be completed as well as completion of all final products and submittal to FCD (Completion of Tasks: 2.2.3, 2.2.4, 2.2.5, 2.2.6, 5.8, 7.1 through & including Task 7.6)	
6/24/91	P&D to receive any comments regarding changes to HEC-2 model or mapping limits prior to close of contract date 7/19/91	
6/25/91	P&D to begin revisions to model and/or mapping, if needed	
7/19/91	Final submittal and fulfillment of final contract! (Completion of Tasks 6.1 & 6.2)	



**P&D Technologies**

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November 2, 1990

Mr. Geave Khatiblou, Hydrologist  
Flood Control District of Maricopa County  
3335 West Durango Street  
Phoenix, AZ 85009

**RE: TRILBY WASH SCHEDULE ADJUSTMENT & MEETING SUMMARY**  
**FCDMC Contract No.: 90-24**  
**P&D P.N.: 10320**

Dear Besian:

Per your request at our meeting Friday, October 26th, 1990, this letter outlines adjustments to the Trilby Wash Project Schedule. The schedule items are discussed below under Section I.

SECTION I

1. The anticipated Notice to Proceed date was scheduled for July 23, 1990; however, the actual verbal Notice to Proceed was not received until August 13, 1990.
2. Per the final contract documents, this project as outlined in the Scope of Work (Attachment "A") dated August 15, 1990, will be completed within 284 calendar days. This corresponds to a new and later submittal date of Friday, May 24th, 1991. The total time period, as specified by the contract, is 340 calendar days, corresponding to a final completion date of Friday, July 19, 1991.
3. Attached is the revised "Bar Graph Schedule" reflecting the above referenced adjustments, spanning over a time frame of approximately 9.5 and 11.3 months, respectively.
4. Every effort will be made to insure that the project is completed on time and within budget. Further, we will attempt to complete the project as early as possible, even before the actual due date.

In addition, Section II, outlines non-schedule items discussed at our meeting on 10/26/90.

SECTION II

1. Per request, we will revise our subsequent billing statement formats to:
  - A. reflect a more detailed task breakdown of work performed directly by P&D;
  - B. list items by task number that are to be completed by Cooper Aerial Survey as our subconsultant on a separate sheet; and finally,
  - C. Show the ten percent (10%) retention sum(s), previously omitted.

We apologize for any inconvenience this may have caused you.

Mr. Geave Khatiblou, Hydrologist  
Flood Control District of Maricopa County  
November 6, 1990  
Page 2

2. We have received the 9 x 9 contact prints from Cooper. They are numbered and we will index them on the USGS quadrangle maps per our discussion. As mentioned at the meeting, the revised Base Sheet will be forthcoming. It will be sent to you for review and final approval.
3. Task 1.0 "Data Collection" will be completed without the detailed hydrology information needed for the study per your instruction. In addition, a tentative "Project Meeting Schedule" is attached for your perusal, which we believe to represent the completion of Task 1.3.

Also, I would like to mention that we have received the revised "INSTRUCTIONS FOR ORGANIZING AND SUBMITTING TECHNICAL DOCUMENTATION FOR FLOOD STUDIES" from ADWR dated August, 1990. We will use this latest version for the compilation of the Data Notebook.

Please review the enclosed materials at your earliest convenience especially in regards to the proposed Schedule Adjustments as well as the Tentative Project Meeting Schedule. Do not hesitate to call should you have any questions or require any additional information. I look forward to hearing from you, especially if the above referenced adjustments do not meet with your approval.

Sincerely,

**P & D TECHNOLOGIES**



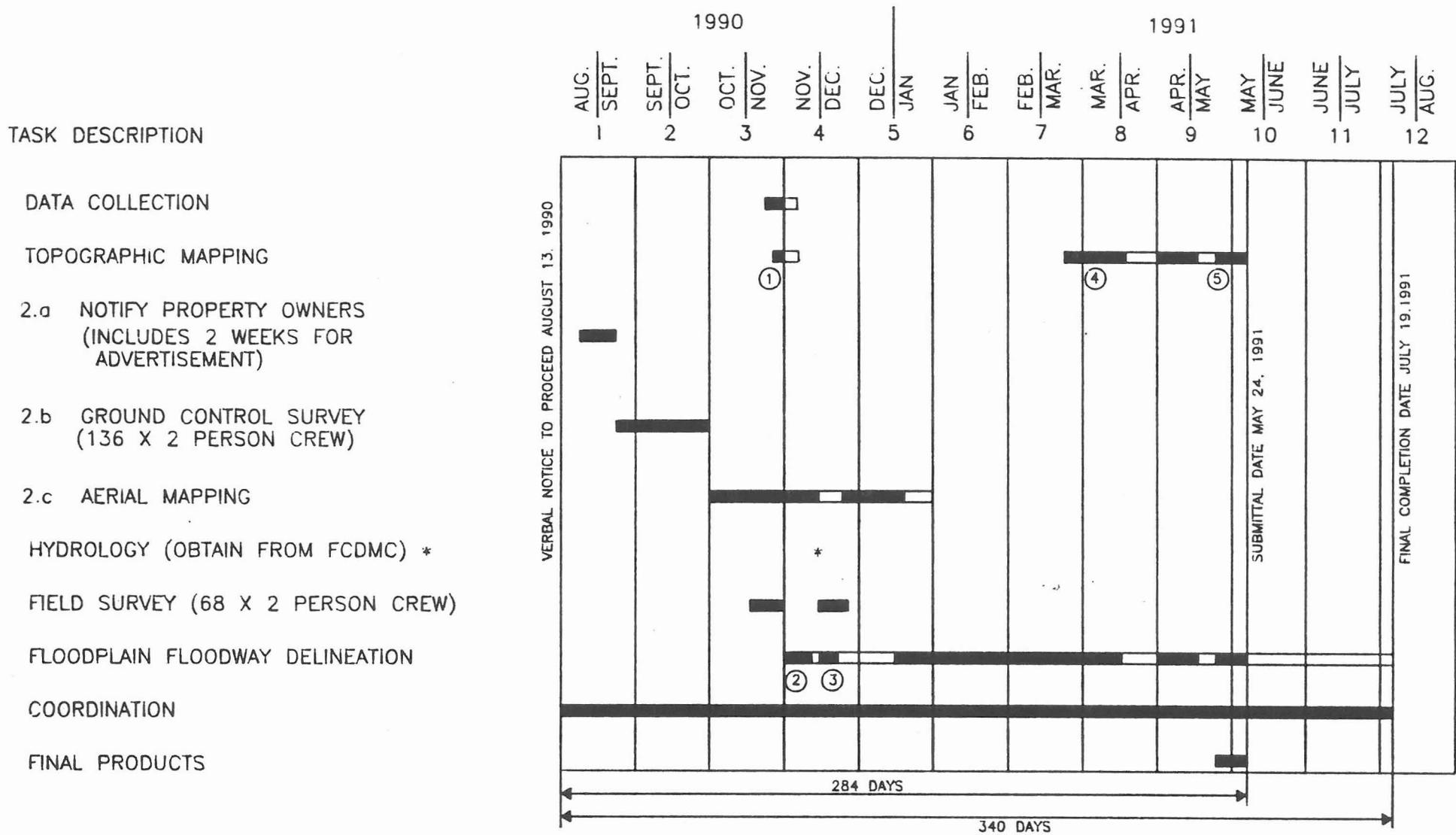
Lisa T.M. Vomero  
Senior Hydrologist

VTMV:ms

Attachments

cc: F.Fleet  
file

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  
 FLOODPLAIN DELINEATION  
 CONTRACT NO. 90-24  
 FOR 6.7 MILES OF TRILBY WASH



■ DENOTES WORK TIME      □ DENOTES REVIEW TIME

- \* TO BE PROVIDED BY FCDMC APPROX. 11/26/90
- 1 BASE SHEET PREPARATION
- 2 MANNING'S 'n' DETERMINATION
- 3 DELINEATE THALWEG & CROSS-SECTIONS
- 4 PREPARE PRELIMINARY MAPPING
- 5 PREPARE FINAL MAPPING

REVISED PER REQUEST  
 MTC. 10/26/90



**P&D Technologies**

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Phoenix, Arizona 85016  
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602/264-3335

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**TRILBY WASH**

**MEETING & MILESTONE DATES**  
**(Completion of Task 1.3)**

**Prepared 11/2/90**

**I. PREVIOUS MEETINGS LIST & MILESTONE DATES:**

<u>DATE</u>	<u>PURPOSE</u>
4/19/90	Initial Presentation (for Gila Canal) @ FCDMC
5/8/90	Saddleback FIS Site Inspection
6/5/90	Trilby Wash FIS Site Inspection
6/6//90	Review @ FCD previously submitted FIS
6/19/90	Fee Proposal Due
6/22/90	Scope Adjustment Meeting @ FCDMC
6/27/90	Fee Negotiation Committee Meeting @ FCDMC
7/23/90	Anticipated Board of Supervisors Approval Date
8/6/90	Actual Board of Supervisors Approval Date
8/13/90	Verbal Notice to Proceed
8/14/90	Notification Letters Sent (dated 7/27/90) (Completion of Task 2.1)
8/15/90	Receipt of written Notice to Proceed
8/19/90	Announcement of Flood Elevation Study Published - Arizona Republic
8/22-9/5/90	Announcement of Flood Elevation Study Published - Daily Sun News
8/23/90	Survey started
9/13/90	Site flown by Cooper Aerial Mapping
10/3/90	Receipt of contact prints from Cooper (Completion of Task 2.2)
10/15/90	Ground Control was completed (Task 2.2.2)
10/26/90	Meeting regarding: billing, schedule adjustment., contact prints & Task 1.0. (Begin Task 6.1)

TRILBY WASH  
MEETING & MILESTONE DATES  
(Completion of Task 1.3)  
Prepared 11/2/90  
(continued 2 of 3)

**II. Proposed Tentative Schedule of Meetings & Milestones**

<u>DATE</u>	<u>ITEM</u>	<u>NOTES</u>
11/13/90	Written Summary of Data Collection Submittal (Completion of Task 1.0)	
11/13/90	Field Inspection for Manning's "n" values	
11/14/90	Final Approval of Project Base Sheet by FCD	
11/20/90	P&D to submit written summary of Manning's "n" values for the FCD's review and approval (Completion of Task 4.4.1)	
11/26/90	P&D to receive the 100-Year Peak Discharge Values from the FCDMC to be used in the FIS (Task 3.0)	
11/26/90	P&D to receive preliminary topographic mapping from Cooper Aerial Mapping (Completion of Task 2.2.1, 2.2.2 & 4.1)	
11/28/90	Delineate thalweg & cross-sections (Preliminary completion of Task 4.3)	
11/29/90	Meeting with FCD to review thalweg & cross-sections	
12/3/90	Resubmit cross-section information to Cooper for digitizing	
12/15/90	P&D to complete Field Survey (Completion of Tasks 4.2 & 4.4)	
1/2/91	P&D to receive digitized data from Cooper in HEC- 2 Format & review with FCD. Begin Floodplain & Floodway Delineation (Task 5.0)	
1/9/91	Hydraulic Analysis Coordination Meeting with FCD (Task 6.1)	
1/16/91	Hydraulic Analysis Coordination Meeting with FCD	
1/23/91	Hydraulic Analysis Coordination Meeting with FCD	
2/6/91	Hydraulic Analysis Coordination Meeting with FCD	
2/20/91	Hydraulic Analysis Coordination Meeting with FCD (Complete Task 4.3)	
3/13/91	Hydraulic Analysis Coordination Meeting with FCD	

TRILBY WASH  
MEETING & MILESTONE DATES  
(Completion of Task 1.3)  
Prepared 11/2/90  
(continued 3 of 3)

<u>DATE</u>	<u>ITEM</u>	<u>NOTES</u>
3/27/91	Hydraulic Analysis Coordination Meeting with FCD	
4/2/91	Meeting with FCD for submittal of HEC-2 model & preliminary mapping (Preliminary completion of Tasks 5.1 through & including Task 5.7)	
4/16/91	P&D to receive FCD comments on HEC-2 model and corresponding preliminary mapping	
4/17/91	Finalization of HEC-2 model(s) & floodway mapping begins	
5/2/91	Meeting with FCD for submittal of proposed final HEC-2 model & mapping (Completion of Tasks 5.1 through & including Task 5.7)	
5/3/91	P&D to prepare draft Final Report	
5/10/90	P&D to submit to FCD draft Final Report for review (Preliminary completion of Task 5.8)	
5/10/91	P&D to receive from the FCD final comments regarding HEC-2 computer model and floodplain/floodway mapping (Preliminary completion of Task 6.2)	
5/11/91	Final print out of HEC-2 model and inking of final maps to begin	
5/24/91	Final mapping to be completed as well as completion of all final products and submittal to FCD (Completion of Tasks: 2.2.3, 2.2.4, 2.2.5, 2.2.6, 5.8, 7.1 through and including 7.6)	
6/24/91	P&D to receive any comments regarding changes to the HEC-2 model or mapping limits prior to close of contract date 7/19/91.	
6/25/91	P&D to begin revisions to model and/or mapping, if needed	
7/19/91	Final submittal and fulfillment of final contract! Completion of Tasks 6.1 and 6.2.	



**P&D Technologies**

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October 31, 1990

Mr. Geave Khatiblou  
Flood Control District of Maricopa County  
3335 W. Durango Street  
Phoenix, AZ 85009

**RE: TRIBLY WASH SURVEY REPORT 10/31/90**

Dear Mr. Geave Khatiblou

Work on Trilby Wash commenced on August 8, 1990 with Task 2.1.d, preparing a list of adjacent property owners. 73 notification letters, Task 2.1.a, were sent out on August 14, 1990. Announcements of the Flood Elevation Study were published in the Daily News - Sun on August 22-31, September 1,4,5, 1990 and in the Arizona Republic on August 19, 1990. Field work commenced on August 23, 1990 with Task 2.2.2. Panels were set at locations as requested by Cooper Aerial Mapping Company. Due to stormy conditions common to this time of year several flight dates were postponed and field crews returned to the field to replace panels disturbed by high winds. The project was flown on September 13, 1990 and field crews began establishing the vertical ground control, Task 2.2.2.c. We located Wittman Reference Mark No. 101 according to the Wittman area Drainage Master Study as prepared by The WLB Group, Inc. on March of 1989 and began our bench circuits with this Bench Mark. We completed our bench circuits on October 6, at the south end by checking into Wittman Reference Mark No. 47 as published in said Master Study and were within accepted standards. Horizontal control commenced on October 9. Control Points at the north end were provided to us by Mark Gavin of The WLB Group and their respective state Plane Coordinates. We began a Traverse down the east side of the wash, tying in panels and section corners, and upon reaching the south end crossed over to the west side and continued north to the point of beginning. Our traverse closed within required standards and our control data was delivered to Cooper Aerial Mapping on October 15, 1990 for their action.

Survey work remaining to be completed are Task 4.2.c, an "as-built" Survey of culvert crossing at Patton Road and overchute at the CAP Canal, which is scheduled to be completed by the end of the week and Task 4.2.d verification of cross sections, which will be performed upon the completion of map preparations.

I have enclosed copies of the field notes and other pertinent information for your files. If you have any questions, please call me at 264-3335.

Sincerely,

Thomas L. Rope, R.L.S.  
Director of Surveys

## **1.4 GENERAL CORRESPONDENCE**

# Affidavit of Publication

STATE OF ARIZONA,  
COUNTY OF MARICOPA ss.

I, Sam Marocco, Publisher of  
NEWS-SUN, Inc.

newspaper of general circulation, published  
in Sun City, County of Maricopa, State of  
Arizona, do solemnly swear that a copy of  
the above notice, in the matter of

Announcement of

Flood Elevation Study

By P&D Technologies

as per clipping attached, was published in  
the regular and entire edition of the said  
newspaper, and not in any supplement  
thereof, for a period of

12 consecutive days as follows, to-wit:

August 22,23,24,25,27,28,29,30,31; Sept.1,4 and 5, 1990

*SL Marocco*

Sworn to before me,

this 5th day of Sept., 1990

*Shirley Ann G. Ouren*  
OFFICIAL SEAL  
SHIRLEY ANN G. OUREN  
Notary Public - State of Arizona  
MARICOPA Notary Public  
My Comm. Expires Aug. 28, 1993

(My Commission expires \_\_\_\_\_)

## ANNOUNCEMENT OF FLOOD ELEVATION STUDY

The Flood Control District of Maricopa County, under authority of the National Flood Insurance Act of 1968. (P.L. 90-448), as amended, and the Flood Disaster Protection Act of 1973 (P.L.93-234), is funding a detailed study of flood hazard areas along the Trilby Wash in Maricopa County between the Central Arizona Canal Project Aqueduct (CAP) and Grand Avenue at Circle City.

The Study is being performed for the Flood Control District by P&D Technologies of Phoenix, Arizona.

These studies will examine and evaluate the flood hazard areas in the community to determine the flood elevation for those areas. These elevations will then be used to determine the flood insurance rates used by the Federal Emergency Management Agency.

This announcement is intended to notify all interested parties of the commencement of this study so that they may have an opportunity to bring any relevant facts and technical data concerning local flood hazards to the attention of the Flood Control District for consideration in the course of this study. Such information should be furnished to Mr. Geave "Beslan" Khatiblou or Joe Tram c/o Flood Control District of Maricopa County, 3335 West Durango Street, Phoenix, AZ 85009, telephone 282-1501 for P&D Technologies' use in performing the study.

Published: Daily News-Sun: August 22, 23, 24, 25, 27, 28, 29, 30, 31, September 1, 4 and 5, 1990.



THE ARIZONA REPUBLIC  *The Phoenix Gazette*

**INVOICE NO. 05605**  
**ANNOUNCEMENT OF FLOOD ELEVATION STUDY**  
 The Flood Control District of Maricopa County, under authority of the National Flood Insurance Act of 1968 (P.L. 90-448), as amended, and the Flood Disaster Protection Act of 1973 (P.L. 93-234), is funding a detailed study of flood hazard areas along the Trilby Wash in Maricopa County between the Central Arizona Canal Project Aqueduct (CAP) and Grand Avenue at Circle City.

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Arizona Republic, August 19, 1990.

STATE OF ARIZONA }  
 COUNTY OF MARICOPA } SS.

JOAN LOHR, being first duly sworn, upon oath deposes and says: That she is the assistant legal advertising manager of the Arizona Business Gazette, a newspaper of general circulation in the county of Maricopa, State of Arizona, published at Phoenix, Arizona, by Phoenix Newspapers Inc., which also publishes The Arizona Republic and The Phoenix Gazette, and that the copy hereto attached is a true copy of the advertisement published in the said paper on the dates as indicated.

*The Arizona Republic*  
~~*The Phoenix Gazette*~~

AUGUST 19, 1990

*Joan Lohr*

Sworn to before me this

24 TH day of

AUGUST A.D. 19 90



*Mary Lee Measel*  
 Notary Public



**P&D Technologies**

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Phoenix, Arizona 85016  
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**ANNOUNCEMENT OF FLOOD ELEVATION STUDY**

July 27, 1990

Dear Landowner:

The Flood Control District of Maricopa County, under authority of the National Flood Insurance Act of 1968 (P.L. 90-448), as amended, and the Flood Disaster Protection Act of 1973 (P.L. 93-234), is funding a detailed study of flood hazard areas along the Trilby Wash in Maricopa County between the Central Arizona Canal Project Aqueduct (CAP) and Grand Avenue at Circle City.

The study is being performed for the Flood Control District by P&D Technologies of Phoenix, Arizona.

These studies will examine and evaluate the flood hazard areas in the community to determine the flood elevation for those areas. These elevations will then be used to determine the flood insurance rates used by the Federal Emergency Management Agency.

Our records search revealed your ownership of land adjacent to the Trilby Wash. This announcement is intended to notify all interested parties of the commencement of this study so that they may have an opportunity to bring any relevant facts and technical data concerning local flood hazards to the attention of the Flood Control District for consideration in the course of this study. Such information should be furnished to Mr. Geave "Beslan" Khatiblou or Joe Tram c/o Flood Control District of Maricopa County, 3335 West Durango Street, Phoenix, AZ 85009, telephone 282-1501 for P&D Technologies' use in performing the study. Additionally, we wish to inform you we will have surveyors in the area performing field work during the course of the study. If you have any questions or concerns regarding the surveyors entering your property, please contact Thomas Rope of P&D Technologies at (602) 264-3335. Thank you.

Sincerely,

**P&D TECHNOLOGIES**

Thomas L. Rope, R.L.S.  
Director of Surveys

TLR/lks

(FILE NOTE: A total of 73 letters were sent out; no responses were received through 3/26/91.)

**1.5 CONTRACT DOCUMENTS**

Scope of Work for the Trilby Wash  
Flood Control District of Maricopa County  
Topographic Mapping and Flood Insurance Study

General

The project consists of topographic mapping and floodplain and floodway delineations of approximately 6.7 River Miles of the Trilby Wash. The downstream study limits being the Central Arizona Project Aqueduct (CAP), the upstream limits being Grand Avenue at Circle City. The hydrology part of this project will be supplied by the FCD. The Consultant will develop the hydraulic using the Corps of Engineer's HEC-2 computer model to determine floodplain and floodway delineations for the 100 year peak flood. All work must be reviewed and accepted by the Federal Emergency Management Agency (FEMA) prior to the finalization of this contract. As a part of this requirement, the Consultant shall be responsible for Public Notification regarding this project. All work under this Scope will be completed within 180 calendar days from the date of the Notice to Proceed, including 60 days for Flood Control District reviews.

Task 1 Data Collection

- 1.1 The Consultant will collect and review pertinent data from the District and other outside sources. Data to be collected will include previous flood hazard reports and hydrology for the study area; existing topographic mapping; historical flooding information; as-built plans for existing structures; FEMA Flood Hazard Boundary Maps and any Letters of Map Amendment and/or Revisions and other pertinent information.
- 1.2 Written summary of data collection will be submitted to the District for information purposes and be included in the report as an appendix.
- 1.3 The Consultant will submit a project schedule showing coordination meetings and completion dates for each of the tasks in the contract.

Task 2 Topographic Mapping

- 2.1 The Consultant will notify all property owners and obtain any necessary Rights-of-Entry for the study area. The District will assist Consultant as may be necessary to complete this task.
- 2.2 An aerial survey subconsultant shall be retained by the firm as part of this contract. The Consultant shall coordinate all the aerial surveying work with the aerial surveying consultant to ensure that the specifications of the aerial surveying work is met. Quality control on surveys will be per FEMA 37, Flood Insurance Study Guidelines and Specifications for Study Consultants. The Consultant will be responsible for the quality control of all topographic mapping by the aerial surveying subconsultant such that it meets the FEMA standard.

- 2.2.1 Prepare topographic mapping to a 2-foot contour interval, 1"=200' scale, with spot elevations and/or 1-foot contours on all section line and mid-section line roads.
- 2.2.2 Ground Control:
- a. The Consultant shall provide all survey control.
  - b. The Consultant shall systematically set panel points and establish horizontal and vertical control throughout the areas to be mapped for use in compilation by the aerial survey Consultant. Where readily available, surveys will tie into the State Plane Coordinate System and the Wittmann ADMS Flood Insurance Study. Field control shall be sufficient to readily allow for compilation of maps by the aerial survey Consultant at the desired map scale and contour interval and will be based on the National Geodetic Vertical Data (NGVD).
  - c. The horizontal and vertical control points shall be located and marked by the Consultant. The controls for the area mapping shall be in sufficient numbers and shall be in locations which will be compatible with the accuracy of the mapping requirements. The controls shall be of at least third order accuracy. Section corners, quarter corners, and mid-section points shall be used for control points wherever possible.
- 2.2.3 Digital contour and planimetric data developed for this project shall be delivered in AutoCAD DXF or Intergraph ISIF ASCII format, as specified in Autodesk, Inc., publication TD106-009 (May 7, 1986) or Intergraph publication DIX4110 (May 12, 1985). Layer names and graphics attributes shall be fully documented by the Consultant. The delivered DXF or ISIF files shall be compatible with the requirements, and subject to the limitations, of the ESRI DXFARC or the ESRI SIF2ARC software translator as detailed in the January 1989 release of the "ARC/INFO Users Guide". All file deliveries shall be in ASCII format on industry-standard 1/2" magnetic tape, 2400-foot reels, written in a generic unlabelled COPY format, with specified record-lengths and block sizes.
- 2.2.4 The Consultant shall provide permanent non-erasable topographic mylar sheets 24" X 36" with a scale of 1-inch equal to 200 feet, with a contour interval of 2 feet for all mapping with the exception of section line roads which will have a contour interval of 1 foot. The consultant shall use the FCD format sheet for the final mapping product. A cover sheet will be provided with the project title, date of topographic mapping, and a location map showing geographic range covered by each specific mapping sheet. Each manuscript shall include a minimum of a north arrow, scale, section corners and quarter corners, township, range, section number, current and proposed streets and Highway names, State Plane Coordinate System, major drainage features, corporate boundaries, cross section lines, channel station center line, index map, description and elevation of control points and ERMs, reference marks used in ground control, legend. The mapping will have an accuracy such that ninety percent (90%) of all contours shall be

within one-half contour of the true elevations and the remaining ten percent (10%) of the contours shall not be in error by more than one contour interval.

2.2.5 The Consultant shall provide permanent non-erasable topographic mylars as described above in Section 2.2.4 with delineated floodplains included.

2.2.6 Sketch maps no larger than 11" x 17" for the study area must be included in the narrative report along with the flood profile maps.

### Task 3 Hydrology

3.1 The hydrologic study of the watershed will be supplied by District.

### Task 4 Field Survey

4.1 Prepare topographic mapping to a 2 foot contour interval with a scale of 1" = 200' feet, with spot elevations or 1 foot contours on all section line and mid-section line roads, for floodplain/floodway delineation areas as identified in Task 2 or FEMA criteria, whichever is more stringent.

4.2 Ground Control for Floodplain Delineations:

- a. All topographic mapping and survey work shall meet or exceed Federal Emergency Management Agency (FEMA) minimum criteria as defined in FEMA Document 37, Flood Insurance Study Guidelines and Specifications for Study Consultants, Appendix 4, September 1985. This would include, but is not limited to: the establishment of "permanent" elevation reference marks (ERM's); field control; and verification of profiles by the ground survey profile procedure.
- b. Horizontal and Vertical Control: Systematically set panel points and establish horizontal and vertical control throughout the area to be mapped for use in compilation by the aerial survey Consultant. Where readily available, surveys will tie into State Plane Coordinate System or/and the Wittmann ADMS FIS. Field control shall be sufficient, at least one "permanent" point per mile, such point(s) being used as Elevation Reference Marks (ERMs). Surveys will be based on National Geodetic Vertical Datum (NGVD), per FEMA guidelines. "Permanent" survey points shall consist of existing monumentation, such as brass caps or similar survey monuments. Where additional monumentation is needed, survey markers conforming to Maricopa Association of Governments (MAG) Uniform Standard Detail for Public Works Construction, detail 120-1, Type C, shall be placed 2" +/- above grade. Elevation Reference Marks will be labelled on available maps and described in a manner which allow them to be readily located in the field.
- c. "As-Built" plans or surveys of all bridges and hydraulic structures are to be obtained by the Study Consultant.

- d. The Consultant shall verify profiles for mapped floodplains. The ground survey profile procedure as described in FEMA Document 37 or other methods approved by FEMA.
- 4.3 Cross Section-Stationing will be from left to right looking downstream. Cross sections will be spaced approximately every 500 feet, unless geographic or structural constraints dictate otherwise. Identification of Cross sections will be in river miles, increasing upstream. The stationing will tie into the specified river mile of the existing FEMA studies. The location and alignment of cross sections and channel centerline will be submitted for the Flood Control District's review and approval prior to digitizing cross section data. Cross section orientation may need to be altered after running of HEC-2 model to make sure that they are perpendicular to flow per FEMA criteria.
- 4.4 The Consultant will conduct field reconnaissance of the full study reach. This will include observation of channel and floodplain conditions for estimation of Manning's "n" values; photographic documentation of floodplain characteristics; determination of channel bank stations; observation of possible overflow areas; inspection of levees or other flood control structures; and measurement of bridge and culvert dimensions.
- 4.4.1 A written summary of the field inspection, including photographs to document "n" value estimation will be submitted to the District for review and approval and included in the final report as an appendix.

#### Task 5 Floodplain and Floodway Delineation

- 5.1 Floodplain and Floodway delineations must be obtained using the U.S. Army Corps of Engineers HEC-2 Water Surface Profiles computer model, 1989 version, and using methodology acceptable to FEMA. This model will simulate the effects of floodplain geomorphology, flow changes, bridges and culverts, hydraulic roughness factors, effective flow limitations, split-flows, and other considerations. The Consultant will prepare the study using the guidelines established in "The Flood Insurance Study Guidelines and Specification for Study Consultants", dated September 1985 and "Appeals, Revisions, and Amendments to Flood Insurance Maps", September 1985.
- 5.2 Bridges and Culverts must be modeled in compliance with HEC-2 modeling requirements for the selected routine. Where multiple bridges occur, each bridge will be modeled separately.
- 5.3 All cross sections will be plotted using a pen plotter. The cross section plots will show water surface profiles, ineffective flow areas, "n" values, encroachments, channel stationing and other pertinent information. These plots are to be available at all reviews, and to be included in an appendix as part of the final study report.

- 5.4 It is preferable to use the slope area methodology to start the delineation and keep the floodplain delineation and ponding delineation separate. When mapping, we will merge the floodplain delienation and ponding elevation together such that the greater of either water surface elevation be noted for flood insurance purposes.
- 5.5 Flood zones must be determined according to FEMA criteria.
- 5.6 The Consultant will prepare working maps and models of the 100-year floodplain and floodway during the course of the hydraulic modeling analysis for review by the Flood Control District at progress meetings. Floodways are to be determined using equal conveyance encroachment methods to start with, but only encroachment method 1 will be used in the final analysis.
- 5.7 The delineation work shall meet requirements for floodplain delineations as prescribed by FEMA and the Arizona Department of Water Resources.
- 5.8 The final report for the floodplain/floodway delineation study will include, but is not limited to the following:
- I. Introduction
    - a. Purpose of study
    - b. Authority for study
    - c. Coordination and acknowledgments
  - II. Area Studied
    - a. Scope of study
    - b. Community description
    - c. Principal flood problems
    - d. Flood protection measures
  - III. Engineering methods
    - a. Hydrologic analyses
    - b. Hydraulic analyses
  - IV. Floodplain Management applications
    - a. Flood boundaries
    - b. Floodways
  - V. Insurance applications
  - VI. Other studies
  - VII. Location of data
  - VIII. Bibliography

#### Task 6 Coordination

- 6.1 The Consultant shall participate in regular coordination meetings (at least every three weeks) with the District's Project Manager and in Milestone coordination meetings in the development of the hydraulic analyses.
- 6.2 Prior to finalizing of the hydraulic analysis, the Consultant will submit maps, report, cross section plots, HEC-2 output hard copy, and HEC-2 input/output file on diskettes to FCD, ADWR, and FEMA for review by the Technical Evaluation Consultant (TEC), and any other

governmental agency reviewers through the District. The Consultant will respond to questions by the reviewers and make modifications to maps, models and report if required.

### Task 7 Final Products

#### 7.1. Mapping:

- a. One complete set of 9" X 9" contact prints of the aerial stereo photographs sequentially numbered and catalogued.
- b. One complete set of contour maps, blue-line, draft copy for Flood Control District reference during the project, delivered immediately following the topographic mapping.
- c. One complete set of contour maps at 1"= 200' scale with the floodplain delineations in reproducible form (mylar) and six blue-line copies as outlined in Task 2.
- d. One set of transparent overlays of photo-mylars
- e. One complete set of mylars for the foldout maps (no larger than 11" x 17") used in the report.

7.2 One-half inch magnetic tape formatted at 1600 bpi containing the topographic data and the digitized floodplain/floodway boundaries in either the AutoCAD DXF ASCII format or the Intergraph ISIF ASCII format.

7.3 Six hardcopies of the HEC-2 printouts and a copy of the HEC-2 model input/output on 5-1/4", 1.2 Mb diskettes compatible with an IBM-AT personal computer.

7.4 One copy of the survey and survey calculations which is used by the aerial survey Consultant for setting the panel points and establishing horizontal and vertical control throughout the study areas, in addition to a Tabular list of control points (ERM's) used with descriptions, elevations, and coordinates.

#### 7.5 Reports:

- a. The Consultant will produce a final report incorporating the comments of the District, ADWR, FEMA and other reviewers. Six copies of the Hydraulic report as outlined in Task 5, will be delivered. Floodway/Floodplain Maps reduced to 11x17.

7.6 Documentation for this study will be as outlined in Instructions for Organizing and Submitting Technical Documentation for Flood Studies as required by ADWR.

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**SECTION 2:      MAPPING AND SURVEY INFORMATION**

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**2.1 DESCRIPTION OF MAPPING, MAP CONTROL AND ANY OTHER  
SURVEY INFORMATION USED IN STUDY**



**P&D Technologies**

1702 E. Highland Avenue  
Suite 410  
Phoenix, Arizona 85016  
FAX 602/241-1334  
602/264-3335

*Planning  
Engineering  
Transportation  
Environmental  
Economics  
Landscape  
Architecture*

An Employee-Owned Company

October 31, 1990

Mr. Geave Khatiblou  
Flood Control District of Maricopa County  
3335 W. Durango Street  
Phoenix, AZ 85009

**RE: TRIBLY WASH SURVEY REPORT 10/31/90**

Dear Mr. Geave Khatiblou

Work on Trilby Wash commenced on August 8, 1990 with Task 2.1.d, preparing a list of adjacent property owners. 73 notification letters, Task 2.1.a, were sent out on August 14, 1990. Announcements of the Flood Elevation Study were published in the Daily News - Sun on August 22-31, September 1,4,5, 1990 and in the Arizona Republic on August 19, 1990. Field work commenced on August 23, 1990 with Task 2.2.2. Panels were set at locations as requested by Cooper Aerial Mapping Company. Due to stormy conditions common to this time of year several flight dates were postponed and field crews returned to the field to replace panels disturbed by high winds. The project was flown on September 13, 1990 and field crews began establishing the vertical ground control, Task 2.2.2.c. We located Wittman Reference Mark No. 101 according to the Wittman area Drainage Master Study as prepared by The WLB Group, Inc. on March of 1989 and began our bench circuits with this Bench Mark. We completed our bench circuits on October 6, at the south end by checking into Wittman Reference Mark No. 47 as published in said Master Study and were within accepted standards. Horizontal control commenced on October 9. Control Points at the north end were provided to us by Mark Gavin of The WLB Group and their respective state Plane Coordinates. We began a Traverse down the east side of the wash, tying in panels and section corners, and upon reaching the south end crossed over to the west side and continued north to the point of beginning. Our traverse closed within required standards and our control data was delivered to Cooper Aerial Mapping on October 15, 1990 for their action.

Survey work remaining to be completed are Task 4.2.c, an "as-built" Survey of culvert crossing at Patton Road and overchute at the CAP Canal, which is scheduled to be completed by the end of the week and Task 4.2.d verification of cross sections, which will be performed upon the completion of map preparations.

I have enclosed copies of the field notes and other pertinent information for your files. If you have any questions, please call me at 264-3335.

Sincerely,

A handwritten signature in cursive script that reads 'Thomas L. Rope'.

Thomas L. Rope, R.L.S.  
Director of Surveys

Date: AUGUST 17, 1990

WLB Job No.: 285031

To: TOM ROPE - P&D TECH

From: MARK SAVAN

CIRCLE CITY / TRILBY WASH H<sub>2</sub> CONTROL

STATE  
LANE  
COORD.

PT. NO.	N	E
114	1,023,287.37	301,255.66
115	1,023,349.84	294,732.05
338	986,921.64	305,739.12

(GROUND TO GRID FACTOR = 0.999861)

270-31-01  
6922.940

PT. 114 - FD. PIPE ON SOUTH LINE OF SEC.  
33, T6N, R3W (APPROX. 1000' WEST OF ~~SW~~ <sup>SE</sup> CORNER)

PT. 115 - FD. REBAR AT THE ~~SW~~ <sup>SE</sup> CORNER  
OF SEC. 32, T6N, R3W

PT. 338 - FD. B.C. AT N<sup>1</sup>/<sub>4</sub> CORNER OF  
SEC. 10 T4N, R3W

PLEASE DELIVER AS SOON AS POSSIBLE

There are a total of 1 pages, including the cover page. If all pages are not received properly, please notify us immediately by calling (602) 279-1016.

Teletype Number (602) 279-7810

Oper Mark Savan

DATE 10/15/90

LIST COORDINATE & ELEVATIONS

PAGE 0001

ELEVATIONS FILE=E TRILBY1

PROJECT FILE =TRILBY1

POINT #	NORTHING	EASTING	EXISTING	FINISHED
101	1023248.73	298608.30	1846.74	
102	1022408.58	302158.15	1838.41	
103	1018988.12	302601.24	1798.29	
104	1019842.70	298675.91	1808.99	
105	1017869.81	300480.22	1782.35	
106	1014545.29	300899.27	1742.47	
107	1014318.39	303363.64	1741.68	
108	1012737.52	299558.07	1730.04	
109	1011202.99	303097.36	1705.32	
110	1010089.70	306180.34	1690.00	
111	1008829.24	302751.42	1689.15	
112	1007343.58	306068.32	1668.62	
113	1006435.80	308150.75	1652.33	
114	1005117.58	304312.18	1650.34	
115	1004313.69	308189.83	1639.00	
116	1002114.06	307427.61	1627.43	
117	1000827.23	305064.87	1623.42	
118	999473.22	307410.54	1607.42	
119	996810.27	306207.17	1598.08	
120	996776.24	310190.10	1584.82	
121	994753.27	307622.67	1563.25	
122	992748.73	308515.03	1566.34	
123	991530.54	309997.61	1558.50	
124	990430.60	307044.69	1564.82	

P & D TECHNOLOGIES  
 1702 E. Highland, Suite 410  
 Phoenix, Arizona 85016  
 (602) 264-3335  
 LIST COORDINATES

DATE 11/14/90

PAGE 0001

PROJECT FILE =TRILBY

Point #	Northing	Easting
10	1,023,313.68510	297,000.39920
11	1,023,262.18522	299,631.41965
12	1,023,297.05520	299,643.64670
13	102,331.29760	294,359.54530
14	1,023,287.37000	301,255.65900
15	1,023,349.83720	294,332.14910
-----		
101	1,023,248.73268	298,608.29709
102	1,022,408.57735	302,158.15073
103	1,018,988.11660	302,601.54039
104	1,019,842.70386	298,676.91262
105	1,017,869.81015	300,480.22114
106	1,014,545.29057	300,899.26859
107	1,014,318.39252	303,363.84107
108	1,012,737.51626	299,556.06533
109	1,011,202.98601	303,097.36008
110	1,010,069.70318	306,180.34328
111	1,008,829.23605	302,751.42375
112	1,007,343.56187	306,068.32345
113	1,006,435.80060	308,150.75193
114	1,005,117.57636	304,312.17863
115	1,004,313.68641	308,189.82974
116	1,002,114.06310	307,427.60866
117	1,000,827.23177	305,064.87068
118	999,473.22122	307,410.53853
119	996,810.27158	306,207.16692
120	996,776.24383	310,190.10078
121	994,753.26970	307,622.67022
122	992,748.72996	308,515.02769
123	991,530.53679	309,997.60544
124	990,430.59618	307,044.69281
-----		
200	1,020,634.38778	302,260.56461
201	1,012,711.34362	302,202.58276
202	1,012,693.27408	304,849.79660
203	996,832.51746	307,395.01024
204	991,547.40254	307,357.96118
205	1,007,410.75512	304,815.22551
206	987,907.78648	308,191.71810
207	1,018,018.09808	299,588.05039
208	994,188.80259	307,377.19067
-----		
300	1,020,637.55656	302,048.12824
301	1,016,300.48662	302,295.47943
302	1,011,871.06339	304,838.59459
303	1,010,075.64942	306,063.34432
304	1,008,367.54476	306,166.90190
305	1,006,941.96513	307,439.85718
306	1,004,402.45511	307,411.28203
307	1,002,575.48230	307,462.30698
308	998,278.85600	308,500.90769
309	996,748.32754	307,592.35958
310	993,661.37544	306,747.90345
311	999,105.03768	306,254.08196

P & D TECHNOLOGIES  
1702 E. Highland, Suite 410  
Phoenix, Arizona 85016  
(602) 264-3335

DATE 11/14/90

LIST COORDINATES

PAGE 0002

PROJECT FILE =TRILBY

Point #	Northing	Easting
312	1,003,099.80342	304,374.49528
313	1,008,759.03766	302,560.31674
314	1,012,750.97853	300,415.85995
315	1,015,750.69100	299,388.13793
316	1,017,860.84046	298,627.48285
317	986,928.62148	305,737.98245

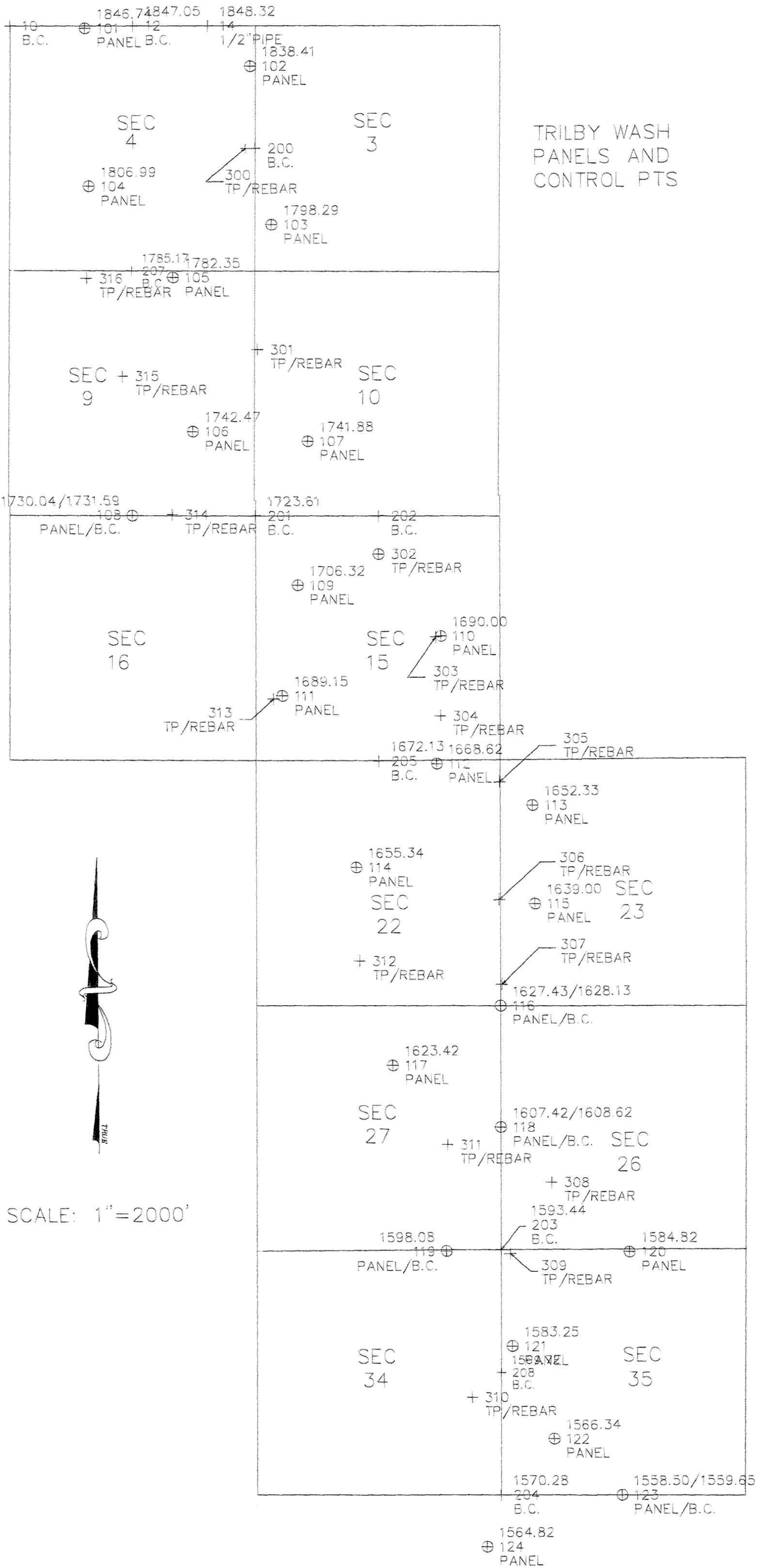
-----

There are 434 unused coordinates between 10 and 500 .

**TRILBY WASH  
ELEVATION REFERENCE MARKS**

<u>ERM#</u>	<u>NORTHING</u>	<u>EASTING</u>	<u>ELEVATION</u> (FT. HGVD)	<u>DESCRIPTION</u>		
PD1	1023297.03	299643.65	1847.05	GLO	B.C	N1/4 SEC 4 T5N R3W
PD2	1018018.10	299588.05	1785.17	GLO	B.C.	S1/4 SEC 4 T5N R3W
PD3	1012737.52	299556.06	1731.59	GLO	B.C.	N1/4 SEC 16 T5N R3W
PD4	1012711.34	302202.58	1723.61	GLO	B.C.	NE COR SEC 16 T5NR3W
PD5	1007410.76	304815.23	1672.13	GLO	B.C.	N1/4 SEC 22 T5N R3W
PD6	1002114.06	307427.61	1628.13	GLO	B.C.	SE COR SEC 22 T5N R3W
PD7	999473.22	307410.54	1608.62	GLO	B.C.	W1/4 SEC 26 T5N R3W
PD8	996832.52	307395.01	1593.44	MCHD	B.C.	FLUSH NW COR SEC 35 T5N R3W
PD9	996810.27	306207.17	1598.08	USCGS	B.C.	IN CONC 1188 W OF PD8
PD10	994188.80	307377.19	1569.72	GLO	B.C.	W1/4 SEC 35 T5N R3W
PD11	991547.40	307357.96	1570.28	GLO	B.C.	SW COR SEC 35 T5N R3W
PD12	991530.54	309997.61	1559.65	GLO	B.C.	S1/4 SEC 35 T5N R3W

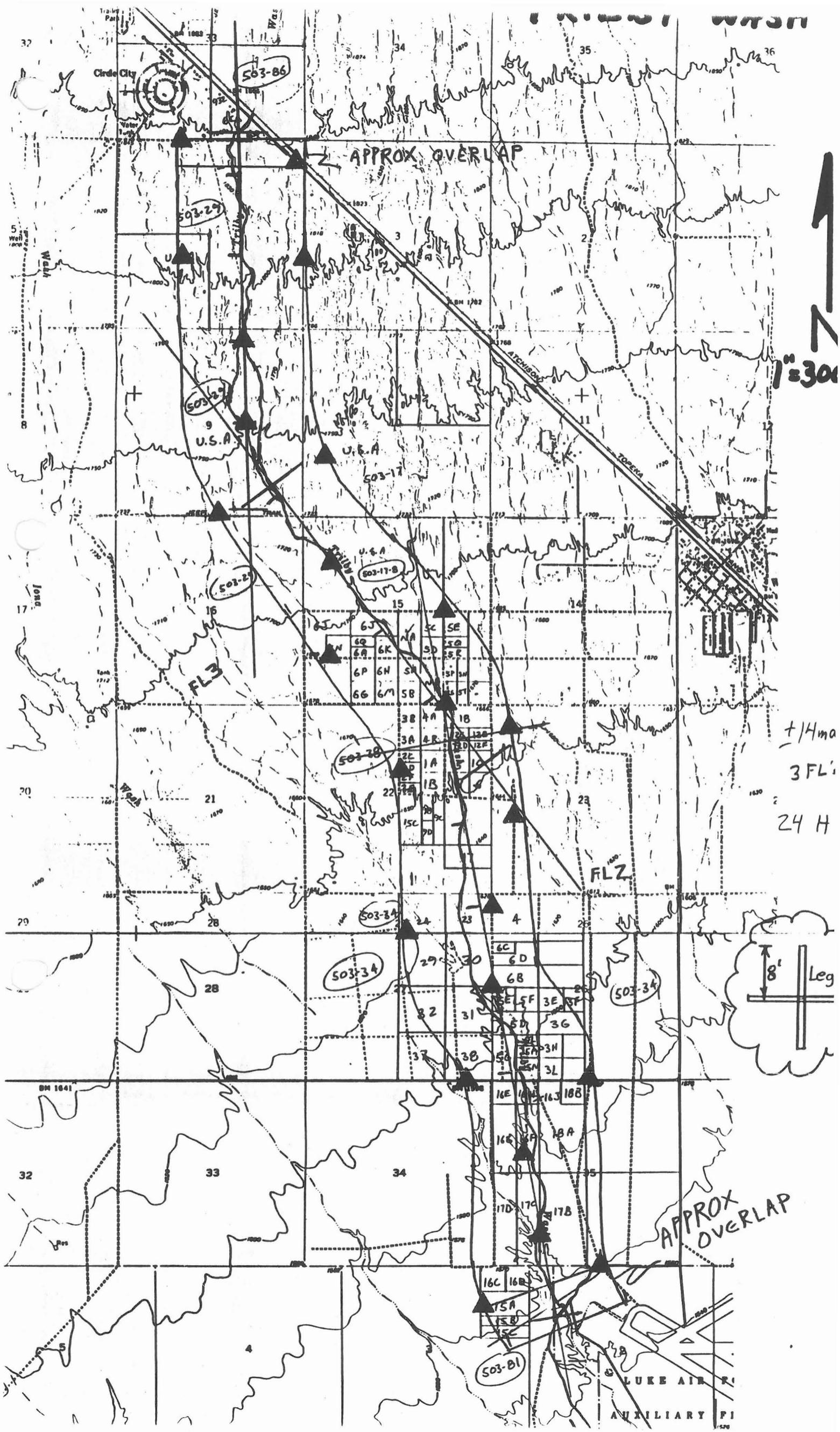
+ 15  
1/2" REBAR



TRILBY WASH  
PANELS AND  
CONTROL PTS



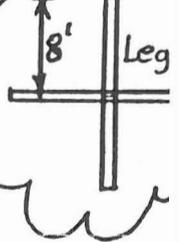
SCALE: 1"=2000'



APPROX OVERLAP

1" = 300'

+ 1/4 ma  
3 FL:  
24 H



APPROX OVERLAP

LUKE AIR F  
AUXILIARY FI



503-29

503-29

503-29

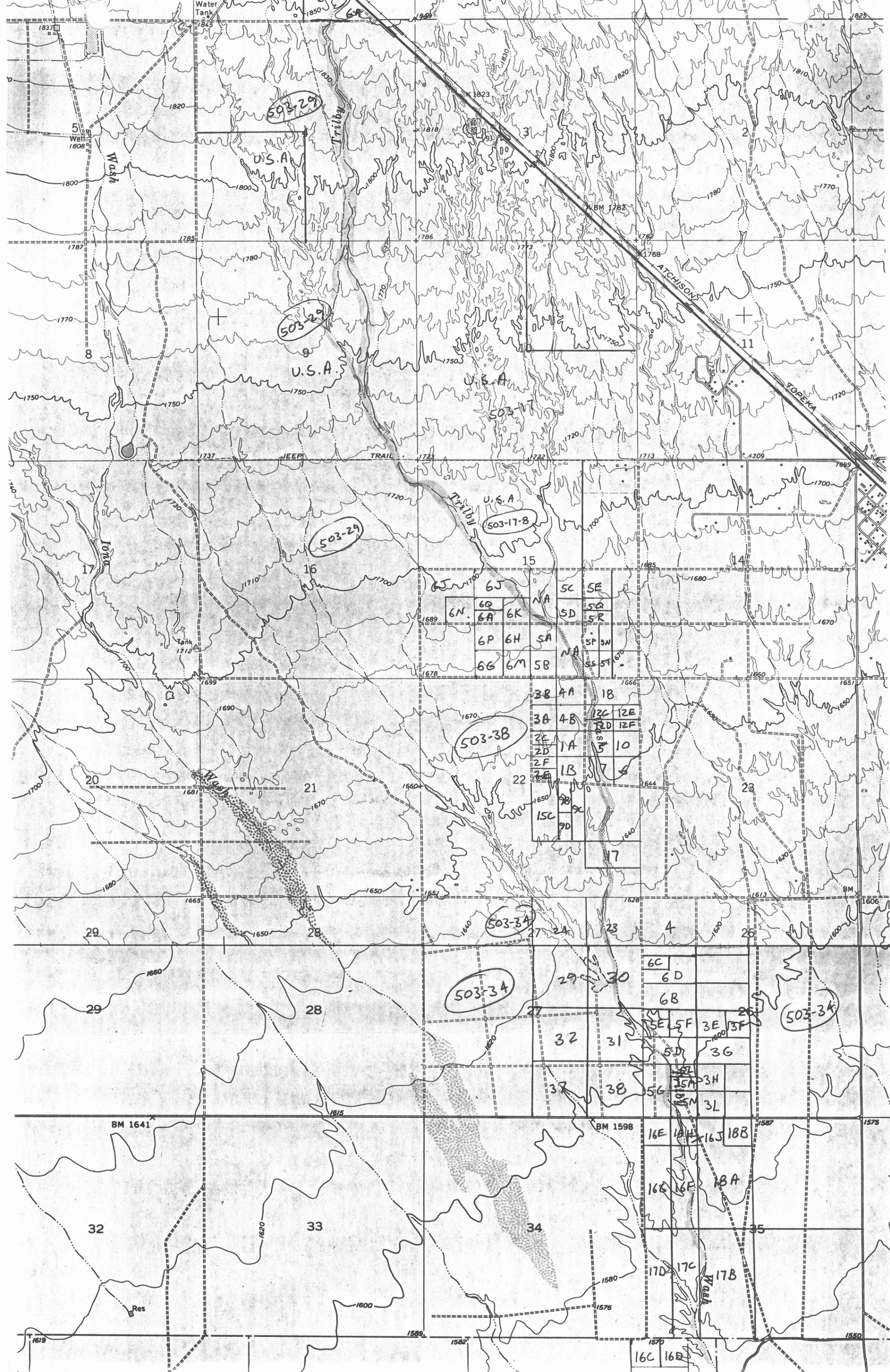
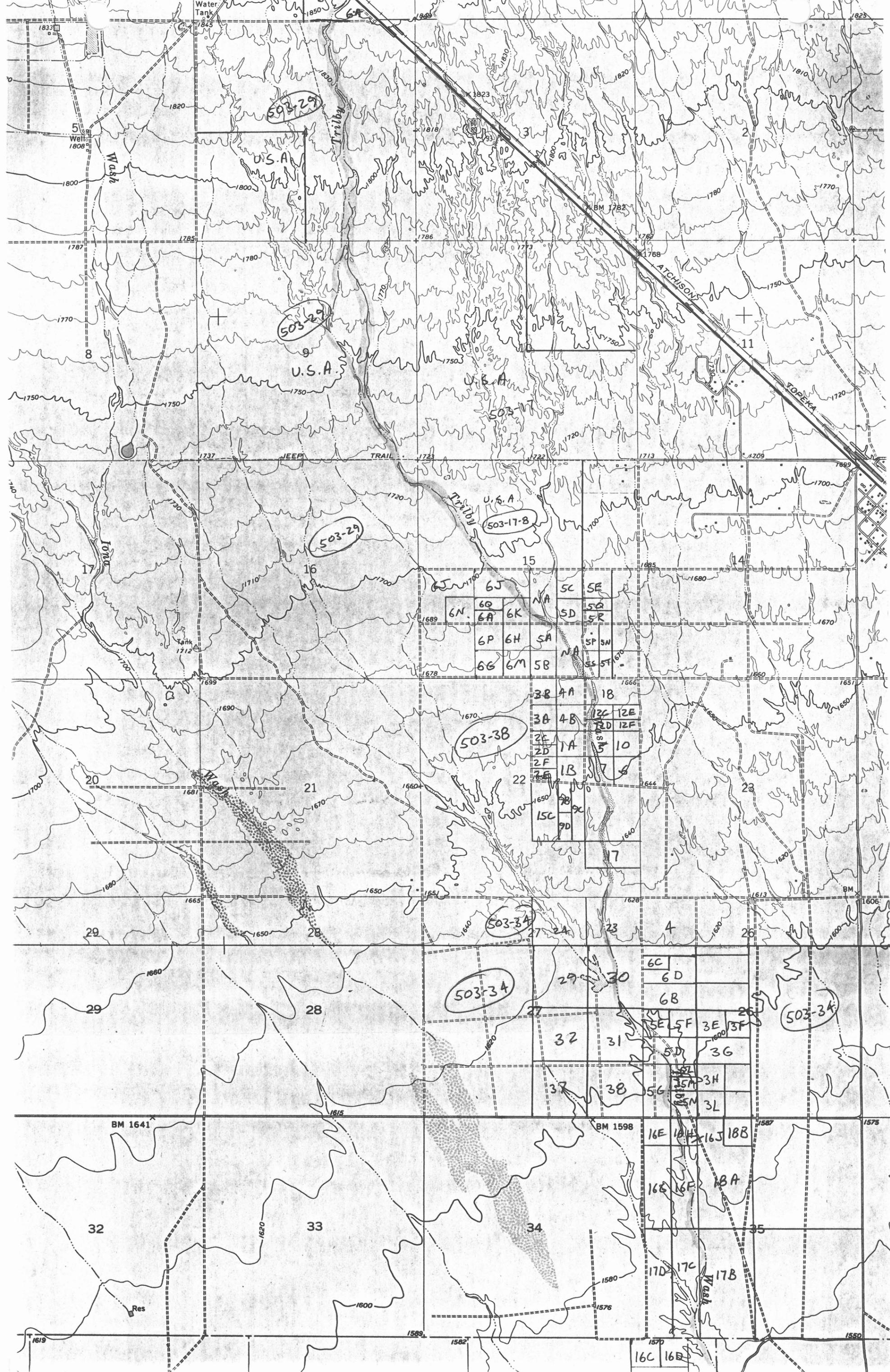
503-17-8

503-38

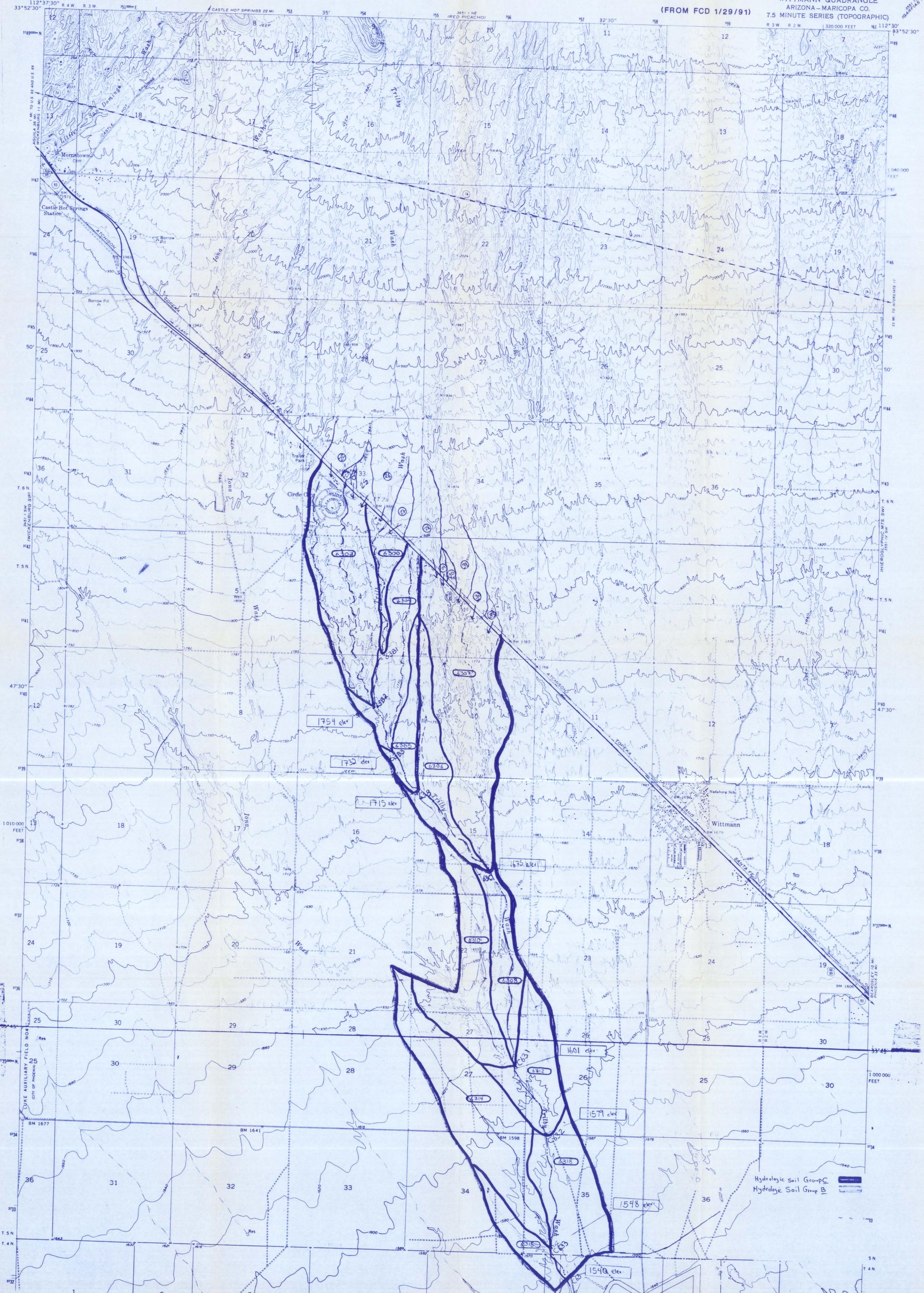
503-34

503-34

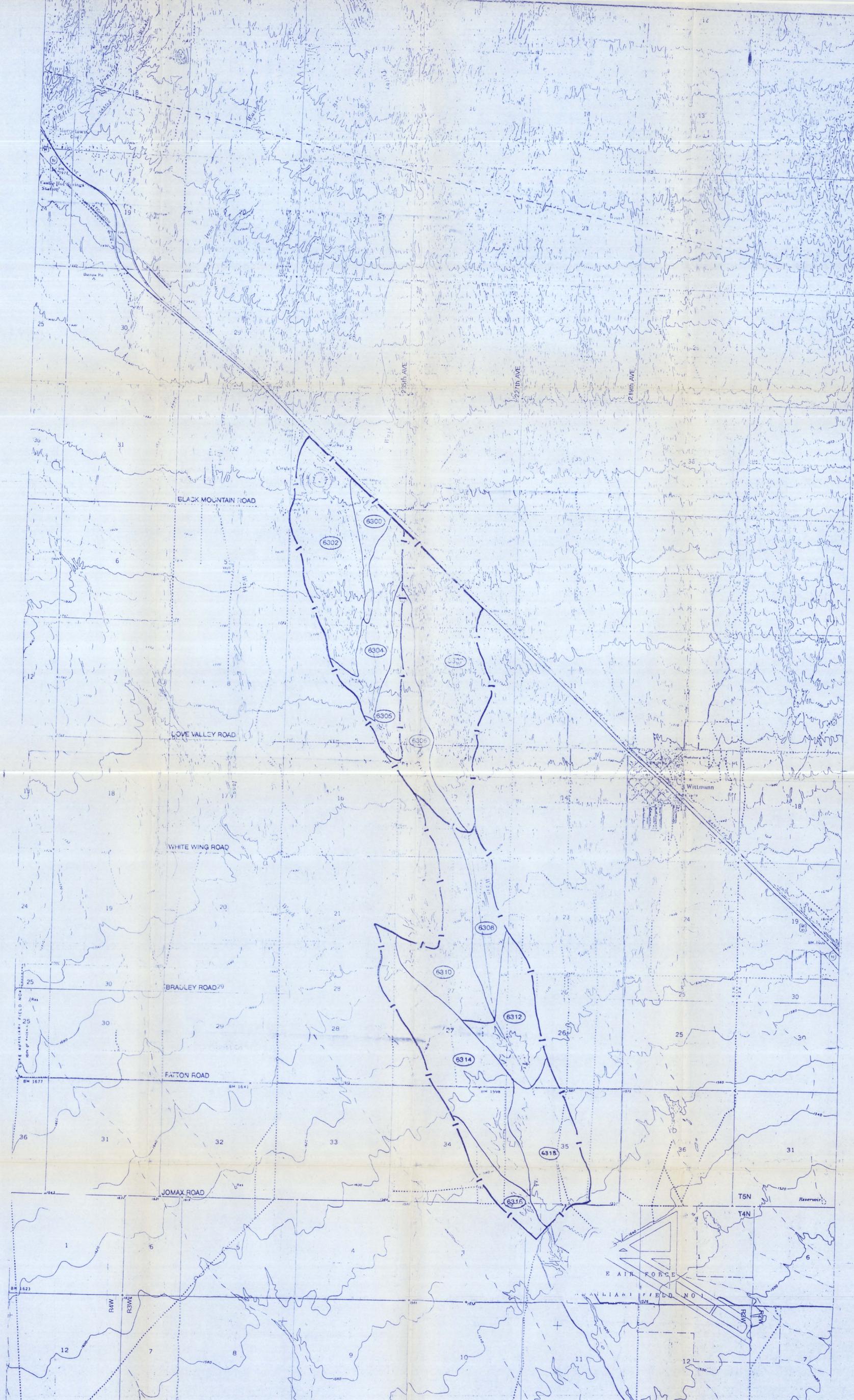
503-34



## 2.2 INDEX OF MAPS

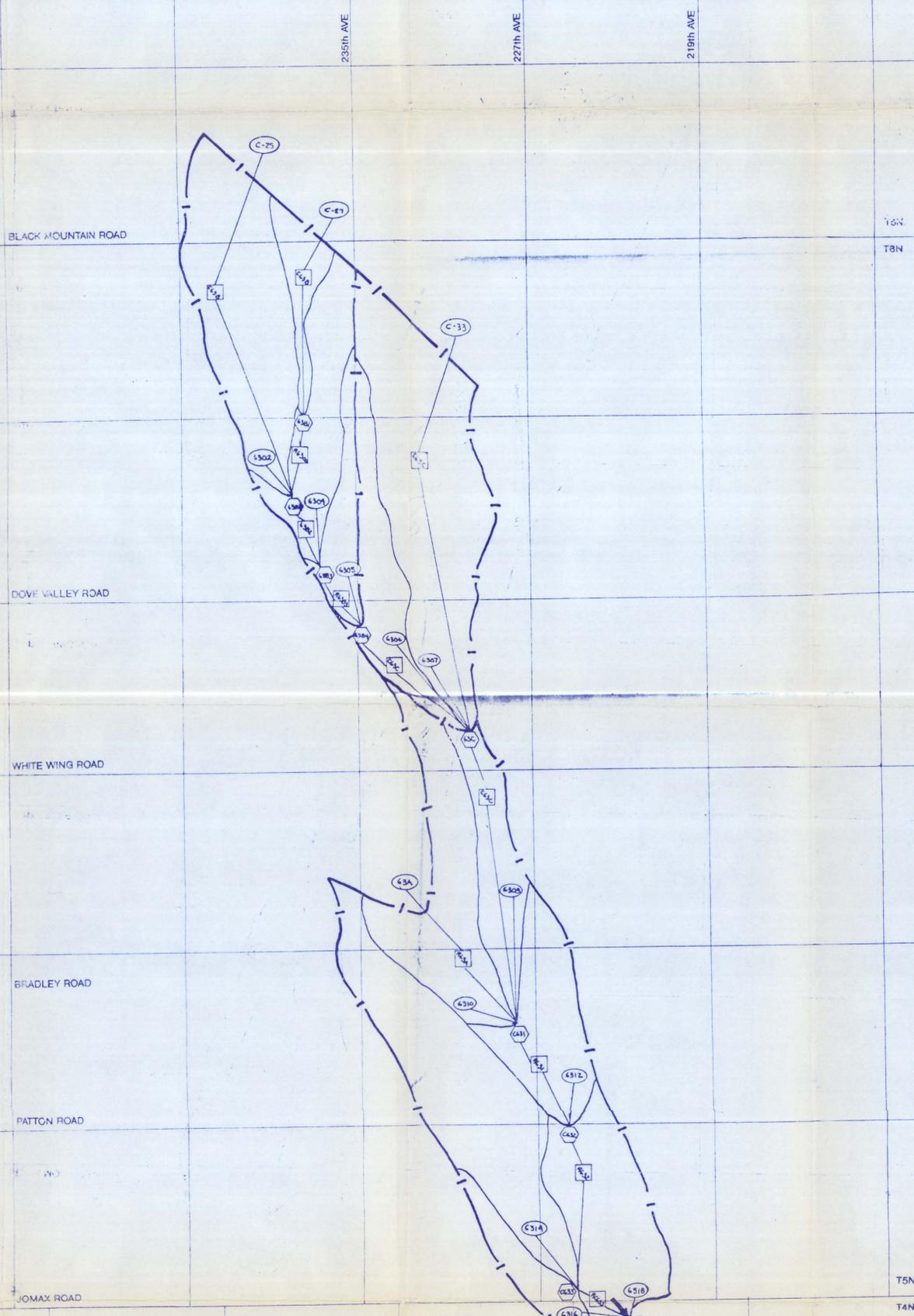


Hydrologic Soil Group C  
Hydrologic Soil Group B



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DESIGN	BY	DATE	WATERSHED DELINEATION FOR	
DESIGN CHK.			TRILBY WASH BREAKDOWN	
PLANS			RECOMMENDED BY:	SHEET
PLANS CHK.			APPROVED BY:	DATE
SUBMITTED BY:			DATE	DATE
			CHIEF ENGINEER AND GENERAL MANAGER	



- ← OVERCHUTE
- SUBBASIN RUNOFF
- ⬡ COMBINE HYDROGRAPHS
- ROUTE HYDROGRAPH

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DESIGN	BY	DATE	SCHEMATIC ROUTING FOR TRILBY WASH BREAKDOWN		SHEET
DESIGN CHK.					
PLANS			RECOMMENDED BY:	DATE	OF
PLANS CHK.			APPROVED BY:	DATE	
SUBMITTED BY:			CHIEF ENGINEER AND GENERAL MANAGER		

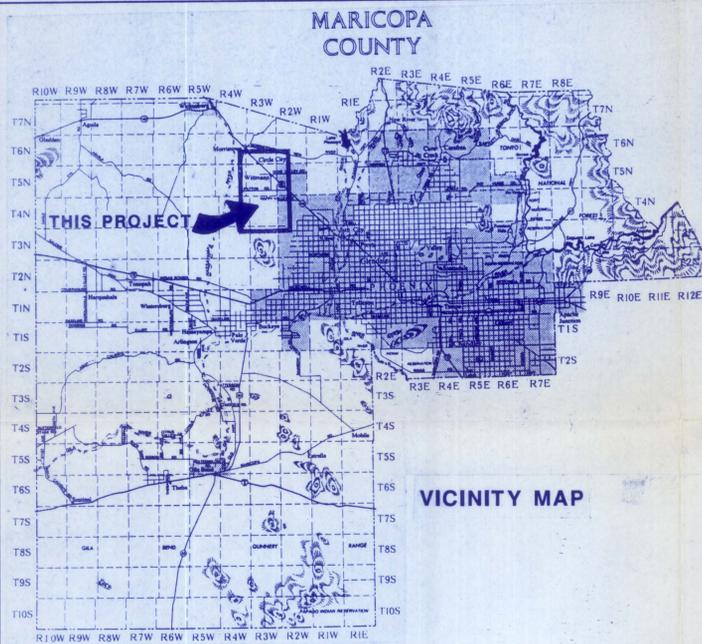
# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## D.E. SAGRAMOSO, CHIEF ENGINEER AND GENERAL MANAGER

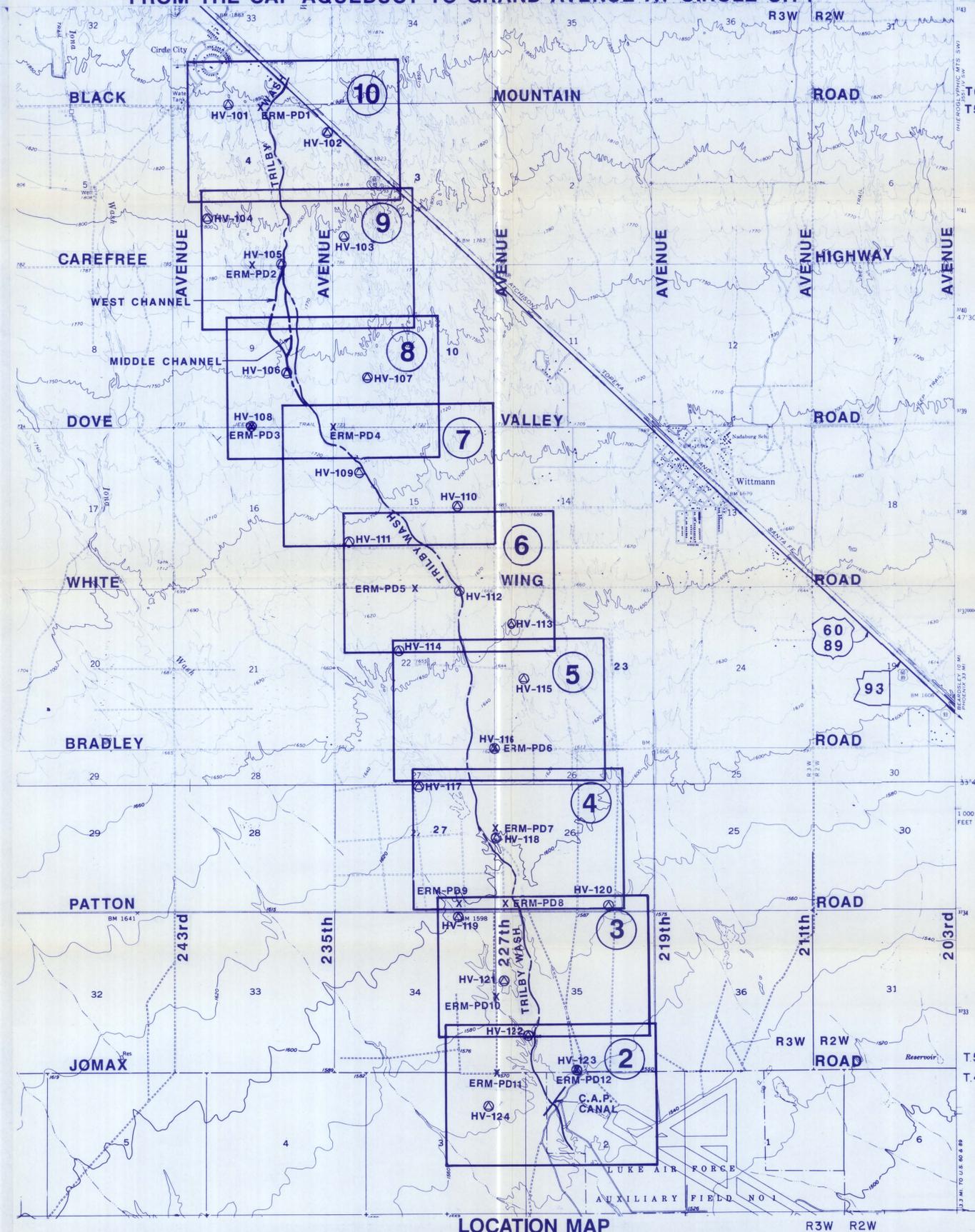
TRILBY WASH FLOOD INSURANCE STUDY 6.7 RIVER MILES  
FROM THE CAP AQUEDUCT TO GRAND AVENUE AT CIRCLE CITY

FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY

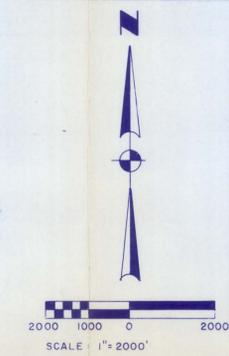
TRILBY WASH FLOODPLAIN  
DELINEATION STUDY



VICINITY MAP



LOCATION MAP



### LEGEND

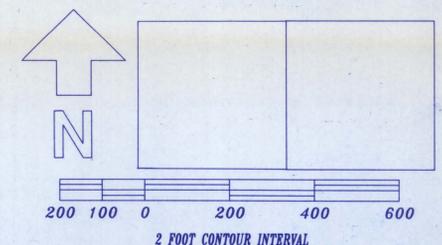
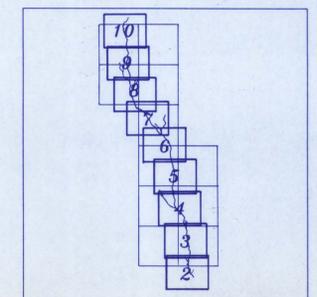
Excluded Areas	_____
100-Yr Floodplain Boundary	_____
Floodway Boundary	_____
Hydraulic Base Line	M 75.0 M 76.0
With River Mile	
Cross Section $Q_{100} = 3,000$ cfs	
PD = 100yr. WSE	
FW = Floodway WSE	
Elevation Reference Marks	ERM-7 X
Horizontal And Vertical Control Points	HV-1
Zone Gutters (Boundary)	_____
Base Flood Elevations	580
Zone Designations	ZONE AE
Dirt Roads	_____
Paved Road	_____
Section Corner	_____
Section Line	_____
Fence Lines	_____

### ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED  
I.D. NUMBER ELEVATION (FT) DESCRIPTION / LOCATION

NOTE: CROSS SECTION STATION

### INDEX MAP



### P & D TECHNOLOGIES

1702 E. HIGHLAND, SUITE 410  
PHOENIX, AZ 85016  
Tel. (602) 264-3335

DESIGN:	By: L.M. Vomero	Date:	Submitted By:	Date:	SHEET:
DESIGN CHECK:	By: Ramesh Patel, PE	Date:	Recommended By:	Date:	1
PLANS:	By: Richard Murillo	Date:	Approved By:	Date:	OF:
PLANS CHECK:	By: Ramesh Patel, PE	Date:	CHIEF ENGINEER AND GENERAL MANAGER:	Date:	10

## 2.3 SURVEY FIELD NOTES

**P&D Technologies is responsible for Horizontal & Vertical control and field survey work for this project. Thomas Rope, R.L.S. is the professional responsible for field work at P&D Technologies. Survey work was done between August 23, 1990 and December 15, 1990.**

**Cooper Aerial of Phoenix, Inc. (602-266-2279) is responsible for aerial topographic mapping work for this project. Jeff Cooper is the professional responsible for aerial topographic mapping work for this project. The site was flown by Cooper Aerial Mapping Company of Phoenix, Inc. on September 13, 1990.**

WILBY WASH

HORIZONTAL  
CONTROL

AT TELSONE

## TABLE OF CONTENTS

## \* NOTE

PANELS ARE 100 SERIES

SECTION COR. 200 SERIES

TRAVERSE PTS. 300 SERIES

TRILBY WASH  
SECTION TIE OF PART  
OF SECTION 4 T6N-R3W  
G&SR MERIDIAN

9/13/90

YN III

MJ IV

110°-45T

T@ BRASS CAP ON 3" DIAM. - NW. COR. Sect #10  
 BS@ TRAVERSE PT #2 - SET NAIL #12  
 FS@ Ed. 1/2 REBAR ON DIKE # 15 (WLB #115)

D	00	00	00	18	
D	179	39	18		175
R	359	39	12	17	
R	179	59	55		

MEAN RT = 179° - 39' - 175"

T@ TRAVERSE PT #3 (NAIL)

BS@ BRASS CAP S.W. COR Sec 33

FS@ BRASS CAP N 1/4 COR Sec 4 #12

D	359-59-58
D	108-14-20
R	288-14-03
R	179-59-56

MEAN RT 108-14-14

FS@ 1/2" PIPE @ FENCE LINE #14 (WLB #114)

D	00-00-01
D	177-59-24
R	357-59-08
R	179-59-50

MEAN RT = 177-59-25

STAMPED 1916 - #114

FS — BS —

TO 1/2" REBAR

TO NAIL

VD	90-09-00	VD	89-43-55
VR	269-50-32	VR	270-15-45
E	359-59-32	SL	2631.525
AVG	90-09-14	HORZ.	2631.50
SLOPE	2668.505		
HORZ	2668.495		

VD	89-39-34
VR	270-24-37
SL	36.96
H <sub>z</sub>	36.96

VD	89-53-54
VR	270-05-29
SL	1624.46
HORIZ	1624.46

T<sup>o</sup> #10 (BRASS CAP NW Cor. Sec 4)

BS<sup>o</sup> #12 (TRAVERSE PT #2 NAIL)

FS<sup>o</sup> #11 (TRAVERSE PT #1 SPENAIL)

D 359-59-59 VD 90-10-50

D 179-43-14 UR 269-48-45

R 359-43-12 SLP DIST 2640.19

R 179-59-55 HZ DIST 2640.18

MEAN  $\bar{Q}$  RT = 179-43-16

T<sup>o</sup> #11

BS<sup>o</sup> #10

FS<sup>o</sup> #15

D 00-00-01 VD 97-95-10

D 91-44-48 UR 262-13-40

R 271-44-48 SLP DIST 21.428

R 179-59-54 HORIZ DIST 21.230

MEAN  $\bar{Q}$  RT 91-44-51

TRILBY WASH

HZ CONTROL

10-9-90 Sunny 85°

TOPCON GTS-3G #032123

T JENNINGS

Φ IN NECHERO

P&D Technologies

1702 E. Highland #410

Phoenix, AZ 85016

(602) 264-3335

T@14

B.S 11 00.00.00

F.S. 300

# 300 TRM. 1/2" REBAR

FS 1) 254-14-21 21 Hz. Dist 2765.765

FS 2) 74-14-14

BS 3) 177.59-53 21

M) 254-14-21

1) 254-14-17 17 ENV. Hz Dist 2765.775

2) 74-14-17

3) 177.59-51 26

M) 254-14-21.5

MEAN \* RT = 254°-14'-21.25"

AVG DIST = 2765.780

$\Lambda @ 300$ 

B.S. 14 00.00.00

S.S. #200

1)	107-30-18	18	Dist	212,465	D
2)	287-30-04			212,460	R
3)	179-59-48	16		212,4625	AVG

# 200 E 1/4 Sec 4

 MEAN & RT =  $107^{\circ} 30' 17''$ 

S.S. #102

1)	20-12-20	20		1774.435	D
2)	200-12-07		18.5	1774.435	R
3)	179-59-50	17		1774.435	AVG.

# 102 PANEL Hub.

 MEAN & RT =  $20^{\circ} 12' 18.5''$ 

F.S. #103

1)	178-06-14	14	Dist	1739.81	D
2)	358-06-01		11.5	1739.805	R
3)	179-59-52	09		1739.8075	AVG.

# 103 PANEL Hub.

1) 178-06-13 13

2) 358-06-13 15

3) 179-59-56 17

 MEAN & RT =  $178^{\circ} 06' 13.25''$

T@103

B.S. 300 00.00.00

F.S. 301

1) 205-02-43 43 Hz Dist 2704.990 D

2) 25-02-43 43 2704.985 R

3) 180-00-00 43 2704.9875 AVG.

1) 205-02-40 40

2) 25-02-38 415

3) 179-59-55 43

MEAN RT = 205°-02'-42.25"

T@301

BS 183 00.00.00

F.S. 107

1) 145-10-45 45 Hz Dist 2251.685 D

2) 325-10-44 46 2251.710 R

3) 179-59-57 47 2251.6975 AVG.

1) 145-10-41 41

2) 325-10-41 445

3) 179-59-53 48

MEAN RT = 145°-10'-45.25"

# 301 TRAV PT 1/2" REBAR

# 107 PANEL HubStack

T@107

BS 301 00-00-00

SS.

106 1 303-35-06 06 HZ DIST 2474.955 D

2 123-35-09 2475.035 R

3 180-00-03 06 2474.995 MEAN DIST

MEAN  $\angle$  RT =  $303^{\circ} 35' 06''$ 

F.S. #302

HZ DIST 2857.355 D

1 177-15-08 08 2857.330 R

2 357-15-09 09 2857.3425 AVG

3 179-59-59 10

1 177-15-10 10

2 357-15-03 11.5

3 179-59-50 13

MEAN  $\angle$  RT  $177^{\circ} 15' 10.25''$ 

\*S.S. #

201 1 244-10-43 43 HZ DIST 1982.705 D

2 64-10-35 1982.710 R

3 180-00-03 32 1982.7075 AVG

MEAN  $\angle$  RT  $244^{\circ} 10' \times 375$  (IN)

# 106 PANEL HUB

# 302 TRAV. RT  
1/2" REBAR# 201 SEC COR 9/10  
16/15

TO 302

BS 107 00-00-00

SS #109 1. 280-04-55 Hz Dist 1865.01 D

2. 100-04-57 1864.99 R

3. 180-00-00 1865.00 AVG

MEAN  $\bar{x}$  RT 280-04-56

# 109 PANEL Hub

J.S. #202

D 1. 31-51-14 14 Hz Dist 822.285 D

R 2. 211-51-08 M13 822.290 R

R 3. 179-59-56 12 822.2875 AVG

MEAN  $\bar{x}$  RT 31-51-13

$\frac{1}{4}$  Cor.  $\frac{10}{15}$  # 202

FS #303

D 1. 176-46-20 20 Hz Dist 2173.385 D

R 2. 356-46-15 23 2173.375 R

R 3. 179-59-49 26 2173.380 AVG

# 303 TRANPT.  $\frac{1}{2}$  REPAR

1. 176-46-24 24

2. 356-46-22 29.5

3. 179-59-47 35

MEAN  $\bar{x}$  RT 176-46-26.25"

TA 303

BSG 302 W/00-00-00

FSG 304

# 304 - TRAVERSE PT.  
1/2" REBAR

D 1	210-49-58	58	HZ DIST D	1711.245
R 2	30-49-38		R	1711.230
R 3	179-59-47	51	AVG.	1711.2375
AVG	210-49-545			

D 1	210-49-57	57		
R 2	30-49-37			
R 3	179-59-48	49		
AVG.	210-49-53			

MEAN 4 PT = 210°-49'-53.75"

S.S 110

<del>1</del>	<del>117-26-56</del>	<del>56</del>	<del>HZ DIST</del>	<del>117.845 D</del>
<del>2</del>	<del>297-26-15</del>	<del>.</del>	<del>117.840 R</del>	
<del>3</del>	<del>178-59-49</del>		<del>117.8425 AVG.</del>	

# 110 PANEL - Hub

1.	117-27-02	02		
	297-26-54			
	178-59-51	03		

Mean 3 PT 117°-27'-02.5"

T@304

BS 303 00-00-00

SS 112

188-58-06 06

~~188-58-00~~~~8-58-00~~~~8-57-48~~

179-59-53

~~179-59-47~~

Hz Dist 1028.720 D

1028.715 R

1028.7175 AVG.

MEAN  $\bar{x}$  RT 188-58-06 (VN)

FS

305

Hz Dist 1911.22 D

1 141-42-23 23

1911.215 R

2 321-42-22 285

1911.2175 AVG

3 179-59-48 34

1 141-42-20 20

2 321-42-19 265

3 179-59-46 33

MEAN  $\bar{x}$  RT 141-42-27.5"

# 112 PANEL HUB

# 305 TRAPPT 1/2 REBAR

At 305

B.S 304 00-00-00

S.S #113

1. 167-12-49 49

H2 DIST. 872.670 D

2. 347-12-47

872.675 R

3. 179-59-54 53

872.6825 AVG.

MEAN  $\delta$  RT 167° 12' 51"

FS 306

1. 222-24-29 29

H2 DIST 2539.660 D

2. 42-24-23 30

2539.665 R

3. 179-59-52 31

2539.6625 AVG

1. 222-24-34 34

2. 42-24-24 30.5

3. 179-59-57 27

MEAN  $\delta$  RT 222° 24' 30.25"

# 113 PANEL HUB

# 306 TRAV. PT 1/2" REBAR

10 306

BS 305 00-00-00

FS 307

1. 177-45-26 26 H<sub>2</sub>O Dist 1827.690 D

2. 357-45-20 23 1827.610 R

3. 180-00-00 20 1827.680 Avg

1. 177-45-28 28

2. 357-45-20 23

3. 180-00-02 18

\* MEAN  $\Delta$  RT 177° 45' 23"

SS #115

1. 95-51-35 35 H<sub>2</sub>O Dist 783.595 D

2. 275-51-17 36 783.590 R

3. 179-59-40 37 783.5925 Avg

MEAN  $\Delta$  RT 95° 51' 36"

307 TRAV PT 1/2" REBAR

T@307  
BS 306

#  
FS 118

1.	182-33-24	24		3102.690 D
2	2-33-18		25.5	3102.675 R
3	179-59-51	27		3102.685 Avg

#118 PANEL 27/26 B/C

1.	182-33-22	22		
2.	2-33-13		23	
3.	179-59-49	24		

MEAN  $\angle$  RT 182° 33' 24.25"

#  
SS 116

1.	185-53-58	53-58	H & DIST	462.725 D
2	5-53-41	54-01		462.720 R
3	179-59-37	54-04		462.7225 Avg

#116 panel S.G  $\frac{22}{23}$  27/26 BEND TO SOUTH B/C

MEAN  $\angle$  RT 185° 54' 01"

T0118

BS 307 00-00-00

F. S. 308

H. Dist 1617.235 D

# 308 TRAV. PT 1/2" REBAR

1 136-39-07 07

1617.240 R

2 316-38-54 06

1617.2375 Avg.

3 179-59-49 05

1 136-39-02 02

2 316-38-46 39-01.5

3 179-59-47 38-59

MEAN  $\angle$  RT 136° 39' 03.75"

T@ 308

BS 118 60-0000

S.S. #120, 174-02-59 59 Hz Dist 2260.770 D

2354-02-43

2260.830 R

3, 179-59-53 50

2260.800 Avg.

MEAN  $\bar{R}T$   $174^{\circ} 02' 54.5''$ 

# 120 PANEL HUB

F.S. #309

1 253-05-21 21 Hz Dist 1779.865 D

2 73-05-08 20.5 1779.860 R

3 179-59-48 20 1779.8625 Avg

# 309 TRAV PT  $\frac{1}{2}$ " REBAR

1 253-05-20 20

2 73-05-10 19

3 179-59-52 18

MEAN  $\bar{R}T$   $253^{\circ} 05' 19.75''$

To 309

BS 308

SS #119

	Hz Dist		
1	241-52-01	52.01	1386.660 R
2	61-52-01	51.9960	1386.5775 Avg.
3	180-00-03	51.58	

USGS BM B/C IN Concrete

MEAN  $\nabla$  RT 241-51-59.5

SS #203

	Hz Dist		
1	262-24-38	38"	214.555 D
2	82-24-20	33.50	214.560 R
3	179-59-51	29"	214.5575 Avg.

#203 Sec Cor  $\frac{27}{34} \frac{26}{35}$  B/C FLUSH PUMT.

MEAN  $\nabla$  RT 262-24-33.5"

FS #121

	Hz Dist		
1)	148-26-07	07	1995.275 D
2)	328-26-01	10.5	1995.290 R
3)	179-59-47	14	1995.2825 Avg.
1)	148-26-09	09	
2)	328-26-03	9.0	
3)	179-59-53	10	

#121 PANEL HubTack

MEAN  $\nabla$  RT 148-26-9.75"

START  
ADD  
2461.5947

10121

BS 309 00-00-00

F.S. #122

1 156-52-30 30

2 336-52-11

3 179-59-46 25

1 156-52-21 21

2 336-52-09 25

3 179-59-40 29

MEAN 156-52'-26.25"

H.D.S.F. 2194.20 0

2194.20 R

27.50 2194.20 Avg.

#122 PANICHA HUKTAK



10-13-90

2

TO 122

BS 121 00-00-00

S.S. #124

H<sub>2</sub>O DIST 2745.110 D

#124 PANEL 4" HLB

1	236-22-55	22.5	2745.110	R
2	56-22-58	22.97	2745.110	AVG
3	179-59-55	23.03		

MEAN  $\angle$  RT 236° 22' 59"

S.S. #204

H<sub>2</sub>O DIST 1667.945 D

#204 Sec Co 34535 C.C. 4" Pipe w/Blk G.L.O

1	247-55-18	18	1667.915	R
2	67-55-19	19	1667.930	AVG
3	179-59-59	20		

MEAN  $\angle$  RT 247° 55' 19"

S.S. #123

H<sub>2</sub>O DIST 1918.85 D

#123 PANEL 8" 4" Pipe S/A 35

1	153-24-19	19	1918.875	R
2	333-24-22	22	1918.8625	AVG
3	179-59-57	25		

MEAN  $\angle$  RT 153° 24' 22"

T@122

BS 121 60-00-00

FS #310

H<sub>z</sub> DIST 1988.860 0

#310 TRAV PT 1/2' REBAR

1 321-18-48 48 1988.855 R

2 141-18-51 51 1988.8575 AVG.

3 179-59-57 54

1 321-18-49 49

2 141-18-45 49.5

3 179-59-55 50

MEAN Ø RT 321° 18' 50.25"

T@310

BS 122 00-00-00

FS #311

H<sub>z</sub> DIST 5466.04 0

#311 TRAV PT 1/2' REBAR

1 237-30-14 14 5466.01 R

2 57-30-06 n.13 5466.0250 AVG.

3 179-59-54 12

1 237-30-15 15

2 57-30-05 m.11

3 179-59-58 07

MEAN Ø RT 237° 30' 12"

T@311

BS 310 00.00-00

#  
F.S 312

1	159-59-08	08
2	339-59-00	10
3	179-59-48	12

H= Dist	4414.835	D
	4414.855	R
	4414.845	AVG

# 312 TRAV PT. 1/2" REPAIR

1	159-59-06	06
2	339-59-00	09
3	179-59-48	12

MEAN  $\Delta$  RT  $159^{\circ} 59' 12''$ #  
S.S 117

1	150-33-27	27
2	330-33-23	
3	179-59-57	26

H= Dist	2092.875	D
	2092.900	R
	2092.8875	AVG.

# 117 PANEL HUB

MEAN  $\Delta$  RT  $150^{\circ} 33' 26.5''$

T<sup>0</sup> 312

BS 311 00-00-00

FS 313

1)	187-25-28	28	5942.905 D
2)	07-25-21	27.5	5942.895 R
3)	179-59-54	27	5942.900 Avg.

# 313 TRAV RT 1/2 REBAR

1)	187-25-34	34	
2)	7-25-15	25.5	
3)	179-59-58	17	

MEAN  $\bar{x}$  RT 187°-25'-26.5"SS<sup>#</sup> 114

1)	203-25-42	42	2018.7200
2)	23-25-37	43	2018.75 R
3)	179-59-53	44	2018.7350 Avg.

# 114 PANEL HUB

MEAN  $\bar{x}$  RT 203° 25' 43"

T0313

BS 312 00-00-00

FS 314

	Hz DIST	
1) 169-31-51	4531.445 D	51
2) 349-31-40	4531.470 R	50
3) 179-59-51	4531.4575 AVG	49

MEAN  $\angle$  RT  $169^{\circ} 31' 49.75''$ 

S.S # III

	Hz DIST	
1) 267-36-12	203.600 D	12
2) 87-36-09	203.585 R	17
3) 179-59-47	203.5925 AVG.	22

MEAN  $\angle$  RT  $267^{\circ} 36' 17''$ 

SS #205

	Hz DIST	
1) 318-39-06	2627.2400	06
2) 138-39-02	2627.275 R	03
3) 180-00-02	2627.2575 AVG.	00

MEAN  $\angle$  RT  $318^{\circ} 39' 03''$ #314 TRAV. PT  $\frac{1}{2}$ " REAR

PANEL HUB # III

#205 5/4 COR Sec 15 GLOB/C, 60 DWN

T@314

BS 313 00.00.00

FS 315

HZ DIST 3170.8100

TRANSIT 1/2" REBAR

- 1) 189° 20' 05" 20' 05" 3170.88 R
- 2) 9° 19' 56" 20' 02" 3170.875 AVG
- 3) 179° 59' 57" 19' 59"

- 1) 189° 20' 07" 07
- 2) 9° 19' 54" 19.995
- 3) 180.00.02 19.52

4,032° 01' 16"

MEAN 189° 20' 01"

4032.021 P.D.

SS 108

HZ DIST 859.590 D

PANEL 5' GLO. B/C #108

- 1) 117.20.53 53 859.590 R
- 2) 297.20.43 51 859.900 AVG
- 3) 179.59.54 49

MEAN 3 RT 117° 20' 51"

TO 315

BS 314 00-00-00

FS # 316

H<sub>2</sub> DIST 2243.055 D

1) 179° 05' 15" 15

2243.060 R

2) 359° 05' 08" 21.50

2243.0515 AVG.

3) 179° 59' 40" 28

1) 179° 05' 29" 29

2) 359° 05' 13" 24.5

3) 179° 59' 53" 20

MEAN  $\Delta$  RT 179° 05' 23"

Azi. 0637

TO 316

BS 315 00-00-00

S.S 105

H<sub>2</sub> DIST 1852.760 D

1) 289° 32' 44" 44

1852.760 R

2) 109° 32' 33" 45

1852.760 AVG

3) 179° 59' 48" 45

MEAN  $\Delta$  RT 289° 32' 44.5"

T@316  
BS 315

FS<sup>A</sup> 104

		H <sub>2</sub> DIST	
1	201-15-04 04	1982.480	D
		1982.495	R
2	21-14-33	8.5	1982.4875 AVG
3	179-59-20 13		

1	201-15-13 13		
	21-15-04	8.5	
	180-00-00 04		

MEAN 201° 15' 08.5"

T@104

BS 316 00-00-00

FS 101

		H <sub>2</sub> DIST	
1)	177-25-04 04	3406.745	D
		3406.715	R
2)	357 25-01 06M	3406.730	AVG
3)	179-59-53 08		

1)	177-25-12 12		
2)	357 24-57 04M		
	180-00-01 29.56		

MEAN  $\angle$  RT 177° 25' 05"

To 101  
BS 104

FS 11

Hz Dist 1023.230 D

- 1) 270-24-05 05 1023.225 R  
 2) 90-24-04 03 1023.2275 Avg  
 3) 180-00-03 01

- 1) 270-24-06 06  
 2) 90-23-58 02  
 3) 180-00-00 B-58

MEAN & RT =  $270^{\circ}-24'-02.5''$

To 11

BS 101 w/00-00-00

BS.  
1023.23

FS 14

- 1) 179-51-59 51  
 2) 359-51-52 54  
 3) 180-00-03 49

- 1) 179-52-08 08  
 2) 359-51-42 59.5  
 3) 179-59-51 51

MEAN & RT  $179^{\circ}-51'-59.5''$

$179^{\circ}-51'-56.75''$  (VN)

HZ CONTROL TIE IN

#338-NY<sup>4</sup> COR Sec 10 T4NR3W

GTS-315<sup>4</sup> 932123 Sunny 65°

11-05-90

TJennings

PH NECKERO

To "Dike"

BS 310

FS 338

H<sub>2</sub> DIST

NY 48-10 T-4 NR 30

D 00-00-00 D 2641.885

D 262-20-01 01 R 2641.895

R 82-19-51 54.5 M 2641.890

R 180-00-02 49

O 00-00-00

D 262-20-03 03

R 82-17-54 57.5

R 179-59-58 56

MEAN 3RT 262-19-57

To 310

BS 311

FS "Dike"

H<sub>2</sub> DIST

Trou NAIL

D 00-00-00 D 5931.975

D 171-05-55 55 R 5931.990

R 351-05-45 54 M 5931.9825

R 179-59-52 53

D 359-59-57

D 171-05-38 41 20

R 351-05-35 39

R 179-59-56

MEAN 3RT = 171-05-47

CK 303

# HzDist

302 2173.415

T<sub>0</sub> 303

2173.430

BS 302

FS 304

HzDist

D 359-59-59

# 304 1711.245

D 210-49-49 50

1711.250

R 30-49-41 53

R 179-59-45 56

D 00-00-00

D 210-49-41 41

R 30-49-38 45

R 179-59-49 49

MEAN 3 RT 210-49-49.0

Hz CONTROL TIES

1/4 COR 4

W 1/4 COR Sec 35

TOPO PT 320

11-7-90 Sunny 80

GTS-33 #Q32123

T@316  
BS 104  
ES.  $\frac{1}{4}$  COR  $\frac{4}{9}$

00-00-00		Hz Dist	973.31
79-16-32	32		973.325
259-16-18	28.5		973.355
179-59-53	25	MEAN DIST	973.3233

GLO BIC  $\frac{1}{4}$   $\frac{4}{9}$  1.40 up N/G

00-00-00	17
79-16-17	22
259-16-13	
179-59-46	27

MEAN QRT 79-16-25.25"

T@121  
BS 309  
ES W.  $\frac{1}{4}$  OF SEC 35

00-00-00		Hz Dist	615.555
204-22-29	29		615.515
24-22-25	31.50	MEAN DIST	
179-59-51	34		615.535

GLO BIC  $\frac{1}{4}$  Sec 35

\* NEXT PAGE TO CONT. SET-UP

00-00-00

204-22-21 21

24-22-17 21.50

179-59-55 22

MEAN QRT 204-22-26.50

T<sub>0</sub> 122

BS 121 00-00-00

FS 320

# 320 TOPO PT FOR RADIAL TIES ON OVERCUTS C.A.F

182-04-54 54

HLDIST 2319.10

02-04-48 56.5

2319.08

179-59-49 59

MEAN DIST

2319.09

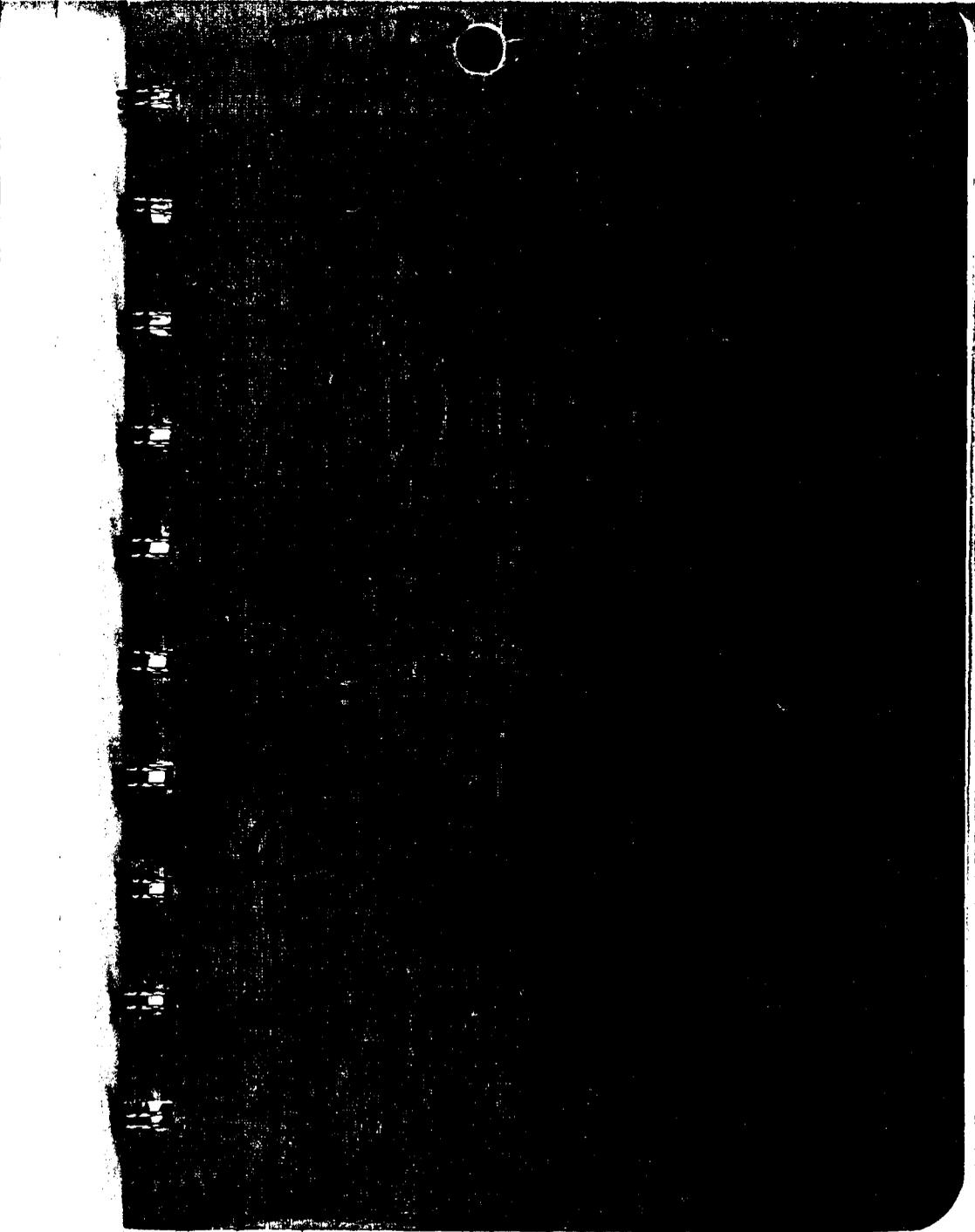
182-04-56 56

02-04-48 56.5

179-59-51 57

MEAN QRT 182°04'56.5"

100



**CURVE FORMULAS**

$T = R \sin \frac{1}{2} I$	$R = T \cot \frac{1}{2} I$	Chord def. = $\frac{\text{chord}^2}{R}$
$T = \frac{50 \sin \frac{1}{2} I}{\sin \frac{1}{2} D}$	$R = \frac{50}{\sin \frac{1}{2} D}$	No. chords = $\frac{I}{D}$
$\sin \frac{1}{2} D = \frac{50}{R}$	$E = R \text{ ex. sec } \frac{1}{2} I$	Tan. def. = $\frac{1}{2} \text{ chord def.}$
$\sin \frac{1}{2} D' = \frac{50 \tan \frac{1}{2} I}{T}$	$E = T \tan \frac{1}{2} I$	

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft.) and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by the given distance.

To find deflection for a given angle and distance. Multiply the angle by .01745, and the product by the distance.

**GENERAL DATA**

**RIGHT ANGLE TRIANGLES.** Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt.  $10.10^2 + 200 = .5. 100 + .5 = 100.5$  hyp.

Given Hyp. 100, Alt.  $25.25^2 + 200 = 3.125. 100 - 3.125 = 96.875 =$  Base.

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

**LEVELING.** The correction for curvature and refraction, in feet and decimals of feet is equal to  $0.674 d^2$ , where d is the distance in miles. The correction for curvature alone is closely,  $\frac{1}{2} d^2$ . The combined correction is negative.

**PROBABLE ERROR.** If  $d_1, d_2, d_3,$  etc. are the discrepancies of various results from the mean, and if  $\sum d^2 =$  the sum of the squares of these differences and  $n =$  the number of observations, then the probable error of the mean =

$$\pm 0.6745 \sqrt{\frac{\sum d^2}{n(n-1)}}$$

**MINUTES IN DECIMALS OF A DEGREE**

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

**INCHES IN DECIMALS OF A FOOT**

1-16	3-32	1/4	3-16	1/2	5-16	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
.0625	.1875	.2500	.1875	.5000	.3125	.6250	.8750	1.0000	1.1250	1.2500	1.3750	1.5000
1	2	3	4	5	6	7	8	9	10	11	12	13
.0625	.1250	.1875	.2500	.3125	.3750	.4375	.5000	.5625	.6250	.6875	.7500	.8125

P&D Technologies  
 1702 E. Highland #410  
 Phoenix, AZ 85016  
 (602) 264-3335

Bench Loop

8-23-90

$\pi$  Jennings  
 $\phi$  Rope

102° Sunny



Bench Loop

8-24-90

WildNA2#387019

T Jennings

φ Rope

103° Sunny



TRILBY WASH

BENCH RUN TO PANELS

WILANA-Z # 387019

T Jennings

# NECHERO

9.13.90 108° Sunny

T	H.I	-	ELEV	Adj. ELEV.
			1848.32	
3.16	1851.48			
		7.26	1844.22	
5.18	1849.40			
		8.96	1840.44	
6.33	1846.77			
		8.37	1838.40	
8.53	1846.93			
		7.94	1838.99	
9.53	1848.52			
		4.25	1844.27	
7.55	1851.82			
		3.49	1848.33	✓.01

DESCRIPTION
I-D 1/2" PIPE - pg. 1. This Book
TP
TP
PANEL # 102 H.S. P&D TECH
TP
TP
I-D = 1/2" PIPE .01 CLOSURE

+	H.I	-	ELEV
			1843.47
8.78	52.25		
		7.58	44.67
7.29	51.96		
		3.96	48.00
5.16	53.16		
		6.43	1846.73, 1846.74
6.33	55.06		
		5.06	48.00
3.81	51.81		
		7.55	44.26
8.25	52.51		
		9.05	43.46
			-0.01

DESCR  
TBRZ RR SPIKE

PANEL #101 HUB PAD TECH.

0101 CLOSURE

BENCH LOOP  
WILD NAZ # 387019  
9-26-90  
85° sunny



+	H.I	-	ELEV	ADJ ELEV.
11.35	1804.45			
		3.33	1801.12	
8.64	1809.76			
		2.75	✓ 1807.01	1806.99 #104
8.34	1815.35			
		3.10	1812.25	
13.81	1826.06			
		3.59	1822.47	
14.76	1837.23			
		1.57	1835.66	
13.37	1849.03			
		2.26	✓ 1846.77	1846.73 #101 74
			+0.04	

BENCH : LOOP  
 9-28-90  
 88° Sunny : NAZ : 387019  
 M. Jennings  
 J. W. NECKERO





	H.I.	-	ELEV.	ADJ ELEV
9.25				
		3.64		
7.26				
		5.34		
3.48				
		2.34		
3.91				
		7.40		
4.11				
		8.31	1742.48	1742.45 # 106
		+0.03		

BENCH LOOP  
 10-3-90 # 387019 WILDNA-2  
 T Jennings # III Neworo  
 Sunny 85°



+	H. I	-	ELEV	40J ELEV.
8.75				
		6.86	✓ 1689.12	1689.15 # III
12.95				
		5.41		
8.93				
		5.61		
10.63				
		4.32	✓ 1706.29	1706.32 # 10A
			ERROR = 0.01	

BENCH LOOP 10-5-90 Sunny 90°  
 W. ID NA-2 # 387019  
 T. JENNINGS # III ROPE

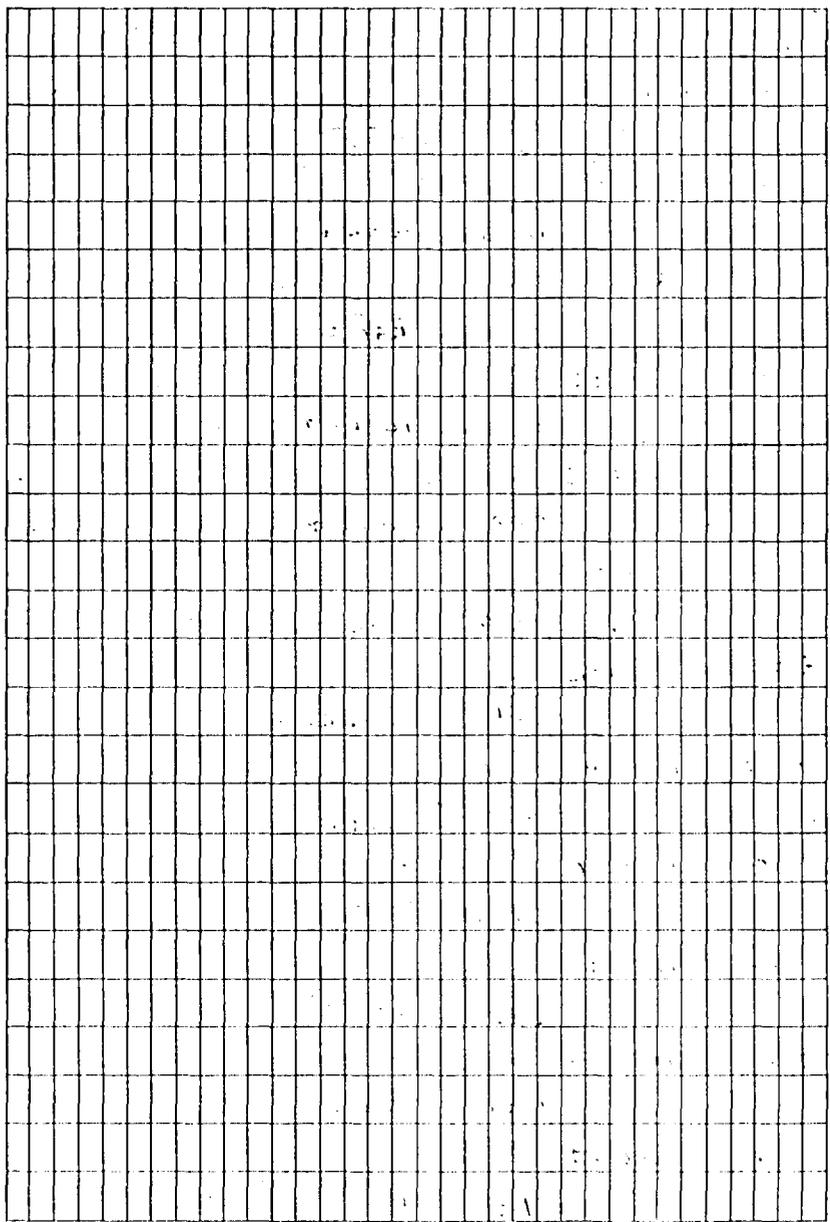


+	H.I	-	ELEV	ADJ. ELEV.
6.83	1634.91			
		8.02	1628.89	
4.64	1631.53			
		5.25	1626.28	
8.18	1634.46			
		6.84	1627.62	
5.51	1633.13			
		13.43	1619.70	
14.04	1633.74			
		6.71	1627.03	
4.78	1631.81			
		8.43	1623.38	1623.37 #
8.56	1631.94			1623.42 117
		5.97	1625.97	
8.77	1634.74			
		5.30	1629.44	
8.06	1637.50			
		2.95	1634.55	
6.92	1641.47			
		2.99	1638.48	
7.56	1646.04			
		2.46	1643.58	
10.17	1653.75			
		3.26	1650.49	

T	H.I	-	ELEV	ADJ ELEV
			1650.49	
7.47	1657.96			
		2.65	✓ 1655.31	1655.30 # 114
8.15	1663.46			1655.34
		2.02	1660.64	
7.87	1668.51			
		4.78	1663.73	
8.77	1672.50			
		3.38	1669.12	
6.87	1675.99			
		6.67	1669.32	
5.60	1674.92			
		6.32	✓ 1668.60	1668.58 # 112
				1668.62
			+0.02	
			END LOOP	

BENCH LOOP 10-5-90  
 Sunny 100° Wind NA-Z # 387019  
 A Jennings φ 21 ROPS

+	H.I.	-	ELEV	ADJ ELEV	
				1628.08 <sup>BC</sup>	# 116
3.70	1631.78			1628.13	
		9.64	1622.14		
2.25	1624.39				
		8.33	1616.06		
3.06	1619.12				
		6.91	1612.21		1/4" PIPE T.P. TOP
2.32	1614.53				
		5.97 <sup>BC</sup>	1608.56	1608.56	# 118
0.87	1609.43	-1.20 <sup>GRAV PANEL</sup>	1607.36	1608.62	E 1/4 Sec 27
		8.09	1601.34	1607.42	
7.06	1608.40				
		9.83	1598.57		
6.86	1605.43				
		6.81	1598.62		
1.03	1599.65				
		6.26 <sup>S.S.</sup>	1593.39	1593.34	B.C. Flush
		5.15 <sup>T.P.</sup>	1594.50	1593.44	N.W. Cor Sec 35
7.49	1601.99				
		5.68	1596.31		
4.88	1601.19				
		3.16	1598.03	1598.02	# 119
3.10	1601.13			1598.08	
		4.82	1596.31		
5.97	1602.28				
		7.11	1595.17		



T	H.I	-	ELEV	
			1595.17	
6.00	1601.17			
		7.78 S.S.	1593.39	1593.39 N.W. Cor Sec 35
		6.50 TP	1594.67	1593.45 B.C. Flush
* 3.74	1598.41			
		10.24	1588.17	
5.12	1593.29			
		2.99	1590.30	
6.83	1597.13			
		5.66	1591.47	
2.15	1593.62			
		8.83	1584.79	1584.76 II
8.06	1592.85			1584.82 120
		3.79	1589.06	
8.90	1597.96			
		3.48	1594.48	
7.67	1602.15			
		3.05	1599.10	
9.04	1608.14			
		2.37	1605.77	
8.18	1613.95			
		2.32	1611.63	
9.31	1620.94			
		6.19	1614.75	
11.42	1626.17			
		7.57	1618.60	

NOTE  
 to 10-6-90 LOOP CONT. #120 AND RETURN #116  
 SUNDY 800 WILD NAZ #387019 T JENNING # III RONE

+	H.I.	-	ELEV	ADJ ELEV.
			1618.60	
12.39	1630.99			
		5.69	1625.30	
5.67	1630.97			
		2.85	1628.12	1628.08 <sup>116</sup>
				1628.13
			ERR. 0.04	.0014 p turn

BENCH 4007 11.11  
 10-6-90 Sunny 30°  
 wildNAZ #387019  
 T. Jennings 800 ROPS









BENCH LOOP PANEL 101 TO #124201, 205  
11-07-90 Sunny 55°  $\frac{1}{4}$  cor  $\frac{1}{2}$   
T. Jennings W. O. NA-2 # 387019  
D. J. NECHERO



+	H.I	-	ELEV	
			1706.32	± 109
6.67	1712.99			
		1.38	1711.61	
12.86	1724.47			
		8.18	1716.29	
11.07	1727.36			
		3.75	1723.61	± 201
4.23	1727.84			
		11.56	1716.28	
6.37	1722.65			
		12.47	1710.18	
2.81	1712.99			
		6.67	1706.32	√.00 ± 109

+	H.I	-	ELEV	#	
			1668.62	112	
6.27	1674.29				
		2.95	1671.94		
6.84	1678.78				
		6.65	1672.13	205	
7.63	1679.76				
		10.15	1669.61		
5.17	1674.78				
		6.19	1668.59	112	(.03)

USGLO BC 1/2' BELOW SURFACE.

+	H.I	-	ELEV.		
			1782.35	#105	
5.38	1787.73				#207
		2.56	1785.17	1/4 COR <sup>+</sup>	4 GLOB/C 1.40 up N/GRO.
3.65	1788.82				
		6.48	1782.34	(V.01)	

BENCH LOOP  
 TOPO. POINT ON OVERCUT C.A.P  
 11-09-90 Sunny 80°  
 W. NECHERO - T Jennings  
 W. ID NA-2 387019

STA	+ H.I	-	ELEV	ADJ ELEV
			1559.65	
3.30	1562.95			
		7.08	1555.87	
5.16	1561.03			
		6.84	1554.19	
6.71	1560.90			
		5.05	1555.85	
7.25	1563.10			
		3.45	1559.65	.00 CLOSURE

B.C. ELEV. 1/4 COR. SEC 35 # 123

TOPO PT # 320 Hub & Tack

**2.4 WATERSHED MAPS, HYDROLOGIC ANALYSIS MAPS**

FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY

TRILBY WASH FLOODPLAIN  
DELINEATION STUDY

LEGEND

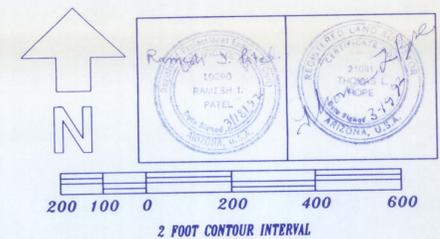
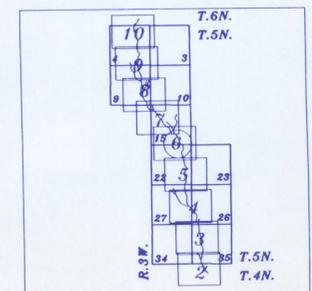
- Excluded Areas
- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line
- With River Mile
- Cross Section  $Q_m = 3,000$  cfs
- $FD = 100yr. WSE$
- $1.00$   $FW = Floodway WSE$
- Elevation Reference Marks
- ERM PD7 X
- Horizontal And Vertical Control Points
- Zone Cutters (Boundary)
- Base Flood Elevations
- Zone Designations
- Dirt Roads
- Paved Road
- Section Corner
- Section Line
- Fence Lines

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.  
I.D. NUMBER ELEVATION (FT) DESCRIPTION / LOCATION  
ERM P85 1672.13 CLO B.C. N1/4 SEC 22 T5N R3W

NOTE: CROSS SECTION STATION 10,000.0 IS HYDRAULIC BASE LINE EXCEPT AS NOTED.

INDEX MAP



P&D Technologies

An Employee Owned Company  
1702 E. Highland #200, Phoenix, Arizona 85016  
Telephone (602) 264-3335



DESIGN:	By: L.M. Romero	Date:	Submitted By:	Date:	SHEET:
DESIGN CHECK:	By: Ramesh Patel, PE	Date:	Recommended By:	Date:	6
PLANS:	By: Richard Murillo	Date:	Approved By:	Date:	OF:
PLANS CHECK:	By: Ramesh Patel, PE	Date:	Chief Engineer and	Central Manager:	10



FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY

TRILBY WASH FLOODPLAIN  
DELINEATION STUDY

LEGEND

- Excluded Areas
- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line
- With River Mile
- Cross Section  $Q_m = 3,000$  cfs
- Elevation Reference Marks
- Horizontal And Vertical Control Points
- Zone Cutters (Boundary)
- Base Flood Elevations
- Zone Designations
- Dirt Roads
- Paved Road
- Section Corner
- Section Line
- Fence Lines

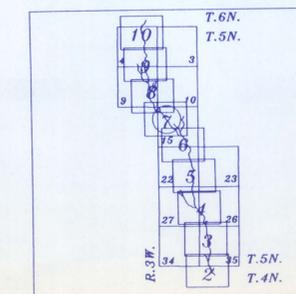
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION / LOCATION
ERM PD4	1723.61	CLO B.C. NE COR SEC 16 T5N R3W

NOTE: CROSS SECTION STATION 10,000.0 IS HYDRAULIC BASE LINE EXCEPT AS NOTED.

INDEX MAP



200 100 0 200 400 600  
2 FOOT CONTOUR INTERVAL

P&D Technologies

An Employee Owned Company  
1702 E. Highland #200, Phoenix, Arizona 85016  
Telephone (602) 264-3335



DESIGN:	By:	Date:	Submitted By:	Date:	SHEET:
DESIGN CHECK:	By: L.M. Yonero	Date:	Recommended By:	Date:	7
PLANS:	By: Ramesh Patel, PE	Date:	Approved By:	Date:	OF:
PLANS CHECK:	By: Richard Marillo	Date:	Chief Engineer and General Manager:	Date:	10



# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## TRILBY WASH FLOODPLAIN DELINEATION STUDY

### LEGEND

- Excluded Areas
- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile
- Cross Section  $Q_{100} = 3,000$  cfs
- Elevation Reference Marks
- Horizontal And Vertical Control Points
- Zone Cutters (Boundary)
- Base Flood Elevations
- Zone Designations
- Dirt Roads
- Paved Road
- Section Corner
- Section Line
- Fence Lines

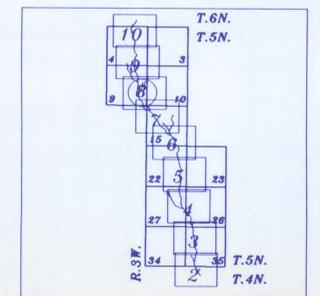
### ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION / LOCATION
ERM P03	1731.59	GLD B.C. N1/4 SEC 16 T5N R3W
ERM P04	1723.61	GLD B.C. NE COR SEC 16 T5N R3W

NOTE: CROSS SECTION STATION 10,000.0 IS HYDRAULIC BASE LINE EXCEPT AS NOTED.

### INDEX MAP



North arrow pointing up.

Scale bar: 200 100 0 200 400 600  
2 FOOT CONTOUR INTERVAL

Professional Engineer Seal for Ramesh L. Patel, State of Arizona, No. 10030.

Professional Engineer Seal for Richard Murillo, State of Arizona, No. 2198.

**P&D Technologies**  
An Employee Owned Company  
1702 E. Highland #200, Phoenix, Arizona 85016  
Telephone (602) 264-3335

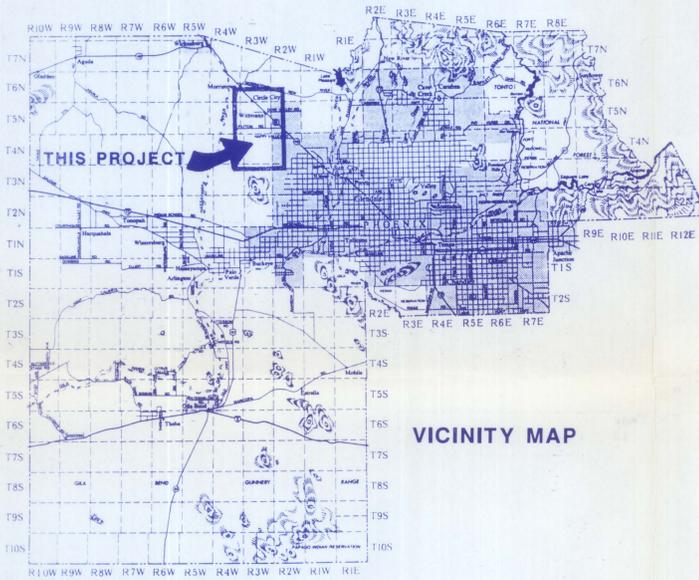
DESIGN:	By: L.M. Vomero	Date:	Submitted By:	Date:	SHEET:
DESIGN CHECK:	By: Ramesh Patel, PE	Date:	Recommended By:	Date:	8
PLANS:	By: Richard Murillo	Date:	Approved By:	Date:	OF:
PLANS CHECK:	By: Ramesh Patel, PE	Date:	Chief Engineer and General Manager:	Date:	10





## 2.5 HYDRAULIC ANALYSIS MAPS

MARICOPA COUNTY

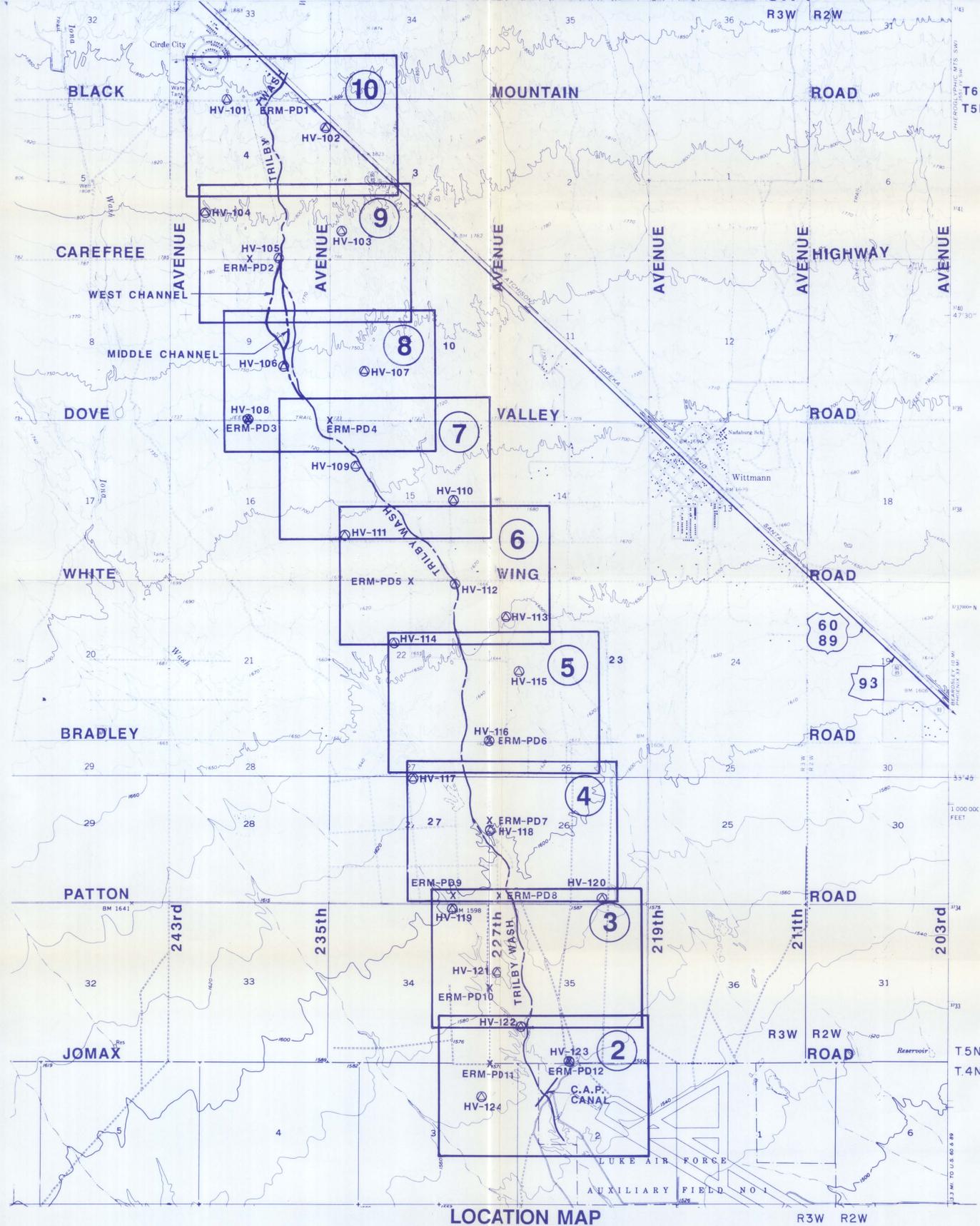


VICINITY MAP

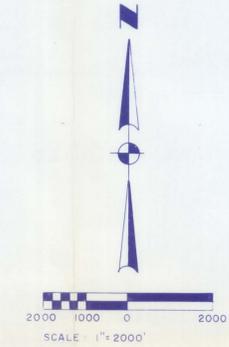
# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## D.E. SAGRAMOSO, CHIEF ENGINEER AND GENERAL MANAGER

TRILBY WASH FLOOD INSURANCE STUDY 6.7 RIVER MILES  
FROM THE CAP AQUEDUCT TO GRAND AVENUE AT CIRCLE CITY



LOCATION MAP



FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY

TRILBY WASH FLOODPLAIN  
DELINEATION STUDY

LEGEND

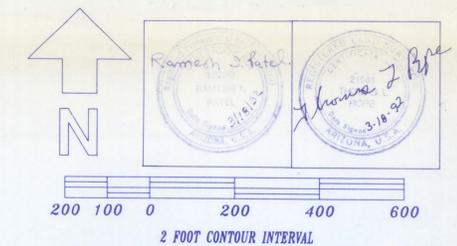
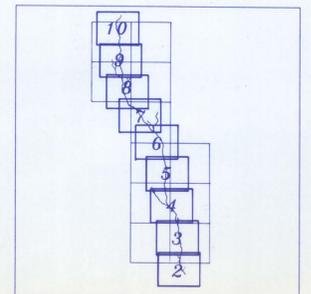
- Excluded Areas
- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile
- Cross Section,  $Q_{100} = 3,000 \text{ cfs}$
- Elevation Reference Marks
- Horizontal And Vertical Control Points
- Zone Gutters (Boundary)
- Base Flood Elevations
- Zone Designations
- Dirt Roads
- Paved Road
- Section Corner
- Section Line
- Fence Lines

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED  
I.D. NUMBER ELEVATION (FT) DESCRIPTION / LOCATION

NOTE: CROSS SECTION STATION

INDEX MAP



P & D TECHNOLOGIES

1702 E. HIGHLAND, SUITE 410  
PHOENIX, AZ 85016  
Tel. (602) 264-3335

DESIGN:	By: L.M. Vamero	Date:	Submitted By:	Date:	SHEET:
DESIGN CHECK:	By: Ramesh Patel, PE	Date:	Recommended By:	Date:	1
PLANS:	By: Richard Murillo	Date:	Approved By:	Date:	OF:
PLANS CHECK:	By: Ramesh Patel, PE	Date:	CHIEF ENGINEER AND GENERAL MANAGER:	Date:	10

FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY

TRILBY WASH FLOODPLAIN  
DELINEATION STUDY

LEGEND

- Excluded Areas
- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line
- With River Mile
- Cross Section  $Q_m = 3,000$  cfs
- Elevation Reference Marks
- Horizontal And Vertical Control Points
- Zone Cutters (Boundary)
- Base Flood Elevations
- Zone Designations
- Dirt Roads
- Paved Road
- Section Corner
- Section Line
- Fence Lines

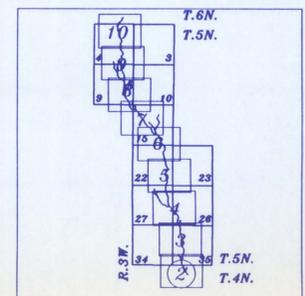
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION / LOCATION
ERM PD11	1570.28	C/O B.C. ST. COR. SEC. 35 T5N R3W
ERM PD12	1559.65	C/O B.C. S1/4 SEC. 35 T5N R3W

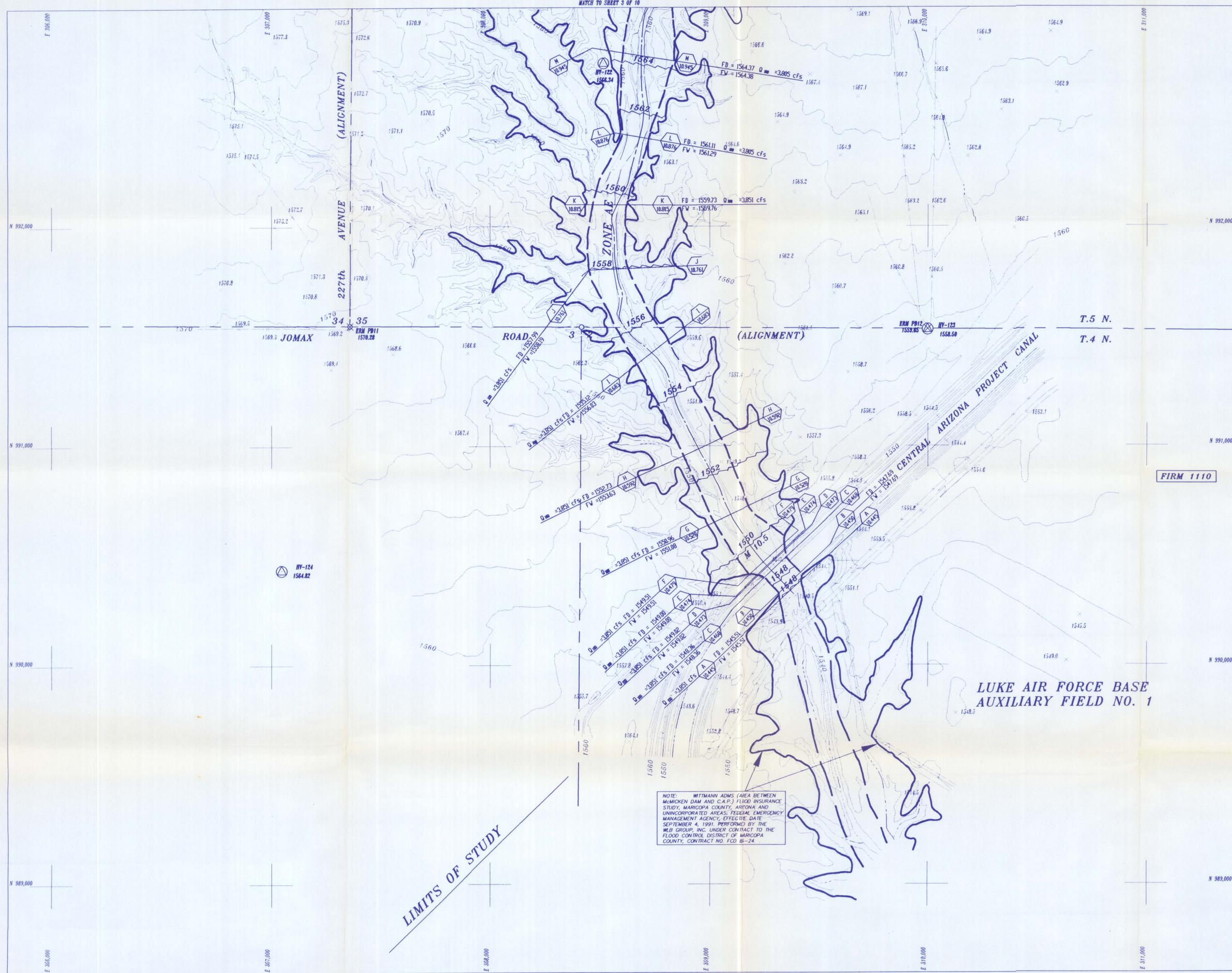
NOTE: CROSS SECTION STATION 10,000.0 IS HYDRAULIC BASE LINE EXCEPT AS NOTED.

INDEX MAP



P&D Technologies  
An Employee Owned Company  
1702 E. Highland #200, Phoenix, Arizona 85016  
Telephone (602) 264-3336

DESIGN:	By: L.M. Vomero	Date:	Submitted By:	Date:	SHEET:
DESIGN CHECK:	By: Ramesh Patel, PE	Date:	Recommended By:	Date:	2
PLANS:	By: Richard Murillo	Date:	Approved By:	Date:	OF:
PLANS CHECK:	By: Ramesh Patel, PE	Date:	Chief Engineer and General Manager:	Date:	10



NOTE: HITTMANN ADMS (AREA BETWEEN MCKRICKEN DAM AND C.A.P.) FLOOD INSURANCE STUDY, MARICOPA COUNTY, ARIZONA AND UNINCORPORATED AREAS; FEDERAL EMERGENCY MANAGEMENT AGENCY, EFFECTIVE DATE SEPTEMBER 4, 1991. PERFORMED BY THE M&B GROUP, INC. UNDER CONTRACT TO THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, CONTRACT NO. FCD 81-24.

FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY

TRILBY WASH FLOODPLAIN  
DELINEATION STUDY

LEGEND

- Excluded Areas
- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile
- Cross Section @  $Q_m = 3,000$  cfs
- Elevation Reference Marks
- Horizontal And Vertical Control Points
- Zone Cutters (Boundary)
- Base Flood Elevations
- Zone Designations
- Dirt Roads
- Paved Road
- Section Corner
- Section Line
- Fence Lines

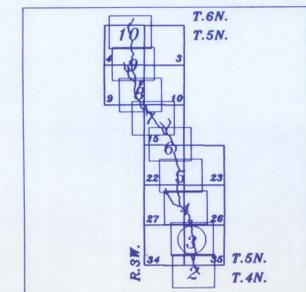
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION / LOCATION
ERM P98	1585.44	MCD B.C. FLUSH NW COR SEC 35 T5N R3W
ERM P99	1586.08	USCGS B.C. IN CONC 1188' W OF P98
ERM P010	1563.72	CLO B.C. W1/4 SEC 35 T5N R3W

NOTE: CROSS SECTION STATION 10,000.0 IS HYDRAULIC BASE LINE EXCEPT AS NOTED.

INDEX MAP



North arrow pointing up.

Scale bar: 200 100 0 200 400 600  
2 FOOT CONTOUR INTERVAL

Professional Engineer stamps for Ramesh E. Patel, License No. 10099, State of Arizona, dated 2/16/22.

P&D Technologies  
An Employee Owned Company  
1702 E. Highland #200, Phoenix, Arizona 85016  
Telephone (602) 264-3335

DESIGN:	By: L.M. Yonero	Date:	Submitted By:	Date:	SHEET
DESIGN CHECK:	By: Ramesh Patel, PE	Date:	Recommended By:	Date:	3
PLANS:	By: Richard Marillo	Date:	Approved By:	Date:	OF:
PLANS CHECK:	By: Ramesh Patel, PE	Date:	Chief Engineer and General Manager:	Date:	10



FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY

TRILBY WASH FLOODPLAIN  
DELINEATION STUDY

LEGEND

- Excluded Areas
- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line
- With River Mile
- Cross Section  $Q_{100} = 3,000$  cfs
- Elevation Reference Marks
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- Zone Cutters (Boundary)
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- Dirt Roads
- Paved Road
- Section Corner
- Section Line
- Fence Lines

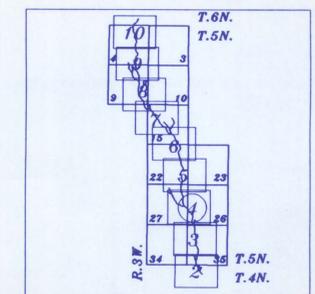
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.  
I.D. NUMBER ELEVATION (FT) DESCRIPTION /

ERM PD7 1608.62 CLO D.C. W1/4 SEC 26 T5N R3W

NOTE: CROSS SECTION STATION 10,000.0 IS HYDRAULIC BASE LINE EXCEPT AS NOTED.

INDEX MAP

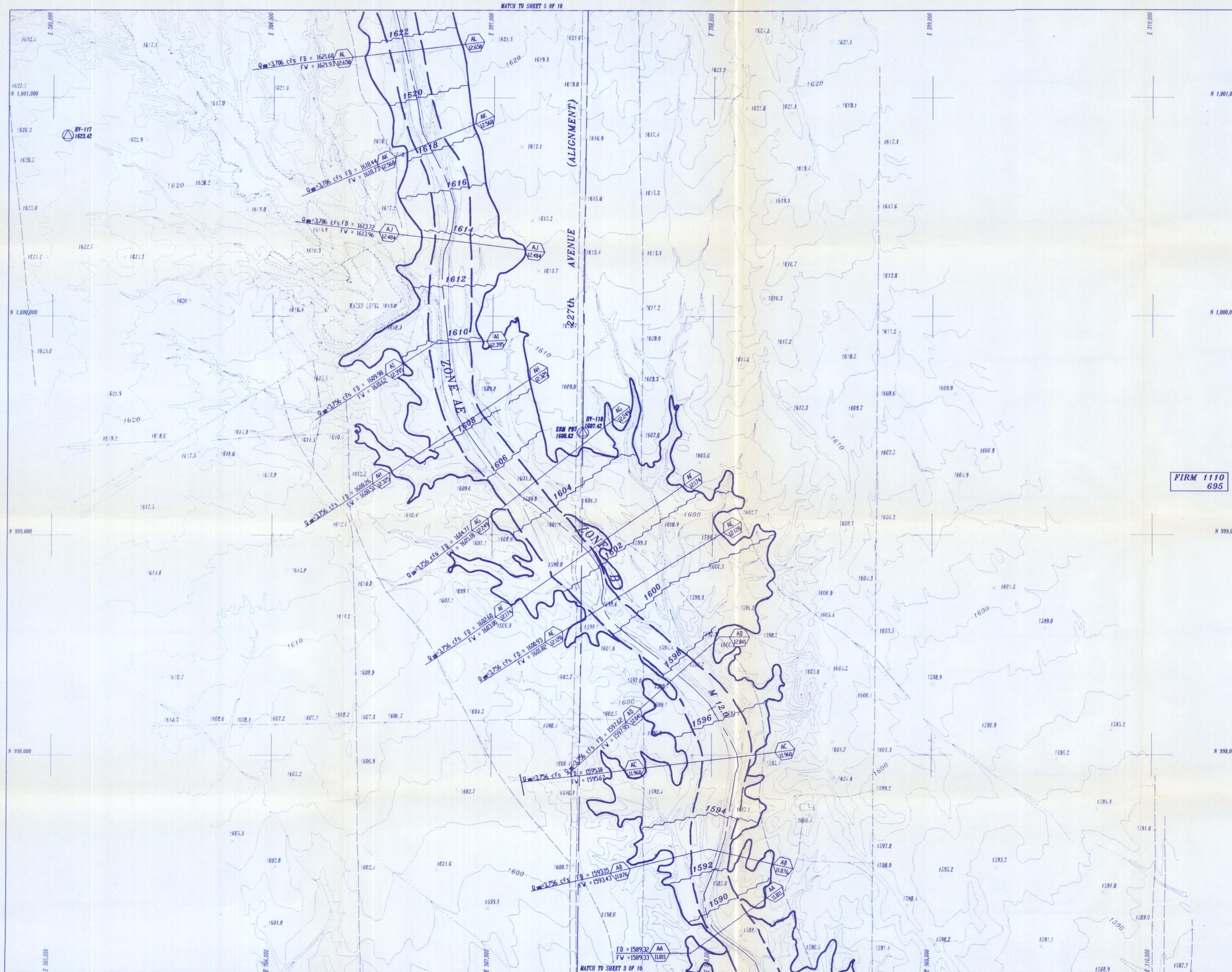


P&D Technologies

An Employee Owned Company  
1702 E. Highland Ave. Suite 200 Phoenix, Arizona 85016  
Telephone (602) 264-3335



DESIGN:	By: L.M. Venero	Date:	Submitted By:	Date:	SHEET:
DESIGN CHECK:	By: Ramesh Patel, PE	Date:	Recommended By:	Date:	4
PLANS:	By: Richard Murillo	Date:	Approved By:	Date:	OF:
PLANS CHECK:	By: Ramesh Patel, PE	Date:	Chief Engineer and General Manager:	Date:	10



# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## TRILBY WASH FLOODPLAIN DELINEATION STUDY

### LEGEND

- Excluded Areas
- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile
- Cross Section  $Q_m = 3,000$  cfs
- Elevation Reference Marks
- Horizontal And Vertical Control Points
- Zone Cutters (Boundary)
- Base Flood Elevations
- Zone Designations
- Dirt Roads
- Paved Road
- Section Corner
- Section Line
- Fence Lines

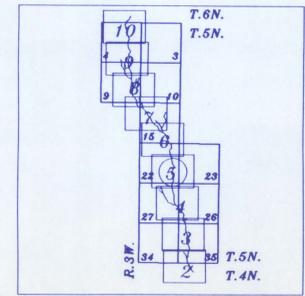
### ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.  
 I.D. NUMBER ELEVATION (FT) DESCRIPTION / LOCATION

ERM PD6	1628.13	GLD B.C. SE COR. SEC 22 T5N R3W
---------	---------	---------------------------------

NOTE: CROSS SECTION STATION 10,000.0 IS HYDRAULIC BASE LINE EXCEPT AS NOTED.

### INDEX MAP



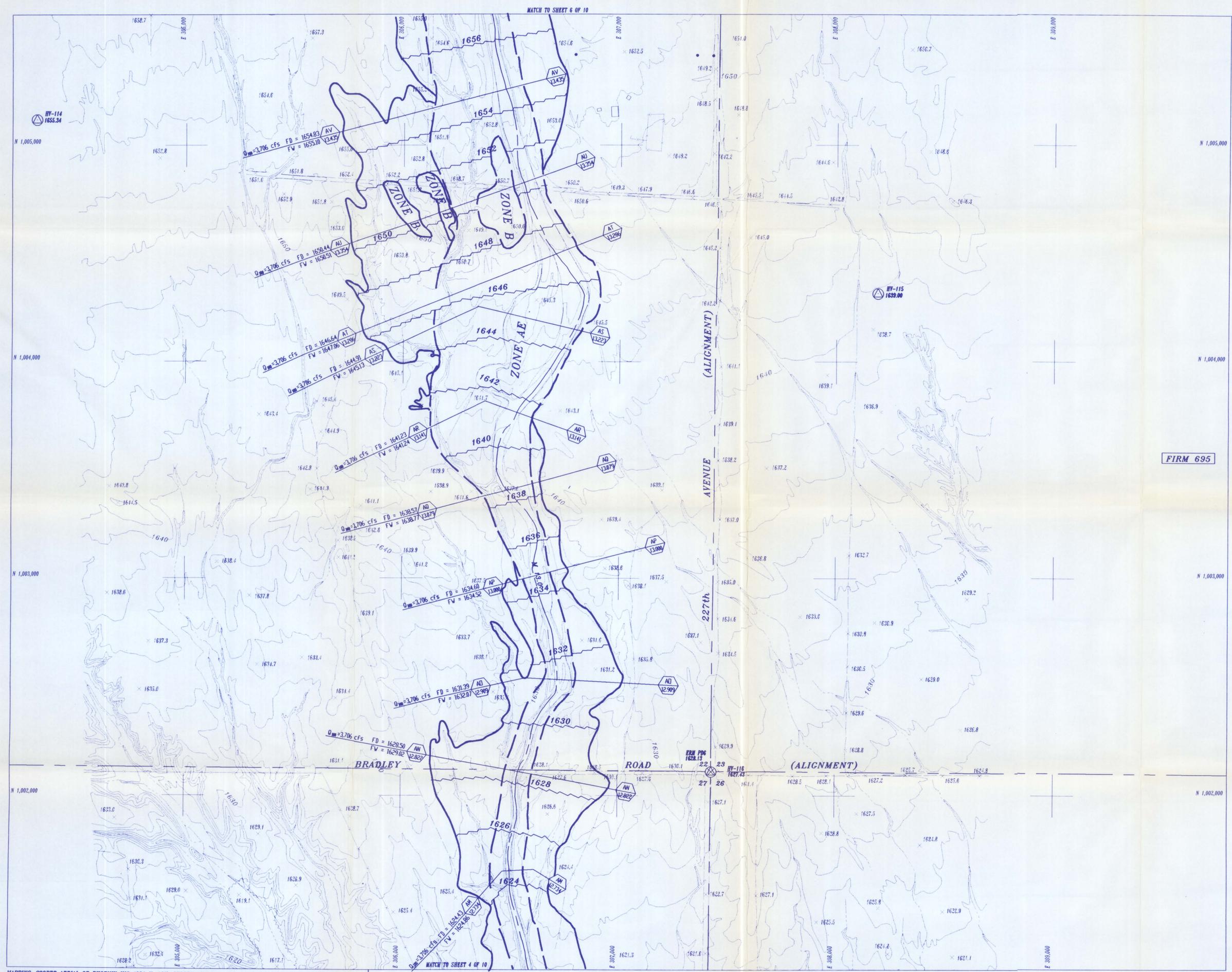
North arrow pointing up.

Scale bar: 200 100 0 200 400 600  
2 FOOT CONTOUR INTERVAL

Professional seals for Ramesh L. Patel and Richard Murillo.

**P&D Technologies**  
 An Employee Owned Company  
 1702 E. Highland #200, Phoenix, Arizona 85016  
 Telephone (602) 264-3335

DESIGN:	By: L.M. Vomero	Date:	Submitted By:	Date:	SHEET:
DESIGN CHECK:	By: Ramesh Patel, PE	Date:	Recommended By:	Date:	5
PLANS:	By: Richard Murillo	Date:	Approved By:	Date:	0F
PLANS CHECK:	By: Ramesh Patel, PE	Date:	Chief Engineer and General Manager:	Date:	10



MAPPING: COOPER AERIAL OF PHOENIX INC. 4621 N. 16th STREET SUITE C-315 PHOENIX, AZ. 85016 TEL.(602) 268-2279  
 SURVEY: P & D TECHNOLOGIES, 1702 E. HIGHLAND AVE. SUITE 200 PHOENIX, AZ. 85016 TEL.(602) 264-3335 DATE: 9-13-90

THIS MAP WAS PREPARED BY PHOTOCGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS\* = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVAL BASED ON GROUND CONTROL SURVEY DATA PROVIDED BY: P & D TECHNOLOGIES (602) 264-3335

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TRILBY WASH FLOODPLAIN DELINEATION STUDY

LEGEND

- Excluded Areas
- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line
- With River Mile
- Cross Section  $Q_m = 3,000$  cfs
- Elevation Reference Marks
- Horizontal And Vertical Control Points
- Zone Cutters (Boundary)
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- Zone Designations
- Dirt Roads
- Paved Road
- Section Corner
- Section Line
- Fence Lines

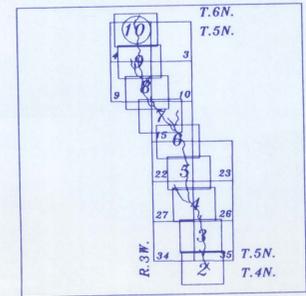
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION / LOCATION
ERM PD1	1847.95	CLD B.C. N 1/4 SEC 4 T5N R3W

NOTE: CROSS SECTION STATION 10,000.0 IS HYDRAULIC BASE LINE EXCEPT AS NOTED.

INDEX MAP



**P&D Technologies**  
 An Employee Owned Company  
 1702 E. Highland #200, Phoenix, Arizona 85016  
 Telephone (602) 264-3335

DESIGN:	By: L.M. Vomero	Date:	Submitted By:	Date:	SHEET
DESIGN CHECK:	By: Ramesh Patel, PE	Date:	Recommended By:	Date:	10
PLANS:	By: Richard Murillo	Date:	Approved By:	Date:	0F
PLANS CHECK:	By: Ramesh Patel, PE	Date:	Chief Engineer and General Manager:	Date:	10



NOTE: WITMAN ADMS CIRCLE CITY FLOOD INSURANCE STUDY, MARICOPA COUNTY, ARIZONA AND UNINCORPORATED AREAS. FEDERAL EMERGENCY MANAGEMENT AGENCY, UNDER CONTRACT TO THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, CONTRACT NO. FCD 86-24.

LIMITS OF STUDY

FIRM 679

MATCH TO SHEET 9 OF 10

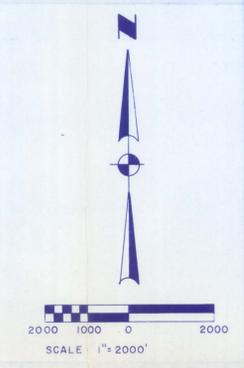
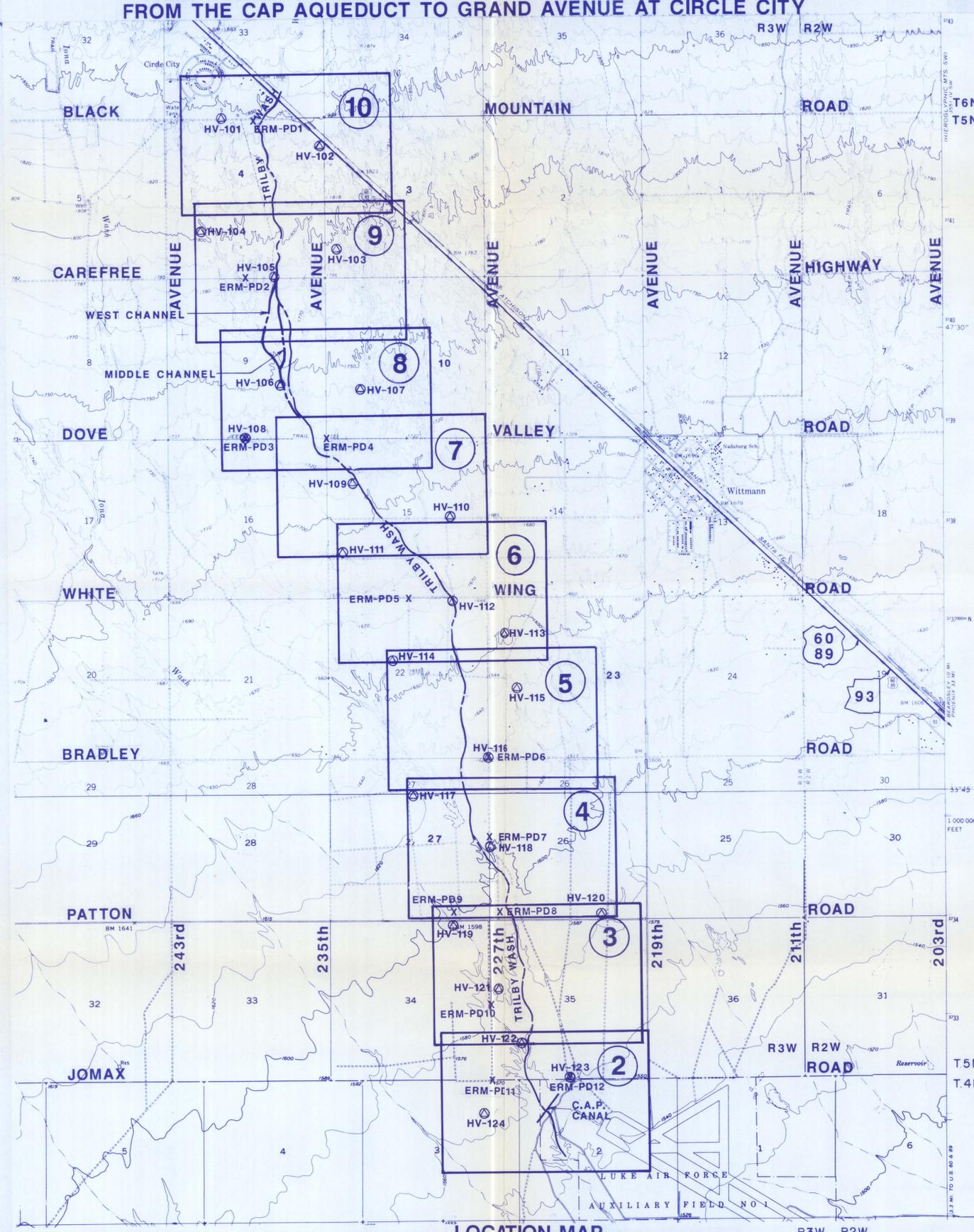
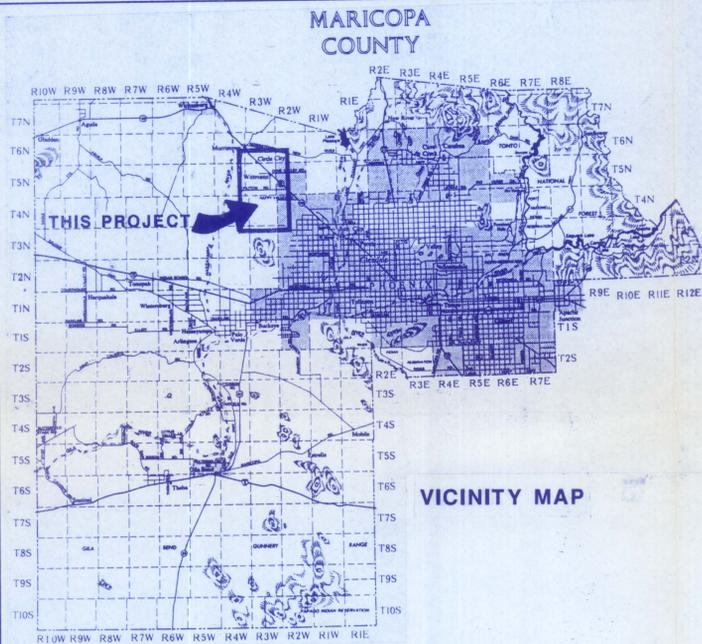
# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## D.E. SAGRAMOSO, CHIEF ENGINEER AND GENERAL MANAGER

TRILBY WASH FLOOD INSURANCE STUDY 6.7 RIVER MILES  
FROM THE CAP AQUEDUCT TO GRAND AVENUE AT CIRCLE CITY

FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY

TRILBY WASH FLOODPLAIN  
DELINEATION STUDY



### LEGEND

<p>Excluded Areas</p> <p>100-Yr Floodplain Boundary</p> <p>Floodway Boundary</p> <p>Hydraulic Base Line With River Mile</p> <p>Cross Section <math>Q_{100} = 3,000 \text{ cfs}</math></p> <p>Elevation Reference Marks</p> <p>Horizontal And Vertical Control Points</p> <p>Zone Cutters (Boundary)</p> <p>Base Flood Elevations</p> <p>Zone Designations</p> <p>Dirt Roads</p> <p>Paved Road</p> <p>Section Corner</p> <p>Section Line</p> <p>Fence Lines</p>	<p>ERM-7 X</p> <p>HV-1</p> <p>580</p> <p>ZONE AE</p> <p>M 75.0 M 76.0</p> <p>PD = 100yr. WSE</p> <p>FW = Floodway WSE</p> <p>1.00</p> <p>1.00</p> <p>11/11</p>
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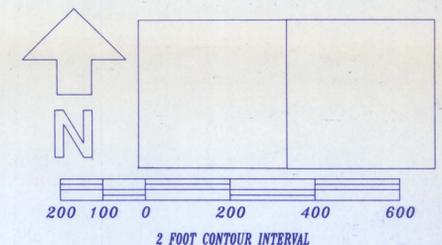
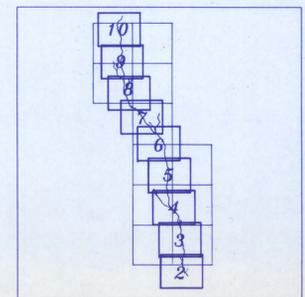
### ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON THE 1985 MEAN SEA LEVEL DATUM.

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION / LOCATION
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NOTE: CROSS SECTION STATION

### INDEX MAP



**P & D TECHNOLOGIES**  
1702 E. HIGHLAND, SUITE 410  
PHOENIX, AZ 85016  
Tel. (602) 264-3335

DESIGN:	By: L.M. Vomero	Date:	Submitted By:	Date:	SHEET: 1
DESIGN CHECK:	By: Ramesh Patel, PE	Date:	Recommended By:	Date:	1
PLANS:	By: Richard Murillo	Date:	Approved By:	Date:	OF: 10
PLANS CHECK:	By: Ramesh Patel, PE	Date:	CHIEF ENGINEER AND GENERAL MANAGER:	Date:	10

**2.6 FIRM, FHBM DRAFT MAPS**

**2.7 COMMUNITY MAPS**

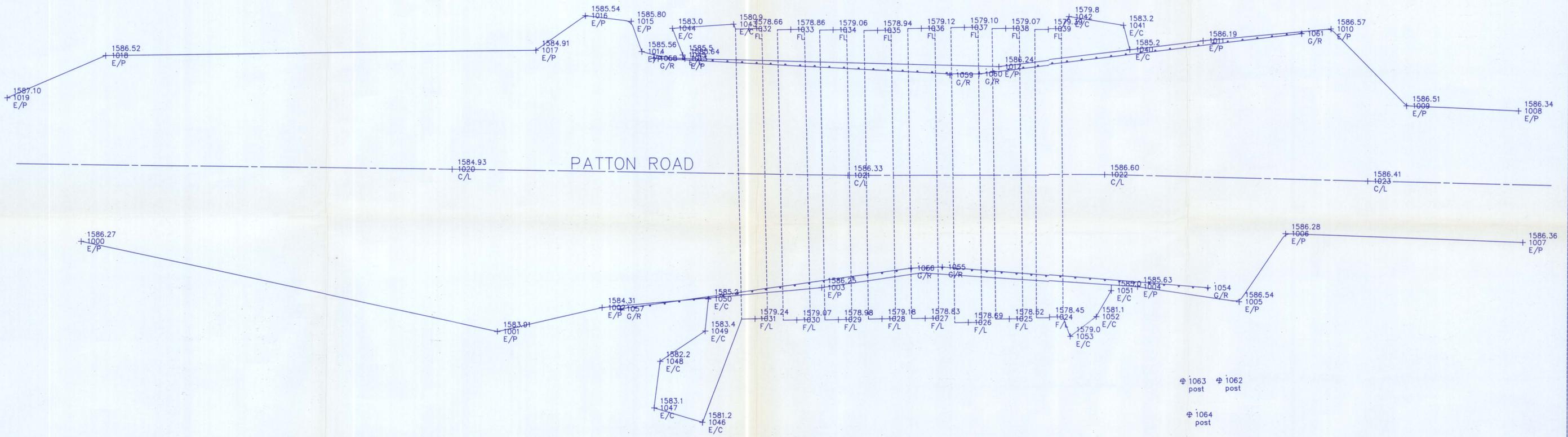
## 2.8 MISCELLANEOUS MAPS

# TOPOGRAPHIC SURVEY OF 8 - 68 INCH CMP'S ON TRILBY WASH CROSSING PATTON ROAD

+ N 996900.00  
E 308100.00

+ N 996900.00  
E 308350.00

WASH FLOWLINE



+ N 996750.00  
E 308100.00

+ N 996750.00  
E 308350.00

### LEGEND

- E/P EDGE OF PAVEMENT
- C/L CENTERLINE OF PAVEMENT
- F/L FLOW LINE OF PIPE
- G/R GUARD RAIL
- E/C EDGE OF CONCRETE

SCALE: 1"=10'



FILE: PATTON.DWG **EXHIBIT 2**

DRAFTED BY: <b>THOMAS ROPE</b> DATE PREPARED: <b>NOVEMBER 12, 1990</b> PROJECT ENGINEER: <b>RAMESH PATEL</b> SURVEY SUPERVISOR: <b>THOMAS ROPE</b> PROJECT MANAGER: <b>RAMESH PATEL</b>	<b>P&amp;D Technologies</b> An Ashland Technology Company 1702 East Highland, Suite 410, Phoenix, Arizona 85016 Telephone (602) 264-3335 <hr/> <b>CULVERT AS-BUILTS PATTON RD/TRILBY WASH</b> <hr/> JDB NO. 10320      SHEET 1 OF 1
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