STAR WASH & TRIBUTARIES
Floodplain Delineation Study
Maricopa County, Arizona

TECHNICAL DATA NOTEBOOK
Hydraulics, Book 1

August, 1993

FLOOD CONTROL DISTRICT of MARICOPA COUNTY

Registered Professional Engineer (Civil)
CERTIFICATE NO.
10512
ASHOK C.
PATEL
Date Signed 8/18/93
ARIZONA, U.S.A.

FCD 92-06

WOOD, PATEL & ASSOCIATES, INC.

STAR WASH & TRIBUTARIES FLOODPLAIN DELINEATION STUDY
FCD 92-06

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TECHNICAL DATA NOTEBOOK
HYDRAULICS
BOOK 1

Prepared for
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NOTE: The numbering system in this report is formatted according to the State of Arizona, Department of Water Resources, Engineering Division document "Instructions for Organizing and Submitting Technical Documentation for Flood Studies". Sections that are not applicable to this study are not included in the report and the numbering system does not change to account for the omitted sections.

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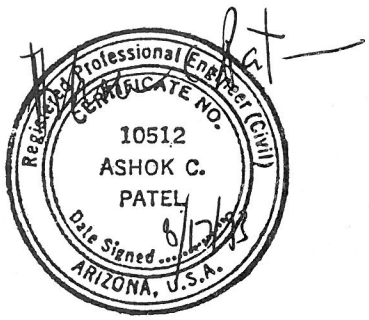


CERTIFICATION

This is to certify that all work accomplished in the conduct of this Floodplain Delineation Study for Star Wash & Tributaries was done in accordance with FEMA 37 Document, *"Flood Insurance Study, Guidelines and Specifications for Study Contractors"*, Federal Insurance Administration, March, 1991; and the General Provisions of Contract FCD 92-06 and all amendments thereto, together with all such modifications, either written or oral as the FCD Contracting Officer or their representatives have directed, as such modifications affect this Contract, and that all such work has been accomplished in accordance with sound and accepted engineering practice within the contract provisions for respective phases of the work.

For Wood, Patel & Associates, Inc.

Ashok C. Patel, P.E., R.L.S.
President

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
STAR WASH & TRIBUTARIES
FLOODPLAIN DELINEATION STUDY

INTRODUCTION

Purpose of Study

The purpose of this Floodplain Delineation Study is to investigate the existence and severity of flood hazards in western Maricopa County for Star Wash and its tributaries.

The area studied includes portions of unincorporated areas of Maricopa County, Arizona. Refer to Figure 1 for the general location of the study area.

Coordination and Acknowledgements

References used in this study are described in Section 6 of Study Documentation.

AREA STUDIED

Scope of Study

Areas selected for study were based upon potential for future development. This floodplain delineation study covers unincorporated areas of Maricopa County as described below:

- Star Wash and major tributaries are located in T4N, R5W to the south Township line of T5N, starting with cross section 1.660, Star Wash, of the completed FEMA-approved Jackrabbit Wash study.

- Powerline Wash and Tank Wash from their confluence with Star Wash to a point at which there is no influence from Star Wash on flows in these washes.

The study area limits are shown on the USGS Quadrangle Map on Figures 2.1, 2.2 and 2.3.

Community Description

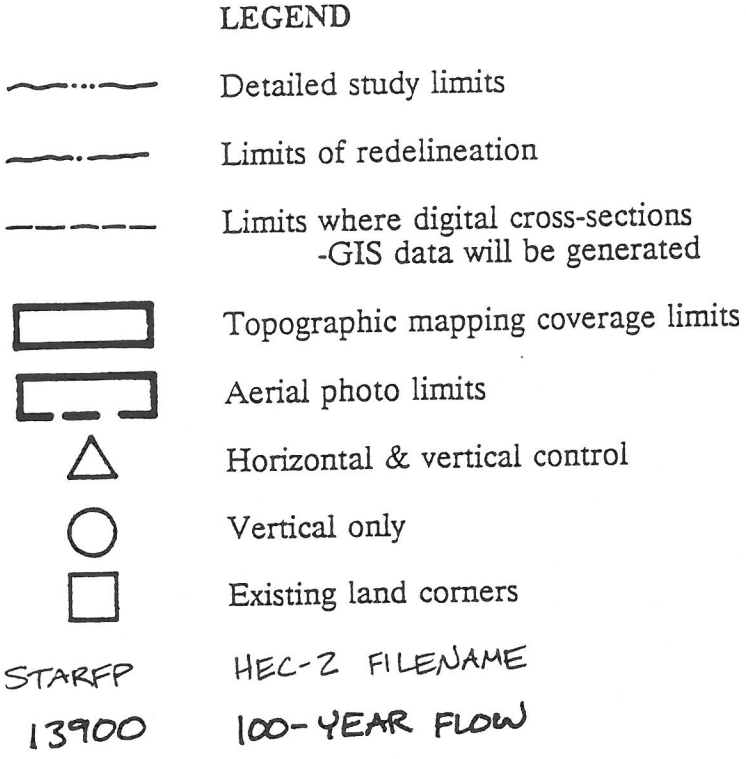
Maricopa County has a total area of 9,238 square miles and is located in the south central region of Arizona. Total Maricopa County population in 1990 was 2,122,101. The area is experiencing rapid population growth, having grown from 1,509,262 in 1980.

Terrain in Maricopa County varies from mountains to plains. Numerous small, intermittent streams and washes traverse the county. Major streams include the Gila, Salt, Agua Fria, New and Hassayampa Rivers.

The area is located within the Sonoran Desert with mild, short winters and long, hot summers.

FIGURE 2.1
STUDY AREA LIMITS

Star Wash & Tributaries
Contract FCD 92-06
Flood Control District of Maricopa County



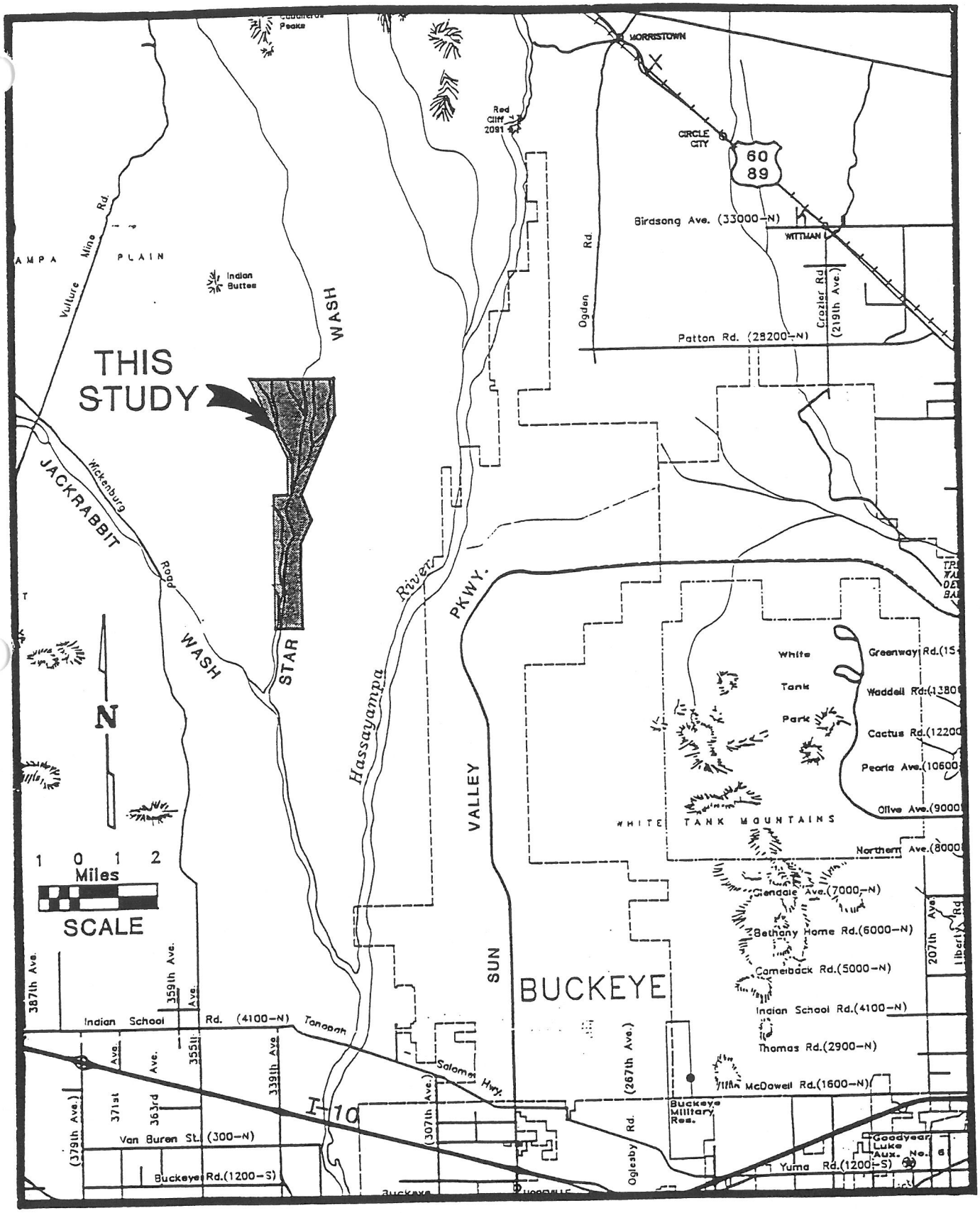
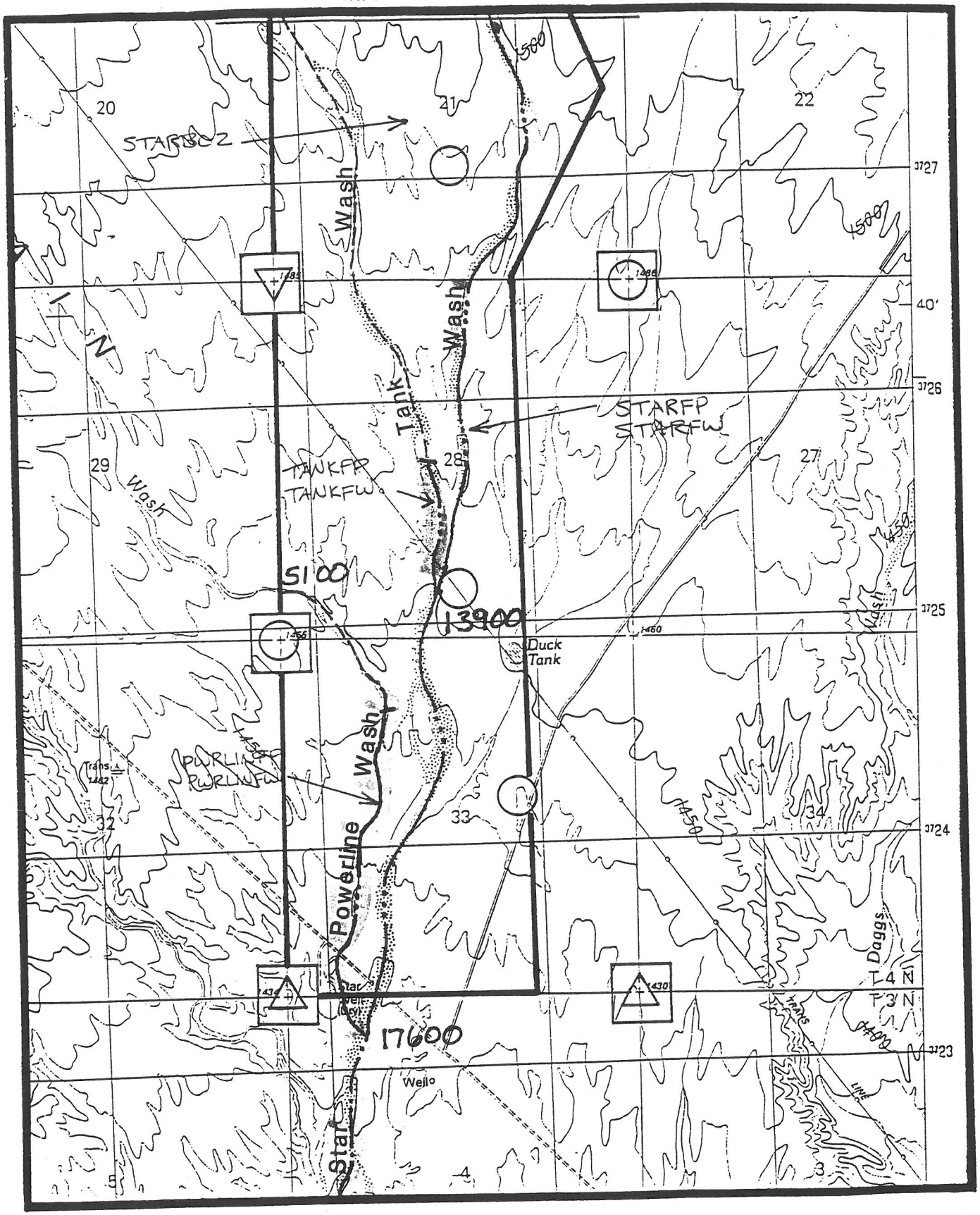


FIGURE 1 **Location Map**

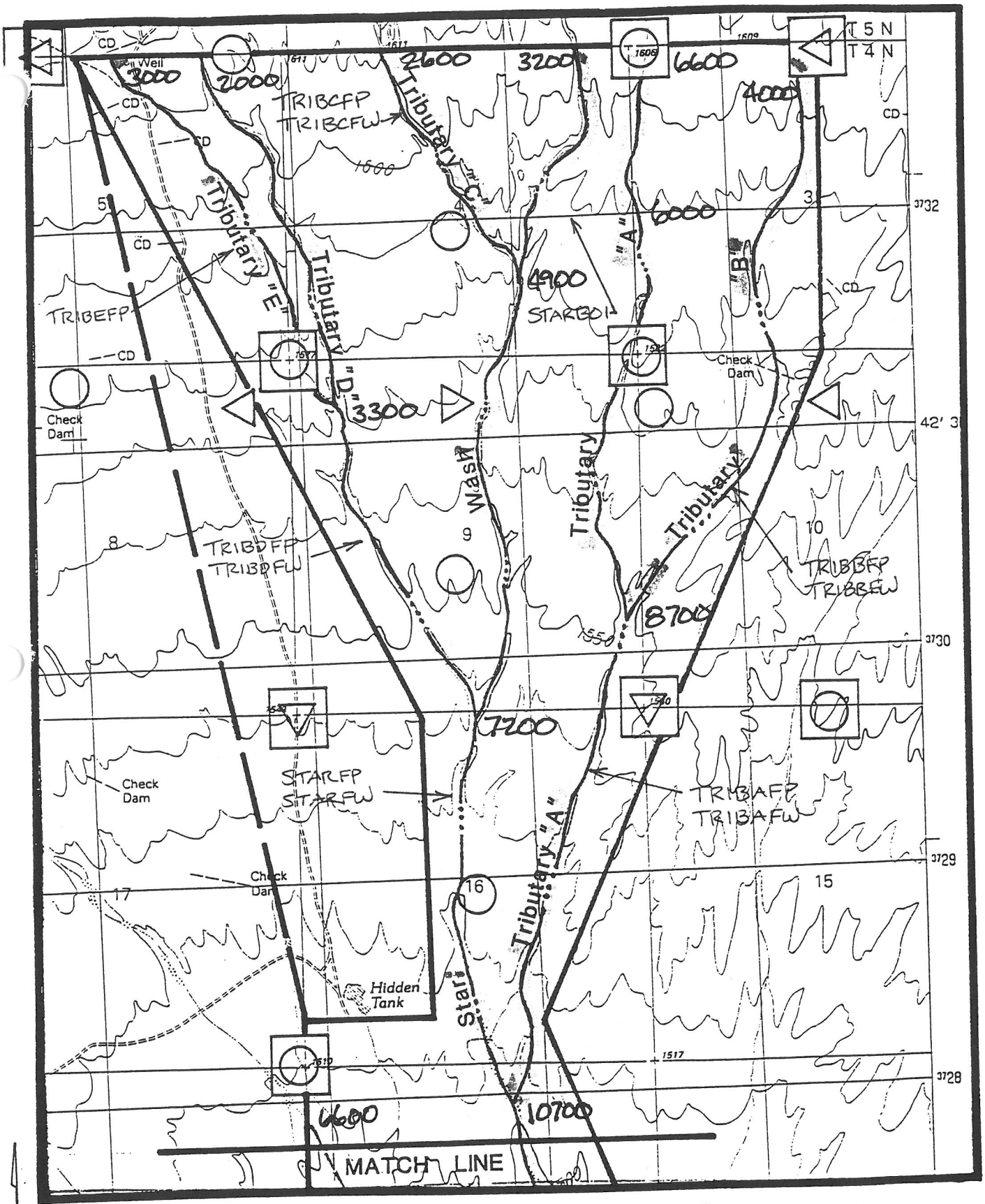
MATCH LINE



STUDY AREA LIMITS

1"=2000'

FIGURE 2.2



STUDY AREA LIMITS

1"=2000'

FIGURE 2.3

Principal Flood Problems

Storms during summer months generally originate in the Gulf of Mexico area and tend to be intense and of short duration. Storms at other times of the year generally originate in the Pacific Ocean and tend to be gentler rains of longer duration. Flooding may occur at any time of the year.

Star Wash and its tributaries within the study area are located in wide floodplains. Flood hazards along the streams result when the channels overflow and inundate development which may occur along the streams.

Flood Protection Measures

There are no significant flood control measures built within the contributing watershed area.

ENGINEERING METHODS

Hydrologic Analyses

Peak 100-year discharges for Star Wash and tributaries were provided by the Flood Control District of Maricopa County (District), (See Table 1, Figures 2.1 through 2.3, and Work Map(s) - Sheet 1 of 10).

The watershed was previously modeled as part of the Jackrabbit Wash Floodplain Delineation Study using the U.S. Army Corps of Engineers HEC-1 computer program. The program (Version 4.0) was dated September, 1990, as implemented by Dodson and Associates, Inc. called ProHEC1. Modeling was accomplished using the SCS Unit Hydrograph, Initial and Uniform Losses, and routing, combining and diversion of sub-basin hydrographs. Derivation of input data, assumptions and procedures used in preparation of the computer model are discussed in the FEMA approved hydrology within the Technical Data Notebook (TDN) prepared by Burgess & Niple, Inc.

The hydrologic data was submitted to FEMA as part of the Jackrabbit Wash Floodplain Delineation Study. The data was subsequently approved by FEMA in 1991.

Since this study is based on the previously approved hydrology by FEMA, no support data is included within this TDN.

TABLE 1
SUMMARY OF PEAK 100-YEAR DISCHARGES

FLOODING SOURCE AND LOCATION	FLOW (cfs)
Star Wash	
Below Powerline Wash	17,600
Above Confluence With Powerline Wash	13,900
Above Confluence With Tank Wash	10,700
Above Confluence With Tributary "A"	7,200
Above Confluence With Tributary "D"	4,900
Above Confluence With Tributary "C"	3,200
Powerline Wash	
Above Confluence With Star Wash	5,100
Tank Wash	
Above Confluence With Star Wash	6,600
Tributary "A"	
Above Confluence With Star Wash	8,700
Above Confluence With Tributary "B"	6,000
Tributary "B"	
Above Confluence With Star Wash	4,000
Tributary "C"	
Above Confluence With Star Wash	2,600
Tributary "D"	
Above Confluence With Star Wash	3,300
Above Confluence With Tributary "E"	2,000
Tributary "E"	
Above Confluence With Star Wash	3,000

Hydraulic Analyses

Standard hydraulic methods were used to determine 100-year recurrence interval flood hazards for this study. Analyses reported herein reflect current conditions of the streams.

Cross sections for the backwater analyses were digitized from aerial mapping at a scale of 1" = 200' (Reference 1) with a contour interval of 2 feet. Locations of selected cross sections used in the hydraulic analysis are shown in the Flood Profiles (Exhibit 1). Cross section locations are also shown on the Work Map(s) (Flood Boundary/Floodway Map - Exhibit 2). Mannings "n" values were obtained during field reconnaissance trips on October 29, 1992 and January 5, 1993. Manning's "n" values ranged from 0.036 to 0.045.

Flood profiles are drawn showing computed water surface elevations to an accuracy of 0.5 feet for a flood of 100-year frequency. Water surface elevations for Star Wash and tributaries are computed through the use of the U.S. Army Corps of Engineers HEC-2 Water Surface Profiles computer program as implemented by Boss Corporation in their August, 1991 version of Boss HEC-2. Starting water surface elevations for Star Wash match the computed water surface elevations from the Jackrabbit Wash Study at section 1.660. Starting water surface elevations for tributaries were obtained by matching the water surface elevation of the mainstem wash. Elevations used are referenced to the National Geodetic Vertical Datum of 1929. Locations of Elevation Reference Marks used in this study are shown on the Work Map(s) (Exhibit 2) and are described in the Elevation Reference Marks Section.

FLOODPLAIN MANAGEMENT APPLICATIONS

This study has been performed to meet the standards of the National Flood Insurance Program as defined by Reference 4.

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound floodplain management programs. This study, therefore, includes a flood boundary map designed to assist communities in developing sound floodplain management measures.

Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Emergency Management Agency (FEMA) as the base flood for purposes of floodplain management measures. The boundary of the 100-year flood has been delineated using flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1" = 200' with a contour interval of 2 feet (Reference 1).

The boundary of the 100-year flood is shown on the Work Map(s) (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding. Due to limitations of the map scale such areas are not shown.

Floodways

Encroachment on floodplains, such as artificial fill, reduces the flood carrying capacity, increases flood depths of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment in order that the 100-year flood can be carried without substantial increase in flood heights. Minimum federal standards limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 3.

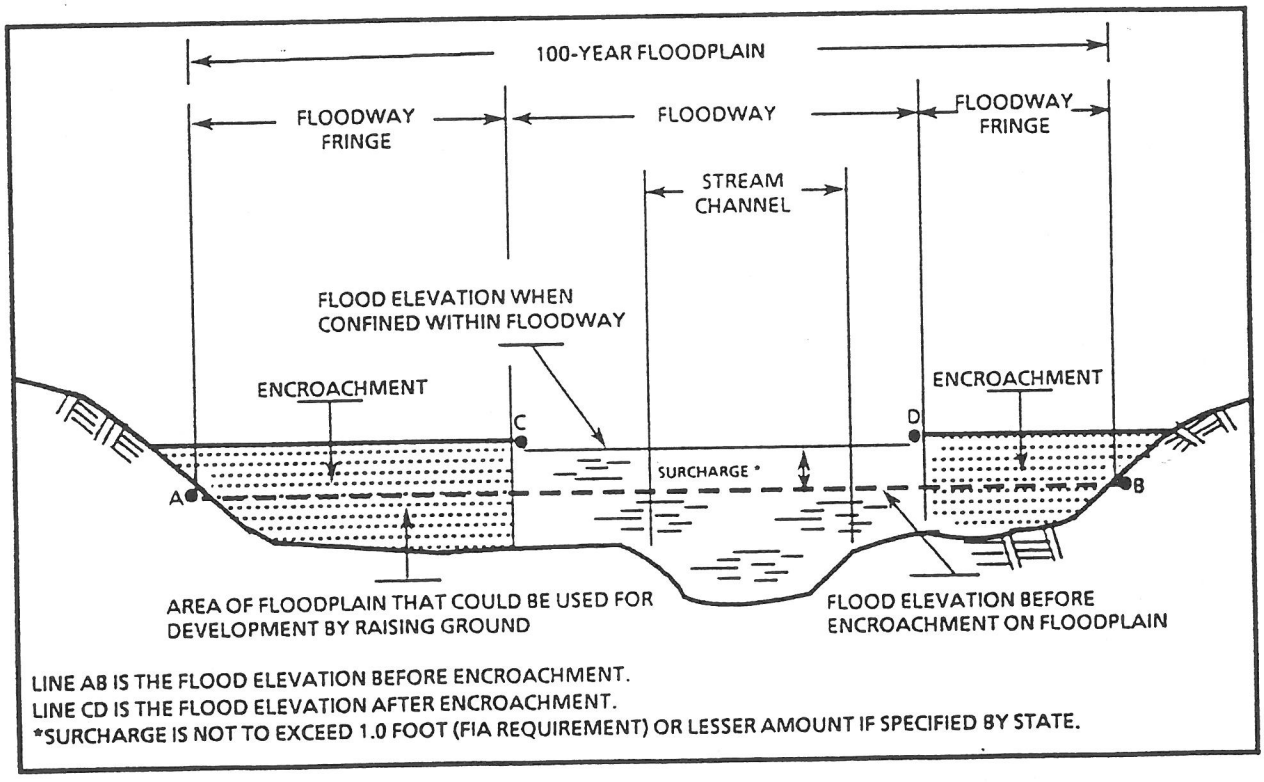


Figure 3: Floodway Schematic

The floodway presented for this study was computed on the basis of equal conveyance reduction from each side of the floodplain and adjusted for high velocities and physical discontinuities. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2). Note that a "Regulatory" column is provided in Table 2 only for washes where a backwater condition exists at a confluence.

As shown on the Work Map(s) (Exhibit 2), the floodway widths were determined at cross sections, between cross sections and the boundaries interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close, together, or collinear only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the floodplain that could be completely obstructed without increasing the water surface elevation of the 100-year flood by more than 1.0 foot at any point.

INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone "A": Zone "A" is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. No base flood elevations or depths are shown within this zone.

Zone "AE": Zone "AE" is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot based flood elevations derived from detailed hydraulic analyses are shown at selected intervals within this zone.

Zone "X": Zone "X" is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

OTHER STUDIES

Previous floodplain and drainage studies include:

- *Flood Insurance Study, Maricopa County, Arizona and Incorporated Areas,* Revised September 29, 1989.

LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study may be obtained from the District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009, (602) 506-1501.

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION (2)		
CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Star Wash							
H	1.660	740	2315	7.6	1411.7	1410.7	1.0
I	1.886	610	2583	6.8	1418.7	1417.8	0.9
J	2.097	1260	4208	4.2	1422.4	1421.6	0.8
K	2.186	1184	3125	5.6	1423.4	1422.7	0.7
L	2.309	1045	3098	5.7	1426.3	1425.8	0.5
M	2.404	947	2467	7.1	1429.3	1428.4	0.9
N	2.506	887	3018	5.8	1432.8	1432.0	0.8
O	2.605	866	2577	6.8	1435.3	1434.6	0.7
P	2.697	1038	3257	5.4	1438.4	1437.8	0.6
Q	2.801	1388	3445	5.1	1440.6	1439.9	0.7
R	2.908	1663	3688	4.8	1443.3	1442.7	0.6

(1) Miles above confluence with Jackrabbit Wash
(2) Feet, NGVD 1929

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOODWAY DATA

STAR WASH

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION (2)		
CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Star Wash							
S	3.002	1093	2246	6.2	1446.3	1445.5	0.8
T	3.101	990	2851	4.9	1449.4	1448.6	0.8
U	3.195	1029	2621	5.3	1451.9	1451.0	0.9
V	3.300	982	2490	5.6	1454.8	1454.2	0.6
W	3.407	945	2386	5.8	1458.1	1457.3	0.8
X	3.505	904	3189	4.4	1460.4	1459.7	0.7
Y	3.609	765	1988	7.0	1462.2	1461.8	0.4
Z	3.703	729	2382	5.8	1465.4	1465.2	0.2
AA	3.796	1079	2801	5.0	1468.0	1467.7	0.3
AB	3.897	1162	2763	5.0	1470.6	1470.3	0.3
AC	3.998	617	1851	5.8	1473.4	1472.8	0.6

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(2) Feet, NGVD 1929

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STAR WASH

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CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Star Wash							
AD	4.092	463	1357	7.9	1476.7	1475.8	0.9
AE	4.187	472	1895	5.6	1480.4	1479.5	0.9
AF	4.286	549	1842	5.8	1482.7	1482.0	0.7
AG	4.375	557	1823	5.9	1485.2	1484.6	0.6
AH	4.471	643	1987	5.4	1487.9	1486.9	1.0
AI	4.569	781	2146	5.0	1490.4	1489.4	1.0
AJ	4.681	800	2433	4.4	1492.5	1491.6	0.9
AK	4.784	725	2223	4.8	1494.5	1493.5	1.0
AL	4.909	700	1955	5.5	1497.6	1496.7	0.9
AM	5.028	809	2200	4.9	1501.1	1500.1	1.0
AN	5.121	793	1884	5.7	1503.9	1503.0	0.9

(1) Miles above confluence with Jackrabbit Wash
(2) Feet, NGVD 1929

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CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Star Wash							
AO	5.228	810	2307	4.6	1506.9	1506.3	0.6
AP	5.334	891	2202	4.9	1509.2	1508.4	0.8
AQ	5.429	1050	2649	4.0	1511.3	1510.8	0.5
AR	5.527	1153	1847	5.8	1514.5	1514.2	0.3
AS	5.623	1285	2569	4.2	1518.0	1517.7	0.3
AT	5.719	1375	2370	4.5	1520.2	1520.0	0.2
AU	5.817	1420	2331	4.6	1522.8	1522.7	0.1
AV	5.917	1392	2262	4.7	1525.5	1524.8	0.7
AW	6.024	1601	2671	4.0	1528.4	1527.8	0.6
AX	6.110	1666	2806	3.8	1530.1	1529.6	0.5
AY	6.215	1846	1890	5.7	1532.9	1532.9	0.0

(1) Miles above confluence with Jackrabbit Wash
(2) Feet, NGVD 1929

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CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Star Wash							
AZ	6.308	1865	2486	4.3	1535.9	1535.7	0.2
BA	6.400	480	1093	6.6	1539.3	1539.1	0.2
BB	6.509	230	783	6.0	1542.7	1541.8	0.9
BC	6.602	250	658	7.1	1545.1	1544.9	0.2
BD	6.695	132	451	10.4	1547.9	1547.9	0.0
BE	6.785	253	966	4.9	1551.2	1550.2	1.0
BF	6.876	302	618	7.6	1553.8	1553.4	0.4
BG	6.964	369	1225	3.8	1556.5	1555.6	0.9
BH	7.062	60	351	13.7	1557.5	1558.1	-0.6
BI	7.156	81	569	8.4	1562.9	1561.9	1.0
BJ	7.253	165	808	5.9	1565.2	1564.3	0.9

(1) Miles above confluence with Jackrabbit Wash
(2) Feet, NGVD 1929

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CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Star Wash							
BK	7.354	143	656	7.3	1566.9	1566.1	0.8
BL	7.442	111	488	9.8	1569.1	1569.0	0.1
BM	7.541	111	624	7.9	1572.9	1572.1	0.8
BN	7.631	95	514	9.5	1575.3	1574.8	0.5
BO	7.721	137	712	6.9	1578.5	1577.7	0.8
BP	7.797	134	624	7.8	1580.0	1579.3	0.7
BQ	7.900	136	393	8.1	1583.2	1582.9	0.3
BR	8.008	250	787	4.1	1586.7	1585.8	0.9
BS	8.126	90	321	10.0	1590.2	1589.9	0.3
BT	8.220	142	560	5.7	1594.4	1593.5	0.9
BU	8.302	199	436	7.3	1598.0	1597.1	0.9

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(2) Feet, NGVD 1929

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CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Star Wash							
BV	8.402	118	528	6.1	1601.9	1600.9	1.0
BW	8.494	56	356	9.0	1604.1	1603.2	0.9
BX	8.571	68	377	8.5	1606.9	1606.0	0.9

(1) Miles above confluence with Jackrabbit Wash
(2) Feet, NGVD 1929

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STAR WASH

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION (2)			
CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	REGULATORY	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Tributary "A"								
A	1.104	1120	1574	5.5	1539.1	1539.1	1538.8	0.3
B	1.201	1038	2217	3.9	1542.2	1542.7	1542.2	0.5
C	1.295	885	1572	5.5	1545.3	1545.6	1545.3	0.3
D	1.387	526	1535	5.7	1548.9	1549.3	1548.9	0.4
E	1.483	299	1229	7.1	1551.1	1551.9	1551.1	0.8

(1) Miles above confluence with Star Wash
(2) Feet, NGVD 1929

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOODWAY DATA

TRIBUTARY "A"

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION (2)		
CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Tributary "B"							
A	0.096	390	1301	3.1	1554.3	1553.7	0.6
B	0.191	335	807	5.0	1555.5	1555	0.5
C	0.289	298	620	6.4	1559.4	1558.7	0.7
D	0.384	371	959	4.2	1563.2	1562.4	0.8
E	0.478	380	881	4.5	1565.4	1564.9	0.5
F	0.577	335	752	5.3	1568.5	1568.1	0.4
G	0.679	324	815	4.9	1571.6	1570.8	0.8
H	0.779	351	897	4.5	1574.3	1573.9	0.4
I	0.909	265	557	7.2	1578.3	1577.6	0.7
J	0.970	273	866	4.6	1580.8	1579.8	1.0
K	1.071	428	809	4.9	1583.3	1582.7	0.6

(1) Miles above confluence with Tributary "A"
(2) Feet, NGVD 1929

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOODWAY DATA

TRIBUTARY "B"

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION (2)		
CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Tributary "B"							
L	1.169	460	830	4.8	1587.0	1586.4	0.6
M	1.263	585	1002	4.0	1589.9	1589.7	0.2
N	1.372	1083	939	4.3	1592.8	1592.9	-0.1

(1) Miles above confluence with Tributary "A"
(2) Feet, NGVD 1929

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOODWAY DATA

TRIBUTARY "B"

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION (2)		
CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Tributary "C"							
A	0.087	82	384	6.8	1582.5	1581.9	0.6
B	0.185	94	321	8.1	1585.4	1585.0	0.4
C	0.303	91	315	8.3	1590.5	1590.3	0.2
D	0.423	105	412	6.3	1595.1	1594.8	0.3
E	0.517	63	249	10.5	1598.7	1598.9	-0.2
F	0.622	79	361	7.2	1603.7	1603.5	0.2
G	0.717	136	322	8.1	1607.5	1607.6	-0.1
H	0.789	217	534	4.9	1611.0	1610.4	0.6

(1) Miles above confluence with Star Wash
(2) Feet, NGVD 1929

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOODWAY DATA

TRIBUTARY "C"

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION (2)			
CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	REGULATORY	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Tributary "D"								
A	0.083	193	715	4.6	1541.8	1542.3	1541.5	0.8
B	0.181	119	370	8.9	1544.9	1544.0	1544.1	-0.1
C	0.274	142	500	6.6	1547.6	1548.4	1547.6	0.8
D	0.369	193	669	4.9	1550.1	1550.9	1550.1	0.8
E	0.471	185	403	8.2	1553.6	1553.9	1553.6	0.3
F	0.568	106	482	6.8	1556.3	1557.1	1556.3	0.8
G	0.668	103	368	9.0	1559.5	1559.6	1559.5	0.1
H	0.763	143	581	5.7	1563.1	1563.6	1563.1	0.5
I	0.867	78	319	10.4	1566.2	1566.3	1566.2	0.1
J	0.969	131	671	4.9	1569.4	1570.2	1569.4	0.8
K	1.069	123	374	8.8	1571.9	1572.0	1571.9	0.1
L	1.185	314	703	4.7	1575.7	1576.5	1575.7	0.8
M	1.279	234	452	7.3	1578.5	1578.8	1578.5	0.3

(1) Miles above confluence with Star Wash
(2) Feet, NGVD 1929

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOODWAY DATA

TRIBUTARY "D"

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION (2)			
CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	REGULATORY	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Tributary "D"								
N	1.382	115	425	7.8	1582.3	1583.0	1582.3	0.7
O	1.482	143	459	7.2	1586.2	1586.5	1586.2	0.3
P	1.607	97	391	8.4	1590.4	1590.5	1590.4	0.1
Q	1.705	118	440	7.5	1593.7	1593.8	1593.7	0.1
R	1.818	169	440	7.5	1597.9	1598.1	1597.9	0.2
S	1.900	103	480	6.9	1599.9	1600.7	1599.9	0.8

(1) Miles above confluence with Star Wash
(2) Feet, NGVD 1929

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOODWAY DATA

TRIBUTARY "D"

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION (2)		
CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Powerline Wash							
A	1.018	683	1562	3.3	1445.1	1444.2	0.9
B	1.113	653	1174	4.3	1447.4	1446.4	1.0

(1) Miles above confluence with Star Wash
(2) Feet, NGVD 1929

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOODWAY DATA

POWERLINE WASH

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION (2)		
CROSS SECTION	DISTANCE (1)	WIDTH (FEET)	SECTION AREA (Sq. Ft.)	MEAN VELOCITY (Feet/Sec.)	WITH FLOODWAY	WITHOUT FLOODWAY	INCREASE
Tank Wash							
A	0.749	403	956	6.9	1474.8	1474.5	0.3
B	0.883	710	1956	3.4	1479.1	1478.2	0.9
C	0.980	734	1466	4.5	1480.9	1480.0	0.9

(1) Miles above confluence with Star Wash
(2) Feet, NGVD 1929

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOODWAY DATA

TANK WASH

LEGEND

ELEVATION REFERENCE MARKS

NOTE: All Elevations Are Based on National Geodetic Vertical Datum of 1929

I.D. NUMBER	ELEVATION (FT.)	DESCRIPTION/LOCATION
ERM #1	1434.54	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a GLO Brass Cap on 3" I.P. 1.2' above ground located at the southeast corner of section 32, T4N, R5W.
ERM #2	1429.71	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a GLO Brass Cap on 3" I.P. 1.1' above ground located at the northeast corner of section 4, T3N, R5W.
ERM #3	1440.21	This station is located approximately 20 miles +/- to the intersection of the Aquila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattled guard, take track road east along south side of fence. This mark is a 1/2" Rebar approximately 0.06' above ground located at approximately 800' east of the center of section 33, T4N, R5W approximately 200' west of dirt road.
ERM #4	1451.32	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a Railroad Spike Set Flush located at approximately 800' E southeast on north 1/4 corner of section 33, T4N, R5W.

LEGEND

ELEVATION REFERENCE MARKS

NOTE: All Elevations Are Based on National Geodetic Vertical Datum of 1929

I.D. NUMBER	ELEVATION (FT.)	DESCRIPTION/LOCATION
ERM #5	1449.72	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a Brass Cap on 2" I.P. approximately 0.67' above ground located at north 1/4 of section 33, T4N, R5W.
ERM #6	1454.93	This station is located approximately 20 miles +/- to the intersection of the Aquila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattled guard, take track road east along south side of fence. This mark is a GLO Brass Cap on 2" I.P. approximately 1.0' above ground located at the northeast corner of section 32, T4N, R5W.
ERM #7	1453.56	This station is located approximately 20 miles +/- to the intersection of the Aquila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattled guard, take track road east along south side of fence. This mark is a 1/2" Rebar approximately 0.10' above ground located north of Steel Tower powerline approximately 700+ north of North 1/4 of section 33 T4N, R5W.
ERM #8	1485.08	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a Brass Cap on 2" I.P. approximately 1.2' above ground located at the northeast corner of section 29, T4N, R5W.

LEGEND

ELEVATION REFERENCE MARKS

NOTE: All Elevations Are Based on National Geodetic Vertical Datum of 1929

I.D. NUMBER	ELEVATION (FT.)	DESCRIPTION/LOCATION
ERM #9	1485.19	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a Brass Cap on 2" I.P. approximately 0.9' above ground located at the northeast corner of section 28, T4N, R5W.
ERM #10	1486.12	This station is located approximately 20 miles +/- to the intersection of the Aquila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattled guard, take track road east along south side of fence. This mark is a 1/2" Rebar Flush with ground approximately 1000' south of the center of section 21, T4N, R5W.
ERM #11	1508.49	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a Brass Cap on 2" I.P. approximately 0.6' above ground located at the northeast corner of section 20, T4N, R5W.
ERM #12	1521.96	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a 1/2" Rebar approximately 0.11' above ground located approximately 200 south of the center of section 16, T4N, R5W.

LEGEND

ELEVATION REFERENCE MARKS

NOTE: All Elevations Are Based on National Geodetic Vertical Datum of 1929

I.D. NUMBER	ELEVATION (FT.)	DESCRIPTION/LOCATION
ERM #13	1574.52	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a 1/2" rebar approximately 0.15' above ground approximately 1000' southwest of the northeast corner of section 8, T4N, R5W.
ERM #14	1567.54	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a 1/2" rebar flush with ground approximately 800 southwest of the north 1/4 of section 9, T4N, R5W.
ERM #15	1548.40	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a brass cap on 2" I.P. approximately 1.3' above ground located at the northeast corner of section 16, T4N, R5W.
ERM #16	1551.80	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a brass cap on 3/4" I.P. approximately 1.23' above ground located at the north 1/4 of section 15, T4N, R5W.

LEGEND

ELEVATION REFERENCE MARKS

NOTE: All Elevations Are Based on National Geodetic Vertical Datum of 1929

I.D. NUMBER	ELEVATION (FT.)	DESCRIPTION/LOCATION
ERM #17	1573.42	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a 1/2' Rebar Flush with ground approximately 800' south of the northeast corner of section 9, T4N, R5W.
ERM #18	1585.20	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a 1/2" Rebar approximately 0.32' above ground located at approximately 800' south of the north 1/4 corner of section 10, T4N, R5W.
ERM #19	1578.59	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a 1/2" Rebar approximately 0.09' above ground located at approximately 1000' westsouthwest of the north 1/4 corner of section 8, T4N, R5W.
ERM #20	1622.24	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a 1/2" Rebar approximately 0.24' above ground at approximately 30' south of southeast corner of section 32, T5N, R5W.

LEGEND

ELEVATION REFERENCE MARKS

NOTE: All Elevations Are Based on National Geodetic Vertical Datum of 1929

I.D. NUMBER	ELEVATION (FT.)	DESCRIPTION/LOCATION
ERM #21	1622.62	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a Brass Cap on 3" I.P. approximately 0.40' above ground located at the southeast corner of section 32, T5N, R5W.
ERM #22	1609.79	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a 1/2" Rebar approximately 0.13' above ground located at approximately 1000' west of the northeast corner of section 5, T4N, R5W.
ERM #23	1576.91	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a Brass Cap on 2" I.P. approximately 1.14' above ground located at the northeast corner of section 8, T4N, R5W.
ERM #24	1580.03	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a Brass Cap on 2" I.P. approximately 0.85' above ground located at the northeast corner of section 9, T4N, R5W.

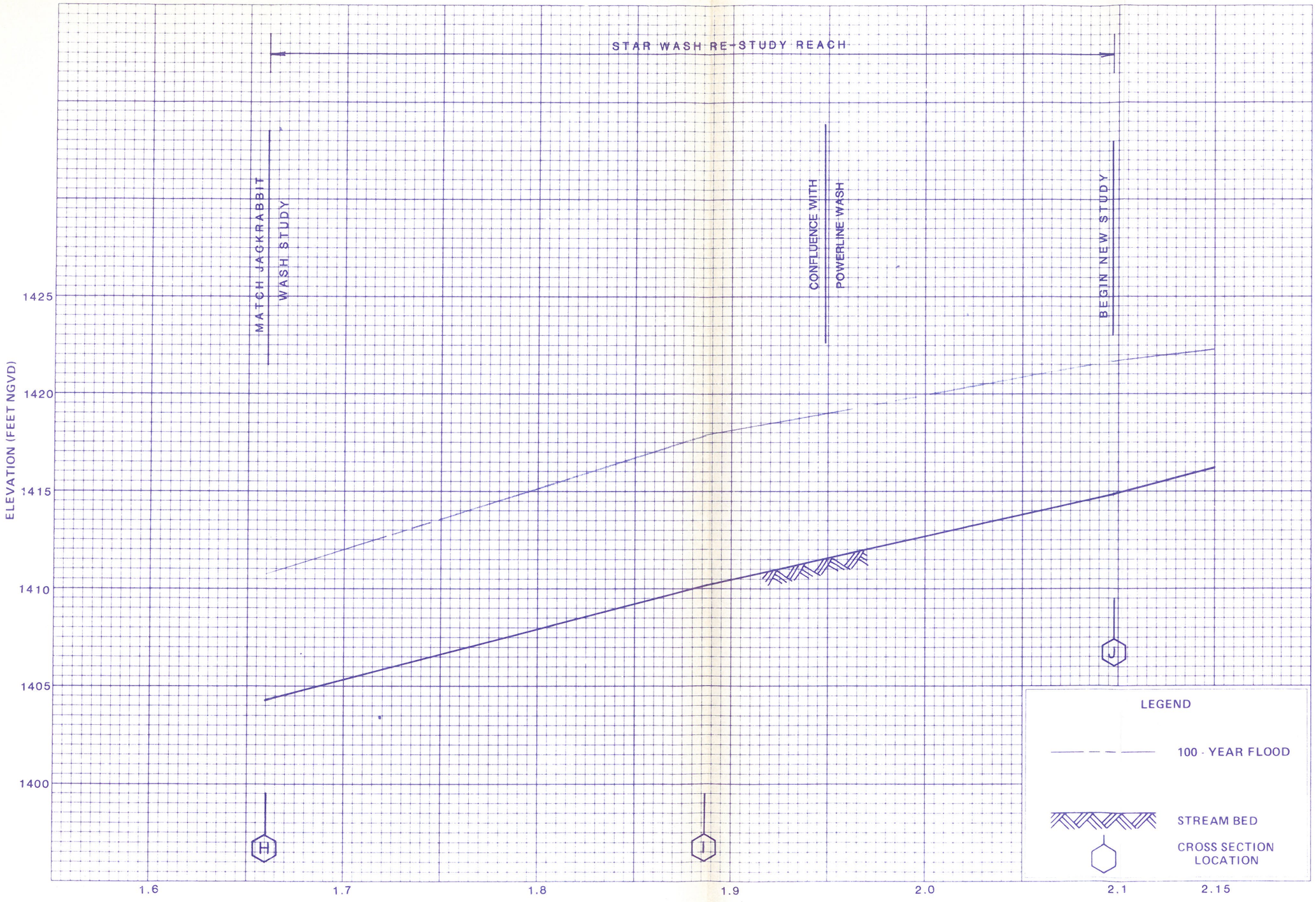
LEGEND

ELEVATION REFERENCE MARKS

NOTE: All Elevations Are Based on National Geodetic Vertical Datum of 1929

I.D. NUMBER	ELEVATION (FT.)	DESCRIPTION/LOCATION
ERM #25	1606.54	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a 1"x2"x12" Stake approximately 0.17' above ground located approximately 300' east of the northeast corner of section 4, T4N, R5W.
ERM #26	1612.12	This station is located approximately 20 +/- miles south of Wickenburg on the Vulture Mine Road to the intersection of Aguila Road, then south on Vulture Mine Road 4 1/2 +/- miles to a fence and cattle guard, take track road east along south side of fence. This mark is a 1/2" Rebar approximately 0.11' above ground located near approximately north 1/4 section 3, T4N, R5W.

EXHIBIT 1
FLOOD PROFILES



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH JACKRABBIT WASH

FLOOD PROFILES

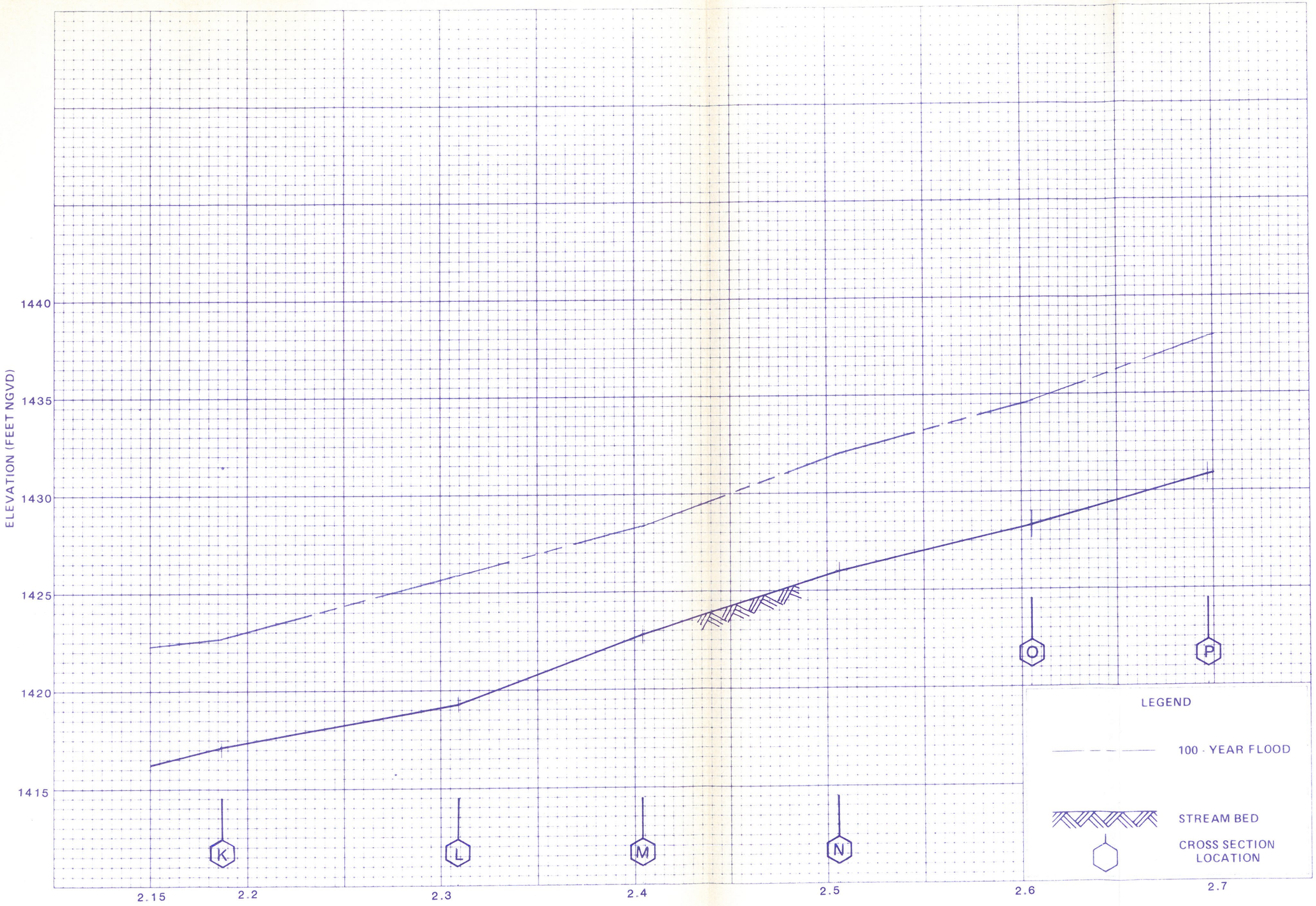
STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

01P



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH JACKRABBIT WASH

FLOOD PROFILES

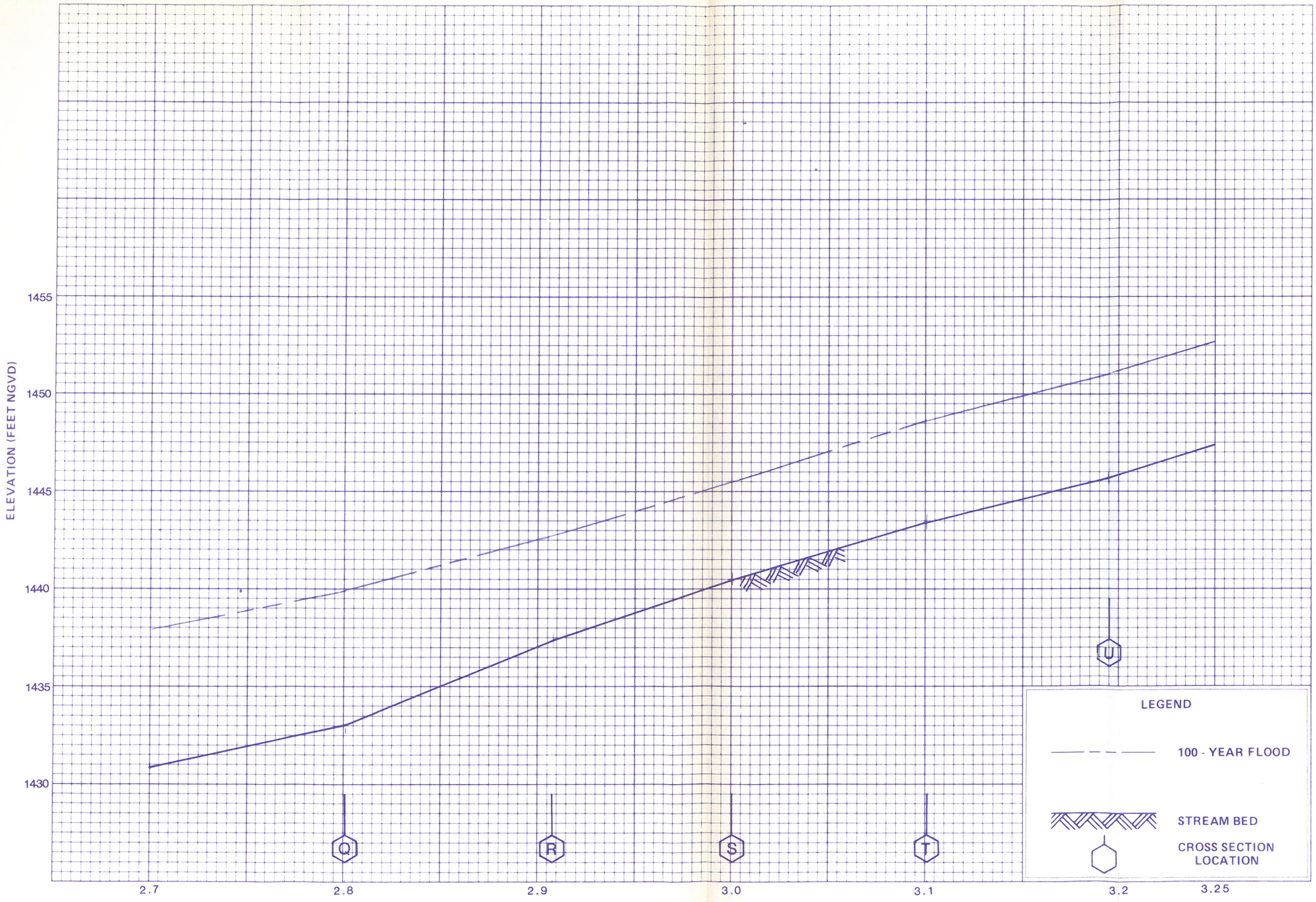
STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

02P



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH JACKRABBIT WASH

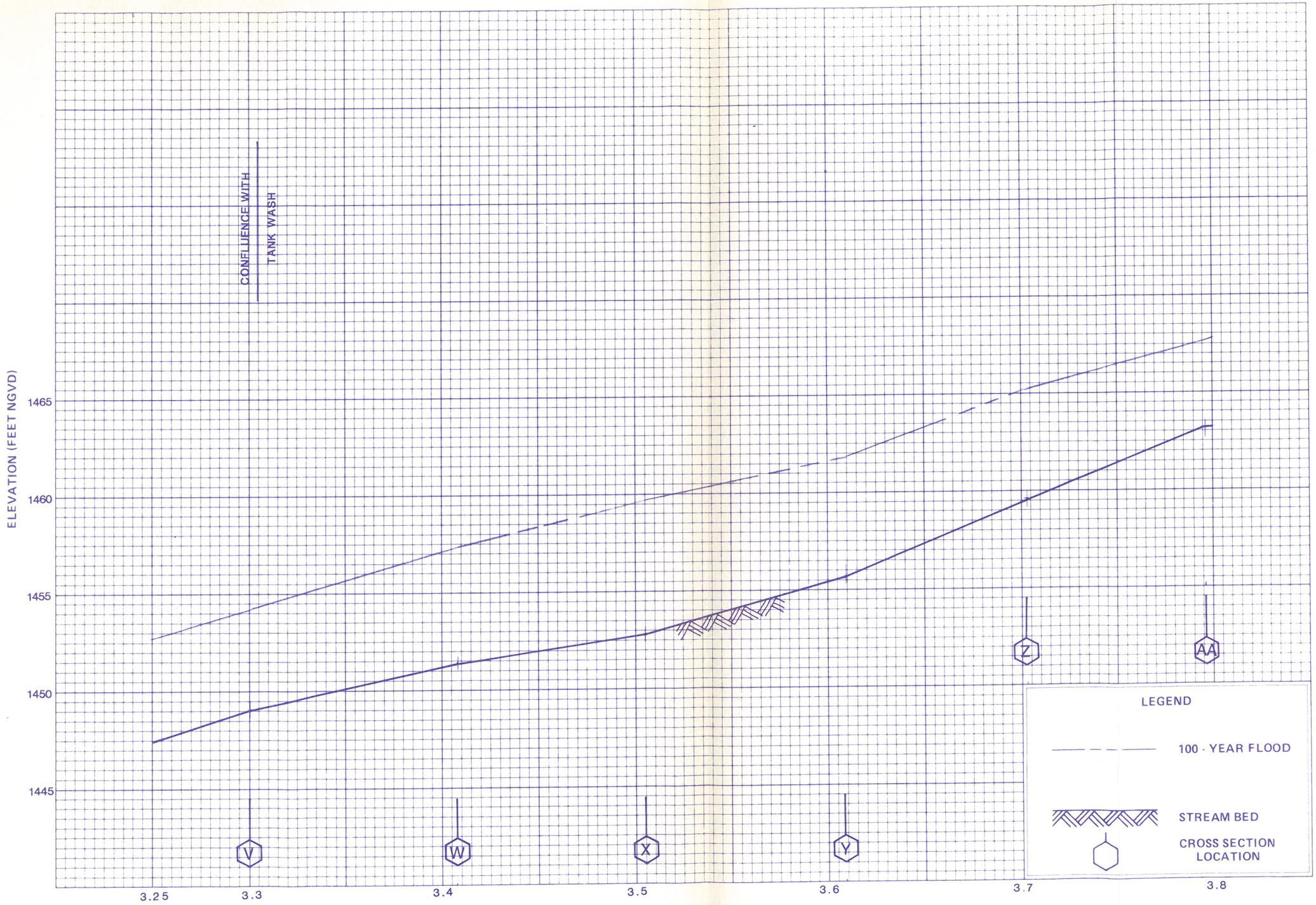
FLOOD PROFILES

STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

03P



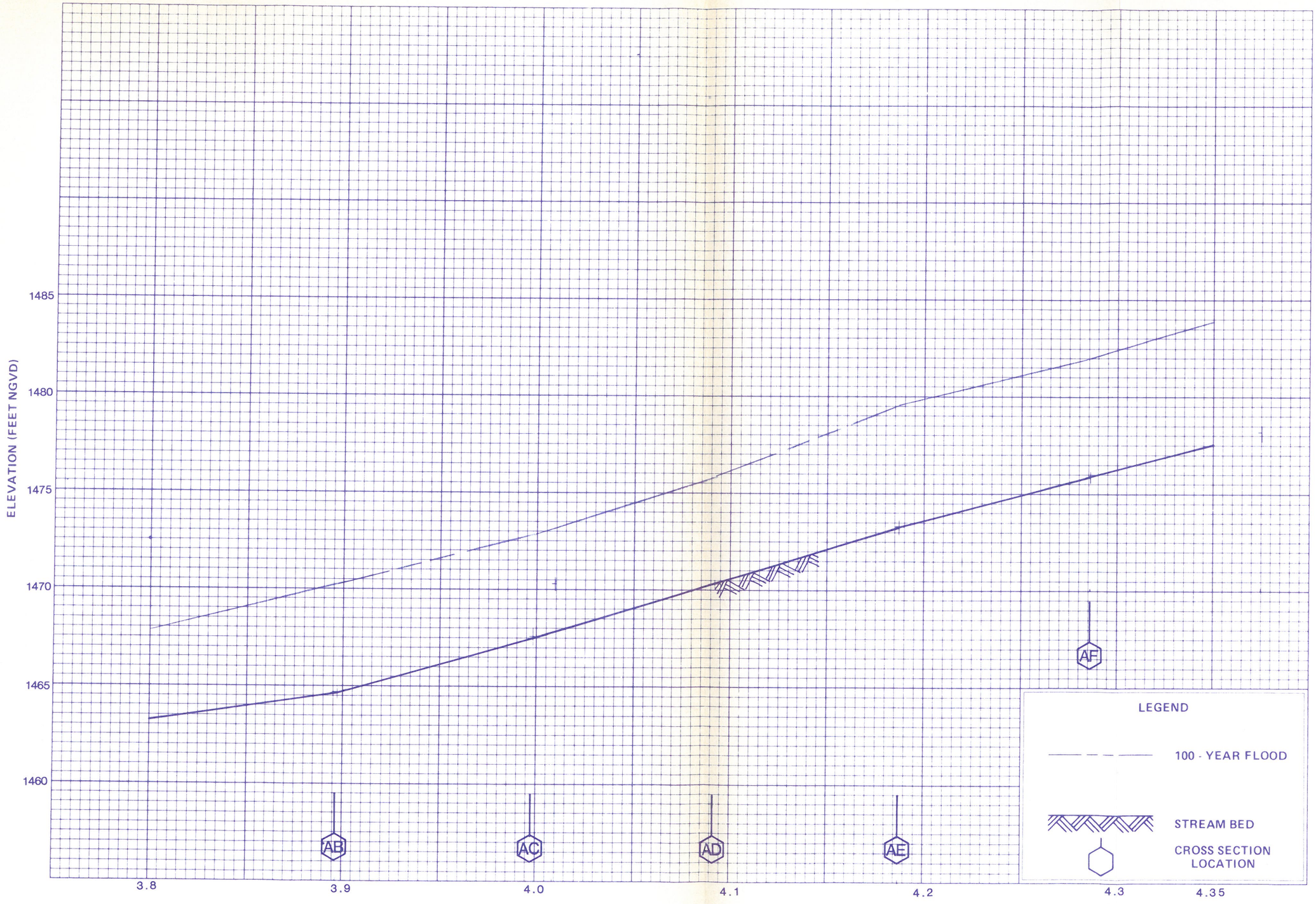
STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH JACKRABBIT WASH

FLOOD PROFILES

STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)



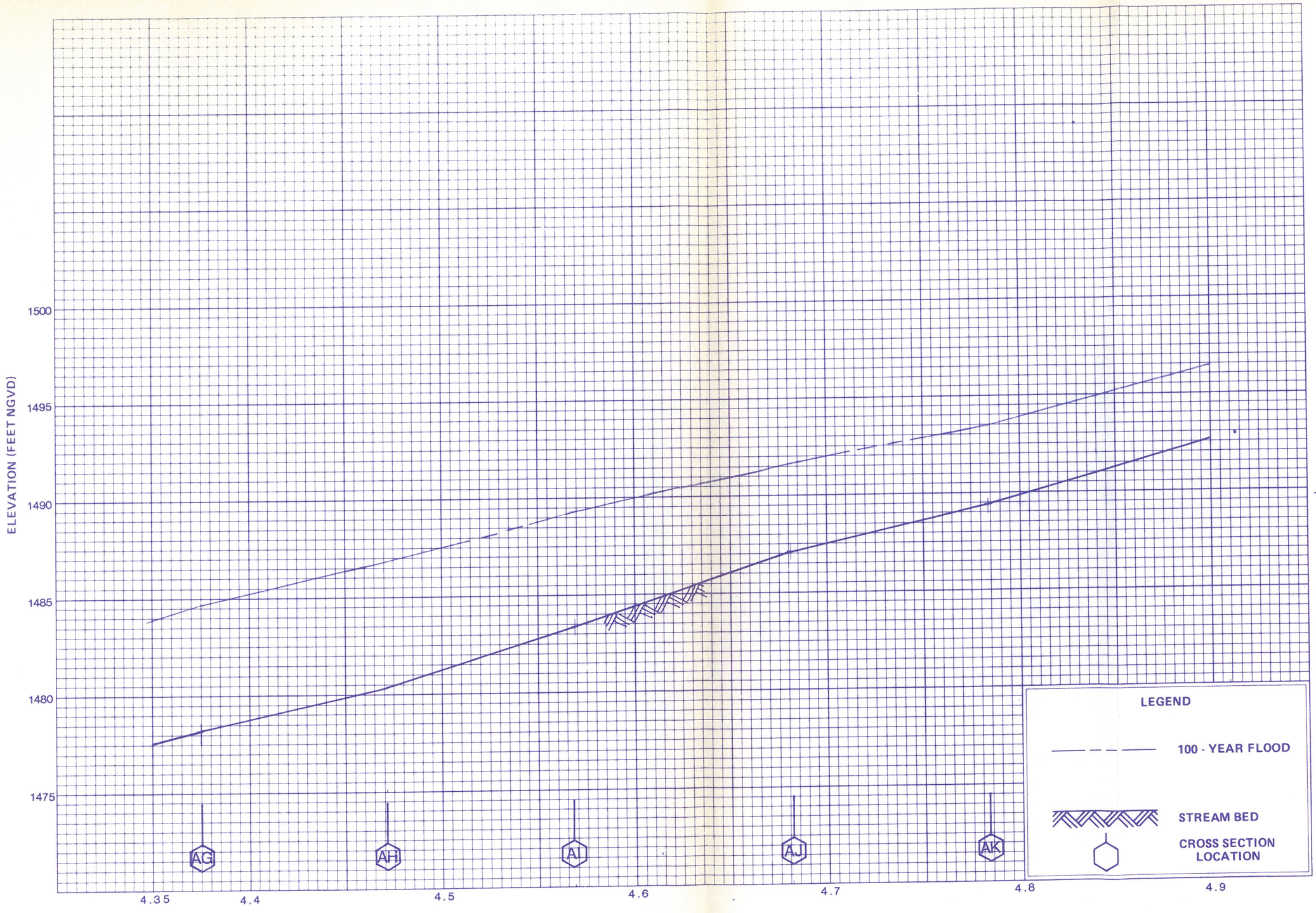
FLOOD PROFILES

STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH JACKRABBIT WASH

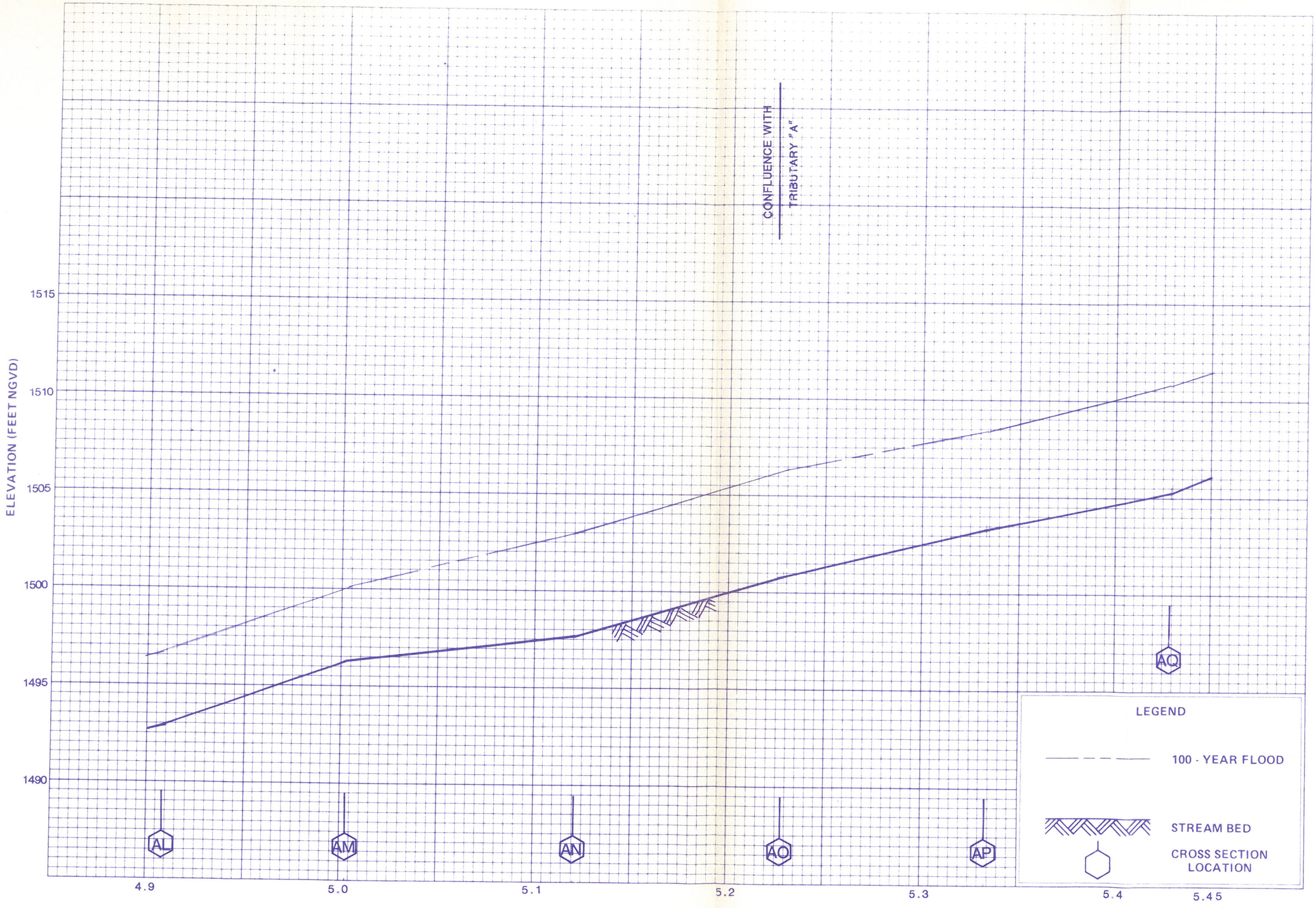
FLOOD PROFILES

STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

06P



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH JACKRABBIT WASH

FLOOD PROFILES

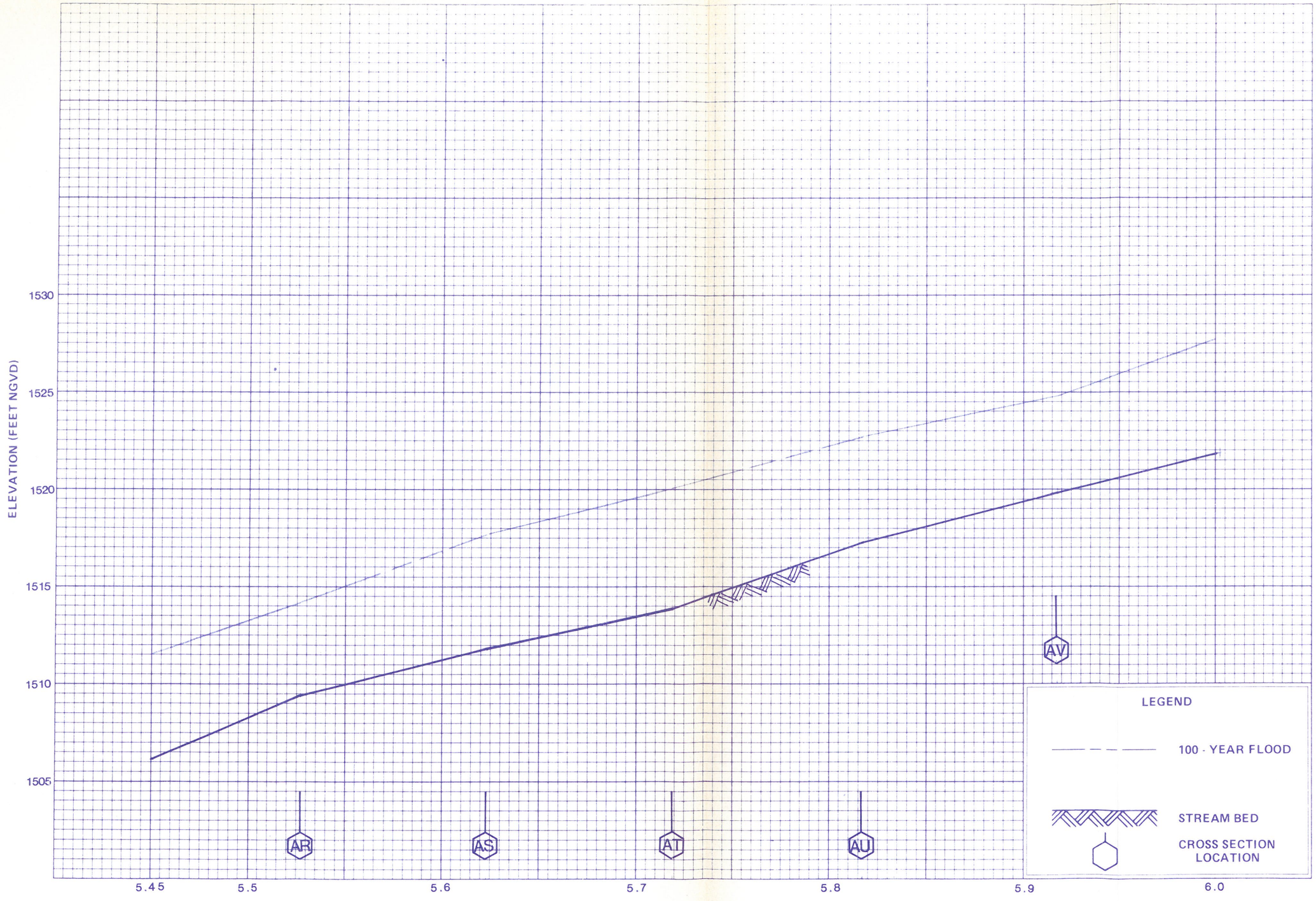
STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

07P



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH JACKRABBIT WASH

FLOOD PROFILES

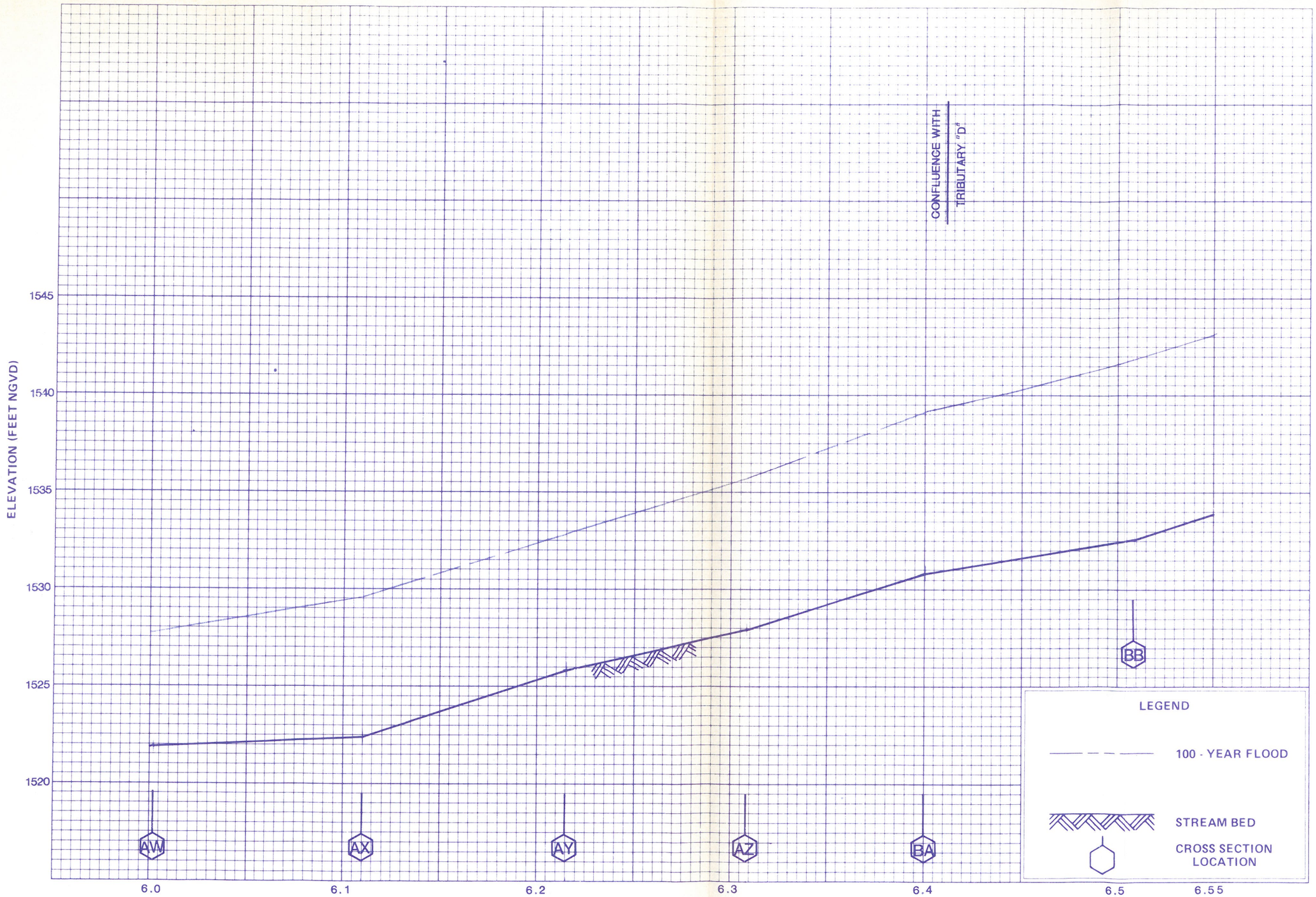
STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

08P



FLOOD PROFILES

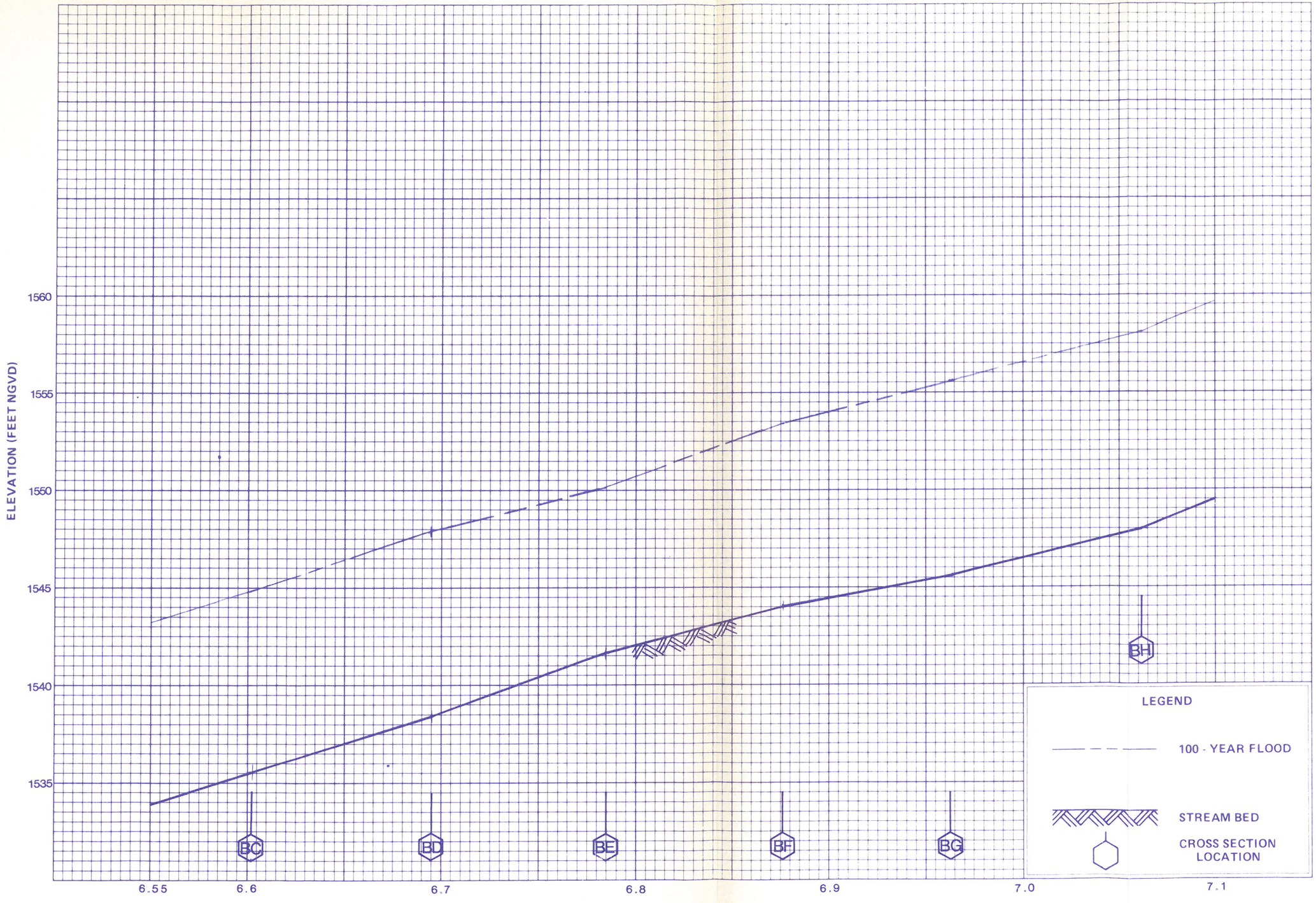
STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

09P



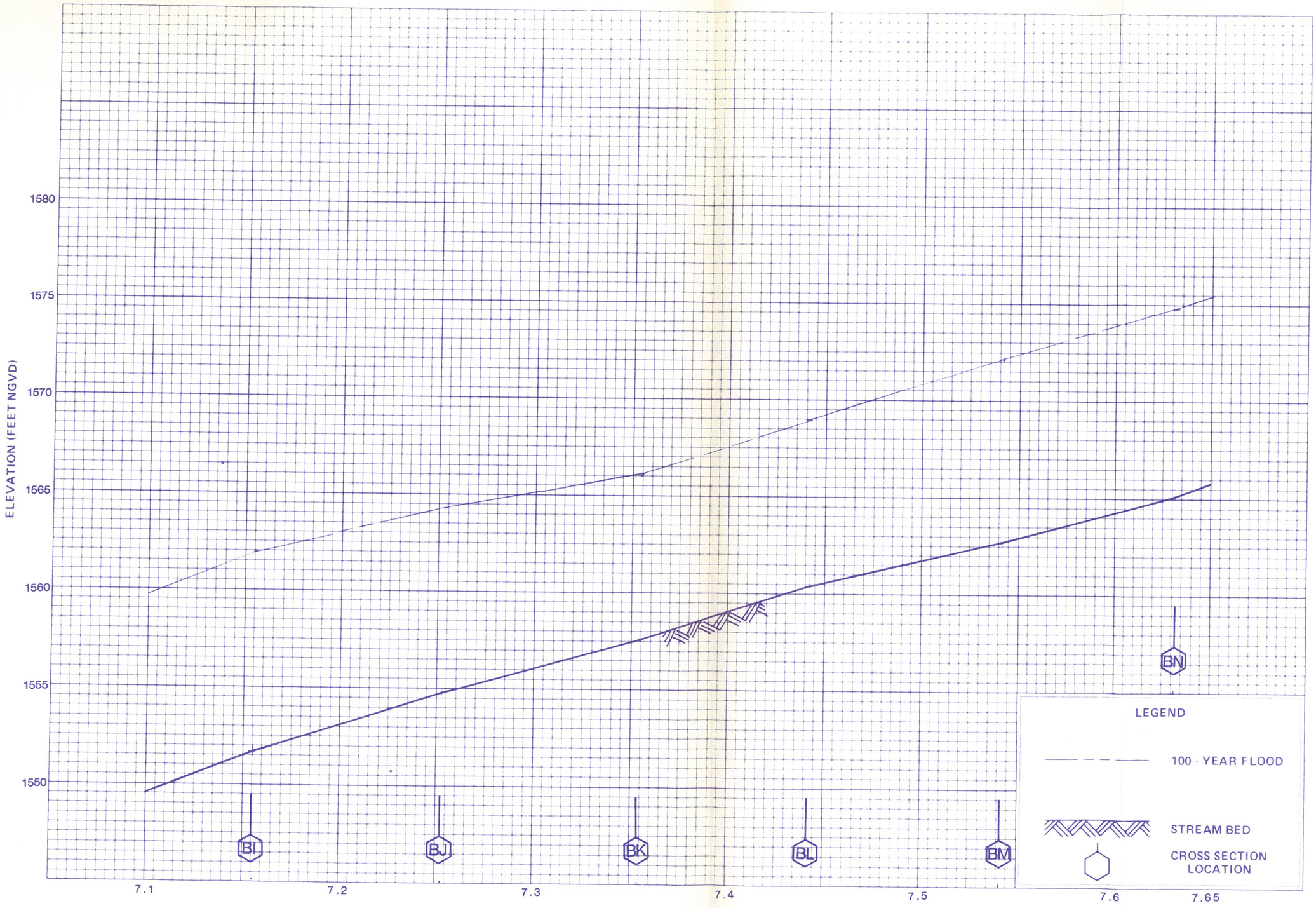
FLOOD PROFILES

STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH JACKRABBIT WASH

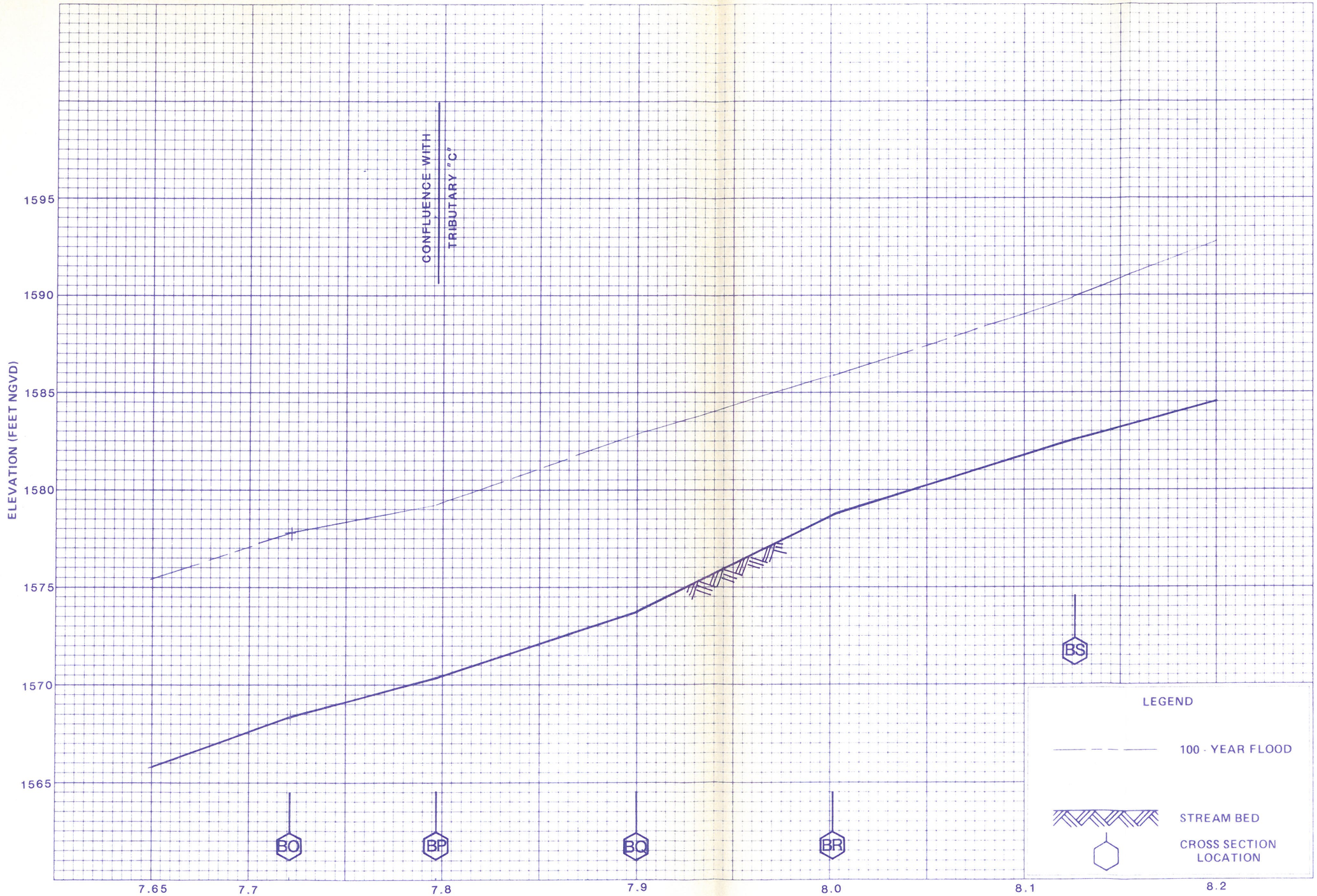
FLOOD PROFILES

STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)



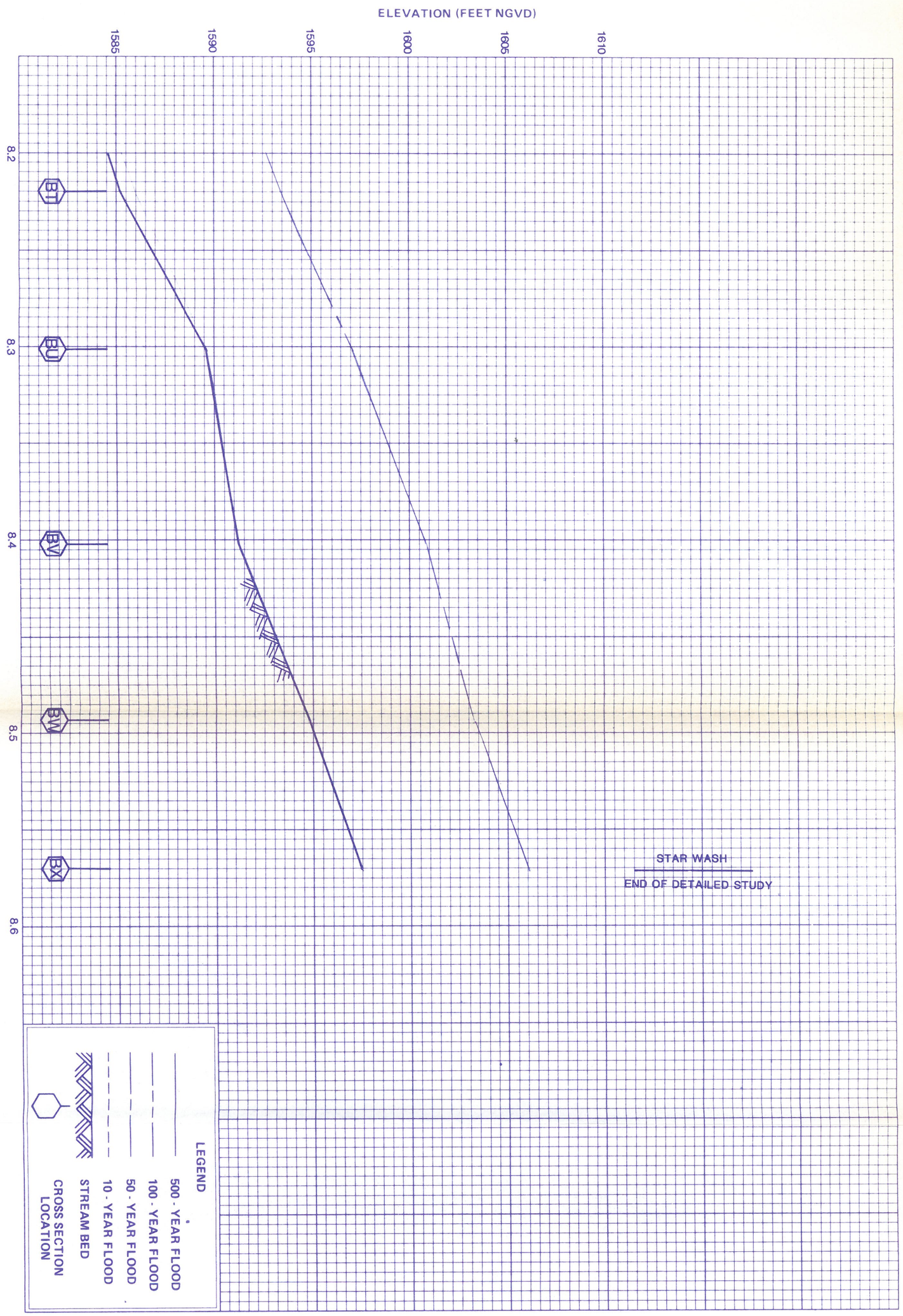
FLOOD PROFILES

STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

12P



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH JACKRABBIT WASH

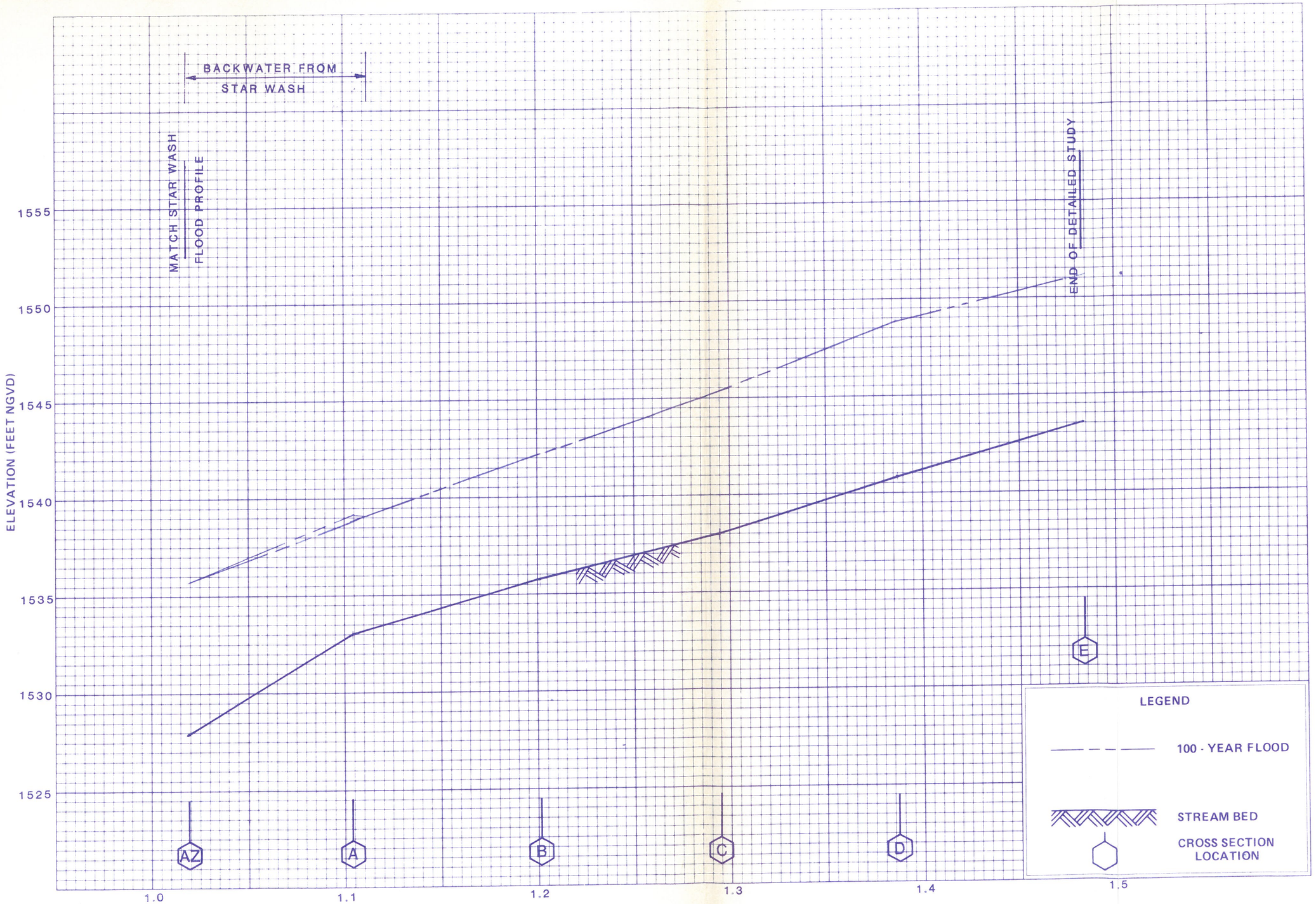
13P

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOOD PROFILES

STAR WASH



FLOOD PROFILES

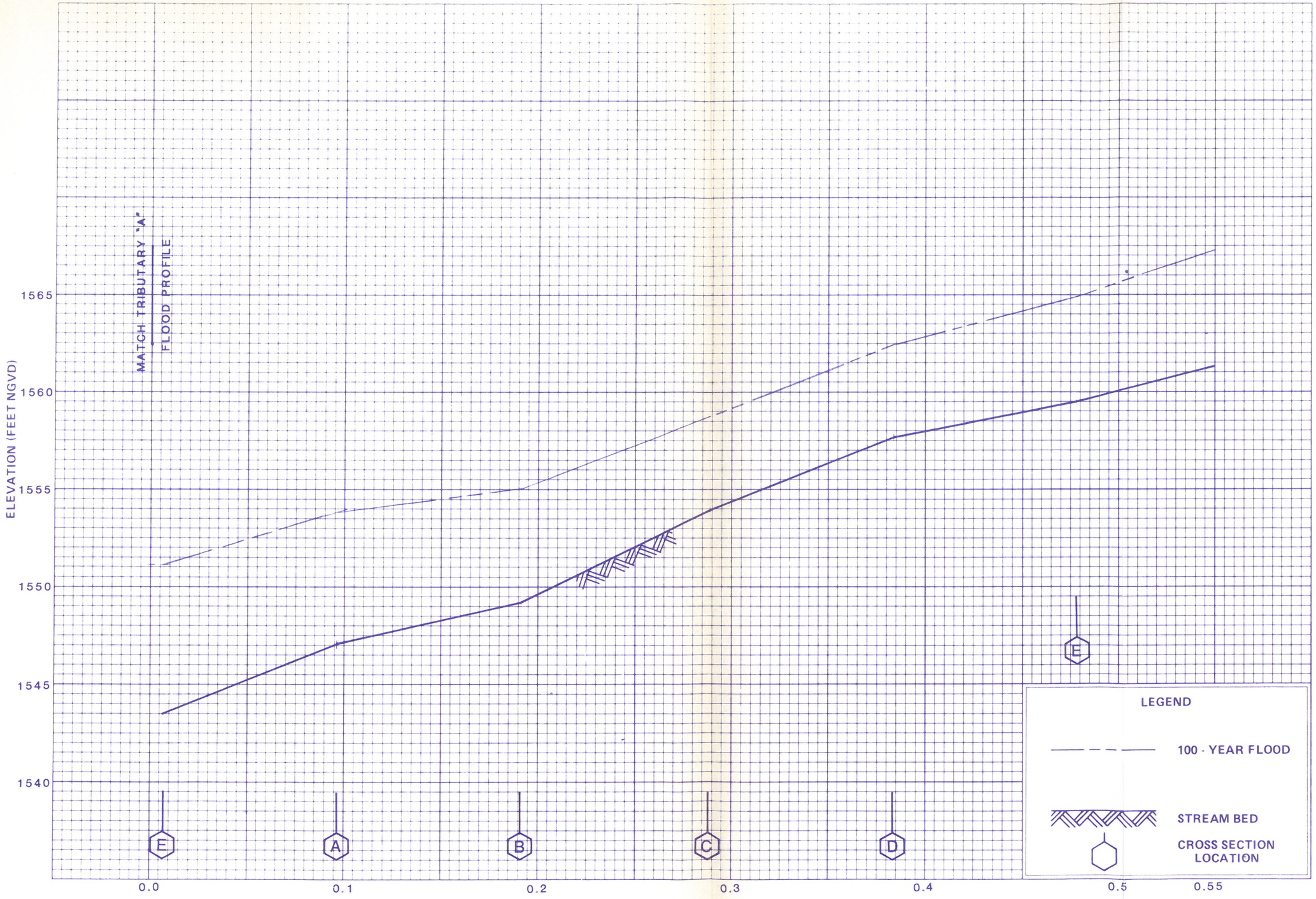
TRIBUTARY "A"

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

01P



FLOOD PROFILES

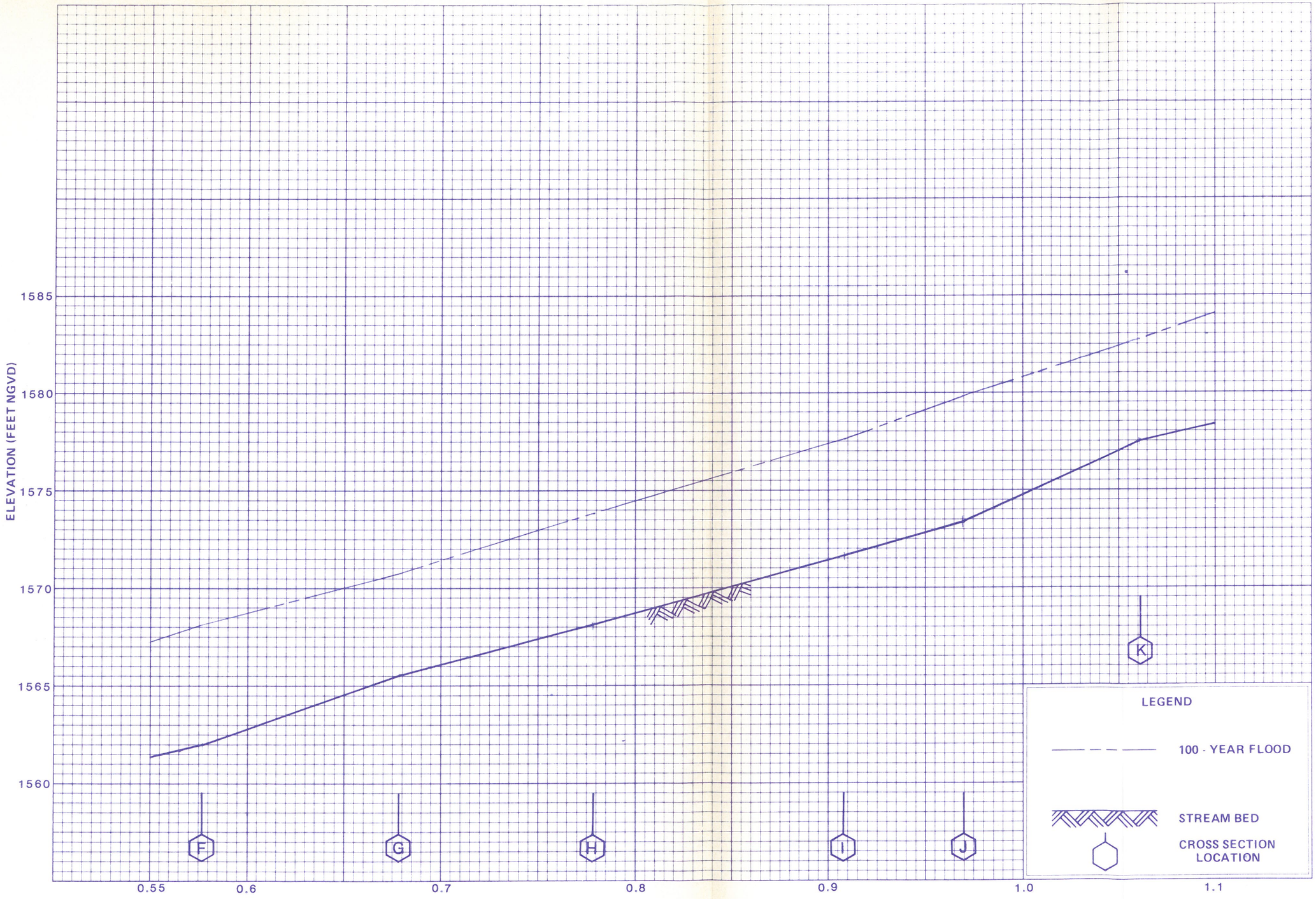
TRIBUTARY "B"

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

01P



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH STAR WASH

FLOOD PROFILES

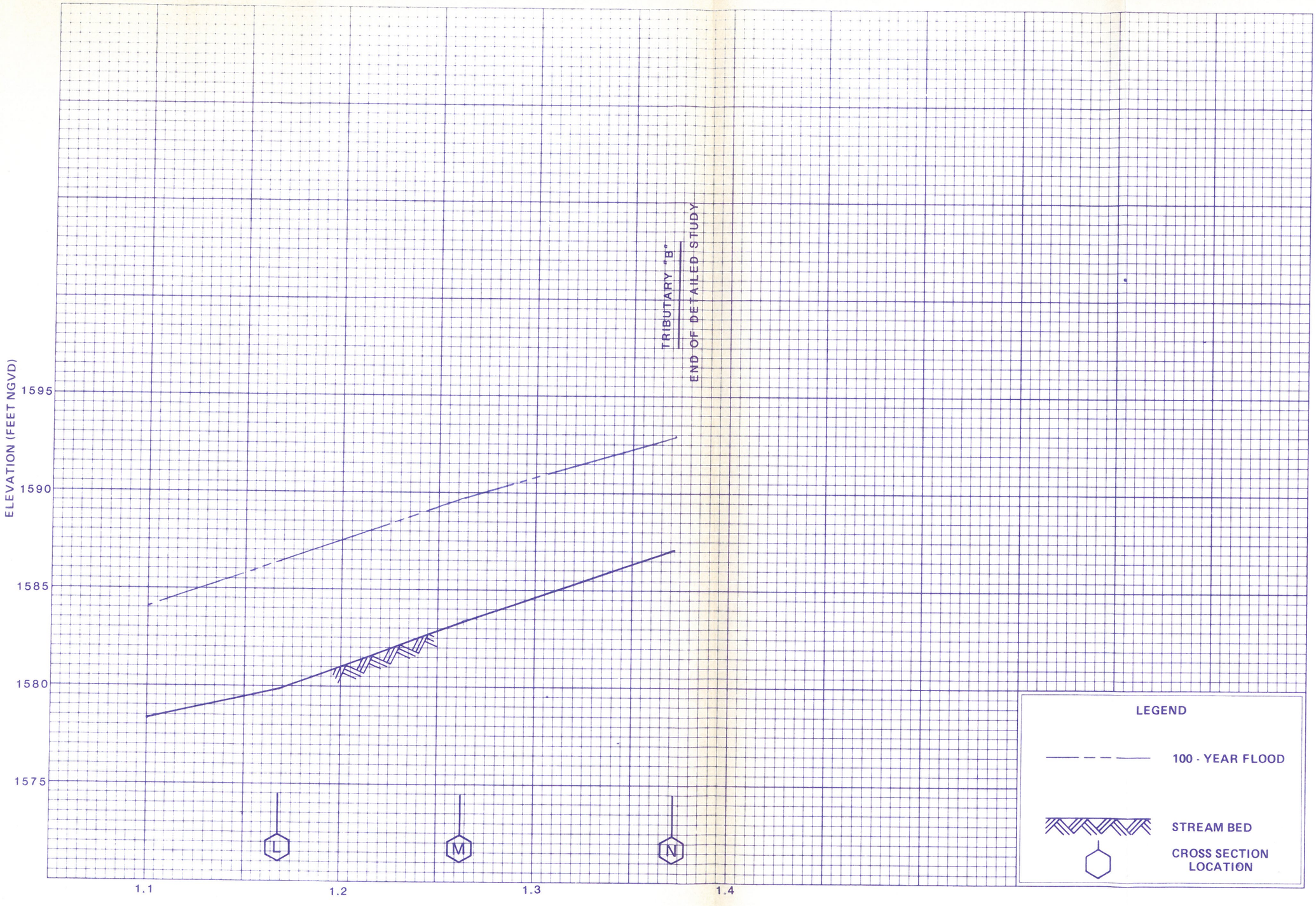
TRIBUTARY "B"

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

02P



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH STAR WASH

FLOOD PROFILES

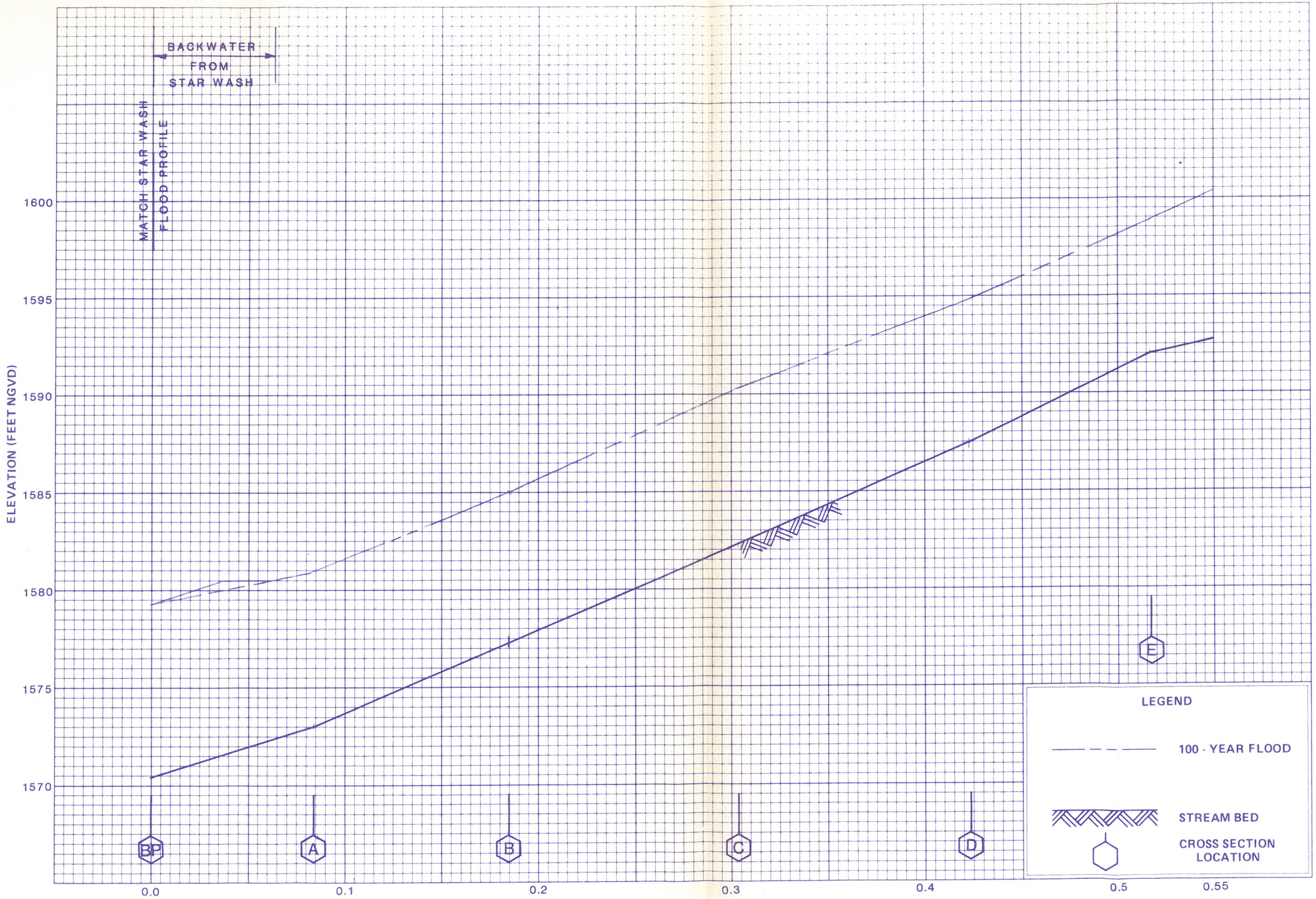
TRIBUTARY "B"

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

03P



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH STAR WASH

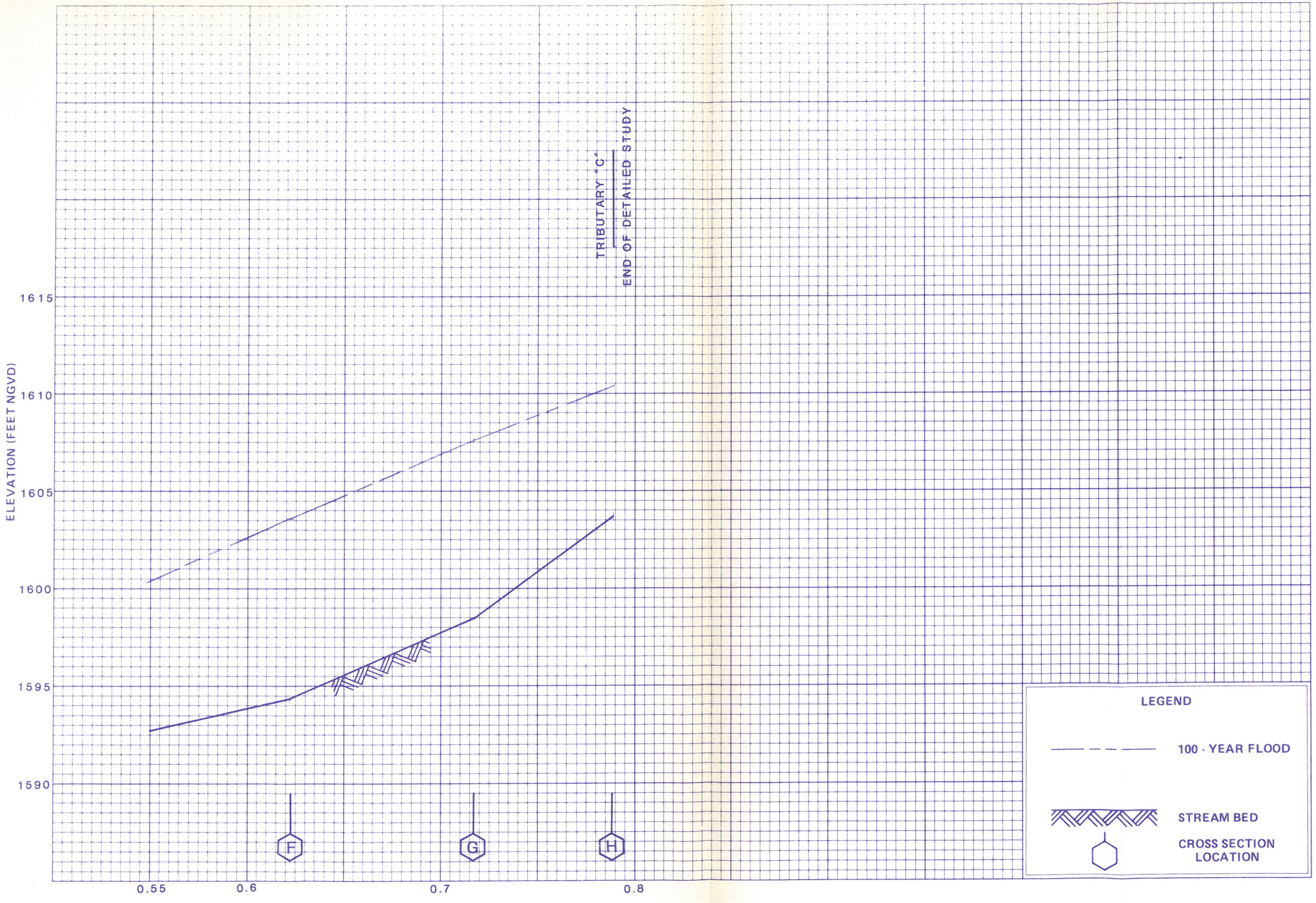
FLOOD PROFILES

TRIBUTARY "C"

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

01P



FLOOD PROFILES

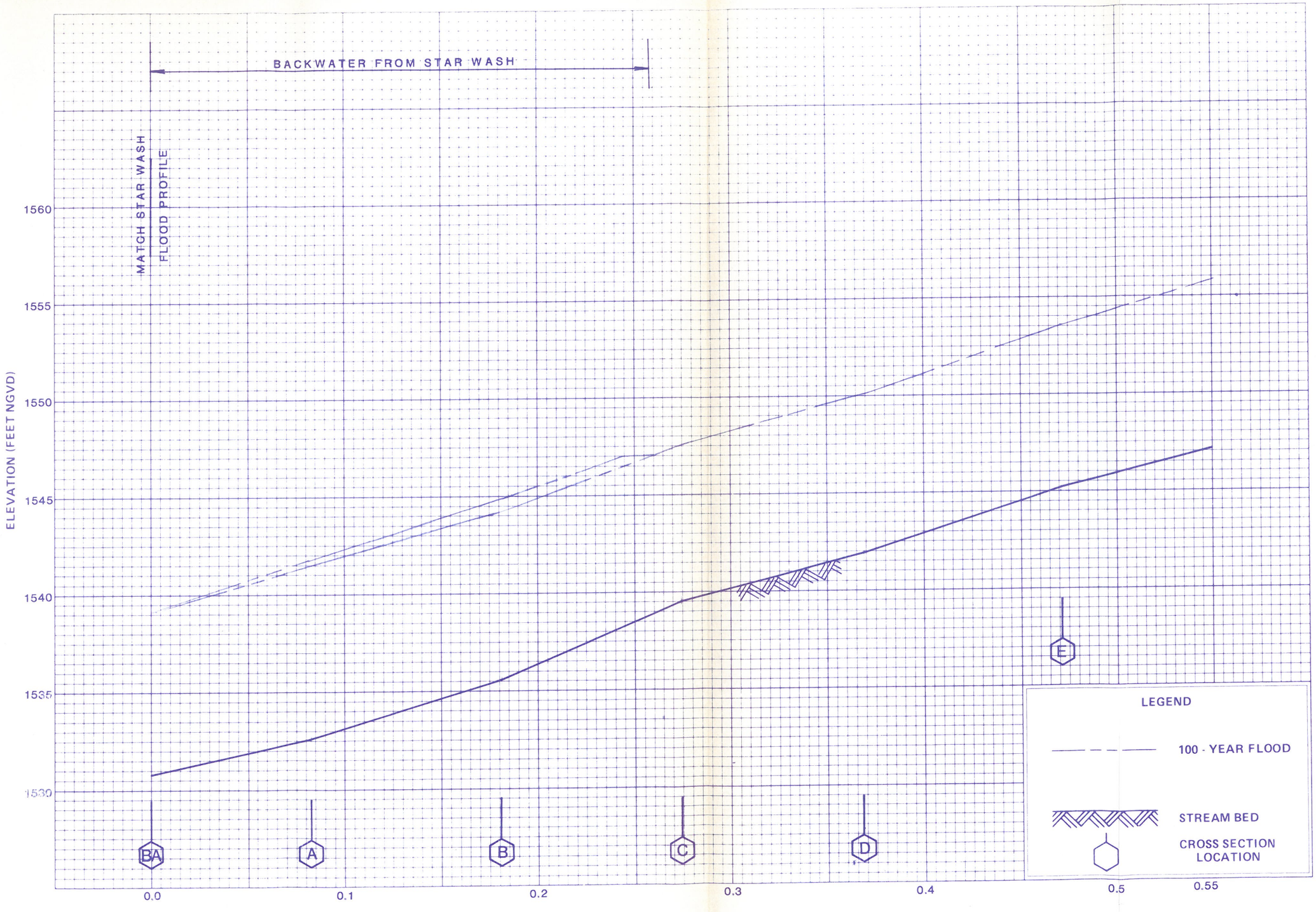
TRIBUTARY "C"

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

02P



FLOOD PROFILES

TRIBUTARY "D"

FEDERAL EMERGENCY MANAGEMENT AGENCY

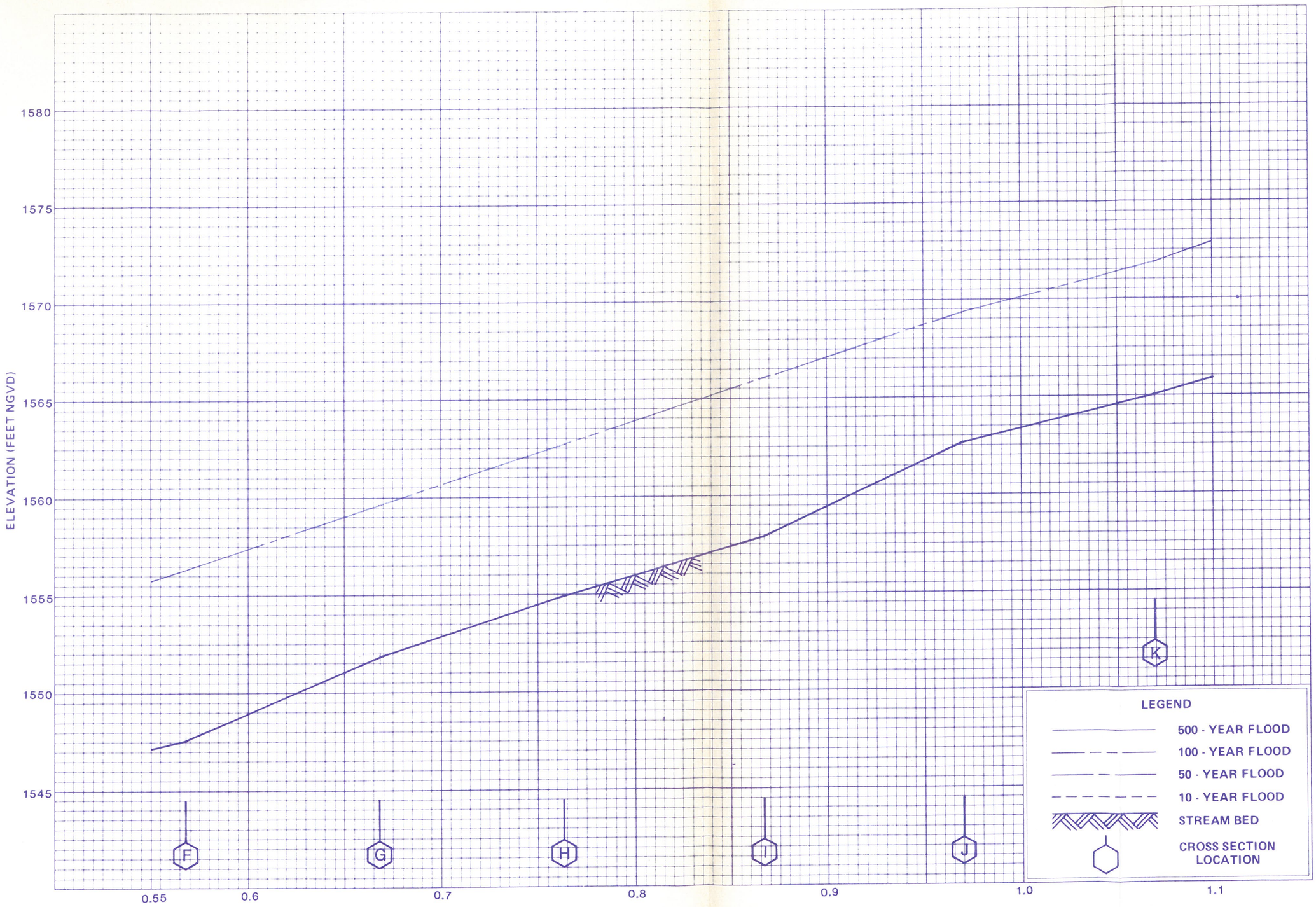
MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

01P

FLOOD PROFILES

TRIBUTARY "D"



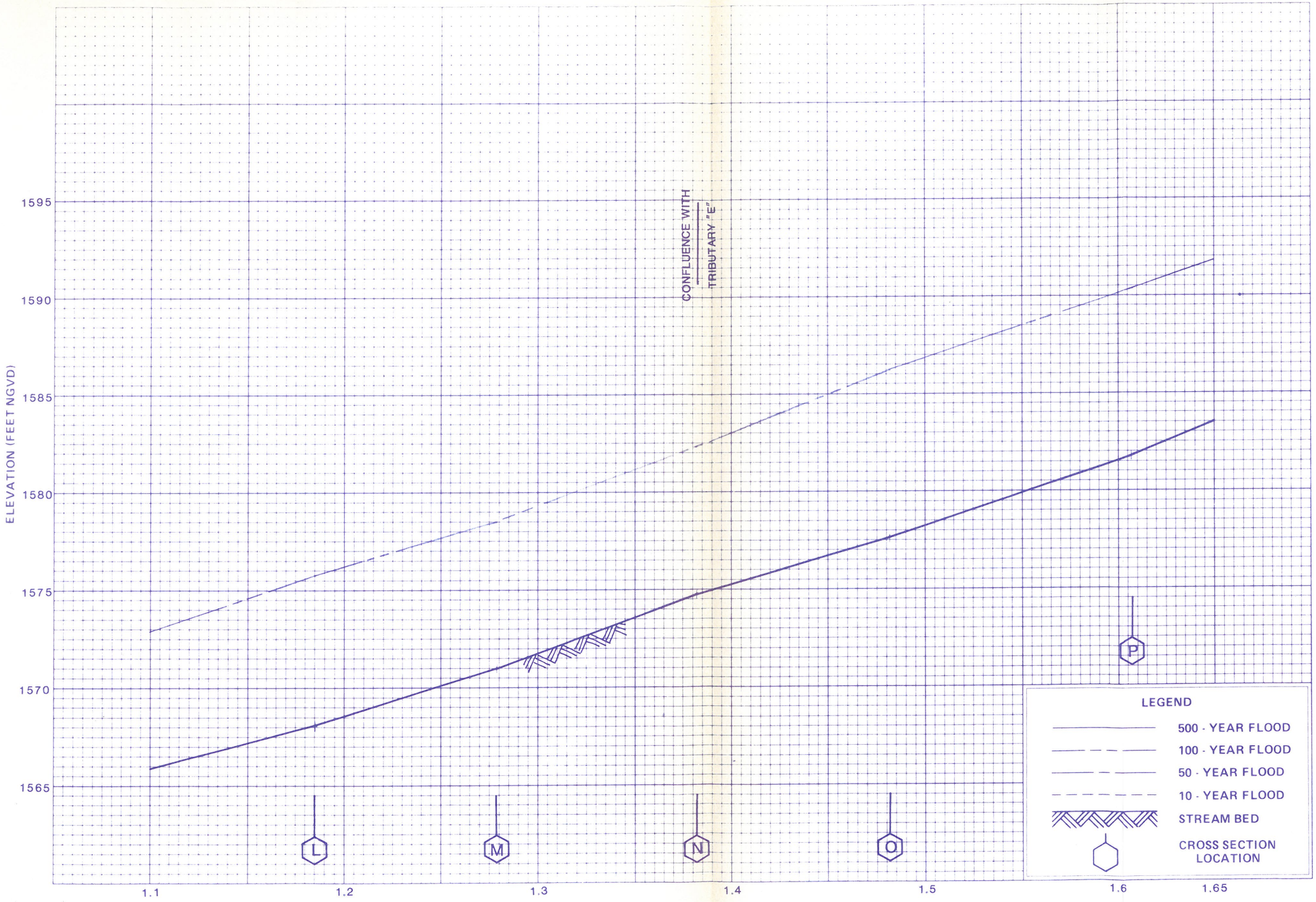
STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH STAR WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

02P



FLOOD PROFILES

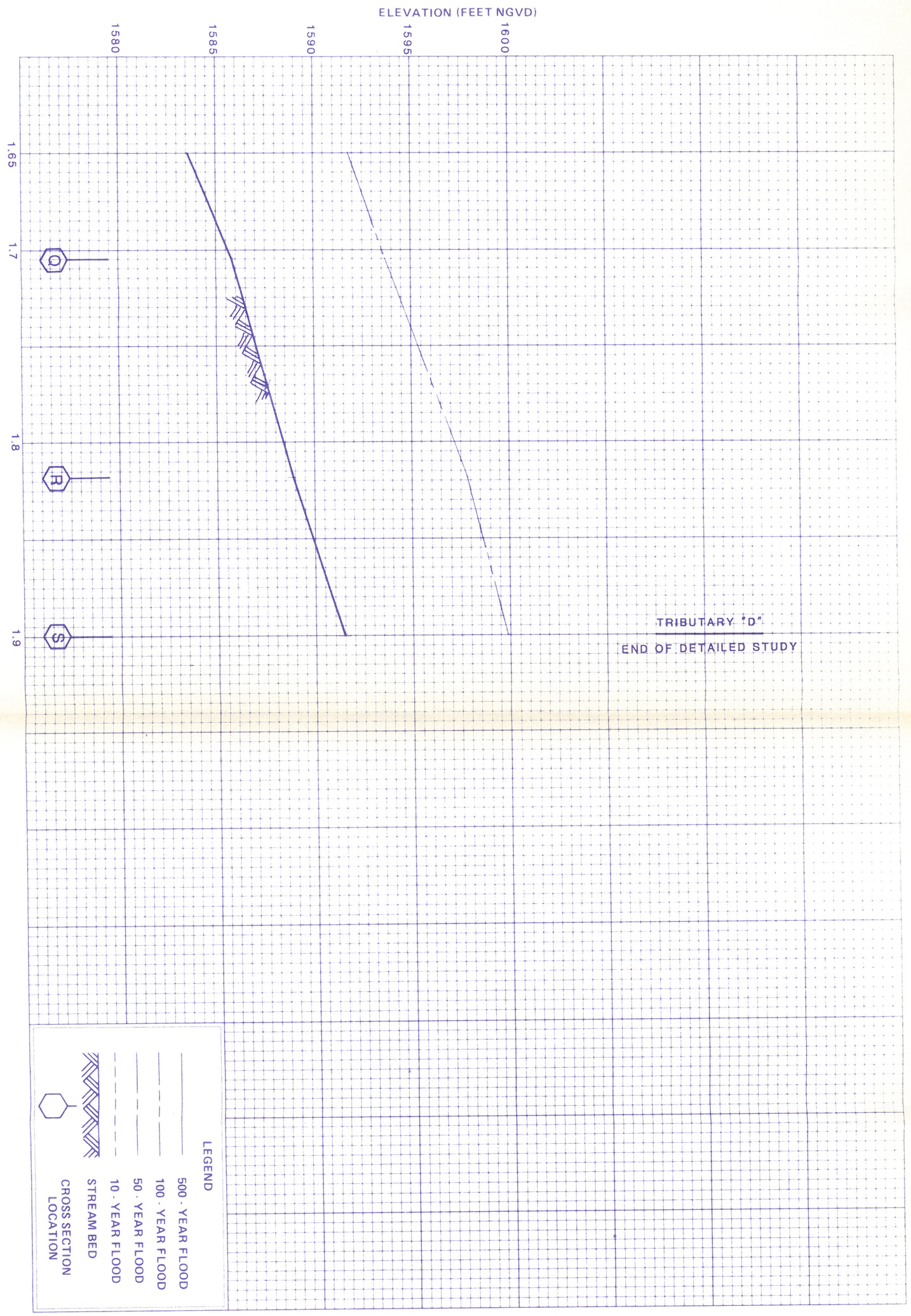
TRIBUTARY "D"

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

03P



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH STAR WASH

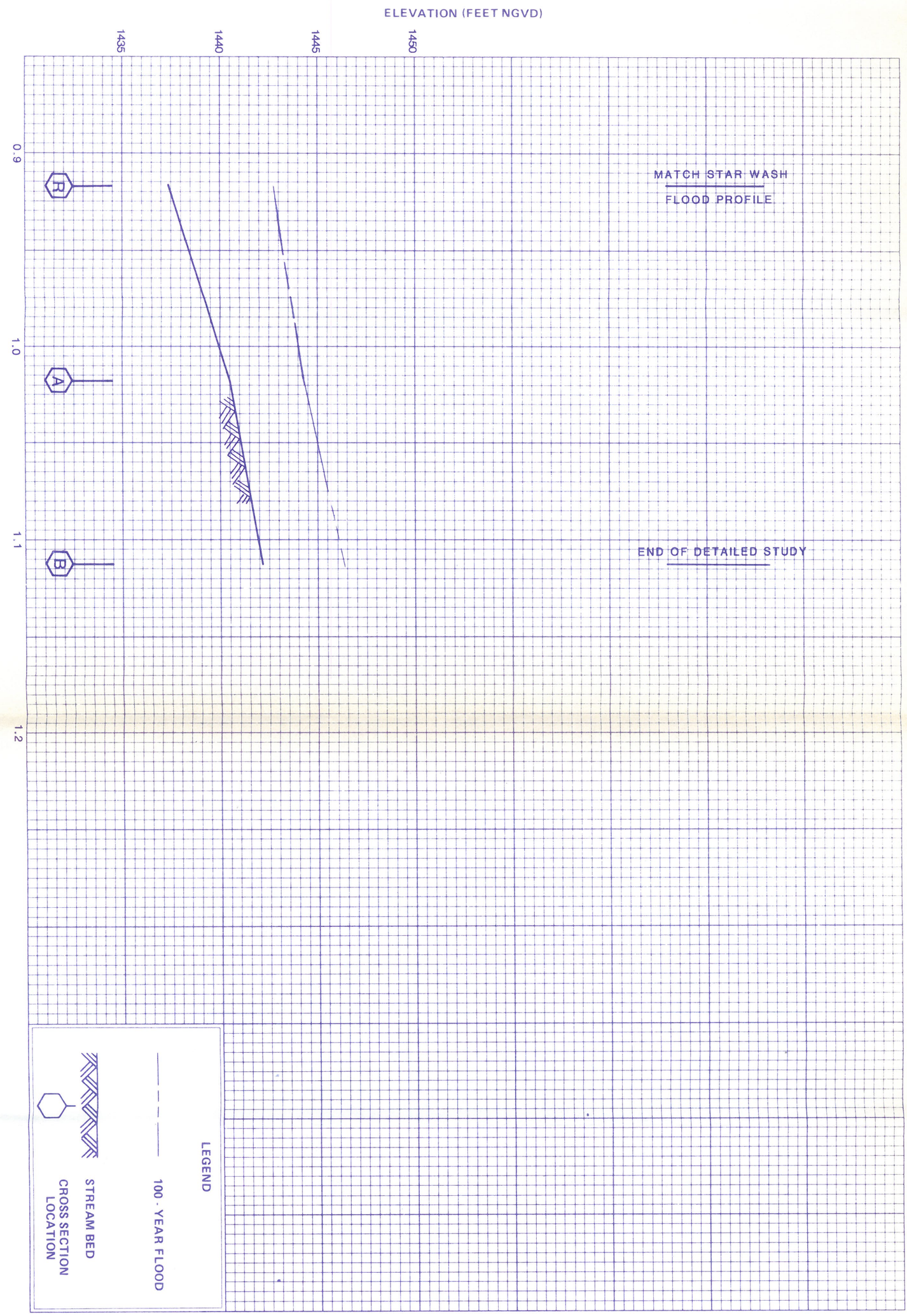
04P

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOOD PROFILES

TRIBUTARY "D"



STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH STAR WASH

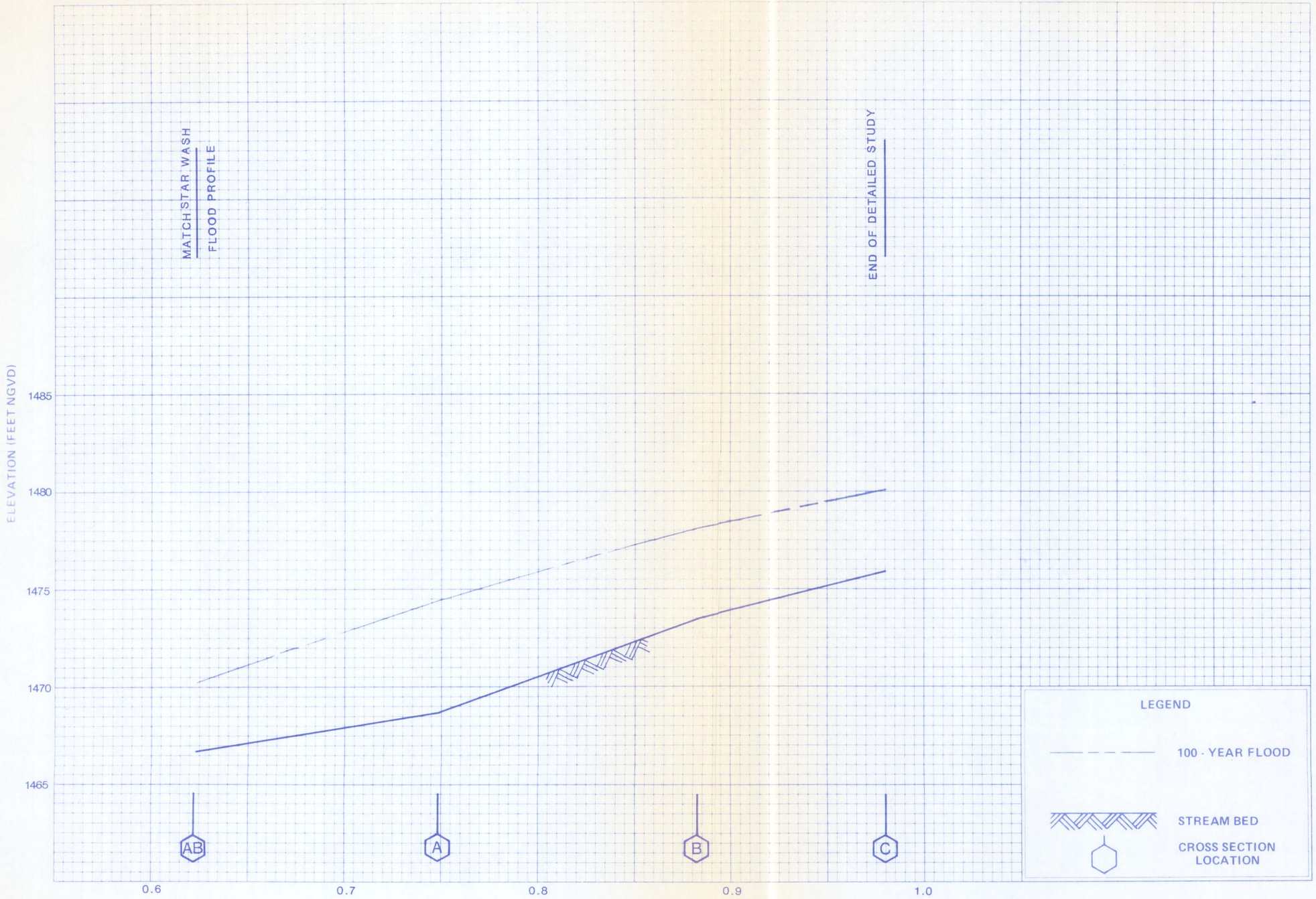
01P

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
(UNINCORPORATED AREAS)

FLOOD PROFILES

POWERLINE WASH



FLOOD PROFILES

TANK WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

(UNINCORPORATED AREAS)

01P

SECTION 1: GENERAL DOCUMENTATION AND CORRESPONDENCE

SECTION 1: GENERAL DOCUMENTATION AND CORRESPONDENCE

1.2 Contact (Telephone) Reports

Community:	Maricopa County, Arizona
NFIP Community Number:	040037
County:	Maricopa
State:	Arizona
Date Study Accepted by FEMA:	Pending
Study Contractor:	**Wood, Patel & Associates, Inc.** 1550 East Missouri, Suite 203 Phoenix, Arizona 85014 **Contact: Ashok C. Patel, P.E., R.L.S.** (602) 234-1344 Fax: (602) 234-1322 FCD Contract 92-06 **Subconsultants:** Aerial Mapping Co., Inc. GIS Consultants of Arizona, Ltd. Project Engineering Consultants, Ltd.
FEMA Technical Reviewer:	Pending
FEMA Regional Reviewer:	Pending
State Reviewer:	Ms. Terri Miller (602) 542-1541
Local Reviewer:	Mr. Pedro Calza, Ms. Cathy Regester (602) 506-1501
River or Stream Name:	• Star Wash • Powerline Wash • Tank Wash • Tributaries "A", "B", "C", "D", & "E" of Star Wash
Reach Description:	The following areas are included on FIRM Panel Number 1075.
Study Type:	Star Wash, Powerline Wash, Tank Wash and Tributaries "A", "B", "C", & "D": detailed riverine using HEC-2. Tributary "E", breakout areas of Star Wash and portions of Tributaries "A", "B" and "D": using approximate methods.

WOOD / PATEL
ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors

COMMUNICATION RECORD

(602) 957-3149
FAX 955-3765

COMPANY FCDMC
NAME Cathy Regester
ADDRESS
PHONE 506-4770

JOB # 92916.00
PROJECT Star Wash FPD
SUBJECT Confluences of Powerline & Tank Wash
DATE 4/14/93

☐ MEETING ☒ CONVERSATION ☐ MEMO

Issue of starting water surface for Powerline & Tank washes is being discussed since 4/7/93.

Scott Buchanan from Stanley Consultant has submitted revised HEC-2 for the confluence area with normal depth condition.

Cathy reviewed that work in light of FEMA 37 requirements and concluded that Wood/Patel should use normal depth for starting water surfaces for these washes.

Stanley's floodplain/floodway work is acceptable & will be incorporated within Wood/Patel's package.

PLEASE REPORT ANY DISCREPANCY OR OMISSION

FROM

W 104888

COMMUNICATION RECORD

DATE:	**MARCH 22, 1993**
SUBJECT:	**THE HANDLING OF FLOODWAY IN THE CONFLUENCE AREAS & MINOR BREAKOUTS**
CONTACT NAME:	**CATHY REGESTER, (FCDMC)**
CONTACT PHONE NO:	**506-4770**
JOB #:	**92916.00**
CONTACTED BY:	**ASH PATEL**

The approach Wood/Patel has taken is a standard procedure for non-coincidental flow condition using FEMA 37.

For the next submittal, provide HEC-2 analysis on a computer floppy, no hard printout is necessary. However, provide cross-section plots because it helps in reviewing the HEC-2 work. As far as the report preparation, it was reiterated that a technical data notebook using ADRW guidelines need to be prepared.

In the condition where the breakout flow occurs, the flow may become Zone "A" or Zone "X". This item needs to be discussed in a section called the "Special Problem Report" section.

A question was raised that for an isolated location, if minor flow may breaks out because the computed elevation is higher than one of the bank ground elevations. How can this area be treated? In response to this question, it was answered by Baker that an estimate should be made as to the quantity of flow breaking out. Once this is determined, then some approximate substantiation can be made as to what happens to the breakout flow. For example, when the breakout flow of say 100 cfs leaves the breakout area from the main wash, might become a sheet flow of less than one (1) foot. A special case like this can be documented with comment cards with HEC-2.

In a previous letter dated January 19, 1993, the District had recommended that instead of labeling tributary with letter designation, a real name should be given for two tributaries, if possible. It was indicated by Wood/Patel that a large portion of work has already been done during the Preliminary & Prefinal Stages utilized the letter designation for the washes. Additionally, the "n" Value Report which was completed January, 1993, also utilized the letter designations. To not create any confusion for future reviews, it was requested that we continue using the letter designation for all tributaries. Ms. Regester approved the use of letter designation.

COMMUNICATION RECORD

DATE:	**MARCH 17, 1993**
SUBJECT:	**SPLIT FLOW ON STAR WASH**
CONTACT NAME:	**CATHY REGESTER, (FCDMC)**
CONTACT PHONE NO:	**506-4770**
JOB #:	**92916.00**
CONTACTED BY:	**ASH PATEL**

Ms. Regester called from Atlanta, Georgia where she had a discussion with individuals from Baker Engineers. Dave Greenwood had sent information to Baker's office to get input from Ernest Lepore. The discussion was primarily regarding the split flow on Star Wash. Currently, 3,700 cfs out of 10,700 cfs total flow breaks out along the west overbank, thereby, creating an approximate flood Zone "A". Input was sought from Baker as to how this condition can be modeled for the floodway modeling purpose. Because this entire mapping area is owned by one owner, it was strongly believed that putting the entire flow into the floodway of the main wash and blocking any breakout flow may be the appropriate thing to do. Baker has given their comments for floodway modeling purposes. Use 10,700 cfs for the main wash floodway for Star Wash.

This same logic can be applied in other similar locations where breakout occurs.

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COMMUNICATION RECORD

DATE:	**MARCH 2, 1993**
SUBJECT:	**FLOODWAY ENCROACHMENTS FOR STAR WASH**
CONTACT NAME:	**CATHY REGESTER, (FCDMC)**
CONTACT PHONE NO:	**506-4770**
JOB #:	**92916.00**
CONTACTED BY:	**ASH PATEL**

Cathy called to inquire about the floodway encroachment for Star Wash and amount of rise and water surface due to encroachments. Ms. Regester indicated that we should try to increase the encroached flood elevation to one (1) foot above BFE, particularly within the reach of Star Wash in between Tank Wash and Powerline Wash. Several reasons were given by Wood/Patel for not obtaining a one (1) foot rise in this subject area:

1. Star Wash main channel is at the easterly portion of the wash cross-section. If you use Encroachment Method #4 with equal conveyance, the rise is very limited because of limited conveyance on the east side of the east channel bank. A small amount in rise of water surface was achieved using Encroachment Method #4.

2. The area near the confluence of Powerline and Tank Wash is being worked on by Stanley Consultants. Our office has been in continuous contact with Scott Buchanan to make sure that the confluence areas are adequately coordinated and resolved. Once the information is received from Stanley, we intend to revisit the floodway boundary lines in this area.

COMMUNICATION RECORD

DATE:	**FEBRUARY 2, 1993**
SUBJECT:	**HEC-1 ANALYSIS OUTPUT FILE**
CONTACT NAME:	**CATHY REGESTER, (FCDMC)**
CONTACT PHONE NO:	**506-4770**
JOB #:	**92916.00**
CONTACTED BY:	**ASH PATEL**

Wood/Patel requested to the District that the original HEC-1 Analysis output file be provided so that attenuated flow from the upstream point or the downstream point, can be reviewed. If there is a attenuative flow, this flow will be used in some critical locations for the tributaries. This may help in the reduction of any breakout potential.

COMMUNICATION RECORD

DATE:	**JANUARY 27, 1993**
SUBJECT:	**TRIBUTARY FLOWS**
CONTACT NAME:	**CATHY REGESTER, (FCDMC)**
CONTACT PHONE NO:	**506-4770**
JOB #:	**92916.00**
CONTACTED BY:	**ASH PATEL**

Cathy responded to our request about these issues. For the confluence area, use normal depth to start the tributary flow. The computed water surface elevation from the main wash will be extrapolated into the tributary until it bisects the CWSE in the tributary. Other technical issues will be discussed with Pedro and David Greenwood of Baker.

COMMUNICATION RECORD

DATE:	**JANUARY 11, 1993**
SUBJECT:	**TECHNICAL DATA NOTEBOOK GUIDELINES**
CONTACT NAME:	**CATHY REGESTER, (FCDMC)**
CONTACT PHONE NO:	**506-4770**
JOB #:	**92916.00**
CONTACTED BY:	**ASH PATEL**

Wood/Patel requested to Ms. Regester that we are looking for the most current technical data notebook guidelines as published by the Arizona Department of Water Resources (ADWR). It is the requirement for this contract that we follow ADWR guidelines. FEMA has accepted in a letter to Jim Morris, ADWR, that the guidelines are acceptable in lieu of FEMA TDN guidelines.

COMMUNICATION RECORD

DATE:	**JANUARY 7, 1993**
SUBJECT:	**DRAINAGE REPORT FOR TOYOTA PROVING GROUND**
CONTACT NAME:	**CATHY REGESTER, (FCDMC)**
CONTACT PHONE NO:	**506-4770**
JOB #:	**92916.00**
CONTACTED BY:	**ASH PATEL**

Ms. Regester indicated that a review done by Sandy Story from the Flood Control District on the Toyota Report has been somewhat negative. In other words, Sandy Story does not agree with the results of Toyota Report. Therefore, Wood/Patel should disregard the work done in the Toyota Report. I indicated that the haul road which is graded to support the Toyota Facility during construction creates certain problems for flood insurance work. Because certain portions of haul road have been excavated below natural grade, and since the haul road alignment is somewhat skewed when it's compared to the contour alignments, the drainage flow may be diverted along the path of haul road in the major flood conditions. This may occur in some isolated areas. Cathy had discussed this information with the staff at the Flood Control District and it was concluded that since there was no permission obtained for construction of the haul road, the District is going to require the contractor to restore the road alignment to the prexisting condition. Cathy has a follow-up to the District staff in writing.

COMMUNICATION RECORD

DATE:	**SEPTEMBER 24, 1992**
SUBJECT:	**PUBLIC MEETING**
CONTACT NAME:	**CATHY REGESTER, (FCDMC)**
CONTACT PHONE NO:	**506-4770**
JOB #:	**92916.00**
CONTACTED BY:	**ASH PATEL**

Ms. Regester indicated that a public meeting was held on September 24, 1992. The meeting went well. No issues were raised by the attendees.

COMMUNICATION RECORD

DATE:	**JANUARY 7, 1993**
SUBJECT:	**"n" VALUE REPORT**
CONTACT NAME:	**GREG SCHUELKE, AN-WEST**
CONTACT PHONE NO:	**861-2200**
JOB #:	**92916.00**
CONTACTED BY:	**ASH PATEL**

Wood/Patel called Mr. Greg Schuelke, AN-West, to find his approach to a "n" Value Report. It was discussed that the "n" Value Report will be in the same format as eventually required for the Technical Data Notebook. Photographs of the washes will be taken at different locations. Cross-sections will be reviewed per field visit. His mapping is not yet completed, and, therefore, he is going to rely upon field observation. He intends to take photographs on a one-mile interval. He was going to estimate 100-year flood depth, prior to establishing "n" values.

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COMMUNICATION RECORD

DATE:	**DECEMBER 1, 1993**
SUBJECT:	**ELEVATION REFERENCE MARK LOCATION MAP**
CONTACT NAME:	**RICHARD COOK, AERIAL MAPPING COMPANY, INC.**
CONTACT PHONE NO:	**263-5728**
JOB #:	**92916.00**
CONTACTED BY:	**ASH PATEL**

Richard Cook, Aerial Mapping Company, Inc (AMCI). I requested by Wood/Patel that AMCI provide Elevation Reference Mark (ERM) location map to the Flood Control District of Maricopa County.

SECTION 1: GENERAL DOCUMENTATION AND CORRESPONDENCE

1.3 Meeting Minutes and Reports

MINUTES OF MEETING

STAR WASH

DATE: June 11, 1993

SUBJECT: Star Wash Final Review

TIME: 11:00 a.m.

ATTENDEES: Cathy Regester, Flood Control District of Maricopa County
Ash Patel, Wood/Patel
Tony Regis, Wood/Patel

Items Discussed:

- FIRM updated by redline delineation should show only floodplain.
- Wood/Patel needs approval letter from FCDMC to include in FEMA package.
- Wood/Patel needs letter from Toyota to include in FEMA package.
- FCDMC requires 3 sets of final TDN: one set for FEMA, one set for ADWR and one set for the District. When approved by FEMA, more copies will be required.
- Use coincidental flow at all confluences.
- Include explanation for each confluence in Special Problem section of Technical Data Notebook.

WPA# 92916

MINUTES OF MEETING

STAR WASH & TRIBUTARIES FIS

DATE: May 28, 1993 **SUBJECT:** Star Wash Final Review

TIME: 2:10 p.m.

ATTENDEES: Cathy Regester, Flood Control District of Maricopa County
Ash Patel, Wood/Patel
Tony Regis, Wood/Patel

Items Received:

Review comments on Star Wash final submittal

Items Delivered:

PVC Grid

Items Discussed:

1. District will discuss policy on whether starting station/ending station should match topo or not.
2. The District will write note about Toyota Haul Road to insert into Technical Data Notebook (TDN).
3. Wood/Patel will obtain diapositives from Aerial Mapping to submit to District.
4. Wood/Patel will include public meeting information in TDN.
5. Wood/Patel will look at how to handle Trib A/Trib B confluence.

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MINUTES OF MEETING

STAR WASH & TRIBUTARIES FIS

DATE: April 19, 1993

SUBJECT: Star Wash Final Review

TIME: 11:00 a.m.

ATTENDEES: Cathy Regester, Flood Control District of Maricopa County
Ash Patel, Wood/Patel
Tony Regis, Wood/Patel

Items Delivered:

Star Wash and Tributaries final submittal including:

- Technical Data Notebook (2 book set)
- Blueline work maps, Sheets 1A through 10
- Blueline aerial photos from Aerial Mapping Company, Sheets 1 through 10.

Items Discussed:

1. The District will prepare a letter to the owner indicating that the Toyota Proving Grounds haul road must be returned to its original condition. The letter will be ready in the next few days.

2. The District will sign an original Community Official form as part of the LOMR package for the Star Wash re-study reach. This is necessary before submitting the LOMR package to FEMA.

3. The District has already received one set of diapositive (contact) aerial photo prints.

4. Wood/Patel will submit 24" x 36" mylar aerial photos within the next few days.

5. After review and acceptance of this submittal by the District, a letter of substantial completion will be issued by the District.

MINUTES OF MEETING

PROJECT:	**STAR WASH**
PROJECT #:	**92916.00**
DATE:	**APRIL 6, 1993 AT 3:30 P.M.**
SUBJECT:	**HANDLING OF FLOODPLAINS AND FLOODWAY BOUNDARIES AT THE CONFLUENCE OF POWER LINE WASH AND TANK WASH**
ATTENDEES:	**SCOTT BUCHANAN, STANLEY CONSULTANTS** **CATHY REGESTER, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY** **ASH PATEL, WOOD/PATEL**

DISCUSSIONS:

1. **Power Line Wash**
   Scott Buchanan reviewed his findings on floodplain and floodway analysis for Power Line Wash and how this information compared with the work done by Wood/Patel on Star Wash. After a discussion, it was concluded that since the confluence is very complex, Wood/Patel will include two additional cross sections of Power Line Wash as Power Line Tributary within their work. This will help in the review process by Baker Engineers.

2. **Tank Wash Confluence**
   Scott reviewed Tank Wash confluence in detail. Here again, it was concluded for the simplicity of the review process, Wood/Patel should include two additional cross sections of Tank Wash as a Tank Wash tributary within their portion of the report.

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MINUTES OF MEETING

PROJECT: STAR WASH
PROJECT #: 92916
DATE: MARCH 11, 1993
SUBJECT: REVIEW OF PART 2 SUBMITTAL
ATTENDEES: CATHY REGESTER, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ASH PATEL, WOOD/PATEL
TONY REGIS, WOOD/PATEL

ITEMS DELIVERED TO WOOD/PATEL:

1. Workmaps Part 1 and Part 2

ITEMS TO BE DISCUSSED:

1. Breakouts less than 1 foot - FEMA may have questions. Must look at options.
2. Try to eliminate floodway areas with velocities less than 3 fps and depths less than 3 feet.
3. Final submittal of Star Wash should be one run.
4. In the final submittal, comment cards will be included that explain anything unusual, plus general information.
5. Haul Road - FCDMC will write a letter to FEMA indicating that the filled areas must be returned to their natural condition.
6. Tributary "E" - Use Zone "A" classification.
7. Star Wash section 7.797 - Check to see if the flows are correct.
8. Tributary "B" - Section 1.071 - look at Zone "A" classification, possibly Zone "AO".
9. Look at how to deal with Section 2.881 breakout, Tributary "A".
10. Star Wash 5.817 to 6.308: delineate floodway to bank stations to create narrower floodway.
11. Remove floodway at Tributary "A"/Tributary "B" confluence.
12. Reviewed revised floodway on Star Wash in response to March 4, 1993, memorandum from Cathy Regester to Pedro Calza; new floodway delineation and water surface elevation rise are acceptable.

MEETING MINUTES

PROJECT: STAR WASH
PROJECT #: 92916
DATE: FEBRUARY 25, 1993
SUBJECT: STAR WASH SUBMITTAL, PARTS 1 AND 2
ATTENDEES: CATHY REGESTER, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ASH PATEL, WOOD/PATEL
TONY REGIS, WOOD/PATEL

ITEMS DELIVERED:

1. HEC-2 files and workmaps for all reaches of Star Wash and Tributaries within Study Area (two (2) notebooks, ten (10) blueline sheets).

   A rolled-up workmap (assembled in two (2) rolls) was loaned to the District to facilitate the review.

ITEMS DISCUSSED:

1. Tributary "B" north of haul road is delineated as Zone "A" because much of the flows follow a path outside of the main channel.

2. All of Tributary "A" upstream of the Tributary "B" confluence is delineated as Zone "A" because a significant part of the flow breaks out of the main wash and enters Tributary "B" and Star Wash.

3. Both breakout washes along Star Wash (sections 4.375 to 5.817 and 7.797 to 8.494) are delineated as Zone "A".

4. Tributary "E" is delineated as Zone "A" since the 3,000 cfs flow is not contained in the mainstem wash; approximately 1,000 cfs breaks out of Tributary "E" and returns to Tributary "D" below the Tributary "E" confluence.

   As an option, the Zone "A" area can be delineated as Zone "X", since the average hydraulic depth is less than 1 foot. Input is sought from the District.

MEETING MINUTES

PROJECT: STAR WASH
PROJECT #: 92916
DATE: FEBRUARY 1, 1993
SUBJECT: MODELING CRITERIA
ATTENDEES: PEDRO CALZA, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
CATHY REGESTER, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
JAMES TAILLON, WOOD/PATEL
ASH PATEL, WOOD/PATEL
TONY REGIS, WOOD/PATEL

ITEMS DISCUSSED:

1. Previous Business

   - The updated copy of the "n" Value Determination Report was delivered to FCDMC.

2. NC vs. NH Cards

   - Use NH cards when there are two major washes in the same cross section eg. Star Wash/Tank Wash confluence areas; otherwise, use NC cards.

3. Divided Flow

   - Care should be taken for split flow versus braided flow; it is acceptable to disregard changes in flow distribution in braided areas, but not for breakouts.
   - FEMA prefers Zone "X" for any island no matter how small, but the District recommends including small islands in Floodplain Zone "A".

4. Confluence Areas

   - Find most downstream cross-section of combined peak flow as starting section.
   - Wood/Patel will analyze this idea further.

5. Breakout Flow on Star Wash - Cross Sections 5.228 to 5.623

- FEMA tends to use Zone "A"; the District recommends delineating floodplain using approximate methods.
- 0.5 foot target increase floodway widths along breakout area

6. Tributary "B"

- Avoid changing hydrology by modifying locations and magnitudes of "Q" changes that may result from breakout flows.
- Tributary "A"/Tributary "B" might be acceptable to use Zone "A" for all breakout areas, but need further analysis before concluding (need to know flooding depths from extended cross-sections).

7. Tributary "D" & "E"

- Tributary "E" carries only 400 cfs, the remainder breaks out of the study area.
- The District recommends delineating as Zone "A" (Tributary "E" area), or Zone "X".
- Regular delineation to be performed on Tributary "D".
- Consider Zone "X", "AO", and "AO1" for Tributary "E" areas.
- Attenuated "Q" is acceptable since the flow breakout is $<1\%$.

8. Star Wash Breakout

- Separate wash model is acceptable.

AGENDA

PROJECT:	**STAR WASH**
PROJECT #:	**92916**
DATE:	**FEBRUARY 1, 1993**
SUBJECT:	**REVIEW PRELIMINARY FLOODPLAIN WORK,**
ATTENDEES:	**CATHY REGESTER, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY** **PEDRO CALZA, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY** **ASH PATEL, WOOD/PATEL** **TONY REGIS, WOOD/PATEL** **JAMES TAILLON, WOOD/PATEL**

ITEMS TO BE DISCUSSED:

1. (i) 'n' Value Report - Resubmittal
   (ii) Use of NC & NH cards

2. Treatment of Divided Flow

   (i) 0.5 to 1' high island
   (ii) Insignificant width of island
   (iii) Significant width, d>2'

3. Treatment of Confluence

   (i) Use combined peak flow
   (ii) Separate flows for each tributary with two flood profiles

4. Breakout Flow

   (i) Zone AE along the main wash and Zone 'A' for breakout area
   (ii) Treatment of Qs
   (iii) Treatment of floodway
   (iv) Treatment for a very minor breakout
   (v) Impact of breakout flow on offsite - subareas

MEETING MINUTES

PROJECT: STAR WASH
PROJECT #: 92916
DATE: JANUARY 21, 1993
SUBJECT: REVIEW OF PRELIMINARY FLOODPLAIN WORK
ATTENDEES: ASH PATEL, WOOD/PATEL
TONY REGIS, WOOD/PATEL
JAMES TAILLON, WOOD/PATEL
CATHY REGESTER, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ITEMS DISCUSSED:

1. Discussion began with a review of the "n" Value Report and letter from the District. District will provide Wood/Patel with a copy of "n" Value Report comments when they are finalized. Wood/Patel will revise "n" Value Report to reflect new names of washes.

2. It was agreed that an engineer's scale will be used on cross section plots near finalization of project.

3. A brief status report was given to the District. Wood/Patel has prepared working HEC-2 models for all study areas. These models have been updated to reflect noneffective flow areas, breakout areas, confluence areas etc. Major problem areas have been located for further input and verification from the District. Once comments, suggestions, and direction are received from the District, Wood/Patel will further refine the HEC-2 model.

4. Study areas discussed are as follows:

   Star Wash:

   - Work maps from the Jackrabbit Wash Floodplain Delineation Study are being used at the downstream end of the study area. The floodplain from the present study will be wider than that from the Jackrabbit Wash Study since there is more topographic information on the west side of Star Wash up to Station 3.002. Some cross sections have used ET cards to remove areas where there is non-effective flow.

   - Several large islands exist within the Star Wash floodplain; the District will discuss how to handle these areas. A decision will be made at a future meeting.

- At Star Wash Section 3.998, the Tank Wash flow is 6,000 cfs, Star Wash flow is 10,000 cfs and the combined flow is 13,000 cfs. The model is currently run with the combined flow of 13,000 cfs. The Tank Wash water surface elevation is artificially low with this model, due to higher ground elevations in Tank Wash. The District will discuss further how to handle this situation.

- ET cards can be used to separate Star Wash and Tank Wash at the confluence in order to determine the actual high water for each wash, instead of using the same high water elevation in both. Wood/Patel will not use floodway encroachments at Section 4.092, and may give a portion of this section to Stanley Consultants to determine the separate water surface elevations for Tank Wash and Star Wash.

- For tributaries, the District prefers to use starting water surface based on coincidental flow; this method is conservative. The District will discuss this further.

- Use three (3) "n" values (left overbank, right overbank, and channel) at cross sections where there is only one channel (one study wash and no confluence). Use NH cards only where there are two main study washes in one cross section (in the confluence areas).

- In reaches where flow is braided, the flow distribution may not be consistent from one section to another. Wood/Patel will not change the model for varying flow distribution. However, areas where flow doesn't return to the main channel will be modeled accordingly (e.g. as split flow).

- Equal conveyance overbank encroachments may not be appropriate for the Star Wash/Tank Wash confluence, since there may be a separate water surface for each wash.

- It was discussed whether the breakout reach from cross sections 4.375 to 5.623 should be modeled with lower flow (total minus breakout) to a point where breakout rejoins, and use the total flow downstream of that point. If modeled at the lower flow of 7,000 cfs, someone may, in the future, put breakout flow back into the main wash, and the mapping will be incorrect. Wood/Patel will check to see the effect of using the entire flow and determine how much the water surface rises. The District has, in the past, increased the overbank elevations thereby containing the flows. The District will discuss this matter further.

- At cross section 8.402, there is a split flow to the east, creating two (2) separate channels. It was decided to use two separate models between cross sections 7.721 to 8.412 and model the breakout flow as a separate tributary (Zone "A"). The District will discuss this issue further. Wood/Patel will do Zone "AE" if budget will allow.

- Critical depth occurs at several cross sections, but not at enough consecutive cross sections to warrant a supercritical flow run.

- Flow breaks out on each side of sections between 6.964 and 6.695. Breakout is less than 1%. Wood/Patel will review the HEC-1 model to determine the actual flow attenuation between the Tributary "C" confluence and Tributary "D" confluence; the flow may be contained since the breakout is small and flows attenuate.

Tributary "A":

- The 6,600 cfs flow is not contained in cross section at upstream end; breakouts occur.

- Since only 3,000 cfs can be carried in original cross section, Wood/Patel recommends extending cross sections east to cover breakout area. The extended sections may contain the flows.

- Breakout at Section 1.900 goes to Tributary "B"; District will discuss how to handle floodway.

- Breakout at Section 2.588 +/- goes to Star Wash, not back to Tributary "A". Again, District will discuss how to handle floodway.

Tributary "B":

- The flow for this channel seems very high for the channel geometry. However, Wood/Patel will not interpret where the "Q" is coming from; we are using assumed Tributary "B" Wash per the Scope of Work.

- The flow in Tributary "B" breaks out everywhere; 4,000 cfs exceeds the capacity of the main channel. The actual capacity is only about 400 cfs at upstream end. The flows will break out to the east into a tributary which is not part of this study and will return to this tributary at Section 1.263. District will discuss how to handle this breakout.

- Wood/Patel will assume the check dam at Sta. 0.874 is not present, it will wash out in a major event; however, a portion of the "flow" behind the dam is not fully effective, so encroachments are used.

Tributary "C":

- There appear to be no problems with this wash. Flows appear to be contained.

Tributary "D":

- At the upstream limit, two (2) separate profiles are needed because a parallel wash carries more flow than the main Tributary "D" channel and a 400-foot island separates the two washes.
- In order to model the main wash at flow given the detailed study limit will be moved to the south to Station 2.047; upstream of this Station will be designated Zone "A".
- Downstream of cross section 1.928, to cross section 1.410, we have separated Tributary "D" and Tributary "E" cross sections.
- Downstream of cross section 1.510, full flow is contained.

Tributary "E":

- The capacity of this wash is approximately 400 cfs as compared to 2,000 cfs inflow. The remainder of the flow breaks out at the right overbank and doesn't return to Tributary "E".
- One option is to use encroachments to contain the flow and establish a flooding depth and designate this area as Zone "A". This tributary needs to be discussed further.

MEETING MINUTES

PROJECT:	STAR WASH
PROJECT #:	92916
DATE:	SEPTEMBER 28, 1992
SUBJECT:	MEETING REGARDING SURVEY CONTROLS
ATTENDEES:	SCOTT BUCHANAN, STANLEY CONSULTANTS
	MAC MCCARTY, STANLEY CONSULTANTS
	RICHARD COOK, AERIAL MAPPING COMPANY
	ASH PATEL, WOOD/PATEL

ITEMS DISCUSSED:

1. Richard Cook had talked to Pedro Calza of the Flood Control District of Maricopa County regarding the use of horizontal datum. What was agreed upon was that we use horizontal datum of 1927. For vertical datum, however, the 1929 datum was to be used. This was okayed by Pedro because the Jackrabbit Floodplain Study was performed using the mapping based on these datums. This item is to be reconfirmed in writing from the District.

2. According to Richard Cook, several panels along the transmission line are still there which were placed by Burgess and Niple Engineering Company. They are short distance from the mapping limit by Stanley Consultants.

3. Comparing controls between Stanley and Aerial Mapping Company, there was room for Richard Cook to remove one vertical control point because of the overlap in mapping. However, it was concluded that the timing for control work between Stanley and Aerial Mapping Company may be several weeks apart. For this reason, Cook is going to use the AMC Control Network.

4. Wood/Patel to contact Project Engineering to give them notice to proceed on this project.

5. Richard Cook to start reconnaissance and data collections this week. Survey work to start on Monday.

6. It was discussed and concurred about giving data generated by Wood/Patel, Stanley to A-N West, Inc.

cc: Richard Cook

MEETING AGENDA

PROJECT:	**STAR WASH FLOODPLAIN DELINEATION** **FCD 92-06** **WP NO. 92916**
DATE:	**NOVEMBER 3, 1992**
SUBJECT:	**PROJECT STATUS** **(PROGRESS MEETING NO. 1)**

DISCUSSION:

1. Status of Mapping
   - Survey
   - GPS
   - Aerial Photogrammetry, Contact Prints
   - Topographic Maps

2. Updates to B & N Floodplain Work.

gencor\92916.n03

MINUTES OF MEETING

PROJECT: STAR WASH
PROJECT #: 92916.00
DATE: APRIL 6, 1993, at 3:00 P.M.
SUBJECT: STAR WASH FINAL SUBMITTAL, WORK MAP REVIEW
ATTENDEES: CATHY REGESTER, FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ASH PATEL, WOOD/PATEL

DISCUSSIONS:

1. The District has been requested to provide a letter in conjunction with haul road.

2. Overall, the District would like to have two copies for the submittal. One copy will stay at the District, and the second will be submitted to FEMA.

3. Cathy is going to follow up on the issue about review fees by FEMA.

4. Wood/Patel can now ask for a release of funds in conjunction with its retainage since we are over 50% complete.

5. After meeting with Scott Buchanan, Stanley Consultants, on information on Power Line and Tank Wash, HEC-2, Wood/Patel is to finalize Star Wash Delineation, and make the appropriate changes to the confluence area of Power Line and Tank Washes. These issues are to be discussed in the following meeting with Scott.

6. For the final FEMA submittal, Wood/Patel requested a letter of approval from the District to be included with the submittal.

7. Cathy suggested that after discussions with Baker, she felt that we needed to include the appropriate Letter of Map Revisions (LOMR) forms with the submittal package. Wood/Patel will include this package within the report.

8. The issue of showing flow discharges on work maps was discussed. The approach that Wood/Patel has taken is they have included a summary of flows on Sheet 1B of work maps. This approach is acceptable to the District, however, it was recommended that in the area where the flow splits and where the flow is changing at every cross section, the individual cross sections should depict the actual flood peak used for hydraulic analysis. In the split flow areas, the flow values differ for natural profile run vs. floodway profile run.

9. Typically, the FEMA submittal package does not require detailed cross-section plots. Wood/Patel will include the cross-section plots (non-engineer scale) with the FEMA submittal. Once FEMA approves on our submittal, all cross-section plots will be redrawn at an engineered scale.

SECTION 1: GENERAL DOCUMENTATION AND CORRESPONDENCE

1.4 General Correspondence

WOOD, PATEL & ASSOCIATES

Memorandum

Subject: Star Wash - Response to Final Submittal Review Comments

Project No.: 92916

To: File

From: A. J. Regis

Date: 8/17/93

All items listed in the Flood Control District of Maricopa County Interoffice Memorandum from Cathy Regester to Pedro Calza dated 7/23/93 have been addressed. One item, however, requires some additional review.

In the above-referenced memorandum, it is suggested in item number 2 of the first list that the floodway elevation at cross section 0.181 of Tributary "D" may be governed by the Star Wash backwater. Furthermore, it is suggested that it may be necessary to include an explanatory note on the work map.

FEMA 37 Guidelines (section 5.B.2) indicate that "the computation of a floodway on a tributary stream should be based on the 100-year flood discharge and elevation of the stream only and normally should not include consideration of any backwater flooding from the main stream." In addition, even if main stream floodway backwater was taken into consideration, the controlling water surface elevation would be less than 1542.7, which is the Star Wash floodway elevation at cross section 6.509. At cross section 0.181 of Tributary "D", the computed floodway water surface elevation is 1544.0, therefore the tributary floodway water surface elevation governs.
As a result, the floodway elevation at cross section 0.181 of Tributary "D" should remain as is. Note that, since the computed floodway elevation (1544.0) is less than the computed floodplain elevation (1544.9), the floodway elevation indicated on the work map has been set equal to the floodplain elevation of 1544.9.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Interoffice Memorandum

Subject: Star Wash — **File:** 93-06
Final Submittal Review Comments

To: PACalza **From:** CWRegester CWR **Date:** 7/23/93

I have completed my review of the FEMA submittal package and have determined that a few minor revisions/additions should be made prior to submittal to FEMA. Those changes are:

1. The Floodway limits appear to be slightly in error at the following cross sections:

   Star Wash: 3.195
   Star Wash: 4.784
   Star Wash: 8.008
   Tributary D: 0.369
   Tributary D: 0.668

2. It appears that the floodway elevation at cross section 0.181 on Tributary D is governed by the Star Wash backwater. Please review. If this is the case, then provide an asterisk next to the floodway elevation.

3. Please label all Zone X islands as "Community Designated Special Hazard Zone". This includes the Zone X area along Star Wash between the Zone A area and cross sections 4.471 and 5.228.

4. Section 8 of the ADWR Report needs to be included in the FEMA submittal. An example from a recent study has been attached for information.

5. The red-lined FIRMs need to be revised to include the floodplain limits from the Zone A areas. It is suggested that another color be used to differentiate the Zone breaks.

In addition, for the final submittal to the FCD (after FEMA approval), the following additions/revisions should be made:

1. Each map sheet should contain at least one (1) section or quarter section corner so that location may be determined without having to match sheets.

2. The contour interval should be added to the delineation maps in the same box as the map scale.

3. The diapositives should be submitted as part of the HIS submittal.

4. Copies of the delineation maps, on 11" X 17" sheets should be included in Section 2 of the TDN as called for in Task 3.6 of the Scope of Work.

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

TO STANLEY CONSULTANTS, INC.

DATE 4/16/93	JOB NO. 92916
ATTENTION SCOTT BUCHANAN PE,	
RE: POWERLINE WASH & TANK WASH	

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			SHEETS 1C, 2, & 3 OF 10 (BLUELINE WORK MAPS - STAR WASH)
1			5¼" DISKETTE - Powerline Wash, Tank Wash HEC-2 Input/Output
1			PROFILE PLOT - POWERLINE WASH
1			PROFILE PLOT - TANK WASH

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☑ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS These are our final floodplain / floodway delineations for Powerline Wash & Tank Wash. Note that the right floodway encroachment station of section 0.980 of Tank Wash is now 10,225 (it was previously 10,230). This is the only change made to the models we received from you on 4/9/93.

COPY TO _____

SIGNED: Anthony J. Rogers

40% Pre-Consumer Content • 10% Post-Consumer Content

If enclosures are not as noted, kindly notify us at once.

PRODUCT 240 NEBS Inc., Groton, Mass. 01471.

WOOD / PATEL ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

DATE 4/15/93

TIME 8 30

COMPANY: FCDMC

ATTENTION: Cathy Regester

FAX NO.: _____

FROM: Ash Patel FAX NO. (602) 955-3765

PROJECT: Star Wash JOB NO. 92916.00

SUBJECT: Floodways @ confluence of Star / Powerline & Tank

COMMENTS:

Per our phone conversation this A.M., here are two sketches depicting the floodway condition at subject locations.

please review & provide input.

fax!

thx

CC: _____

2. Floodway Determination

A floodway is defined as the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water-surface elevation by more than a designated height. Floodways are established by the communities in consultation with the Regional office as unobstructed waterways to convey floodwaters. The community is responsible for maintaining the conveyance of flooding sources to mitigate flood hazards.

Normally, the floodway will include the stream channel and that portion of the adjacent land areas required to pass the 100-year flood discharge without cumulatively increasing the water-surface elevation at any point more than 1.0 foot above that of the pre-floodway condition. If the state in which the study is being performed has established more stringent regulations for the maximum rise in water-surface elevations, through legally enforceable statutes, then these regulations shall apply. In the case of interstate streams, where opposite sides of the floodplain are under the jurisdiction of different states, the 1.0-foot maximum allowable rise criterion will be used unless the states have previously agreed on a lesser rise criterion. The SC must obtain the written approval of the Regional PO, through the Contracting Officer, before computing or mapping a second floodway based on a criterion established by the community.

When flow is in the supercritical regime, or where velocity conditions are such that normal encroachment analyses are not possible or are inappropriate, the allowable rise shall be applied to the energy grade line instead of the water-surface elevation.

Normally, the floodway shall be determined using equal loss of conveyance on opposite sides of the stream. If equal loss of conveyance is not technically appropriate, or where unusual flow patterns are encountered (e.g., interbasin flow, divided flow, etc.), the SC shall coordinate with the Regional PO in selecting the most appropriate engineering methods. Where the stream forms the border between contiguous communities, and the floodway designation affects both of them, equal loss of conveyance must be used.

The computation of a floodway on a tributary stream should be based on the 100-year flood discharge and elevation of that stream only and normally should not include consideration of any backwater flooding from the main stream. Therefore, the floodway elevations in the lower reach of a tributary subject to backwater flooding may be lower than those used to plot the flood profiles.

The SC must consider the maximum allowable surcharge (e.g., 1.0 foot) established at the upstream-most cross section in the downstream community when conducting the floodway analysis for upstream

communities. This is necessary to avoid excessive increases that would occur if the floodway in the downstream community was not considered. In addition, the starting water-surface elevation for a floodway analysis at the first cross section should be 1.0 foot above the natural 100-year flood elevation unless a lesser rise criterion is imposed by the State.

Floodways are not normally delineated in coastal high-hazard areas (Zones V1-30, VE, and V). The computation of floodways on rivers in coastal floodplains should be based on the 100-year flood discharge and elevations of the rivers only and should terminate at the boundary of the V1-30, VE, or V zone or where the mean high tide exceeds the 100-year flood elevation from a riverine-only flood, whichever occurs further upstream.

The SC shall begin to coordinate all floodway determinations with State and community officials as early as possible. Where the floodplain is entirely contained within one community, the location of the floodway is negotiable and should be coordinated with the State Coordinating Agency, the community, and the CCO. This negotiation shall not be a reason for delay of the FIS. If the SC is unable to arrive at a final floodway determination prior to the final community coordination meeting, the floodway shall be determined as described above.

C. Considerations for Flood Insurance Restudies

1. Flood Elevation Determination

Except for the cases where errors in measurements or modeling have been found, or where substantial changes in topographic conditions are not reflected in the effective FIS, the cross-sectional and structural information for the hydraulic model must be obtained from step-backwater computer models of the effective FIS and subsequent revisions. In the case of topographic changes, only the affected cross sections should be revised; the remaining data should come directly from the existing models.

It is important to note that a restudy of a community's FIS, FIRM, and/or FBFM may include a flooding source(s) that does not have any established BFEs. In these cases, Section B of this chapter entitled, "Initial Flood Insurance Study Methodology" should be consulted for necessary guidance.

The existing conditions 10-, 50-, 100-, and 500-year flood discharges as determined by one of the hydrologic methods described previously, will be used in the standard step-backwater computer program that was used in the effective FIS to compute the water-surface profiles. The most recent version of the effective FIS computer models should be used to reduce the cost in setting up the hydraulic model. The

13,900 CFS

3.101

1445.5 N
1446.2 F

3.002

1445.0 F ±

WASH

1444.3 F ±

1444.3 N
1445.3 F

1443.3 F

17,600 CFS

2.908

POWERLINE

STAIR

2.801

1" = 200'

FIGURE 1

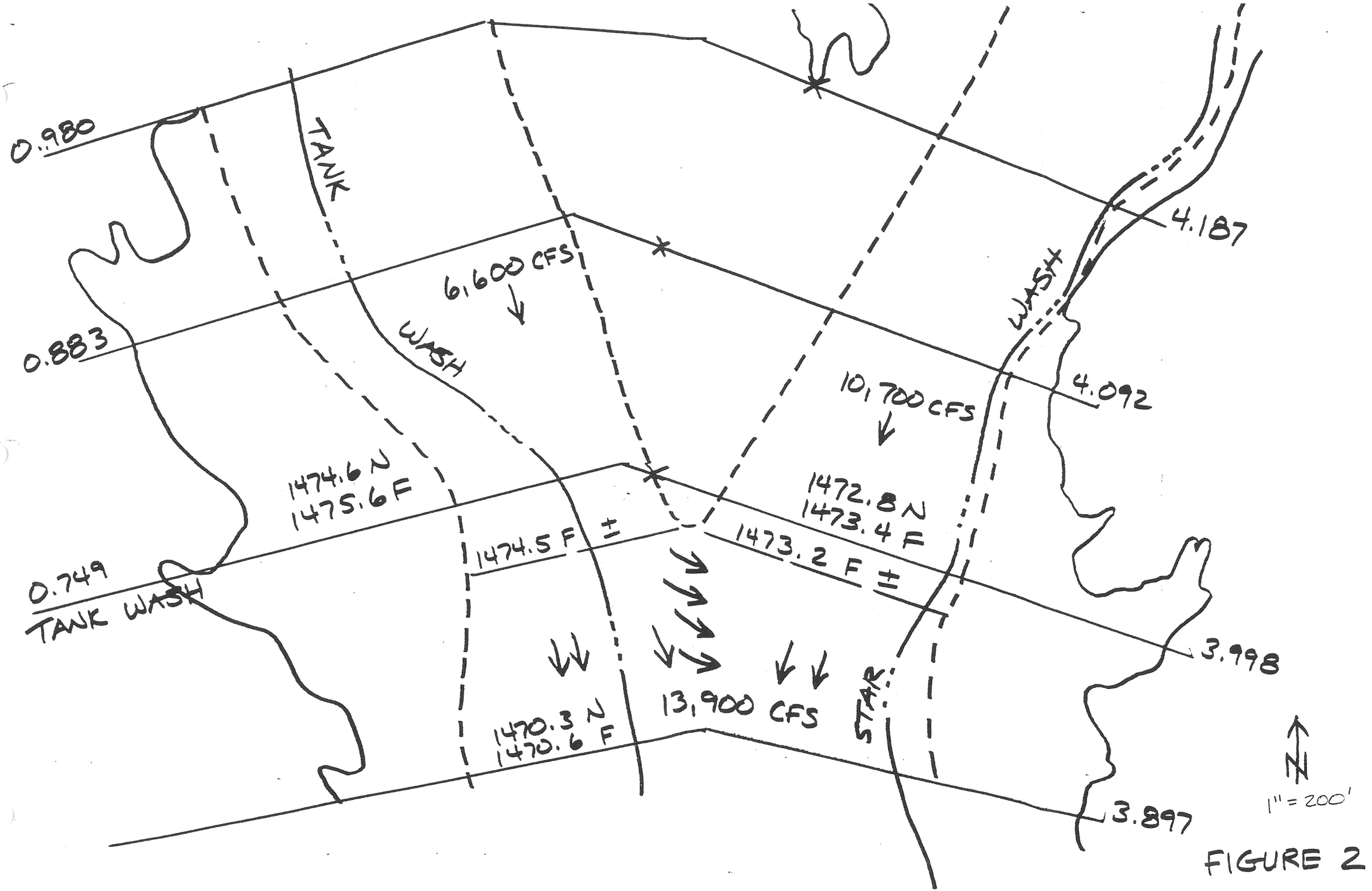
0.980
TANK
6,600 CFS
WASH
0.883
4.187
WASH
10,700 CFS
4.092
1474.6 N
1475.6 F
1472.8 N
1473.4 F
1474.5 F ±
1473.2 F ±
0.749
TANK WASH
3.998
STAR
13,900 CFS
1470.3 N
1470.6 F
3.897
N
1" = 200'

FIGURE 2

STANLEY CONSULTANTS, INC.

3117 North 16th Street • Phoenix, AZ 85016 Tel: 602/279-0901 • Fax: 602/230-7655

TO: WOOD/PATEL (For Pickup)

DATE: 4-9-93

PROJECT: POWER/TANK

ATTN: ASH

PROJECT #: 11547

THE FOLLOWING ITEMS ARE TRANSMITTED:

COPIES	ORIGINALS	DESCRIPTION
1		DISKETTE W/ HEC2 FILES
1		EXHIBIT SHOWING REVISED TANK
		WASH FLOODWAY

THE ABOVE ITEMS ARE SUBMITTED:

- ☐ AT YOUR REQUEST
- ☐ FOR YOUR REVIEW
- ☐ FOR YOUR APPROVAL
- ☐ FOR YOUR SIGNATURE
- ☐ AS REVISED
- ☒ YOUR INFORMATION

REMARKS:

Copy To:
Cathy Regester

BY: Scott Buchanan

RECEIVED:

DATE:

STANLEY CONSULTANTS, INC.

3117 North 16th Street • Phoenix, AZ 85016 Tel: 602/279-0901 • Fax: 602/230-7655

TO: Wood/Patel DATE: 4-6-93

PROJECT: Power/Tank

ATTN: Ash PROJECT #: 11547

THE FOLLOWING ITEMS ARE TRANSMITTED:

COPIES	ORIGINALS	DESCRIPTION
1		Diskette with HEC2 files for
		Powerline and Tank washes
		@ confluence with Star Wash

THE ABOVE ITEMS ARE SUBMITTED:

☐ AT YOUR REQUEST ☐ FOR YOUR REVIEW ☐ FOR YOUR APPROVAL

☐ FOR YOUR SIGNATURE ☐ AS REVISED ☐ YOUR INFORMATION

REMARKS:

BY: Scott Buchanan

RECEIVED:

DATE:

Copy to:
Cathy Rejester

STANLEY CONSULTANTS, INC.

3117 North 16th Street • Phoenix, AZ 85016 Tel: 602/279-0901 • Fax: 602/230-7655

TO: Wood / Patel DATE: 4-1-93

PROJECT: Power / Tank

ATTN: Ash PROJECT #: 11547

THE FOLLOWING ITEMS ARE TRANSMITTED:

COPIES	ORIGINALS	DESCRIPTION
1 ea		Shts 2, 11 & 12 of 17 with proposed floodplain / Floodway limits @ confluence with Star Wash

THE ABOVE ITEMS ARE SUBMITTED:

☐ AT YOUR REQUEST ☒ FOR YOUR REVIEW ☐ FOR YOUR APPROVAL
☐ FOR YOUR SIGNATURE ☐ AS REVISED ☐ YOUR INFORMATION

REMARKS:

Copy to:
Cathy Rejester

BY: Scott Buchanan

RECEIVED:

DATE:

PROJECT ENGINEERING
CONSULTANTS, LTD.
3130 N. 35th AVENUE, SUITE 1
PHOENIX, ARIZONA 85017

LETTER OF TRANSMITTAL

DATE 3-25-93	JOB NO.
ATTENTION Ash Patel	
RE: Star Wash	

TO Wood / Patel
4105 N. 20th Street, Ste #130

RECEIVED
MAR 25 1993
WOOD, PATEL & ASSOCIATES

GENTLEMEN:

WE ARE SENDING YOU ☑ Herewith ☐ Under separate cover via _____

6 Blue lines (GPS Point Map)

THESE ARE TRANSMITTED as checked below:

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REMARKS: _____

COPY TO: _____

VERY TRULY YOURS

Signed Larry Maldonado

March 24, 1993

PROJECT STATUS REPORT NO. 6

STAR WASH FLOODPLAIN STUDY
FCD 92-06
WP# 92916

1. Coordination

- Submitted **Part 2** portion of the Preliminary Floodplain/Floodway Analysis to the District on February 24, 1993.
- Met with the District on March 11, 1993, to review the District's comments of the Preliminary Floodplain Analysis for Part 1 of this project.
- Met with Stanley Consultants to review their Floodplain/Floodway data on the Powerline Wash Confluence.
- Submitted and coordinated the Pre-final Floodplain/Floodway data to Stanley Consultants on March 9, 1993.
- To avoid any future confusion, it was confirmed with the District on March 23, 1993, that Wood/Patel continually use the letter designations for the Star Wash tributaries.
- Received input/direction from the District on the issues previously submitted in the special problem reports.
  - Input/direction received through meetings and documented in the minutes.
  - Input/direction received through Baker:
    - Floodways are modified in conjunction with the split-flow areas on Star Wash Sections 4.375 to 5.719 and 7.797 to 8.494. These modifications have been completed based on the input received by Ms. Regester from the Flood Control District of Maricopa County. Accordingly, the Star Wash Floodway Analysis incorporates the entire peak flow (without any downward adjustment for the breakout flow) for modeling purposes.
    - For a minor breakout flow at an isolated location, documentation will be required such as volume of breakout flow in the cfs and what happens to the breakout flow, e.g., the flow becomes a shallow sheet flooding of less than one foot (Zone "X"). This documentation can occur by the use of title cards within HEC-2 data.

2. Data Collection

This task is one-hundred percent (100%) complete.

3. Topographic Mapping

All topo mylars for the entire project are one-hundred percent (100%) complete, containing Sheets 1-10.

Additional GR points were received from the mapping company in conjunction with breakout areas. The GR point data was incorporated at pertinent reach locations to facilitate the hydraulic modeling.

GIS Consultant's Status

Coordinated with Lari Spire, R.L.S. of GIS Consultants, that the Floodplain, BFE, cross-section data, etc. will be transferred to HIS only after FEMA approves Wood/Patel's floodplain delineation work.

4. Field Surveys

This task is one-hundred percent (100%) complete.

5. Floodplain/Floodway

Coordination with Stanley:

- Pre-final HEC-2 files for the confluence areas of Star Wash with Powerline Wash and Tank Wash were delivered to Stanley Consultants on March 9, 1993. Input was requested from Stanley concerning floodplain and floodway delineations for the subject area.

Part 2 data package was submitted on February 24, 1993, in two volumes:

Volume 1:

1. Comments in conjunction with the Preliminary Floodplain/Floodway Submittal.
2. Study Area Limits Figure.
3. Computer Diskettes containing HEC-2 input and output files.
4. Star Wash floodplain and floodway HEC-2 printouts.

Volume 2

5. Tributary floodplain and floodway HEC-2 printouts.
6. Blueline prints showing preliminary floodplain and floodway delineations (Sheets 1 through 10).

Several items were discussed in conjunction with Preliminary Floodplain/Floodway Submittal.

ITEM 1.
Confluence of the mainstem of Star Wash and Star Wash breakout: Flow lost from the mainstem wash between cross sections 5.228 and 5.817 returns to Star Wash at cross section 4.375; the full flow of 10,700 cfs is used at section 4.375.

ITEM 2.
In the main stem of the Star Wash breakout reach between sections 4.471 to 5.228, a reduced flow equal to 10,700 cfs minus the breakout flow is used for both the floodplain and the floodway models. The floodway is modeled using a 0.5-foot target water surface elevation increase.

ITEM 3.
The Star Wash breakout is modeled using a simplified HEC-2 model. A Manning's "n" value of 0.040 is used for the entire cross section along the entire breakout reach.

ITEM 4.
Along the reach of Star Wash where the flow breaks out, the HEC-2 split flow routine is used. This split flow is modeled as weir flow, using digitized cross sectional data along the breakout ridge between sections 5.228 and 5.719.

ITEM 5.
In the main stem of Star Wash adjacent to the side weir breakout, no floodway is modeled, since raising the water surface would result in a larger breakout flow.

ITEM 6.
Star Wash, sections 5.817 to 6.308. The floodway width in this reach of Star Wash is constrained by the Tributary "A" and Star Wash main channels, as well as by the downstream breakout reach of Star Wash, where the floodway is set equal to the floodplain. As a result, the floodway water surface elevation rise is generally less than one foot in this reach.

ITEM 7.
Confluence of Star Wash and Tributary "A". In the Tributary "A" model, ineffective flow encroachments are used from section 6.308 (Star Wash) to 1.387 (Tributary "A") to limit the rate of flow expansion. This is necessary since noncoincidental flow is assumed, i.e., there is no flow in Star Wash in the Tributary "A" model. In the Star Wash model at section 6.308, however, these encroachments are not used, since the entire Star Wash cross section 6.308 contains effective flow.

ITEM 8.
Confluence of Star Wash and Tributary "D". Encroachments are used at sections 0.083 and 0.181 (Tributary "D") to limit the effective Tributary "D" flow to the main stem of the wash. Another encroachment is used at Star Wash cross section 6.602 to limit the effective Star Wash flow to the main stem of Star Wash.

ITEM 9.
Star Wash/Tributary "A" confluence area. In this area, the two individual floodplain delineations "overlap" at section 6.602 (Star Wash) and section 1.295 (Tributary "A"). Thus, although a single floodplain is delineated, there are two different water surface elevations. A tabulation of computed water surface elevations near this area appears below.

Summary of Computed Water Surface Elevations, ft MSL:

Star Wash Cross Section	CWSE	Tributary "A" Cross Section	CWSE
6.509	1541.49	1.201	1542.17
6.602	1545.52	1.295	1545.30
6.695	1548.09	1.387	1548.88

ITEM 10.
Tributary "A"/Tributary "B" confluence. The downstream-most common cross section is section 1.580 (Tributary "A"). In the Tributary "B" model, an ineffective flow encroachment is used to isolate the Tributary "B" flow to the main stem of Tributary "B". Since Tributary "A" upstream of the confluence is delineated as Zone "A" due to the numerous breakouts, the floodway delineation can be represented in two possible ways at this confluence. The first is to delineate the floodway up to the first cross section upstream of the confluence, from which the delineation could be continued in the future. The second is to delineate the floodway across Tributary "A" at the confluence, joining it with the Tributary "B" delineation upstream of the confluence. Both delineations are shown at this time.

ITEM 11.
Tributary "A"/Star Wash breakout area. In this reach of Tributary "A" and Star Wash, some flow from Tributary "A" breaks out of the mainstem of Tributary "A" and flows into Star Wash. This area is modeled using cross sections extending across the breakout wash, both in the Star Wash and the Tributary "A" models. However, per directions from the District, flows in the two washes are not modified from those obtained from the Jackrabbit Wash hydrology study. In other words, Star Wash sections are modeled using only Star Wash flows, and Tributary "A" sections are modeled using only Tributary "A" flows.

ITEM 12.
Tributary "B" check dam. Per direction from the District and in accordance with the FEMA guidelines, this check dam is assumed to fail for purposes of downstream floodplain delineation. However, upstream of the dam, the dam is assumed to not fail, as the resulting ponded area is the worst-case condition for upstream of the dam.

ITEM 13.
Section 1.372, Tributary "B". This cross section has been realigned in order to make it perpendicular to the direction of flow.

ITEM 14.
Tributary "B" upstream of haul road. This reach is delineated as Zone "A" due to the numerous possible flow paths.

ITEM 15.
Tributary "E". Due to numerous breakouts, Tributary "E" is delineated as Zone "A". Since flow depths are generally less than one foot, Tributary "E" could also be delineated as Zone "B". Average hydraulic depths are shown. Specifically, between sections 0.778 and 0.885, approximately 1,000 cfs breaks out of Tributary "E" and a portion of this returns to Tributary "D" downstream of the Tributary "D"/Tributary "E" confluence.

In general, confluence areas are handled by delineating the individual floodplains and floodways for each wash, and eliminating that portion of the floodplain or floodway downstream of the point where they intersect.

6. Final Product
The following documents/reports are completed to date:

Document/Report	Status
• Topographic Maps	Submitted & Approved by the District
• "n" Value Report	Submitted & Approved by the District
• Survey Data Report	Submitted to the District
• Technical Data Notebook	Being Prepared

LETTER OF TRANSMITTAL

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
~~3335 West Durango Street~~
PHOENIX, ARIZONA 85009
506-
(602) ~~262~~-1501

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY
2801 W. Durango
PHOENIX, AZ 85009

DATE 3/11/93 JOB NO. 92-06

ATTENTION MR. ASH PATEL.

RE: "STAR WASH FIS"

PROFILE / X-SECTION EXAMPLES

TO WOOD/PATEL & ASSOCIATES, INC.
4105 NORTH 20th STREET, SUITE 130
PHOENIX, AZ 85016

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via PICK-UP the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
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COPIES	DATE	NO.	DESCRIPTION
1		1	PROFILE - GILA BEND STUDY (BURGESS & NIPLE)
1		1	X-SECTION - " " " " " "
1		1	PROFILE - DEADMAN WASH STUDY (HNTB)
1		1	X-SECTION - " " " "

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REMARKS SAMPLES AT ENGINEERED SCALES.

COPY TO FILE

SIGNED: Cathy Regester

6910-009 3-90

If enclosures are not as noted, kindly notify us at once.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Interoffice Memorandum

Subject: Star Wash FIS **File:** FCD #92-06

To: PACalza **From:** CWRegester CWR **Date:** 3/10/93

I have completed my review of the first submittal of the HEC-2 for the subject delineation from the confluence of Star Wash and Tributary A to the upper limit of the study (including Tributaries B, C, D, and E) and have the following comments for the consultant:

General Comments

1. In the final report, note how starting WSEL's were derived.

2. In the final report, explain the plotting of the floodplain limits with respect to the SSTA, ENDST, and the plan view contours.

3. Address the numerous breakouts of less 1FT. In cross sections where these breakouts are occurring, why are encroachment stations set at the topographic high point in some of the sections and not in others. For example, see cross sections Star Wash 6.4 and 7.156.

4. Explain why the attenuated Q was used in Star Wash sections 6.695 through 7.442.

5. For the floodway, a 1 FT rise in WSEL is to be used as the target increase. Elimination of areas from the floodway which have velocities of less than 3 FPS and depths of less than 3 FT is preferred wherever possible.

6. For the final submittal, I would like to have the entire Star Wash submitted as one run.

STAR2FW1

1. Based on the flow distribution across cross sections 5.817 - 6.308, it does not appear that a floodway as proposed is appropriate in this area. Much of the area between Star Wash and Tributary A has average velocities of approximately 2.7 FPS with average depths of 1.0 FT. I recommend that two individual floodway models be developed for these washes.

2. 5.817 - 6.308: Flows in Trib. A do not fill Trib. A's main channel to the top of the channel banks. Will this pose a problem with FEMA?

and Tributary A has average velocities of approximately 2.7 FPS with average depths of 1.0 FT. I recommend that two individual floodway models be developed for these washes.

2. 5.817 - 6.308: Flows in Trib. A do not fill Trib. A's main channel to the top of the channel banks. Will this pose a problem with FEMA?

TRIBAFP

1. 1.295: How was the right encroachment station chosen?
2. 1.387: Plotted SSTA doesn't agree with the HEC-2.
3. 1.580: Check left overbank reach length.
4. 3.074: Is flow area from 9380 - 9500 effective?
5. 2.588: Plotted SSTA doesn't agree with the HEC-2.
6. Explain mapped ENDST's for cross sections where breakouts occur. All show less than 1 FT except for section 2.881 which shows 1.22 FT.
7. In the final report, provide explanation for why Zone 'A' is being recommended for the upper end of Trib. A.
8. Will "dry" islands within the Zone 'A' pose a problem with FEMA?
9. 2.684: Plotted ENDST doesn't agree with the HEC-2.
10. 2.881: Plotted SSTA doesn't agree with the HEC-2.
11. 3.279: Plotted SSTA doesn't agree with the HEC-2.

TRIBAFW1

Not reviewed at this time as major revisions are anticipated based on the General Comments and STAR2FW1 comment # 1.

TRIBBFP

1. 0.096: Use Trib. B thalweg as station 10000.
2. 0.970: Plotted SSTA doesn't agree with the HEC-2.
3. 1.476: Check right overbank reach length.
4. 1.672: Check right overbank reach length.
5. 1.572: Plotted ENDST doesn't agree with the HEC-2.
6. 1.899 & 1.933: Explain plotted SSTA's.
7. 1.933: Plotted ENDST differs from the HEC-2. Please explain. Why is breakout indicated on the plan view.
8. Would AO Zone be more appropriate from 1.071 north?

TRIBBFW1

1. 1.476: Check right overbank reach length.
2. 1.672: Check right overbank reach length.
3. 0.096: SSTA and ENDST are the same as the floodplain model. CWSEL = CWSEL for the floodplain run. Plotted SSTA and ENDST do not match the HEC-2.
4. 0.478: Plotted ENDST doesn't agree with the HEC-2.
5. 0.909: Plotted ENDST doesn't agree with the HEC-2.
6. 0.909: Plotted SSTA doesn't agree with the HEC-2.
7. 0.970: Plotted ENDST doesn't agree with the HEC-2.
8. 0.909, 1.071 - 1.476: WSEL's without floodway shown in the summary table 200 do not match the HEC-2.

STAR3FP

1. 6.695: Provide justification for this section as the first section without the influence of Trib. D.
2. 7.541: Left channel station looks odd in comparison to the other sections - approx. 6 FT higher than the right channel station. Please check.
3. 7.797: Appears that incorrect Q was used. Should be at least 4230 CFS.
4. 6.509: Plotted ENDST doesn't agree with the HEC-2.
5. 6.785: Flow area 9297.52 - 9350 -- effective?
6. 7.156: Flow area 10135 - 10150 -- effective?
7. 8.494: Plotted SSTA doesn't agree with the HEC-2.
8. 8.571: Plotted ENDST doesn't agree with the HEC-2.
9. 7.797 - 8.402: Sections oscillating back and forth between conveyance change... and critical depth assumed.
10. How were limits and Q for Zone A determined.
11. 6.602: ENDST appears to be plotted at approximately 10375 rather than 10400.

STAR3FW

1. Not all corrections to the floodplain elevations have been made in the summary printout table 200.
2. 7.541: Same comment as floodplain model regarding left channel station. Left ET station is within the channel - appropriate?
3. 6.602: See #11 on STAR3FP.
4. 6.785: Plotted SSTA doesn't agree with the HEC-2.
5. 6.964: Plotted SSTA doesn't agree with the HEC-2.
6. 7.721: Plotted ENDST doesn't agree with the HEC-2.

7. 7.797: Right ET is within the channel - appropriate?

8. 8.126: Right ET is within the channel - appropriate?

TRIBCFP

1. 0.087: Right overbank reach length appears low check.

2. 0.517: Flow area 10125-10155 - effective?

TRIBCFW1

1. 0.000: In floodplain model, X3 was used to block out area to the left of station 9899.8. Why wasn't the same done for the floodway model?

2. Corrected WSEL's for profile #1 does not always agree with the floodplain run.

TRIBDFP

1. 1.100: Check channel reach length. 690 FT appears too high. River mile stationing appears off by approximately 160 FT between 1.0 and 1.1.

2. 1.213: Right and left overbank reach lengths appear low. Please check.

3. 1.510: Right overbank reach length appears low. Please check.

4. 1.635: Right overbank reach length appears low. Please check.

5. 0.083: Plotted ENDST doesn't agree with the HEC-2.

6. 0.083 and 0.181: Station 10000 should be on Trib. D rather than Star Wash.

7. 0.181: Flow area 11220 - 11273 -- effective?

8. 1.410: Flow areas 10300 - 10350 & 10470 - 10520 -- effective?

9. 1.635: Flow area 10065 - 10170 -- effective?

10. 1.846: Area right of 10325 -- effective?

TRIBDFW1

1. 1.100 - 1.213: Thalweg may not meander outside of the floodway limits. Need floodway limits revised to include thalweg.
2. Not all CWSEL's for profile 1 have been corrected.
3. Explain WSEL on J1.
4. Check channel stationing and reach lengths as per comments on TRIBDFP.
5. Cross section plots for 0.083 through 0.471 not submitted.

TRIBEFP

1. 0.373: Plotted ENDST doesn't agree with the HEC-2.
2. 0.466: Plotted ENDST doesn't agree with the HEC-2.
3. 0.572: Plotted ENDST doesn't agree with the HEC-2.
4. How was breakout Q determined?
5. 0.991: Plotted ENDST doesn't agree with the HEC-2.
6. 1.093 - 1.277: Explain the delineation in this area.
7. We prefer to stay with the Zone A designation in this area.

Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

DATE	JOB NO.
3/9/93	92916

ATTENTION: SCOTT BUCHANAN

RE: POWERLINE WASH AND TANK WASH CONFLUENCES WITH STAR WASH

STANLEY CONSULTANTS, INC.

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☑ FLOPPY

COPIES	DATE	NO.	DESCRIPTION
1 ea			XEROXED WORKMAP SHEETS 1, 2, & 3 - REVISED FLOODWAY DELINEATION
1			DISKETTE (5¼" HIGH DENSITY) CONTAINING HEC-2 INPUT & OUTPUT FILES

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REMARKS THE FLOODPLAIN DELINEATION ON THE ATTACHED XEROXED WORKMAPS HAS BEEN HIGHLIGHTED IN GREEN FOR YOUR CONVENIENCE. THE REVISED FLOODWAY DELINEATION IS INDICATED BY THE HEAVY DASHED LINE. THE LIGHTER DASHED LINE IS THE PREVIOUS FLOODWAY DELINEATION.

IF YOU HAVE ANY QUESTIONS, PLEASE DON'T HESITATE TO CALL.

NOTE, THESE REVISIONS HAVE BEEN PER DISTRICT'S INPUT & ARE BELIEVED TO BE FINAL. PLEASE INFORM US IMMEDIATELY IF THERE ARE ANY CONFLICTS.

THANKS!

COPY TO Cathy Roodzant, FCDMC

SIGNED: TCH

If enclosures are not as noted, kindly notify us at once.

PRODUCT 240 NEBS Inc., Groton, Mass. 01471.

RECEIVED
MAR 4 1993
WOOD, PATEL & ASSOCIATES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Interoffice Memorandum

Subject: Star Wash FIS **File:** FCD #92-06

To: PACalza **From:** CWRegester CWR **Date:** 3/4/93

I have completed my review of the first submittal of the HEC-2 for the subject delineation study from the confluence of Star and Powerline Washes to the confluence of Star Wash and Tributary 'A' and have the following comments for the consultant:

1. The floodway encroachments need to more closely approach a 1.0 FT target increase in the CWSEL. An exception to this must be made, however, in areas where there is braiding of the main channel. In these areas, the floodway limits must be set so as not to encroach upon the channel braids.

2. 2.506(fp): Need to check for ineffective flow area in left overbank.

3. 3.407(fp): Minor breakout in left overbank.

4. 2.100(fw): ENDST on plan view doesn't agree with HEC-2.

5. 4.471 - 5.623 (fp & fw): For management purposes, believe that the floodplain and floodway in these sections should be based on the 10,700 CFS. Ignore the breakout for the delineation in this area but continue to show the breakout area as a Zone 'A'.

6. 5.121: Insufficient mapping in left overbank. What is proposed to rectify this problem?

7. 5.228 - 5.623 (fp & fw): Suggest using right encroachment station along the determined breakout as the ENDST for the floodplain run.

8. 5.527(fp): Is area left of sta. 9200 effective?

9. 5.623(fp): Is area left of sta. 9000 effective?

WOOD / PATEL ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S.
James S. Campbell, P.E.
G. Thomas Hennessy, P.E.

February 11, 1993

Ms. Cathy Regester
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

RE: **Star Wash Flood Delineation Study**
Preliminary Floodplain/Floodway Submittal, Part I
WP# 92916.00
FCD 92-06

Dear Ms. Regester:

Pursuant to our conversation on February 10, 1993, we are herewith submitting a preliminary Floodplain/Floodway analysis, for Part I of the referenced study for your review. This part includes portions of Star Wash and several tributaries described herein.

Please note Part II, our final part, will include the remainder portions of Star Wash and tributaries. We anticipate that submittal to be made within the next 2-3 weeks.

Part I:

Specifically, the southern 2.7 miles and the northern 0.8 miles of Star Wash, and all of Tributaries "C", "D", and "E" are included in this submittal. These reaches are highlighted on the "Study Area Limits" figure.

Comments regarding this submittal:

1. The files were run using the BOSS HEC-2 package, Version 3.10.

2. These profiles are refined from our initial hydraulic analyses which were reviewed with you in our office on January 21, 1993. Subsequently, the profiles were updated, as appropriate, per input from Pedro Calza at our February 1, 1993 meeting.

3. Floodway files, (denoted by xxxxxfw1), were run with two profiles each. The first profile, due to limitations of the BOSS software, is totally unencroached; that is, it does not contain any ineffective flow encroachments. For this reason, please disregard Profile Number 1 of the floodway files. The second profile contains the Method 1 encroachment stations that define the floodway limits. In order to determine whether the floodway water surface elevation increase is less than or equal to one foot compared to the floodplain water surface, it was necessary to compare Profile 2 of the floodway run with the floodplain profile of the corresponding separate floodplain file (filename denoted by xxxxxfp).

4. A separate, handwritten tabulation of water surface elevation without floodway and water surface elevation difference appears adjacent to the Summary Table 200 of each floodway file printout.

5. Please note that in the final submittal of washes, ineffective flow encroachments in the first profile of the floodway files will be handled by artificially inserting a high GR point at the encroachment stations. This will provide a means of comparing the floodway-encroached profile (Number 2) and the "natural" profile (Number 1) with ineffective flow encroachments in one single run.

6. To avoid confusion, we are still referring to all tributaries as Tributaries "A", "B", "C", "D", and "E". Prior to our final submittal, we will revise the tributary names, per your letter, dated January 19, 1993.

7. All flood peaks are taken from the Burgess-Niple's Jackrabbit hydrology study as approved by the District/FEMA.

Should you have any questions please feel free to contact me.

Sincerely,

WOOD, PATEL & ASSOCIATES, INC.

Ashok C. Patel, P.E., R.L.S.
Principal

ACP:jag
gencor\92916.f11

PART I SUBMITTAL

TABLE OF CONTENTS

1. Study area limits depicting Part I wash reaches & flood peaks

2. HEC-2 data input/output files, February 11, 1993

3. Profile comments (eventually to be incorporated within the HEC-2 input files using comment cards in the final submittal)

    - Star Wash
    - Tributary "C"
    - Tributary "D"
    - Tributary "E"

4. HEC-2 output files with different dividers, as noted.

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

DATE 2/18/93	JOB NO. 92916.00
ATTENTION Cathy Regester	
RE: Star Wash Floodplain Study FCD 92-06	
Subject: Status Report No. 5	

TO Flood Control District of Maricopa Co.
2801 West Durango st.
Phoenix, AZ. 85009

WE ARE SENDING YOU [X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop drawings [ ] Prints [ ] Plans [ ] Samples [ ] Specifications
[ ] Copy of letter [ ] Change order [X] Status Report, by Fax 5 Pages

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REMARKS Please call if you have any questions.

Thanks!

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PRODUCT 240 NCR Inc., Groton, Mass. 01471

WOOD / PATEL
ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S.
James S. Campbell, P.E.
G. Thomas Hennessy, P.E.

February 24, 1993

Ms. Cathy Regester
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

RE: **Star Wash**
WP# 92916

Dear Cathy:

The following HEC-2 files are the preliminary floodplain and floodway profiles for all reaches of Star Wash and Tributaries within the study area. Please note that for simplicity and ease of review, this submittal includes both Parts I and II in one package. The appropriate file names for each are highlighted on the "Study Area Limits" figure. The files were run using the BOSS HEC-2 package, Version 3.10.

Comments on various items requiring special consideration in the development of the HEC-2 models are included in this submittal. These items are identified by numbers 1 through 15 in the attached Study Area Limits figure.

Floodway files, (denoted by xxxxxfw1), were run with two profiles each. The first profile, due to limitations of the BOSS software, is totally unencroached; that is, it does not contain any ineffective flow encroachments. For this reason, please disregard Profile Number 1 of the floodway files. The second profile contains the method 1 encroachment stations that define the floodway limits. In order to determine whether the floodway water surface elevation increase is less than or equal to one foot compared to the floodplain water surface, it was necessary to compare profile 2 of the floodway run with the floodplain profile of the corresponding separate floodplain file (filename denoted by xxxxxfp).

At sections where the table 200 printout shows a water surface rise of greater than one foot, a corrected, handwritten tabulation of water surface elevation without floodway and water surface elevation difference appears adjacent to the summary table 200 of each floodway file printout. At sections where the table 200 printout shows a water surface increase of less than one foot, the actual water surface rise will be equal to or less than that computed by HEC-2.

Please note that in the final submittal of all washes, ineffective flow encroachments in the first profile of the floodway files will be handled by artificially inserting a high GR point at the encroachment stations. This will provide a means of comparing the floodway-encroached profile (number 2) and the "natural" profile (number 1) with ineffective flow encroachments in one single run.

Should you have any questions please call me.

Sincerely,

WOOD, PATEL & ASSOCIATES, INC.

Ashok C. Patel, P.E., R.L.S.
Principal

ACP:jag

GENCOR\92916L.F11

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

DATE	JOB NO.
2/3/93	92916

ATTENTION: SCOTT BUCHANAN

RE: STAR WASH / POWERLINE WASH & STAR WASH / TANK WASH CONFLUENCE AREAS

TO STANLEY CONSULTANTS INC.

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☑ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☑ DISKETTE

COPIES	DATE	NO.	DESCRIPTION
1 ea.			SHEETS 1, 2, & 3 – STAR WASH MAPPING WITH PRELIMINARY FLOODPLAIN & FLOODWAY DELINEATIONS
1			DISKETTE (5 1/4") WITH HEC-2 INPUT & OUTPUT FILES FOR STAR WASH FLOODPLAIN & FLOODWAY

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☑ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Please provide weight on the FPD width, we also need to coordinate flowways, CWISEL etc.

thanks!

COPY TO Cathy Reposter, FCDMC

SIGNED: [signature]

40% Pre-Consumer Content • 10% Post-Consumer Content

If enclosures are not as noted, kindly notify us at once.

PRODUCT 240 NEBS Inc., Groton, Mass. 01471.

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

DATE 1/1/93 JOB NO. 92916.00

ATTENTION Cathy Regester

RE: Star Wash Floodplain Study
FCD 92-06

Subject: "n" Value Report

TO Flood Control District of Maricopa Co.
2801 West Durango st.
Phoenix, AZ. 85009

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☒ Report

COPIES	DATE	NO.	DESCRIPTION
1	1/93		Revised Copy of "n" Value Report
			(incorporates response to your Comments)

THESE ARE TRANSMITTED as checked below:

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☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Please note that in our final submittal, Color photographs will be included.

Please treat this as an interim copy.

thanks!

COPY TO _____

SIGNED: _____

If enclosures are not as noted, kindly notify us at once.

January 25, 1993

PROJECT STATUS REPORT NO. 4

STAR WASH FLOODPLAIN STUDY
FCD 92-06
WP# 92916

1. Coordination
Met with Aerial Mapping Company to review digital cross-sections, section modifications.

2. Data Collection
This task is one-hundred percent (100%) complete.

Field Reconnaissance
Study reach photographs were taken on October 29, 1992, and January 5, 1993. On January 5, 1993, three staff members from the Wood/Patel office and Cathy Regester from Flood Control District of Maricopa County (District) visited the site. The primary goal was to observe channel conditions and overbank areas, take photographs and evaluate conditions such as channel irregularities, vegetation cover, base condition for channel, etc. for the "n" Value Report preparation. Several areas on Star Wash and all tributaries were observed. Subsequent to the field trip, a report documenting "n" value was prepared, **titled "n" Value Determination Report, Star Wash and Tributaries.** The report was submitted on January 15, 1993, and comments were received from Cathy Regester regarding the report. This task is ninety percent (90%) complete.

3. Topographic Mapping
All topo mylars for the entire project are ninety-five percent (95%) complete, containing Sheets 1-10.

4. Field Surveys
This task is one-hundred percent (100%) complete.

5. Floodplain/Floodway

Several issues regarding floodplain delineation work have been coordinated with the District:

- Reviewed hydrology report for Toyota prepared by SFC Consultants. A comparison was made for peak flows entering at the north end of study limits. Drainage area distribution, peak flows, etc. were compared. Some inconsistencies were found between the Toyota Study and the study which is being utilized by Wood/Patel. Inconsistencies were submitted to the District staff for review. The District recommended the use of the B & N Study.

- It was pointed out to the District that Toyota Haul Road bisects the project in a diagonal direction running northwest to southwest in the northern part of the study limits. The road has been cut below ground surface and therefore, will divert runoff generally in the southeast direction. This would, in fact, create some changes in hydrology condition because flow is redirected into different watersheds. The District's response was received regarding this issue.

- Check dams were discussed with the District to confirm that these dams are made of loose dirt. They appeared to have been designed using improper construction techniques. For this reason, the dams will not be used in the HEC-2 model as an effective barrier to the flow.

- Several tributaries are named as Tributaries "A-E" and input was sought from the District regarding proper names to these tributaries.

- Handling of breakout areas was discussed again. It was reconfirmed that the breakout areas where the channel banks are low and the flow leaves the main wash alignment will be handled as Approximate Zone "A". This approach is consistent with the Scope of Services in this contract.

- As requested by the District, a key map for elevation reference mark was submitted and subsequently approved.

- For Star Wash (north portion) from river mile 5.5 upstream, a workmap depicting cross-section alignments was submitted and subsequently approved by the District. Likewise, the workmaps for Tributaries "A-E" were also submitted and approved. After approval of cross-section alignments, the maps were submitted to Aerial Mapping Company, Inc. so that the digital cross-sections can be obtained. The digital cross-sections were completed by Aerial Mapping Company.

- For the northern portion of the study area, Tributaries "A-E", plus a portion of Star Wash, a working HEC-2 model was created. Based on a working computer model, several HEC-2 runs were made to evaluate flood conveyance capacities, breakout potentials, effective flow areas, etc. The working HEC-2 model was refined into a preliminary worktable computer model. Cross-sections and flood profiles were plotted. On January 20, 1993, the results of this preliminary HEC-2 were presented to Cathy Regester at the offices of Wood/Patel.

- This task is thirty-five percent (35%) complete.

gencor\929164.j21

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

Flood Control District of Maricopa Co.
2801 West Durango St.
Phoenix, AZ. 85009

DATE 1/22/93 | JOB NO. 92916.00

ATTENTION Cathy Regester

RE: Star Wash Floodplain Study
FCD 92-06

Subject: Project Status Report

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☒ Report

COPIES	DATE	NO.	DESCRIPTION
2			Project Status Report No. 4

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
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☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO Terry Rolligar with Invoice / Status Report

SIGNED: T Clatter

If enclosures are not as noted, kindly notify us at once.

PRODUCT 240 NEBS Inc. Groton, Mass.

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

DATE	JOB NO.
1/21/93	92916

ATTENTION: RICHARD COOK

RE: STAR WASH

TO AERIAL MAPPING CO., INC.
3141 W. CLARENDON AVE
PHOENIX, AZ 85017

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☑ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☑ DISKETTE

COPIES	DATE	NO.	DESCRIPTION
1	1/18/93		STAR WASH HEC-2 CROSS SECTIONS (REVISED)
1 ea	—		SHEETS 6, 7, 10 STAR WASH TOPOGRAPHIC MAPPING

THESE ARE TRANSMITTED as checked below:

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☐ As requested ☐ Returned for corrections ☐ Return_____corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

RICHARD;

ENCLOSED ARE PRINTS INDICATING CROSS SECTIONS WHERE WE ARE REQUESTING ADDITIONAL DIGITIZED (GR) DATA. THE EXTENDED PORTIONS OF THE AFFECTED CROSS SECTIONS ARE HIGHLIGHTED IN YELLOW FOR YOUR CONVENIENCE. WE ARE ALSO ENCLOSING A DISKETTE CONTAINING THE MOST RECENT GR DATA THAT YOU PROVIDED US

THANK YOU.

COPY TO _____

SIGNED: Anthony J. Rogers

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PRODUCT 240 NEBS Inc., Groton, Mass. 01471.

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TDD (602) 506-5897

BOARD OF DIRECTORS

P. Ben Arredondo
Betsey Bayless
James D. Bruner
Carole Carpenter
Tom Freestone

January 20, 1993

Mr. Ashok C. Patel, P.E., R.L.S.
Wood, Patel & Associates, Inc.
4105 North 20th Street, Suite 130
Phoenix, Arizona 85016

SUBJECT: Star Wash & Tributaries FIS
"n" Value Determination Report
FCD # 92-06

Dear Mr. Patel:

I have completed my review of the subject report and am basically satisfied with the report. I do, however, have a few minor comments which need to be addressed in the final report:

1. We request that the second sentence of the last paragraph on page 6, beginning "Resistance to flow varies greatly ...", be removed from the report.

2. On section 2.1, please explain the n = 0.040 shown on the cross-section plot.

3. Please place the assigned 'n' values next to the channel photos in the report.

4. Please be aware that, for the hydraulic study, the HEC-2 cross-section plots are to be at an engineered scale.

5. Provide an explanation for the derivation of the percentages used in averaging the channel 'n' values.

6. I am sure you are aware, but just a reminder, the final report shall contain color photos of the area.

If you have any questions or comments on the above, please feel free to call me at (602) 506-4770.

Sincerely,

Catherine W. Regester

Catherine W. Regester
Hydrologist

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TDD (602) 506-5897

BOARD OF DIRECTORS

P. Ben Arredondo
Betsey Bayless
James D. Bruner
Carole Carpenter
Tom Freestone

January 19, 1993

Mr. Ash C. Patel, P.E., R.L.S.
Wood, Patel & Associates, Inc.
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016

SUBJECT: Star Wash
FCD #92-06

Dear Mr. Patel:

I have discussed several issues with you in the past several weeks. This letter serves as written documentation of those discussions for your files.

ERM Key Map

Jim Stewart of Floodplain Management has reviewed and approved the ERM locations as shown on your map submittal of 12/21/92.

Handling of Breakout Areas

Breakout areas are to handled as described in the scope. Every attempt is to be made to assign Zone AE designations to the main channel of Star Wash and the tributaries under study in this project. Zone A, however, is acceptable for the areas where flows breakout of the main channel of Star Wash and the tributaries. Q's should be adjusted where appropriate.

Names of Tributaries

Although the letter designations for the Star Wash tributaries are acceptable, I have reviewed the area and attempted to name the washes based on features noted on the USGS maps. There are very few identified features in this area, however. Wash 'C', though, does, or at least did before Toyota, flow through Mesquite Tank. Therefore, Mesquite Tank Wash may be a viable name for this wash. In addition, Wash 'E' flows along the base of Indian Buttes. Therefore, Indian Buttes Wash may be an appropriate name for this wash. I am at a loss for names for the remaining three washes. If you have any suggestions, please let me know.

Check Dams

Check dams are to be ignored in the HEC-2 modeling since FEMA criteria can not be met.

Q's for Tributaries 'D' and 'E'

There was a question regarding the Q's for tributaries 'D' and 'E' as tributary 'E' is a much larger and more clearly defined wash than tributary 'D' yet has a Q of only 2000 CFS as compared to 3000 CFS for wash 'D'. After discussing this question with Sandy Story, however, this discrepancy does appear justified. The drainage area to tributary 'D' is nearly twice the size of that to 'E'. In addition, the drainage area to 'E' is very long and narrow and, therefore, quite different to that of 'D'. In summary, the varying characteristics of the two watersheds support the disparity between the two Q's.

Toyota Haul Road

For HEC-2 modeling, the Toyota Haul Road should be ignored. The Drainage Branch of the FCD will be instructing Toyota that the area disturbed during the construction of the temporary haul road must be returned to the original grades at the completion of the work. Drainage has estimated that this road may be needed for another year. As the haul road appears on the mapping, this item will need to be addressed in the final report for FEMA.

Toyota Hydrology

I have discussed the differences in Q's between the Jackrabbit Study and the Toyota Drainage Report with Sandy Story who reviewed both studies. Sandy does not have enough confidence in the results of the Toyota Report to recommend its use in a floodplain delineation study. Therefore, the Q's stated in the Jackrabbit Wash Study should still be used in this delineation study.

If any of the above is unclear, or if you believe it is not as we previously discussed, please let me know as soon as possible.

Sincerely,

Catherine W. Regester

Catherine W. Regester
Hydrologist

WOOD / PATEL ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S.
James S. Campbell, P.E.
G. Thomas Hennessy, P.E.

January 19, 1993

Ms. Cathy Regester
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

Re: **Star Wash & Tributaries**
FCD 92-06

Dear Ms. Regester:

We are herewith submitting a copy of "n" Value Determination Report in conjunction with the referenced study.

Please note that a detailed evaluation was made of nine (9) different cross-sections on Star Wash and Tributaries. These representative sections reflect typical conditions of the study reaches within the project limits. In the confluence areas, a "NH" card will be used to account for multiple channels, vegetation areas and overbank conditions.

Our analysis accounted for various factors as cited below:

Please note that the 100-year peak flows are produced by the summer thunderstorms. Therefore, considerations need to be given to the conditions of washes during the peak flow time period.

As you are aware, Maricopa County received unusually high annual participation in 1992 (14 inches as compared with the 7.4" average annual precipitation). As a result, the vegetation is much denser along the wash bank areas as shown by the report photographs. The vegetation will not appear as dense if photographs are taken at these same locations in the summer.

A comparison was also made for the previously approved "n" values for the FEMA-approved portion of Star Wash immediately downstream of the powerline.

Please review and comment on this submittal. Should you need any clarification, please do not hesitate to call.

Very truly yours,

WOOD, PATEL & ASSOCIATES, INC.

Ashok C. Patel, P.E., R.L.S.
Principal

ACP:jag
gencor\92916.j19

AERIAL MAPPING COMPANY, INC.
3141 W. Clarendon Avenue
PHOENIX, AZ 85017-4588

TEL (602) 263-5728
FAX (602) 263-0165

LETTER OF TRANSMITTAL

TO Ash Patel
Wood / Patel

DATE 1-18-97	JOB NO. 92155
ATTENTION	
RE:	

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			DISK ETTR.

THESE ARE TRANSMITTED as checked below:

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☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Fixed SECTION - are -
A 1580 (on BOQ) ext extended to top of ridge
A 3074
A 3157
D 1510
STR B 7797 ←
all others to RUN to PICK UP
end POINT

COPY TO _____ SIGNED: RF

If enclosures are not as noted, kindly notify us at once.

PRODUCT 240 NEBS Inc., Groton, Mass. 01471

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

DATE	JOB NO.
11/9/95	92916

ATTENTION: RICHARD COOK

RE: STAR WASH

TO AERIAL MAPPING
3141 W. CLARENDON AVE.
PHOENIX, AZ 85017

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☑ COPIES OF SECTIONS

COPIES	DATE	NO.	DESCRIPTION

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☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19 _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS RICHARD,
ENCLOSED ARE A NUMBER OF SECTIONS LINES OR GRADES SEEM TO CONFLICT WITH AERIAL PLAN
PLEASE REVIEW & COMMENT.

THANK YOU

COPY TO _____

SIGNED: JAMES TALLON

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PRODUCT 240 NEBS Inc., Groton, Mass. 01471.

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

DATE 1/11/93	JOB NO. 92916.00
ATTENTION Cathy Regester	
RE: Star Wash Floodplain Study FCD 92-06	
Subject: Toyota, Rainbow Wash – Reports	

TO Flood Control District of Maricopa Co.
2801 West Durango St.
Phoenix, AZ. 85009

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☒ Report

COPIES	DATE	NO.	DESCRIPTION
1	7/12/91		Toyota – Project hydrology Report by SFC
1	4/92		"n" Value Report, Rainbow Wash, SLA

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☒ Returned Reports
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Cathy,
Thanks for let me use these reports. please give me a copy of "Technical Support Data Notebook" ~~by~~ Guidelines by ADWR.

Sincerely,

COPY TO _____

SIGNED: [signature]

If enclosures are not as noted, kindly notify us at once.

PRODUCT 240 NEBS Inc., Groton, Mass. 01471

WOOD / PATEL ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S.
James S. Campbell, P.E.
G. Thomas Hennessy, P.E.

December 29, 1992

Mr. Bob Parks/Richard Cook, R.L.S.
Aerial Mapping Company, Inc.
3141 West Clarendon Avenue
Phoenix, AZ 85017

RE: **Star Wash, North Segment**
FCD 92-06
WP# 92916

Dear Richard:

Please provide HEC-2 digital cross-sections for the referenced project.

Please prepare your data in the following format:

1. Cross-section numbering X-1 card as labeled on the cross-section line.

2. Digital accuracy shall be to the 1/4 contour interval (0.5 foot).

3. Digitize cross-section into HEC-2 format (FEMA and the FCDMC Standards).

4. Digitize the cross-section's elevations and stations from left to right looking downstream (south).

5. Set the cross-section stationing such that the intersection of the cross-section line and the control line, as indicated on the topo map, is at station 10,000 (i.e. the cross-section is to be stationed such as the control line is at station 10,000, see yellow highlighted area).

6. Limit the horizontal limits of the digital cross-section to the horizontal limits of the cross-section line indicated on the topographic map.

7. Sequence the cross-sections such that the first cross-section is the downstream most cross-section and that the last cross-section is the upstream most cross-section of the wash (i.e. sequence the cross-sections from low to high cross-section numbers: Note cross-section numbers represent river distance from confluence with Jack Rabitt Wash.

8. Provide the digital cross-section files on DOS formatted 3.5" high density disk(s).

If you have any questions regarding the information provided, please call me at 957-3149.

Thank you for your assistance.

Sincerely,

WOOD, PATEL & ASSOCIATES, INC.

Ashok C. Patel, P.E., R.L.S.
Principal

ACP:jag

gencor\92916.d29

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
~~3335 West Durango Street~~
PHOENIX, ARIZONA 85009
506-
(602) ~~262~~-1501

LETTER OF TRANSMITTAL

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY
2801 W. Durango
PHOENIX, AZ 85009

DATE	JOB NO.
12/29/92	92-06
ATTENTION: ASH PATEL	
RE: STAR WASH FIS	

TO WOOD/PATEL INC.

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via PICK-UP the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			TOPO SHEETS 5 THRU 10

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☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS CROSS-SECTION ALIGNMENTS APPROVED AS SUBMITTED. PLEASE IN MIND, HOWEVER, THAT CROSS-SECTION ALIGNMENTS MAY NEED TO BE ALTERED AFTER RUNNING HEC-2 TO ENSURE THAT ALL SECTIONS ARE PERPENDICULAR TO FLOW PER FEMA CRITERIA.

COPY TO FILE

SIGNED: Catherine W. Regester

6910-009 3-90

If enclosures are not as noted, kindly notify us at once.

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

DATE 12/22/92 JOB NO. 92716
ATTENTION Scott Brickman
RE:
Powerline / Tank Wash

TO Stanley Consultants, Inc.
3117 N 16th St.
Phoenix, Az 85016

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via ________ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ ________

COPIES	DATE	NO.	DESCRIPTION
1			Floppy Disk with Geo Pt digital Data

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☒ For your use ☐ Approved as noted ☐ Submit ____ copies for distribution

☐ As requested ☐ Returned for corrections ☐ Return ____ corrected prints

☐ For review and comment ☐ ________

☐ FOR BIDS DUE ________ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS
Please call Aerial Mapping (Richard Cook) if you have any problems regarding the data.
Thanks

COPY TO Cathy, Rory, EDMC

SIGNED: [signature]

If enclosures are not as noted, kindly notify us at once.

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PRODUCT 240 NEBS Inc., Groton, Mass. 01471.

December 21, 1992

PROJECT STATUS REPORT NO. 3

STAR WASH FLOODPLAIN STUDY
FCD 92-06
WP# 92916

1. Coordination
Met with Aerial Mapping Company to review the topographic maps (Sheets 5-10).

2. Data Collection
This task is one hundred percent (100%) complete.

Field Reconnaissance
No activity.

3. Topographic Mapping
Completed compilation of Phase II. (Northern portion). Topo Sheets 5,6,7,8,9 & 10 are prepared.

4. Field Survey
Field survey work is one hundred percent (100%) complete.

5. Floodplain/Floodway
For Star Wash (South portion), from river mile 2.1 to 5.5, workmap depicting cross-section alignments were approved by the District. The work maps were submitted to the mapping company for the purpose of digital cross-section preparation. The GR point/digital data for this portion of study area is completed. This work is being reviewed and edited for the working HEC-2 model.

For the northern portion of study area, workmaps were prepared depicting cross-section alignments. The cross-sections were established based on a preliminary hydraulic analysis to locate limits of cross-section widths. Several breakout areas have been noted and discussed with the District.

6. Final Product
No activity.

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

DATE 12/21/94	JOB NO. 92916.00
ATTENTION Cathy Regester	
RE: Star Wash Floodplain Study FCD 92.06	
Subject: Cross-section locations 2nd (last) segment	

Flood Control District of Maricopa Co.
2801 West Durango St.
Phoenix, AZ. 85009

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☒ Worksmaps

COPIES	DATE	NO.	DESCRIPTION
1			Sheets 5, 6, 7, 8, 9 & 10

THESE ARE TRANSMITTED as checked below:

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☒ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Please provide input on the following items:

1. Cross-section Alignments
2. Name of Tributaries
3. Handling of breakout areas
4. ERM Map

Thanks for your help

Status Report:
- All mapping (topo Complete)
- Digital (GR cards) points done for the first segment

COPY TO _____

SIGNED: TC Patel

If enclosures are not as noted, kindly notify us at once.

PRODUCT 240 NEBS Inc., Grand Haven, MI 49417

WOOD / PATEL ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S.
James S. Campbell, P.E.
G. Thomas Hennessy, P.E.

December 9, 1992

Mr. Richard Cook, R.L.S.
Aerial Mapping Company, Inc.
3141 West Clarendon Avenue
Phoenix, AZ 85017

RE: **Star Wash, South Segment**
FCD 92-06
WP# 92916

Dear Richard:

Please provide HEC-2 digital cross-sections for the referenced project.

Please prepare your data in the following format:

1. Cross-section numbering X-1 card as labeled on the cross-section line.

2. Digital accuracy shall be to the 1/4 contour interval (0.5 foot).

3. Digitize cross-section into HEC-2 format (FEMA and the FCDMC Standards).

4. Digitize the cross-section's elevations and stations from left to right looking downstream (south).

5. Set the cross-section stationing such that the intersection of the cross-section line and the control line, as indicated on the topo map, is at station 10,000 (i.e. the cross-section is to be stationed such as the control line is at station 10,000).

6. Limit the horizontal limits of the digital cross-section to the horizontal limits of the cross-section line indicated on the topographic map.

7. Sequence the cross-sections such that the first cross-section is the downstream most cross-section and that the last cross-section is the upstream most cross-section of the wash (i.e. sequence the cross-sections from low to high cross-section numbers: Note cross-section numbers represent river distance from confluence with Jack Rabitt Wash.

8. Provide the digital cross-section files on DOS formatted 3.5" high density disk(s).

9. Cross-section for the power line and Tank Wash for Stanley Consultants, are highlighted with an orange marker. The digital-section files for the Stanley's portion of washes should be on a separate floppy disk.

If you have any questions regarding the information provided, please call me at 957-3149.

Thank you for your assistance.

Sincerely,

WOOD, PATEL & ASSOCIATES, INC.

Ashok C. Patel, P.E., R.L.S.
Principal

ACP:jag

cc: Cathy Regester, Flood Control District of Maricopa County
Scott Buchanan, Stanley Consultants

gencor\92916.d09

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
~~3335 West Durango Street~~
PHOENIX, ARIZONA 85009
506-
(602) ~~262~~-1501

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY
2801 W. Durango
PHOENIX, AZ 85009

LETTER OF TRANSMITTAL

DATE	JOB NO.
12/8/92	92-06

ATTENTION ASH PATEL

RE: "STAR WASH"
FLOODPLAIN DELINEATION STUDY
(PORTIONS OF POWERLINE & TANK WASHES INCLUDED)

TO WOOD / PATEL ASSOCIATES

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via PICK-UP the following items:

☐ Shop drawings ☒ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1		1	TOPO MAPS W/ CROSS-SECTION ALIGNMENTS

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☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS PLEASE CHECK LOCATION OF RIVER MILE 3.9 ON STAR WASH. APPEARS TO BE ONLY ABOUT 480 FT ABOVE RM 3.8 & ABOUT 495 FT BELOW RM 4.0.
CROSS-SECTION ALIGNMENTS APPEAR TO BE OKAY. PLEASE KEEP IN MIND THAT CROSS-SECTION ORIENTATION MAY NEED TO BE ALTERED AFTER RUNNING HEC-2 TO ENSURE THAT ALL SECTIONS ARE PERPENDICULAR TO FLOW PER FEMA CRITERIA.

COPY TO SCOTT BUCHANAN

SIGNED: Catherine W. Regester

6910-009 3-90

If enclosures are not as noted, kindly notify us at once.

3141 W. Clarendon Avenue
PHOENIX, AZ 85017-4588

TEL (602) 263-5728
FAX (602) 263-0165

STANLEY CONSULTANTS
3117 N 16th Street
Phx Az 85016

DATE 12-7-92 | JOB NO. 92155

ATTENTION Scott Buchanan

RE: Star Black / Phoenix

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order

☒ Auto Cad DWG File Sheet 1-4

COPIES	DATE	NO.	DESCRIPTION

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☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints

☐ For review and comment ☐ _____

☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO Rich Carter / File

SIGNED: [signature]

If enclosures are not as noted, kindly notify us at once.

PRODUCT 240 (NASHUA) Inc. Groton, Mass. 01471

1992-12-07 18:12 1 602 263 0165 AERIAL MAPPING COMPANY, INC. 005 P01

December 1, 1992

PROJECT STATUS REPORT NO. 2

STAR WASH FLOODPLAIN STUDY
FCD 92-06
WP# 92916

1. Coordination
Met with Aerial Mapping Company and Stanley Consultants to review the topographic maps (Sheets 1, 2, 3 & 4).

Sent vertical control to Stanley Consultants, including both AMCI values and B & N (Jackrabbit Wash) final control data.

Also provided control to: Collins Pina for Daggs Wash Study purposes.

2. Data Collection
Data collection, as it pertains to survey control information, and existing data has been completed. Also completed is the data collection on hydrology, existing mapping, existing HEC-2 analysis, etc.

This task is one hundered percent (100%) complete.

3. Topographic Mapping
Completed compilation of Phase I. (Southern portion)

Provided PEC with vertical control values for test purposes to validate GPS elevation model.

4. Field Survey
Vertical control work is one hundred percent (100%) complete and is finalized. All GPS work is also complete.

5. Floodplain/Floodway
For Star Wash (South portion), from river mile 2.1 to 5.5, work map depicting cross-section alignments were prepared and submitted to the District for approval. Coordinated with Stanley, two confluence locations as well as their cross-section alignments. To establish cross-section widths, approximate hydraulic analysis was performed for all wash reaches on Sheets 1, 2, 3, & 4.

6. Final Product
No activity.

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

TO Stanley Consultants, Inc

DATE 11/30/92	JOB NO. 92916
ATTENTION Scott Buchanan	
RE: Star / Power Line Wash	

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☒ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1	11/20	4 sheets	Blue prints, W/P mapping
1		4 sheets	Mylars (loaned copy)
1		1	Workmap, (4 sheets attached) with cross-section alignments

THESE ARE TRANSMITTED as checked below:

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☒ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19 _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

- Please add cross-sections (alignments) to the two washes being studied by Stanley.
- Confirm locations of the confluence cross-sections
- Provide any other input

COPY TO Cathy Pocock/

SIGNED: [signature]

40% Pre-Consumer Content • 10% Post-Consumer Content

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PRODUCT 240 NEBS Inc., Groton, Mass. 01471

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

TO Flood Control District of Maricopa County

DATE 11/30/92 JOB NO. 92916.00

ATTENTION Cathy Regester

RE: Star Wash
FCD 92-06

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☒ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1	11/30/92		Workmap consisting of 4 sheets
			depicting - Control line
			- River mile stationings
			- Cross-section Alignments

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☒ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Please note that this workmap has been coordinated with Scott Buchanan of Stanley Consultants, Inc. Cross-sectional data (alignment, control line) etc from Stanley is also depicted on this map.

Thanks for your assistance of this project

COPY TO Scott Buchanan, Stanley

SIGNED: [signature]

40% Pre-Consumer Content • 10% Post-Consumer Content

If enclosures are not as noted, kindly notify us at once.

PRODUCT 240 NEBS Inc., Groton, Mass. 01471

STANLEY CONSULTANTS, INC.

3117 North 16th Street • Phoenix, AZ 85016 Tel: 602/279-0901 • Fax: 602/230-7655

TO: Wood - Patel

DATE: 11-30-92

PROJECT: Powerline / Tank

ATTN: Ash

PROJECT #: 11547

THE FOLLOWING ITEMS ARE TRANSMITTED:

COPIES	ORIGINALS	DESCRIPTION
1ea		Affidavit of Publication
		Wickenburg Sun
		Republic / Gazette

THE ABOVE ITEMS ARE SUBMITTED:

- ☐ AT YOUR REQUEST
- ☐ FOR YOUR REVIEW
- ☐ FOR YOUR APPROVAL
- ☐ FOR YOUR SIGNATURE
- ☐ AS REVISED
- ☒ YOUR INFORMATION

REMARKS:

Copy To:
Cathy Regester

BY: Scott Buchanan

RECEIVED:

DATE:

TOTAL PRICE: $20.84

ISSUED TO: AFFIDAVIT OF PUBLICATION

Stanley Consultants

STATE OF ARIZONA

County of Maricopa

Kevin Cloe, being duly sworn, upon oath, deposes and says: That he is the Publisher of

The Wickenburg Sun

A newspaper of general circulation in the County of Maricopa, State of Arizona, published in Wickenburg, Arizona, and that the copy hereto attached is a true copy of the advertisement as published weekly in The Wickenburg Sun on the dates following:

October 14 and 21, 1992

KEVIN CLOE
PUBLISHER

Sworn to before me this 21st day of

October A.D. 19 92

Notary Public

OFFICIAL SEAL
BRENDA M. FORNOFF
NOTARY PUBLIC - ARIZONA
MARICOPA COUNTY
My Comm. Expires April 15, 1994

PUBLIC NOTICE - Your Right To Know

ANNOUNCEMENT OF INTENT TO PERFORM FLOOD ELEVATION STUDY.

The Flood Control District of Maricopa County (FCDMC) 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 in western Maricopa County. FCDMC has contracted Stanley Consultants, Inc., Wood/Patel Associates and A/N West, Inc. to perform studies for Powerline Wash, Tank, Star and Daggs Wash located west of the Hassayampa River approximately half way between the communities of Buckeye and Wickenburg. Flood elevations from these studies will be used to determine flood insurance rates by the Federal Emergency Management Agency (FEMA). This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any relevant technical information to the attention of FCDMC/FEMA, so that it may be considered during the course of this study. Your comments should be addressed to Ms. Cathy Regester, or Mr. Pedro Calza, Hydrologists at the Flood Control District of Maricopa County, 2801 W. Durango Street, Phoenix, AZ 85009, Phone (602) 506-1501.

Published in The Wickenburg Sun on October 14 and 21, 1992.

AFFIDAVIT OF PUBLICATION

The Arizona Republic/The Phoenix Gazette

STATE OF ARIZONA
COUNTY OF MARICOPA } SS.

JOAN LOHR, being first duly sworn, upon oath deposes and says: That she is the 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~~

October 14, 21, 1992

Joan Lohr

Sworn to before me this

18th day of

November A.D. 19 92

Notary Public

OFFICIAL SEAL
THOMAS F. BIANCO
Notary Public - State of Arizona
MARICOPA COUNTY
My Comm. Expires Mar. 19, 1995

INVOICE NO. 92516
ANNOUNCEMENT OF INTENT TO PERFORM FLOOD HAZARD STUDIES

The Flood Control District of Maricopa County, (FCDMC), 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 in western Maricopa County. FCDMC has contracted Stanley Consultants, Inc., Wood/Patel Associates and A-N West, Inc. to perform studies for Powerline, Tank; Star and Daggs Washes located west of the Hassayampa River approximately half way between the communities of Buckeye and Wickenburg. Flood elevations from these studies will be used to determine flood insurance rates by the Federal Emergency Management Agency (FEMA). This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any relevant technical information to the attention of FCDMC/FEMA, so that it may be considered during the course of this study. your comments should be addressed to Ms. Cathy Regestar or Mr. Pedro Calza, Hydrologists at the Flood Control District of Maricopa County, 2801 W. Durango Street, Phoenix, AZ 85009, Phone (602) 506-1501. Published: Arizona Republic, October 14,21, 1992.

AERIAL MAPPING COMPANY, INC.
3141 west clarendon avenue, phoenix, arizona 85017, (602) 263-5728 fax (602) 263-0165
Gerald E. Francis - President
Richard D. Cook, R.L.S. - Executive Vice President

11-23-92

Mr. Ashok Patel, P.E.
Wood - Patel & Associates, Inc.
4105 North 20th Street, Suite 130
Phoenix, Arizona 85016

RE: STAR WASH & Tributaries; FCD 92-06, WP#92916.00
Survey & Mapping, AMCI WORK PROGRESS SUMMARY

DATE	DISCUSSION
10/27	Received final control from Project Engineering Corp. (PEC) with final coordinates on project
10/28	Field survey completed.
11/06	Analytical aerotriangulation completed.
11/09	Topographic map compilation begins on Phase I.
11/10	Sent vertical control to Stanley Consultants, including both AMCI values and B & N (Jackrabbit Wash) final control data. Also provided control to: Collins Pina for Daggs Wash Study purposes.
11/19	Completed compilation of Phase I. (Southern portion) Provided PEC with vertical control values for test purposes to validate GPS elevation model.
11-20	Edit Phase I. CAD data and build Sheets 1-4 dwg files.
11-23	Plot & Deliver Phase I.

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TDD (602) 506-5897

BOARD OF DIRECTORS
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Betsey Bayless
James D. Bruner
Carole Carpenter
Tom Freestone

TO: Roy Pederson, County Manager

VIA: Louis A. Schmitt, P.E., Assistant County Manager, Transportation and Development Agency

FROM: Stanley L. Smith, Jr., P.E., Acting Chief Engineer and General Manager

DATE: November 17, 1992

SUBJECT: PUBLIC MEETING IN MORRISTOWN

A public meeting was held in Morristown on November 16th to announce the beginning of four floodplain delineation studies involving desert washes southwest of the Wittmann/Morristown area . Eighteen people attended the meeting, of which 12 were local residents, one represented the Toyota Proving Grounds, and the remaining five were District staff or study consultants.

Residents were given an overview of the floodplain delineation process and the purpose of such studies. A map of the general study area was distributed and a description of the five washes to be studied was provided. Residents were encouraged to submit any information they had regarding local flooding problems so that it could be incorporated into the study. The washes being studied are Iona Wash, Daggs Wash, Star Wash, Powerline Wash and Tank Wash. Except for portions of Iona Wash which are located within the City of Surprise, all the washes are located in unincorporated areas.

Staff answered questions about flood insurance and regulatory impacts associated with delineated floodplains and other general questions about the need for such studies. Residents were told that the studies would be finished next summer and that another public meeting would be held to announce the study results.

Stanley L. Smith, Jr., P.E.

Copy to: Carole Carpenter, District 4 Supervisor

PLEASE PRINT

MEETING ATTENDANCE ROSTER

MEETING: Pre-Study Public Meeting Iona, Daggs, Star, Tank & Powerline Washes

LOCATION: Morristown School

DATE: November 16, 1992

NAME	ADDRESS	PHONE
June Boone	P.O Box 685, Wittmann Az 85361	602 388-2255
Ethel Moehn	P.O. Box 254, Wittmann AZ 85361	388-9423
Ken Pritchett	2320 W. Butler Dr PHX AZ 85021	995-5367
Mr & Mrs Sohler	2548 N 54 AVE Phoenix 85035	272444
Paul Gillis	21724 Lone Mtn Rd Wittmann	388-2006
Gertrude Echard	21724 Lone Mountain Rd. Wittmann, Ar.	388-2006
Joe Cazares	Toyota Project P.O. 1000 Wittman, AZ 85361	320-2155
Sandy Story	FCD	506-1501
Cathy Regester	FCD	506-1501
Ron Nev.tt	FCD	506-1501
Stan Plagens	44802 N Schuraco Blvd Wickenburg	684 3849
[illegible] Charles	2042 Morristown AZ 85342	388-2397
Jon Fuller	583 W Magdalen Tempe 85283	838 0341
Alyaileen DeCellis	3340 W. Colter Phx 85019	973-6490
Bryon Whipple	14046 N 34 Pl Phoenix Az 85032	493.6855
DAVID GLOVER	30344 Oberlin Way	993 8710
DAVID GLOVER	1802 W Charleston Phoenix Ariz 85023	9937835 (Mailing address)
[illegible signature]	FCD	506-1501

6910-004 1-92

AGENDA
Flood Hazard Study Public Meeting
Iona Wash, Daggs Wash, Star Wash, Tank Wash and Powerline Wash

November 16, 1992
Morristown School

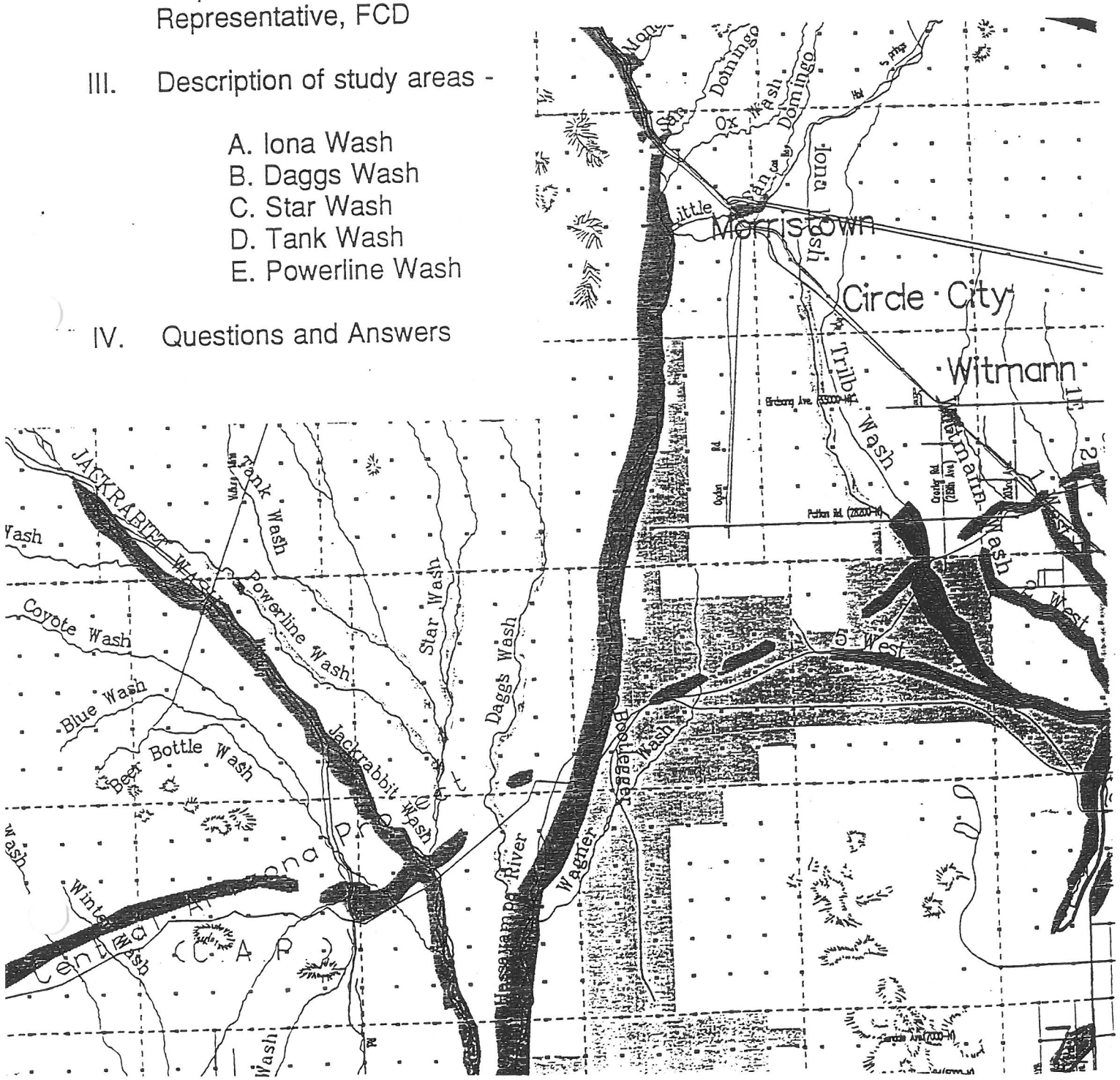
I. Introduction - Jim Phipps, Public Involvement Coordinator, FCD

II. Purpose and uses of Flood Hazard Studies - Ron Nevitt, Floodplain Representative, FCD

III. Description of study areas -

A. Iona Wash
B. Daggs Wash
C. Star Wash
D. Tank Wash
E. Powerline Wash

IV. Questions and Answers



MAILING LIST

LABELS

Douglas Land Corporation
767 5th Ave, 7th Floor
New York, NY 10022

U.S. Bureau of Land Reclamation
Ste. 2200 Valley Center
Phoenix, AZ 85073

Mr. & Mrs Roberts
8971 East De Avenue
Richmond, MI 49093

Mr. Terry J. Stime
15432 North 69th Ave.
Peoria, AZ 85345

Mr. Glenn H. Moiyan
P.O Box 6158
Sitka, AZ 99835

Mr & Mrs Giannantonio
10026 Clair Drive
Sun City, AZ 85351

Mr & Mrs Pardi
137 Orlando Street
Edison, NJ 08817

Mr & Mrs Juzwiak
Box 1100
Sitka, AK 99835

Ms. Sharon Allen
20 East Echo Lane
Phoenix, AZ 85020

Mr & Mrs Davis Jr.
6500 West Buckeye Rd.
SP 22
Phoenix, AZ 85043

Mr & Mrs Liberatore, Jr.
333 Yale Avenue
Morton, PA 19070

Mr. Richard I Surma
10 Grow Lane
Streamwood, Il 60103

Mr & Mrs Hill
725 Territory Street
Las Vegas, NM 89121

Mr & Mrs Yingling
P.O. Box 125
El Mirage, AZ 85335

Mr & Mrs Patterson
7307 Galloway Ave
Indianapolis, IN 46250

J. Seth & H. Cruise
P.O. Box 3974
Greenville, DE 19807

Mr & Mrs Bruning
233 Flintridge Drive
Gahanna, Ohio 43230

Mr & Mrs Taylor
415 South Saint Asaph St.
Alexander, VA 22314

Mr & Mrs Cable
6326 West Garden Dr.
Glendale, AZ 85304

Mr & Mrs Koenig
1910 West Belmont
Chicago, Il 60657

Mr & Mrs Tschetter
10417 Lavergn Ave.
Oaklawn, Il 60453

Mr.& Mrs Olsen
7802 Ruby Dr S.W.
Tacoma, WA 98498

Mr & Mrs Wheaton
2759 Lakeridge Lane
West Lake Village, CA 91361

Mr. James A. Johnson
8676F S.W. 95th Ave
Ocala, Fla. 32676

-31st Ltd Partnership
201 W. Coolidge St
Phoenix,AZ 85013

Ambrose Family Trust
6520 N. Maryland Cir
Phoenix, AZ 85013

AT & SF Railroad
1 Sante FE Plz
5200 E. Sheila ST
Los Angelas CA 90001

Gary E.Baker
P.O. Box 1060
El Mirage,AZ 85335

Barkley Family Trust
515 W. Madison
Prescott, AZ 86301

Donald J.Bever
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Wabash, IN 46992

William L.Blair
2390 E.Camelback Rd,Ste 216
Phoenix, AZ 85016

Walter A. Brinkman
P.O Box 1720
Wickenberg, AZ 85358

John Brister & Dixon Cowley
5510 E. Washington
Phoenix,AZ 85034

William F. Butler Invest.
P.O Box 1774
Surprise, AZ 85374

Chicago Title Company Tr 589
3500 N. Central Ave
Phoenix, AZ 85102

Coast Properties 1 Ltd
P.O. Box 5178
Scottsdale, AZ 85261

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5510 E. Washington
Phoenix, AZ 85034

Lyle D. Crosby
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Scottsdale, AZ 85260

A.L. Delellis
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Phoenix, AZ 85019

Karl Dennison
1210 Woodside Dr.
Eugene, OR 97401

David J. Dosch
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Peoria, AZ 85345

Douglas Land Corp.
767 5th Ave, 7th Floor
New York, NY 10022

Patrick Dupoux
1443 W. Rockwood Dr.
Phoenix, AZ 85027

Andrew Dulcie
6743 E. Almeria
Scottsdale, AZ 85257

Bernice Ewald
26072 Bamboo Palm Dr.
Homeland, CA 92348

Albert L. Fielding
P.O. Box 254
Wittman, AZ 85361

Robert C. Foss
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Edina, MN 55436

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Honolulu, HI 96821

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13 Dixon Ct.
Queensbury, NY 12804

Nennette Graves & Miss Lubman
16834 Halsey St
Granada Hills, CA 91344

Charles D. Hallman
Box 1122
Wickenberg, AZ 85358

Alvin K. Harris
P.O. Box 22795
Sacramento, CA 95822

Earl Herring
P.O. Box 67
Wittmann, AZ 85361

L.M. Jayson
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Phoenix, AZ 85032

Leo Jensen
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Phoenix, AZ 85018

Paul Kiang
2126 N. 48th Dr.
Phoenix, AZ 85035

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4435 E. Redfield Rd.
Phoenix, AZ 85032

Donald G. Lyon
7500 E. McCormick
Scottsdale AZ 85258

Kenneth L.Manning & Mr. Eckel
8109 E. Via De La Escuela
Scottsdale, AZ 85258

Robert Mattson
1115 3rd St.
Devils Lake, ND 58301

leopolis Spann
Star Rt. Box 4
Morristown, AZ 85342

Sally J.Tilden
1820 W. Coolidge
Phoenix, AZ 85015

C.W. Tomkinson
2310 N. 15th Ave
Phoenix, AZ 85007

Harry J. Valentine
3736 William Way
Sacramento, CA 95821

Valley Nt'l Bank of Az Trust
P.O. Box 29519 C808
Phoenix, AZ 85038

Edward Vanouck
New Norway, Alberta,Canada
TOB 3LO

Kenneth D.Wagner Mr. Blackwell
1035 E. Watson Dr.
Tempe, AZ 85283

Sally S. Wayman
P.O. Box 1776
Surprise, AZ 85374

W-B Sun Valley Ltd Part.
2111 E. Highland Ste.150
Phoenix, AZ 85016

Curtis Wentz
P.O. Box 17238
Fountain Hills, AZ 85269

Tamara D. Williams
P.O. Box 10460
El Mirage, AZ 85335

Robert S.Winters
3535 E. Rose Ln
Paradise Valley,AZ 85012

Jay W. McAfee
729 E. Gardenia Dr.
Phoenix, AZ 85020

David J. McHenry
P.O. Box 9356
Phoenix, AZ 85068

Denise S.Mikalson
14 W. Pearyl Ave.
Phoenix, AZ 85021

Robert Monestime
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Thousand Oaks, CA 91360

N-S Partnership
3333 E. Camelback Rd. #250
Phoenix, AZ 85018

Patton Rd 1 Ltd Partnership
2111 E. Highland Suite
Phoenix, AZ 85016

Patton Sun Valley Ltd.Part.
2111 E. Highland Ste 150
Phoenix, AZ 85016

Andrew Pikuza
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Westmont, IL 60559

Kenneth E. Pritchett
2320 W. Butler Dr.
Phoenix, AZ 85021

PRP Joint Venutre
4520 N. Central Ave,Ste 204
Phoenix, AZ 85012

19877 E. Kentucky Ave.#101
Aurora,CO 80012

George Robinson Ltd
5741 Briarcliff Rd.
Los Angelas, CA 90068

Roman Sun Valley Ltd. Part.
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Benn A. Rothfelder
2302 E. Van Buren
Phoenix, AZ 85006

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Phoenix, AZ 85035

George J.Rutledge
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Glendale, AZ 85301

Edward L. Schlimgen
P.O. Box 988
Chino Valley, AZ 86323

Glenna P. Scott
7235 N. 10th Ave
Phoenix, AZ 85021

Rick Seaman
22033 N. 87th Ave.
Peoria, AZ 85382

Robert H.Seaman
Rt. 3 Box 536F

James G. Sichting
P.O. Box 192
Libby, MT 59923

Nicholas J. Silvaroli
437 Ranger Ct.
Boulder City, NY 89005

Ka Luk Siu
2411 W. Calavar
Phoenix, AZ 85029

George D. Snider
Box 98 New Norway,
Alberta,Canada TOB 3LO

mil & Margaret Klasic
4300 South Houghton Rd.
Tucson, AZ 85730

Mr. Joseph Innocenti
44 South Main Apt 5E
Lodi, NJ 07644

Edward & Ester Jones
608 W. 5th Street
Chillicothe, OH 45601

Edmund & Mary Miller
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Phoenix, AZ 85029

Robert & Sue Strand
1717 Tarragot
Chicago, Il 60640

Walter and Eva Berry
1713 Zelma Drive
Belleville, Il 62223

Arizona Boys Ranch
c/o Mr. John Mangum
650 North 1st Ave.
Phoenix, AZ 85003

Mr & Mrs Wojciechowski
3448 W. 116th Street
Chicago, Il 60655

Mr. Chad Trian
71 Harbar Drive
Claymond, DE 19703

Edward & Adeline Troutt
P.O. Box 226
Borrego Springs, CA 92004

Mr. David Nosal
P.O. Box 241
Wittmann, AZ 85361

Ms. Marjorie Baker
P.O. Box 363
Wittman, AZ 85361

Ms. Carolyn Ferris
P.O. Box 464
Wittmann, AZ 85361

Jeffery & Gertrude Gillis
5859 Clinton Street
Erie, PA 16509

Ms. Francis A. Sattler
1458 County Hwy. F
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Mr. Richard Bartlett
112 Crest Road
Wellesley, MA 02181

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Woodbridge, VA 22193

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Rockford, Il 61103

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Roseville, MI 48066

Thomas & Louise Sparks
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Wittmann, AZ 85361

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122 West Illini
Phoenix, AZ 85041

Mr. and Mrs. Ansani
1234 South Lincoln Ave.
Park Ridge, Il 60068

alter & Maria Bassi
1418 Forest
River Forest, Il 60305

Mr & Mrs Leineweber
P.O. Box 1992
Lucerne Valley, CA 92356

Frederick & Linda Hill
P.O. Box 687
Wickenburg, AZ 85265

Israel & Gloria Martinez
30540 N. Patton Rd.
Wittmann, AZ 85361

Ms. Inga Lisa Carlson
7060 Shoup #190
Canogo Park, CA 91307

Tischer Resident
RR#2, Box 35
Maynard, MN 56260

Mr & Mrs Estrada
P.O. Box 487
Wittmann, AZ 85361

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P.O. Box 692
Antioch, Il 60002

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8337 N. Delta Ave.
Tucson, AZ 85741

Malcolm & Henrietta Olson
5531 Niemeyer Road
Erie, PA 16509

Daniel & Mary Lou Kinnerk
116 North Green Street
McHenry, Il 60050

Roland & Rita Samkas
439 North Lakeshore Dr.
Chicago, Il 60610

Ms. Vera Hoffman
1400 N. Lakeshore Dr.
Chicago, Il 60610

Mr. Samuel Swayne
311 14th Ave. South
Nampa, ID 83651

Mr & Mrs Encinas
P.O. Box 346
El Mirage, AZ 85335

Ms. Helen B. Anderson
401 Finch Court N.E.
Cedar Rapids, IA 52402

Ms. Elma Mae Demmert
20505 Marina Drive N.W.
Stanwood, WA 98292

Mr & Mrs Ledwina
5365 Kilbourne
Lyndhurst, Ohio 44134

Mr. Joe Encinas
P.O. Box 94
Waddell, AZ 85355

Charles & Lois Mydock
10958 Oakmont Drive
Sun City, AZ 85310

Ray & Rita Florczak
6 Evergreen Street
Elk Grove, Il 60007

Mr & Mrs Anast
217 Heather Lane
Wilmette, Il 60091

Ms. Anna Cochrane
1724 Clermont Street
St. Antige, WI 544409

Mr & Mrs Katharina Reicheat
6465 N. Caldwell Ave.
Chicago, Il 60646

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Dreisesselstr 5 8391
West Germany

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Denver, Co 80110

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1 Cypress Street Tittling
Keyport, NJ 07735

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2304 North Hawthorne
Melrose Park, Il 60164

Ms. Mary G. Wightman
8317 Oriole Avenue
Niles, Il 60648

Mr & Mrs Schler
2548 North 54th Avenue
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Mr & Mrs Soltis
3938 East Cortez
Phoenix, AZ 85028

Alberto & Bertha Ruin
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Phoenix, AZ 85035

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Wittman, AZ 85361

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6810 North 59th Drive
Glendale, AZ 85301

Mr & Mrs Jerome Murray
400 East Randolph Street
Apt. 2221
Chicago, Il 60601

Mr. Saul Valadez
30339 West Peakview Drive
Wittman, AZ 85361

Henry Mosca
110 Midland Ave
Apt. 7B
Midland Park, NJ 07432

Arizona State Land Depart.
Mr. Bill Fish
1616 West Adams
Phoenix, AZ 85007

WTM Partners 86-7
4520 N. Central Ave
Suite 500
Phoenix, AZ 85012

WWJ Investments General Part.
9821 E. Mission Lane
Scottsdale, AZ 85258

Joe Cazares, P.E.
Taisai/Bechtel Joint Venture
30700 W. Patton Rd.
P.O. Box 1000
Whitman, AZ 85361

DOUGLAS LAND CORPORATION
767 5th Ave, 7th Floor
New York, NY 11022

FEDERAL BUREAU OF LAND MGT.
3707 N. 7th Street
Phoenix, AZ 85014

BUREAU OF RECLAMATION
Valley Center, Suite 2200
Phoenix, AZ 85023

STATE OF ARIZONA
State Land Department
1616 West Adams Street
Phoenix, AZ 85007

[illegible] & Mrs Hernandez
7372 West Desert Cove
Peoria, AZ 85345

James & Karen Moline
1173 East Carmen St.
Tempe, AZ 85283

Edmund & Mary Miller
P.O. Box 328
El Mirage, AZ 85335

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2552 35th Ave.
Rock Island, Il 61201

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2516 Hessing Street
River Grove, Il 60171

Ms. Lorriane Stewart
19807 Willowcreek Dr.
Sun City, AZ 85373

Peter & Gerlinde Mueller
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Hacienda Hts, CA 91745

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450 Rex Boulevard
Elmhurst, Il 60126

Tim & Jean Van Horn
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415 Vista Way
Cula Vista, CA 92010

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San Diego, CA 92119

Mr. Homer Chamberlain
16677 NW Grand Ave.
Sun City, AZ 85373

Mr. Frank Buccola
109 Sunset Drive
Cocoa Beach, Fla 32931

Lawrence & Mary Pouse
910 Mainland Drive
Texas City, TX 77590

Mr & Mrs Krzywkowski
5734 Cambridge Lane Unit 7
Racine, WI 53406

Ms. Victoria A. Duntemann
7619 W. Clarence Ave.
Chicago, Il 60631

John & Renee Angel
OPM Sang
New York, NY 09038

Claude & Laurin Brown
346 Clara Lane Rio Comm.
Berlin, NM 87002

Frank B. Gossinger
36 Chalk Hill Road
Monroe, CT 06468

Mr & Mrs Gloria
104 Pinta Ct.
Pekin, Il 61554

Ms. Celia B. Pierson
1600 60th St. Apt. 39
Kenosha, WI 53140

Fritz & Phyllis Kreiss
2699 Waters Avenue
Northbrook, Il 60062

Ms. Loretta Caterino
Ms. Charlotte Johnson
Rural Free Delivery 1
New Boston, N.H. 03070

Mr. Robert L. Burns
118 Norwalk Drive #8
Runnemede, NJ 08078

Mr. & Mrs. Hancock
4609 West Lake Shore Dr.
Mchenry, Il 60050

Ms. Mary L. Bay
130 South Cleveland Ave.
Peoria, Il 61605

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539 La Pasada Boulevard
Goodyear, AZ 85338

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Surprise, AZ 85374

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Lincolnwood, Il 60645

Ms. Therese M. Gherra
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Elmhurst, Il 60126

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Wittman, AZ 85361

Mr. Eddie Miller
12000 West Northern
Peoria, AZ 85308

Mr. Robert W. Benson
10403 Tropicanna Circle
Sun City, AZ 85351

Walter & Mary Miller
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Pekin, Il 61554

Mr. Kenneth Leabo
6312 West Georgia
Glendale, AZ 85301

WOOD / PATEL ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S.
James S. Campbell, P.E.
G. Thomas Hennessy, P.E.

October 26, 1992

Douglas Land Corporation
767 5th Avenue, 7th Floor
New York, NY 100022

Subject: Right-of-Entry For Surveying Purposes

Assessor Parcel Numbers: 503-85-005, 006,etc.
T4N R5W, Maricopa County

Gentlemen:

The Flood Control District of Maricopa County has contracted with Wood, Patel & Associates, Inc. to perform a flood insurance study for Star Wash and selected tributaries, from the Jomax Road Alignment to the Bell Road Alignnment. The purpose of this study is to determine flood-related hazard zones and delineate areas that may be subject to inundation during a "100-year flood" event.

The intent of this letter is to notify you of the commencement of surveying activities in support of the above-mentioned study. In order to perform these surveys, it may be necessary to enter your land. This activity should not result in any inconvenience or damage to property. If you have any objections to the entry onto your property, you must notify Ms. Cathy Regester of the Flood Control District at (602)506-1501 within two weeks of the date of this letter. Otherwise, it will be assumed that you consent to the entry onto your property.

For the purposes of aerial survey work, there will be panel points (large, white crosses) in the area. These panel points should not be disturbed.

The study and resulting maps will be used for floodplain management purposes and submitted to the Federal Emergency Management Agency for flood insurance information and revision of Flood Insurance Rate Maps. This study should be available to the public in about 12 to 18 months.

The Flood Control District and its representatives appreciate your help in assuring the accuracy of this study by allowing access to your property for the surveyors and by providing any information you may have regarding past flooding or related problems.

If you have any questions regarding this study or the right-of-entry, please contact Ms. Cathy Regester, Hydrologist of the Flood Control District at (602)506-1501, or Mr. Ashok Patel, Project Manager of Wood, Patel & Associates, Inc. at (602)957-3149.

Sincerely,

WOOD, PATEL & ASSOCIATES, INC.

Ashok C. Patel, P.E., R.L.S.
Project Manager

ACP:jag
cc: Cathy Regester, FCDMC
gencor\roeltr.027

WOOD, PATEL & ASSOCIATES, INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

LETTER OF TRANSMITTAL

DATE 10/22/92 JOB NO. 92916.00

ATTENTION Cathy Regester

RE: Star Wash Floodplain Study
FCD 92-06

Subject: Status Report No. 1

To: Flood Control District of Maricopa Co.
2801 West Durango St.
Phoenix, AZ. 85009

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☒ Status Report

COPIES	DATE	NO.	DESCRIPTION
1	10/22/92		Status Report No. 1, Invoice for Sept/Oct 92 follows.

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☒ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☒ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Please call if you need any clarification.

Thanks!

COPY TO _____

SIGNED: [signature]

If enclosures are not as noted, kindly notify us at once.

PRODUCT 240 NEBS Inc. Groton, Mass. 01471

October 22, 1992

PROJECT STATUS REPORT NO. 1

STAR WASH FLOODPLAIN STUDY
FCD 92-06
WP# 92916

1. **Coordination**
   Met with Aerial Mapping Company and Stanley Consultants to review the survey control network. Coordinated common control points at the mapping limit lines. Provided mapping coverage data to A-N West, Inc.

   Coordinated with District staff issues such as 1927 NAD, Burgess-Niple floodplain limits, etc.

2. **Data Collection/Field Reconnaissance**
   Data collection, as it pertains to survey control information, and existing data has been completed. Also completed is the data collection on hydrology, existing mapping, existing HEC-2 analysis, etc.

   This task is ninety percent (90%) complete.

3. **Topographic Mapping**
   Flying and photography work is one hundred percent (100%) complete. No activity on topographic mapping.

4. **Field Survey**
   Data review, field reconnaissance, and setting aerial targets are complete. Vertical control work is eighty percent (80%) complete and is anticipated to be finalized by October 30, 1992. GPS work is ninety percent (90%) complete and it is anticipated that all GPS work should be done by October 26, 1992.

6. **Floodplain/Floodway**
   Existing HEC-2 analysis by Burgess-Niple was reviewed. Corrections have been made to the floodway and floodplain analysis per the Scope of Services. Work map has been prepared for District review.

7. **Final Product**
   No activity.

STATUS REPORT
By: Aerial Mapping Company, Inc.

Star Wash Floodplain Study

October, 1992

WP#92916
FCD 92-06

DATE	DESCRIPTION
9/28	Attended kick-off meeting and coordination at Wood/Patel.
9/30	Began to assemble research data for Base Control Telephonic Conference with PCE (GPS) L. Maldonado. Advised existing control west of Poline Wash from B&N study should be included to insure tie to existing maps.
10/5	Began field recon.
10/8	Began setting aerial targets
10/16	Flow project did not get satisfactory results. Began levels. Discussed levels and coding with Larry Spire GCA.
10/19	Met with PCE L. Maldonado and C. Mortensen, AMCI R. Cook and W. Barbec. Discussed point layout and how to get points delivered in 10-16 photos. Also, results of GPS would not be required before 10/26. PCE schedule to begin 10/22.
10/20	Faxed to C. Mortensen company a copy of AMCI point diagram and a copy of one GPS point data from B&N study which was common to Star Wash so as to include this point as a positive tie to previous mapping. Tied Stanley's horizontal point for positive tie to their future photography.
10/23	Anticipate spirit leveling complete.

GENCOR\92916STA.330

WOOD / PATEL
ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors

(602) 957-3149
FAX 955-3765

COMMUNICATION RECORD

COMPANY FCDMC
NAME Pedro Calzya
ADDRESS
PHONE

JOB # 92916.00
PROJECT Star Wash
SUBJECT Ground Control, NAG1927
DATE 10-13-92

☒ MEETING ☐ CONVERSATION ☐ MEMO

Discussion about Fax memo dated 10/12/92:

- Pedro Confirmed that use of NAD 1927 is ok. It will be consistent with the prior work by B&G.
- FEMA is not requiring '83 datum
- GIS/FCDMC, Marta has concurred with NAD 1927 use.
- Cathy Regester to ask Marta to write a memo on Confirmation

Called Scott B,
Richard Cook,
Greg Schuelke

& Conveyed the message. No other memo will be written.

C.C. Cathy Regester FCDMC.
including minutes 9/28/92

PLEASE REPORT ANY DISCREPANCY OR OMISSION

FROM TG

W 104888

WOOD / PATEL ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

DATE 10/13/92

TIME 3:30

COMPANY: A.N. West

ATTENTION: Greg Schuelke P.E

FAX NO.: 943-1989

FROM: Ash Patel FAX NO. (602) 955-3765

PROJECT: Star Wash JOB NO. 9216.00

SUBJECT: Mapping Coverage.

COMMENTS:

Greg,

Per our phone conversations, here is a copy of our mapping coverage. (sheets 1/2, 3).

please call if you need any other info.

thanks!

AP.

CC:

PLATE 1

STUDY AREA LIMITS AND MAPPING COVERAGE

Star Wash & Tributaries
Contract FCD 92-06
Flood Control District of Maricopa County

LEGEND

Detailed study limits

Limits of redelineation

Limits where digital cross-sections
-GIS data will be generated

Topographic mapping coverage limits

Aerial photo limits

Horizontal & vertical control

Vertical only

Existing land corners

MATCH LINE

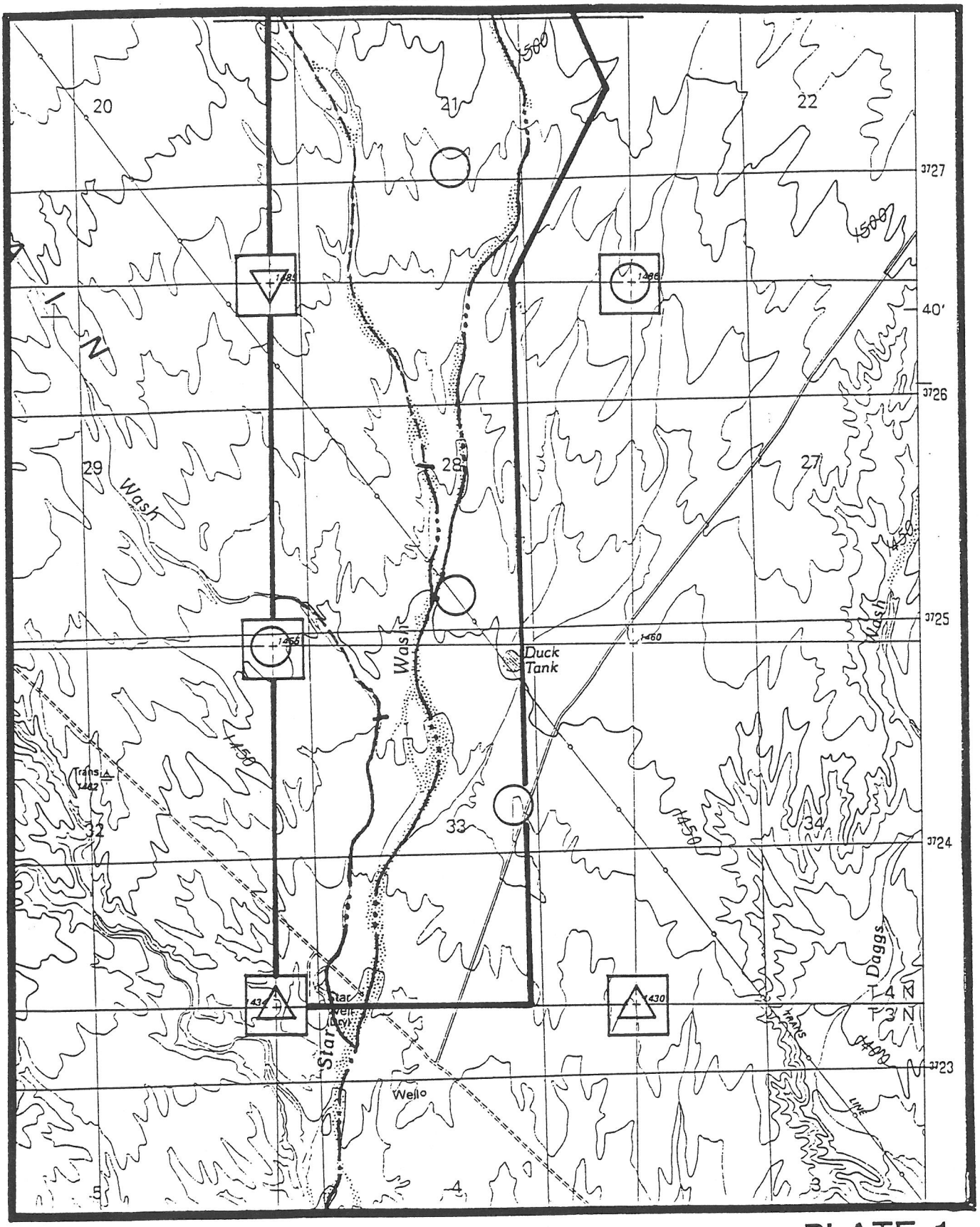

PLATE 1
2 of 3

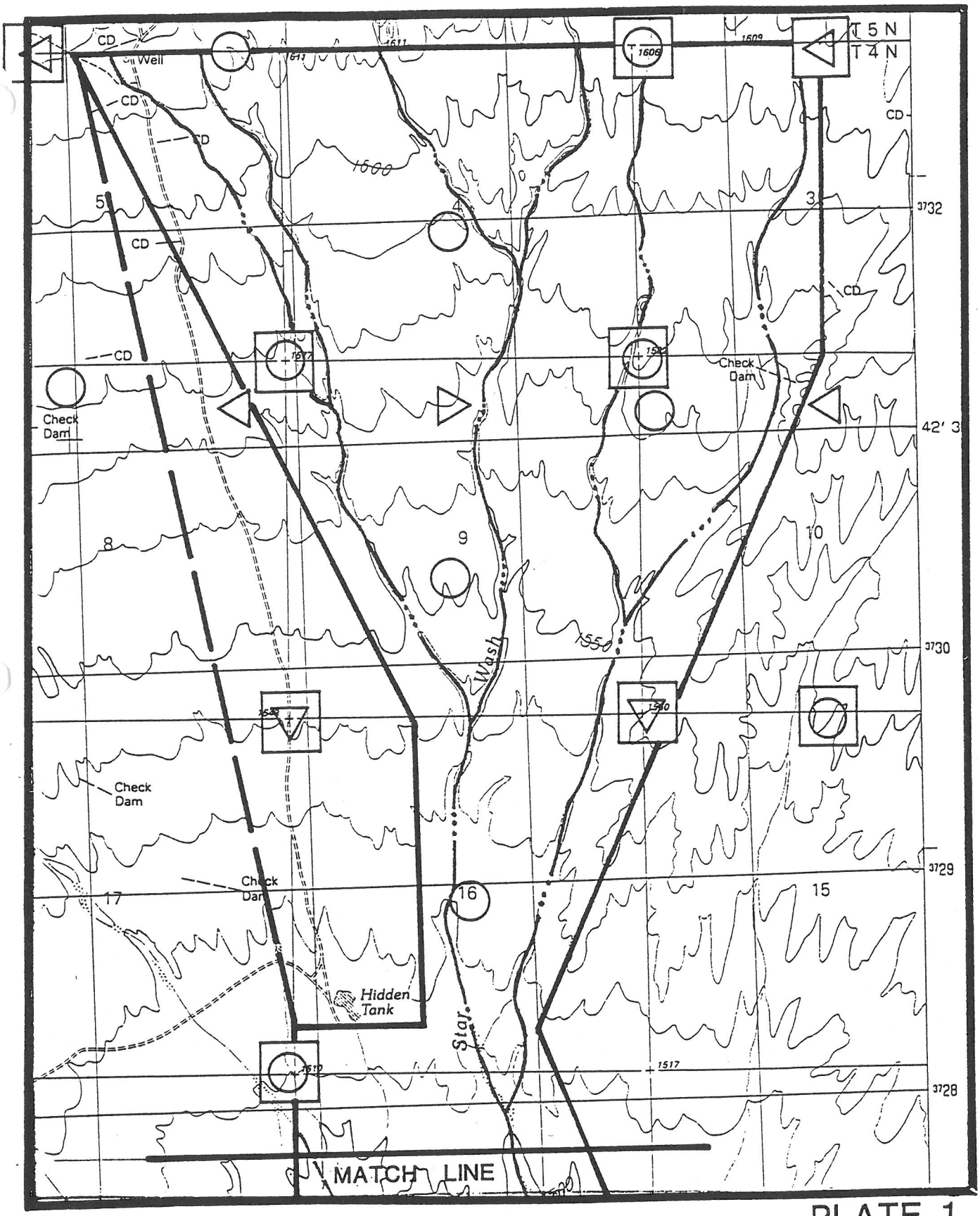
T 5 N
T 4 N
CD
Well
1611
1609
1606
1600
5
3
3732
Check Dam
42' 3
8
9
10
Wash
1550
3730
Check Dam
Check Dam
17
16
15
3729
Hidden Tank
Star
1517
3728
MATCH LINE

PLATE 1
3 of 3

WOOD, PATEL & ASSOCIATES INC.
Civil Engineers, Hydrologists, Land Surveyors
4105 North 20th Street Suite 130
PHOENIX, ARIZONA 85016

(602) 957-3149
FAX 955-3765

Memo
LETTER

To Pedro Calza.
FCDMC

Date 10/12/92

Subject FCD 92-06
Star Wash FIS

(RUSH)

Pedro,

We began field survey for star Wash area last week. Per your discussions with Richard Cook of Aerial Mapping Company, who is our sub, it is our understanding that NAD 1927 will be used for horizontal control. This was decided because all other prior work on Jack Rabbit by B & N has been performed with NAD 1927 data.

Butt Stanley & wood/patel have started work with this understanding. If your understanding differs in this matter, please call us A.S.A.P.

Thanks!

cc: Richard Cook, AMCI
Scott Buchanan, Stanley
Cathy Regestar, FCDMC
Greg Schuelke, A.N West
Magnus Jolayemi, FCDMC

[X] Please reply [ ] No reply necessary

SIGNED

WOOD / PATEL ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S.
James S. Campbell, P.E.
G. Thomas Hennessy, P.E.

October 12, 1992

GIS Consultants of Arizona, Ltd.
3141 West Clarendon
Phoenix, AZ 85017

ATTN: Mr. Lari D. Spire

RE: **Star Wash & Tributaries**
FCD 92-06
WP# 92916.00

Dear Lari:

Per my fax letter of October 1, 1992, in reference to your proposal dated August 19, 1992, you are hereby authorized to proceed on the referenced project.

The GIS services to be performed by your office will be in accordance with the guidelines from the Flood Control District of Maricopa County. By reference, the District's Scope of Work as it pertains to the GIS services for this project, is made a part of this Scope of Services.

We look forward to working with you on this exciting project.

Very truly yours,

WOOD, PATEL & ASSOCIATES, INC.

Ashok C. Patel, P.E., R.L.S.
Principal

ACP:jag

gencor\929160C.12

WOOD / PATEL ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S.
James S. Campbell, P.E.
G. Thomas Hennessy, P.E.

October 12, 1992

Project Engineering Consultants, Ltd.
3130 North 35th Avenue, Suite 1
Phoenix, AZ 85017

ATTN: Mr. Larry Maldonado

RE: **Star Wash & Tributaries**
FCD 92-06
WP# 92916.00

Dear Larry:

Per my fax letter of October 1, 1992, in reference to your proposal dated August 12, 1992, you are hereby authorized to proceed on the referenced project.

The GPS services to be performed will be in accordance with the guidelines from the Flood Control District of Maricopa County. By reference, the District's Scope of Work as it pertains to the horizontal survey, for this project, is made a part of this Scope of Services.

We look forward to working with you on this exciting project.

Very truly yours,

WOOD, PATEL & ASSOCIATES, INC.

Ashok C. Patel, P.E., R.L.S.
Principal

ACP:jag

gencor\929160C.12

STANLEY CONSULTANTS

FAX COVER SHEET
Fax (602) 230-7655

• 3117 North 16th Street • Phoenix, AZ 85016 Tel. (602) 279-0901

TO: Ash Patel

FIRM/LOCATION: Wood - Patel

FAX NO: 955-3765

FROM: Scott Buchanan

SUBJECT:

JOB/PROJECT NO:

NO. OF PAGES, INCLUDING THIS SHEET: 5

DATE: 10-5-92

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MESSAGE:

See Fax Sheet under copies sent to Kenney Aerial and Project Engineering.

IF COPY IS INCOMPLETE OR UNREADABLE, PLEASE CALL (602) 279-0901

cc. Richard Cooley

STANLEY CONSULTANTS

FAX COVER SHEET

Fax (602) 230-7655

• 3117 North 16th Street • Phoenix, AZ 85016 Tel. (602) 279-0901

copy to: Wood-Patel FAX # 955-3765
Project Engineering FAX # 484-7694

TO: Frank Deal
FIRM/LOCATION: Kenney Aerial
FAX NO: 340-1677
FROM: Scott Buchanan
SUBJECT: Powerline/Tank Washes Ground Control
JOB/PROJECT NO: 00200-0020-520

NO. OF PAGES, INCLUDING THIS SHEET: 4
DATE: 10-5-92
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MESSAGE:

Here is the proposed ground control layout for Powerline and Tank Washes per our meeting of 10-2-92. H-V points are shown as ▲. V-only points are ●. Wood-Patel points are △ and ○. All of our points that will need X-Y coordinates thru your mapping process will be a 3-legged target ⚠. We anticipate needing coordinates for several more points in addition to those shown to use as ERM's. All points not needing coordinates from you will be 4-legged targets ✛. I will coordinate any field location changes with you. We anticipate 4-5 weeks before this is ready to fly.

Scott

IF COPY IS INCOMPLETE OR UNREADABLE, PLEASE CALL (602) 279-0901

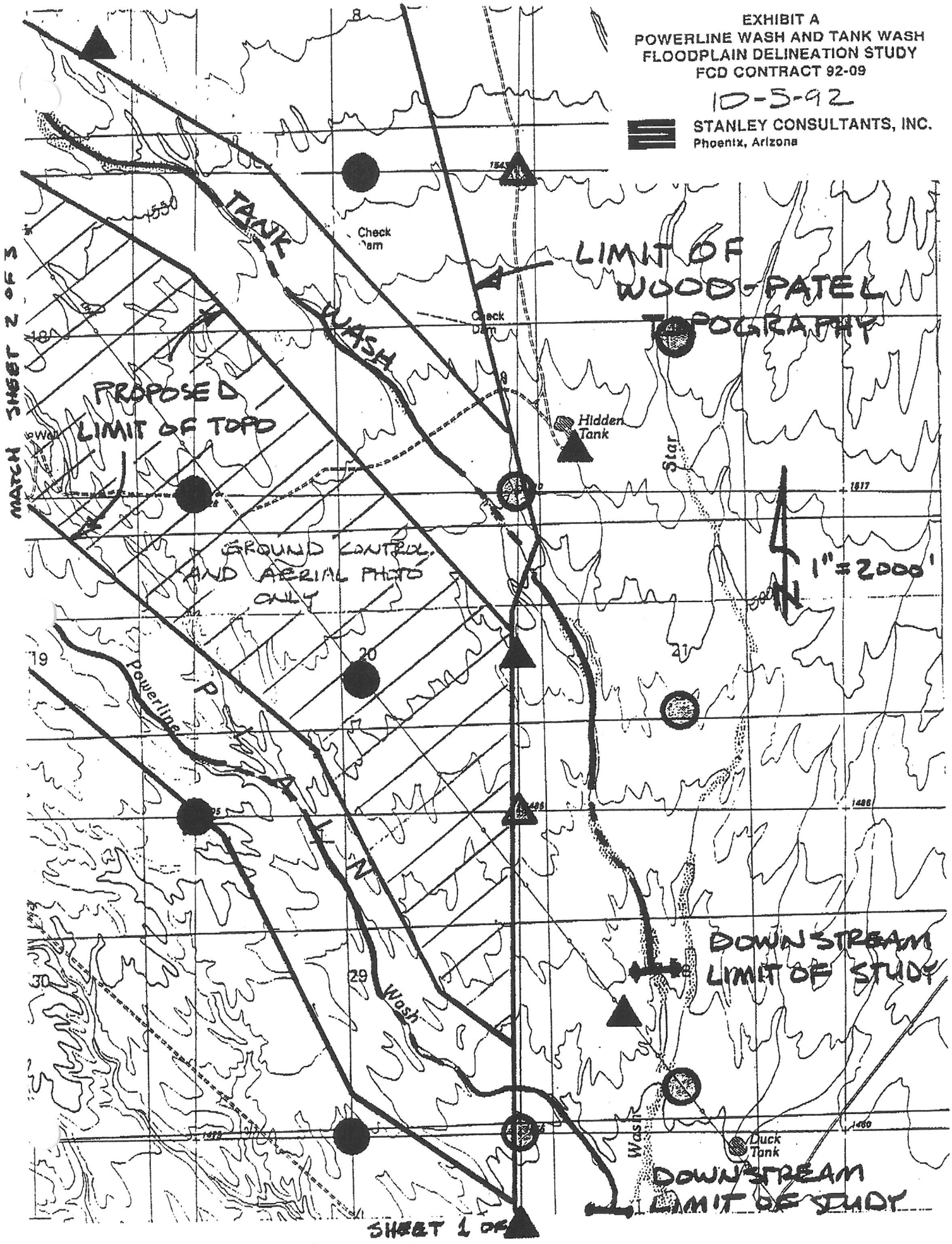
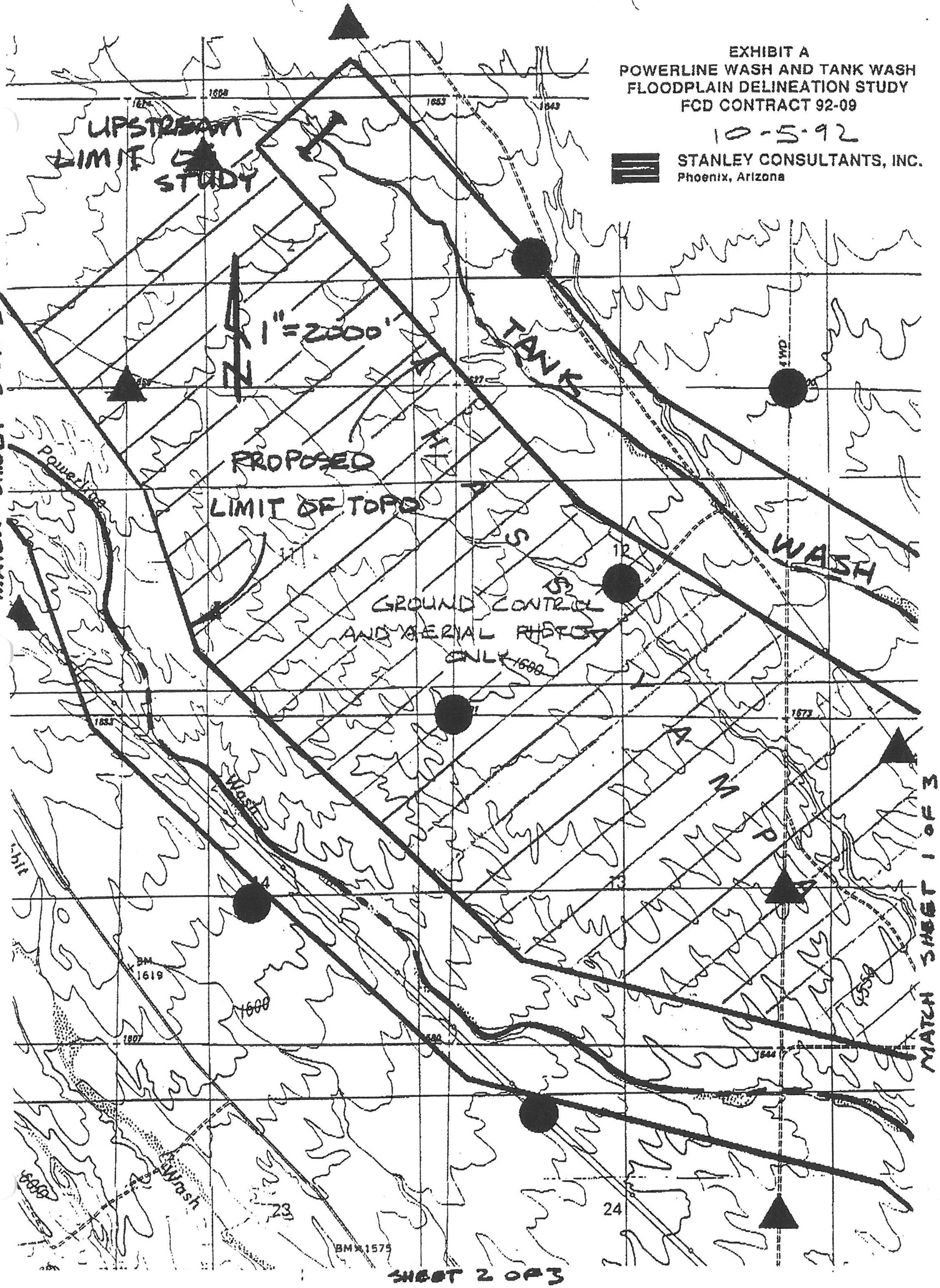


EXHIBIT A
POWERLINE WASH AND TANK WASH
FLOODPLAIN DELINEATION STUDY
FCD CONTRACT 92-09
10-5-92
STANLEY CONSULTANTS, INC.
Phoenix, Arizona
MATCH SHEET 2 OF 3
TANK WASH
PROPOSED LIMIT OF TOPO
LIMIT OF WOOD-PATEL TOPOGRAPHY
GROUND CONTROL AND AERIAL PHOTO ONLY
Check Dam
Hidden Tank
Star
1" = 2000'
Powerline
Wash
Duck Tank
DOWNSTREAM LIMIT OF STUDY
DOWNSTREAM LIMIT OF STUDY
SHEET 1 OF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UPSTREAM LIMIT OF STUDY
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TANK WASH
WASH
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Powerline
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MATCH SHEET 3 OF 3
MATCH SHEET 1 OF 3
SHEET 2 OF 3
11
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BM 1619
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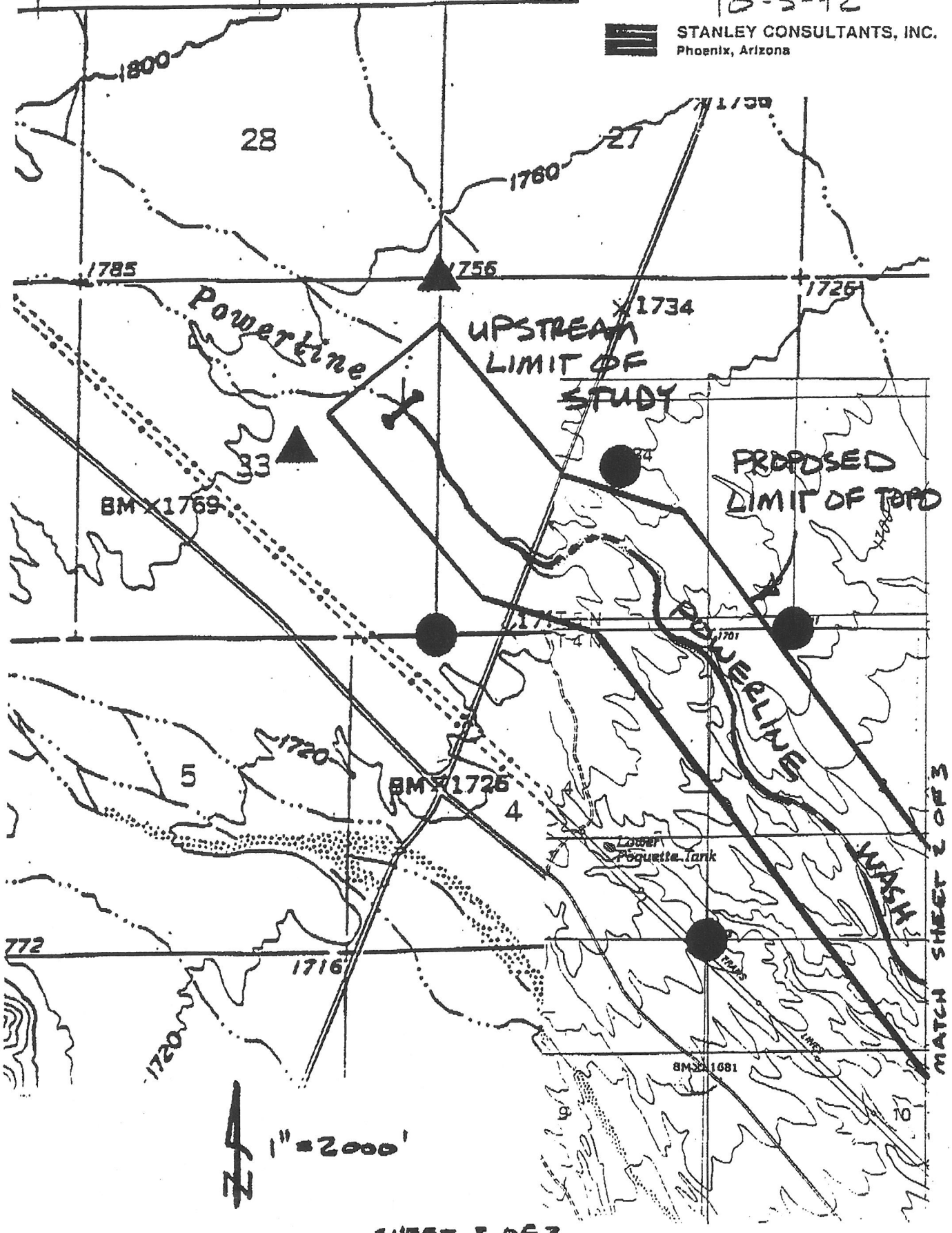
1644

EXHIBIT A
POWERLINE WASH AND TANK WASH
FLOODPLAIN DELINEATION STUDY
FCD CONTRACT 92-09

10-5-92

STANLEY CONSULTANTS, INC.
Phoenix, Arizona



WOOD / PATEL ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

DATE 10/5/92

TIME 545

COMPANY: AMCI

ATTENTION: Richard Cook R.L.S.

FAX NO.: _____

FROM: Ash Patel FAX NO. (602) 955-3765

PROJECT: Star Wash JOB NO. _____

SUBJECT: Stanley's Control Network

COMMENTS:

For information.

CC: _____

WOOD / PATEL ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

DATE 10/1/92

TIME

COMPANY: Project Engineering Consultants, ltd.

ATTENTION: Mr. Larry Maldonado

FAX NO.:

FROM: Ash Patel FAX NO. (602) 955-3765

PROJECT: Star Wash JOB NO. 92916.00

SUBJECT: GPS Schedule

COMMENTS:

You are hereby notified to Proceed on the Star Wash Project. A letter of confirmation follows.

please review the attached schedule as it pertains to your tasks. & call if you have any question.

thanks!

Ash

CC:

MEETING MINUTES

PROJECT: STAR WASH
PROJECT #: 92916
DATE: SEPTEMBER 28, 1992
SUBJECT: MAPPING SCHEDULE
ATTENDEES: RICHARD COOK, AERIAL MAPPING COMPANY
ASH PATEL, WOOD/PATEL AP

The schedule committed by Aerial Mapping Company was as follows:

- Reconnaissance and Data Collection - September 28 through October 2.
- Field Reconnaissance and Setting of Panels - October 5 through October 19.
- Aerial Mapping to fly the project on October 15.
- Project Engineering to Establish GPS sometime within the week of October 19.
- Vertical Control Work to start on October 19.

- Aerial Mapping Company will only be doing vertical control out in the field. The horizontal control is going to be done by Project Engineering. Information from Project Engineering to Aerial Mapping Company regarding GPS will be delivered by October 26.

- Aerial Mapping Company is to start analytics in late October. It is anticipated that analytics will be performed by October 30.

- The topo work will start sometime in October. Segment 1 of mapping will be completed by November 20. Essentially all mapping will be completed by December 14.

cc: Attendees

GENCOR\92916.929

WOOD / PATEL ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

DATE 10/1/92

TIME 3 PM

COMPANY: GIS Consultants

ATTENTION: Lari Spire R.L.S

FAX NO.: 263-0165

FROM: Ash Patel FAX NO. (602) 955-3765

PROJECT: Star Wash JOB NO. 92916

SUBJECT: NTP

COMMENTS:

You are hereby notified to proceed with Star Wash as it pertains to the GIS task.

A letter confirming this fax memo will follow.

Thanks! Ash.

CC:

Wood, Patel & Associates, Inc. 4105 North 20th Street, Suite 130 (602) 957-3149 Fax (602) 955-3765

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TDD (602) 506-5897

BOARD OF DIRECTORS

P. Ben Arredondo
Betsey Bayless
James D. Bruner
Carole Carpenter
Tom Freestone

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

September 30, 1992

Mr. Ash C. Patel, P.E., R.L.S.
Wood, Patel & Associates, Inc.
4105 North 20th Street
Suite 130
Phoenix, Arizona 85016

SUBJECT: Star Wash
HEC-2 Input Files

Dear Mr. Patel:

Please find enclosed one (1) diskette containing the subject HEC-2 data input files. In addition, please find attached mylar copies of the topographic base maps (sheets 2, 3, and 5 of 9) for Star Wash from the Burgess & Niple Study as you requested.

Should you require any additional information, please feel free to call me at (602) 506-4770.

Sincerely,

Cathy

Catherine W. Regester
Hydrologist

Enclosure (1 Diskette)

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TDD (602) 506-5897

BOARD OF DIRECTORS

P. Ben Arredondo
Betsey Bayless
James D. Bruner
Carole Carpenter
Tom Freestone

RECEIVED
OCT 0 1992
WOOD, PATEL & ASSOCIATES

SEP 3 0 1992

Mr. Ashok C. Patel, P.E.
President
Wood, Patel & Associates, Inc.
4105 North 20th Street, Suite 130
Phoenix, Arizona 85016

SUBJECT: Contract FCD 92-06, Star Wash and Tributaries Floodplain Delineation Study

Dear Mr. Patel:

This letter will serve as confirmation of the September 22, 1992 verbal Notice to Proceed for the work under the above referenced contract that was approved by the Board of Directors on September 21, 1992.

A fully executed contract is enclosed for your use. If you have any questions regarding work under this contract, please contact Cathy Regester at 506-1501.

Sincerely,

Leanna Cumberland
Chief, Contracting Branch

Enclosure (1)

WOOD / PATEL ASSOCIATES

Civil Engineers
Hydrologists
Land Surveyors

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S.
James S. Campbell, P.E.
G. Thomas Hennessy, P.E.

September 30, 1992

Aerial Mapping Company, Inc.
3141 West Clarendon
Phoenix, AZ 85017

ATTN: Mr. Richard Cook, R.L.S.

RE: **Star Wash & Tributaries**
FCD 92-06
WP# 92916.00

Dear Richard:

Per our phone conversation on September 9, 1992, you are hereby authorized to proceed on the referenced project.

Please note that Aerial Mapping Company, Inc. will perform both the field survey and topographic mapping on this project. The services to be performed will be in accordance with the guidelines from the Flood Control District of Maricopa County. By reference, the District's Scope of Work as it pertains to the field survey, mapping and final produce for this project, is made a part of this Scope of Services.

Please sign both copies of "Subconsultant Agreement" and return one copy to us.

We look forward to working with you on this exciting project.

Very truly yours,

WOOD, PATEL & ASSOCIATES, INC.

Ashok C. Patel, P.E., R.L.S.
Principal

ACP:jag

Enclosure: Meeting Minutes 9/28/92

market\aerial.930

SECTION 1: GENERAL DOCUMENTATION AND CORRESPONDENCE

1.5 Contract Scope of Work

ATTACHMENT "A"
RECEIVED
JUL 2 5 1992
WOOD, PATEL & ASSOCIATES

SCOPE OF WORK
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FLOODPLAIN DELINEATION AND TOPOGRAPHIC MAPPING
FOR STAR WASH AND TRIBUTARIES

GENERAL

The project consists of approximately 18 river miles of floodplain and floodway delineations for Star Wash and major tributaries from the powerlines located in T.4 N., R.5 W. to the south Township Line of T.5 N. also being the north Township Line of T.4 N., as shown on Exhibit 1. The starting section shall be cross section 1.660 of the completed Jackrabbit Wash study. For the tributaries of Powerline and Tank Washes, the study shall terminate at the point at which there is no influence from Star Wash on flows in these washes. This point is estimated to be 0.25 miles south of the north section line of section 33 in T.4 N, R.5 W. for Powerline Wash; and, 0.5 miles south of the north section line of section 28 in T.4 N, R.5 W. for Tank Wash. This study will require the development of all necessary topographic data to fully cover the extent of the floodplain (extended cross sections will not be allowed except in areas of true breakouts).

Coordination with Stanley Consultants, Inc. will be required for the Powerline and Tank Washes. Western mapping limits for Powerline and Tank Washes will be as shown on the consultant's Exhibit-A. The consultant will develop the necessary topographic, digital cross-section, and GIS data up to these mapping limits. Stanley Consultants, Inc. will provide the consultant with the locations and alignments of cross sections to be digitized within its study area; and, the necessary floodplain data, as identified in the GIS Data Delivery Specifications, for digitizing for the GIS. All information pertaining to Powerline and Tank Washes developed within the mapping limits will be provided to Stanley Consultants, Inc. as requested by Stanley Consultants, Inc. Floodplain and floodway delineations will be to the limits described in the preceding paragraph.

The consultant will develop the floodplain and floodway delineations using the Corps of Engineer's HEC-2 computer model. The consultant must use sound engineering judgement in the development of the hydraulic model. The results of the model must be analyzed carefully and refinements made to the input parameters in order to obtain the most realistic results.

All work must meet Arizona Department of Water Resources (ADWR) and Federal Emergency Management Agency (FEMA) requirements for floodplain delineations. The results of this study must be reviewed and accepted by FEMA prior to the finalization of this contract.

All work under this Scope will be completed within 240 calendar days from the date of Notice to Proceed, including 60 days for District reviews.

TASK 1 - COORDINATION

1.1 The consultant will submit a project schedule showing coordination meetings and completion dates for each of the tasks in the scope within 14 days of Notice To Proceed. The consultant shall update this project schedule when appropriate.

1.2 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. The consultant is responsible for the minutes of any meetings. Whenever possible, coordination and milestone meetings should be combined.

1.3 The consultant shall submit monthly progress reports at least 5 days before submittal of monthly invoices. The report shall be brief and should be no longer than two typed pages. At a minimum, the monthly report shall contain the following:

a. A description of the work accomplished by task during the reporting month.

b. Percent (%) completed for the month and percent (%) cumulative completed for each task.

c. A brief description of the work to be accomplished the following month.

d. A description of any problems encountered.

1.4 The consultant will notify all property owners and obtain any necessary Rights of Entry for the study area. The District will assist the consultant as may be necessary to complete this task. The consultant will furnish the District with a list of all the property owners notified and a sample Right of Entry letter.

1.5 The consultant shall coordinate with all local development around the study area. The purpose of this coordination is to identify local flooding problems and obtain information on current and planned public works projects, channel modifications, storm-drainage systems, development, and obtain the current corporate limits.

1.6 There will be two public meetings. The consultant shall provide any technical support necessary to conduct the public meetings. The meetings shall conform to FEMA guidelines. The first meeting shall be held to inform the public of the purpose and scope of the study. The second meeting will be to inform the public and obtain public comment on the study results, and shall take place prior to the submittal of the final report to FEMA. The consultant is not required to attend either of the two meetings.

1.7 The consultant will submit delineation maps, hydraulics report, and HEC-2 model to ADWR and FEMA for review by the Technical Evaluation Contractor (TEC), and any other governmental agency reviewers through the District. The consultant will respond to questions by the reviewers and make modifications to the delineation maps, hydraulics report, and HEC-2 model as required.

TASK 2 - DATA COLLECTION

2.1 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.

2.2 A written report summarizing the data collected will be submitted to the District for information purposes. A preliminary draft of this report is due within 90 days of Notice to Proceed.

TASK 3 - TOPOGRAPHIC MAPPING

3.1 An aerial survey subcontractor shall be retained by the consultant as part of this contract. The consultant shall coordinate all the aerial surveying work with the aerial surveying subcontractor to ensure that the specifications of the aerial surveying work are met. The consultant is responsible for ensuring that the topographic mapping covers the area of delineation and area described in paragraph two of the scope pertaining to Powerline and Tank Washes. Quality control on surveys will be per FEMA Document 37, Flood Insurance Study Guidelines and Specifications for Study Contractors, March 1991.

3.2 Digital contour and planimetric data developed for this study shall be delivered according to the District's GIS specifications.

3.3 Prepare topographic mapping to a 2-foot contour interval, with a scale of 1 inch = 200 feet, with spot elevations on all section line and mid-section line roads.

3.4 Ground Control:

a. The consultant shall provide all survey control using 1983 NAD.

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 contractor. Where readily available, surveys will tie into the State Plane Coordinate System. Field control shall be sufficient to readily allow for compilation of maps by the aerial survey contractor at the desired map scale and contour interval, and will be based on the National Geodetic Vertical Data of 1929 (NGVD).

c. The horizontal and vertical control points shall be located and marked by the consultant. The controls for the aerial 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.

3.5 The consultant shall provide permanent non-erasable topographic mylars of the work study drawings. The drawings shall be 24" X 36" in size, with a scale of 1 inch = 200 feet and a contour interval of 2 feet for all mapping with the exception of section line roads which will have spot elevations. 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 drawing shall include the floodplain and floodway delineations and a minimum of a north arrow, scale, section corners and quarter corners, 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, and reference marks used in ground control. See Exhibit 2 for how the drawings are to be laid out. 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.

3.6 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.

3.7 Flood profile maps, per FEMA Document 37, must be provided in the narrative report.

TASK 4 - FIELD SURVEY

4.1 Prepare topographic mapping to a 2 foot contour interval with a scale of 1 inch = 200 feet, with spot elevations on all section line and mid-section line roads, for floodplain/floodway delineation areas as identified in Task 6 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 Contractors, March 1991. 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. Prior to the establishment of "permanent" ERM's the consultant shall submit to the District for comment a drawing showing the location of all proposed "permanent" ERM's.

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 contractor. Where readily available, surveys will tie into State Plane Coordinate System 1983 NAD. 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, and topped with a brass cap. 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. All aerial targets are to be removed following completion of the topographic mapping.

4.3 The consultant shall verify the accuracy of the mapping by the procedures called for in FEMA Document 37 or other methods approved by FEMA. This shall include the verification of cross sections used in the floodplain delineation.

4.4 Field surveys or "as-built" plans of all bridges, culverts, and hydraulic structures are to be obtained by the consultant. This information should be reduced and compiled into an 11"x 17" (maximum size) drawing for inclusion in the final report. The information presented in the drawing should be in a format appropriate for use in the HEC-2 model. It may be necessary to field survey some structures since the as-built plans may not be on 1929 NGVD.

TASK 5 - HYDROLOGY

5.1 The hydrologic data will be provided by the District.

TASK 6 - FLOODPLAIN AND FLOODWAY DELINEATION

6.1 Floodplain and floodway delineations must be obtained using the U.S. Army Corps of Engineers HEC-2 Water Surface Profiles computer model, version 4.6.2, May 1991, and methodology acceptable to FEMA. This model will simulate the effects of floodplain geomorphology, flow changes, bridges, culverts, hydraulic roughness factors, effective flow limitations, split-flows, and other considerations. The consultant will prepare the study using the guidelines established in FEMA Document 37, Flood Insurance Study Guidelines and Specification for Study Contractors, March 1991, and FIA Document 12, Appeals, Revisions, and Amendments to Flood Insurance Maps, January 1990.

6.2 The delineation work shall meet requirements for floodplain and floodway delineations as prescribed by FEMA and the Arizona Department of Water Resources.

6.3 The consultant is to make refinements to the HEC-2 model based on review of the model results by the District, ADWR, FEMA, and the Technical Evaluation Contractor. The consultant shall review the HEC-2 model results for reasonableness. Adjustments to the input parameters for obtaining the most realistic results is normal to the scope.

6.4 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 District at progress and milestone 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. The floodway encroachment is to be as near the one foot maximum rise in elevation as possible.

6.5 The consultant must obtain District approval at each of the following steps:

a. Field reconnaissance report and estimation of Manning's "n" values.

b. Proposed location and alignment of the cross sections and channel centerline.

c. Floodplain (natural) delineation.

d. Floodway delineation using equal conveyance encroachment.

e. Floodway delineation using encroachment method 1.

f. Final Hydraulics Report.

6.6.1 The consultant will conduct a 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 dimensions.

6.6.2 Mannings "n" values are to be determined using the methodology in the USGS report, Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona, April 1991. Copies of the report are available through the District.

6.6.3 A draft report on the field reconnaissance will be submitted to the District for review and approval prior to beginning the HEC-2 modeling. The report will present the determination of channel and overbank "n" values using captioned color photographs or color photocopies. The report will also discuss floodplain conditions affecting the delineation, describe structures and obstructions, and provide color photos or photocopies of major hydraulic structures. Photo locations, structures, and "n" values will be displayed on reduced scale mapping include in the report. The final report will be included in the Final Hydraulics Report.

6.7.1 The location and alignment of cross sections and channel centerline will be submitted for the District's review and approval prior to digitizing the cross section data. Cross section stationing will be from left to right looking downstream with the thalweg as station 10,000. 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. 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.

6.7.2 All cross sections will be plotted using a pen, laser, or electrostatic plotter. The cross section plots will show water surface profiles, ineffective flow areas, "n" values, encroachments, channel stationing and other pertinent information. All plots are to be at an engineered scale and are to be accompanied by a legend. These plots are to be available at all reviews.

6.7.3 Cross section plots will show the following information: a plot of digitized "GR", STCHL, STCHR, centerline (station 10,000) to be used as a check of input data and for working sections during compilation of the floodplain model; a plot of the cross section for the

completed floodplain run which shows the floodplain water surface elevation, ineffective flow areas, "n" factor, and encroachments to be used as working sections for development of the floodway model. The final cross section plots will show a plot of the final floodway model cross sections with Type 1 encroachments, encroached water surface, and flow velocity, in addition to previously stated items. These cross sections will be submitted as part of the Final Hydraulics Report.

6.8 An error exists in the approved Jackrabbit Wash Study. The error is an incorrect discharge Q at cross section # 1.886 on Star Wash. The consultant will correct this error and obtain FEMA approval of the correction. A revision to the delineation is not anticipated. Revised profiles may be required by FEMA.

6.9 For floodplains identified as ponding areas, it is preferable to analyze the area by using the HEC-2 model, which will provide the District with water surface elevations. If appropriate, the consultant shall identify a floodway in the ponded floodplains.

6.10 Flood zones must be determined according to FEMA criteria and clearly labelled on the final drawings.

6.11 Flood profiles must de developed per FEMA guidelines.

6.12 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
   d. Public notification and contact

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
   c. Total acres of floodplain and floodway (from HEC-2 output, TWA variable)

V. Insurance applications and CRS summary

VI. Other studies

VII. Location of data

VIII. Bibliography

IX. Reduced Delineation Maps (11"x17")

X. ERM's

XI. Flood Profiles

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, blueline, draft copy for Flood Control District reference during the project, delivered immediately following completion of the topographic mapping.

c. One complete set of contour maps at 1"= 200' scale with the floodplain delineations in reproducible form (mylar) and nine blueline copies as outlined in Task 3.

d. One set of transparent overlays of photo-mylars.

7.2 Digitized topographic data and floodplain/floodway boundaries in conformance with the District's GIS Specifications.

7.3 Two (2) diskette copies of the HEC-2 input/output files on 5-1/4", 1.2 Mb diskettes compatible with an IBM-AT personal computer.

7.4 Tabular list of control points (ERM's) used with descriptions, elevations, and coordinates.

7.5 The consultant will produce a final report incorporating the comments of the District, FEMA and other reviewers. Six copies of the Hydraulics report as outlined in Task 6 will be delivered.

7.6 Documentation for this study will be as outlined in ADWR State Standard Attachment 1-90, Instructions for Organizing and Submitting Technical Documentation for Flood Studies, September 1991.

7.7 Two (2) copies of the current FIRM panels showing the proposed delineation.

SECTION 2: MAPPING AND SURVEYING INFORMATION

SECTION 2: MAPPING AND SURVEYING INFORMATION

2.1 General

Hydraulic Mapping

Mapping at a scale of 1" = 200' with a 2-foot contour interval was prepared by Aerial Mapping Company, Inc. under subcontract to Wood, Patel & Associates, Inc. (Wood/Patel). Digitized cross sections at locations selected by Wood/Patel were also provided by Aerial Mapping Company, Inc. The aerial mapping company job number is 92155 and the flight date was October 20, 1992.

Vertical control was based on the NGVD 1929 datum.

Horizontal control was placed on the Arizona State Plane Coordinate System on NAD 1927 datum.

Mapping Control

Section 2.3 contains Mapping Control and Field Data by Aerial Mapping Company, Inc.

SECTION 2: MAPPING AND SURVEYING INFORMATION

2.2 Index of Maps

SEE WORK MAPS

SECTION 2: MAPPING AND SURVEYING INFORMATION

2.3 Survey Field Notes

HORIZONTAL and VERTICAL CONTROL TABULATION

for

STAR WASH FLOODPLAIN STUDY

MARICOPA COUNTY, ARIZONA

FCD 92-06

MARCH 1993

Prepared for:
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

Prepared by:
Aerial Mapping Company, Inc.
3141 West Clarendon Avenue
Phoenix, Arizona 85017

AMC JN 92155

WP JN 92916

Richard D. Cook, RLS
Aerial Mapping Company, Inc.
3141 West Clarendon Avenue
Phoenix, Arizona 85017

HORIZONTAL AND VERTICAL CONTROL TABULATION

for

STAR WASH FLOODPLAIN STUDY

MARICOPA COUNTY, ARIZONA

FCD 92-06

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Section 2

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GPS Horizontal Tabulation NAD '83

Section 3

Level Loop Diagram
Field Book #1 Field Notes
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Section 4

Field Book #2 Field Notes
Field Check Cross-Section Information

Section 5

Field Cross-Section Diagrams
Cross-Section Comparison Plots - Field vs. Photogrammetric

Section 6

GPS Coordinates
(By Project Engineering Consultants, Inc.)

PREFACE

The field survey data on horizontal and vertical controls and cross-section checks were performed by Aerial Mapping Company, Inc. (AMCI).

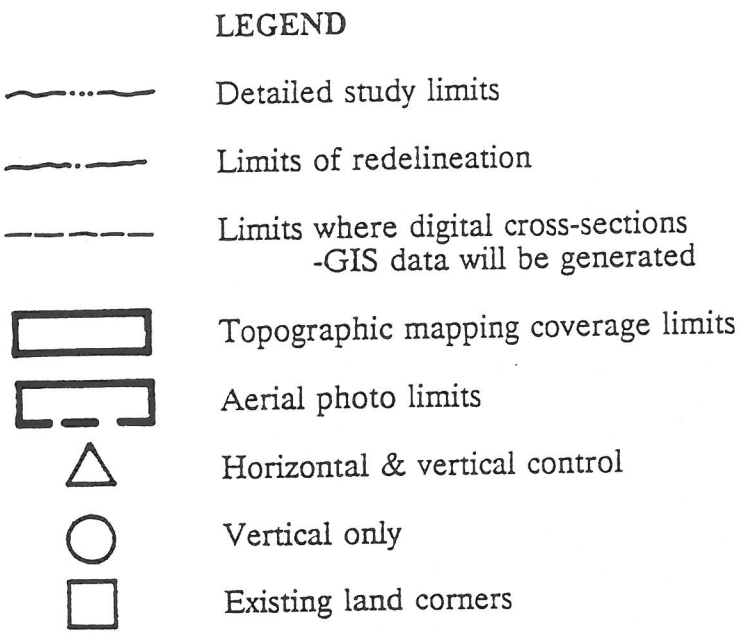
AMCI performed these services as a subconsultant to Wood, Patel & Associates, Inc. in conjunction with the Star Wash Floodplain Study for the Flood Control District of Maricopa County.

SECTION 1

Control Diagram
Point Descriptions

FIGURE 2.1
STUDY AREA LIMITS

Star Wash & Tributaries
Contract FCD 92-06
Flood Control District of Maricopa County



MATCH LINE

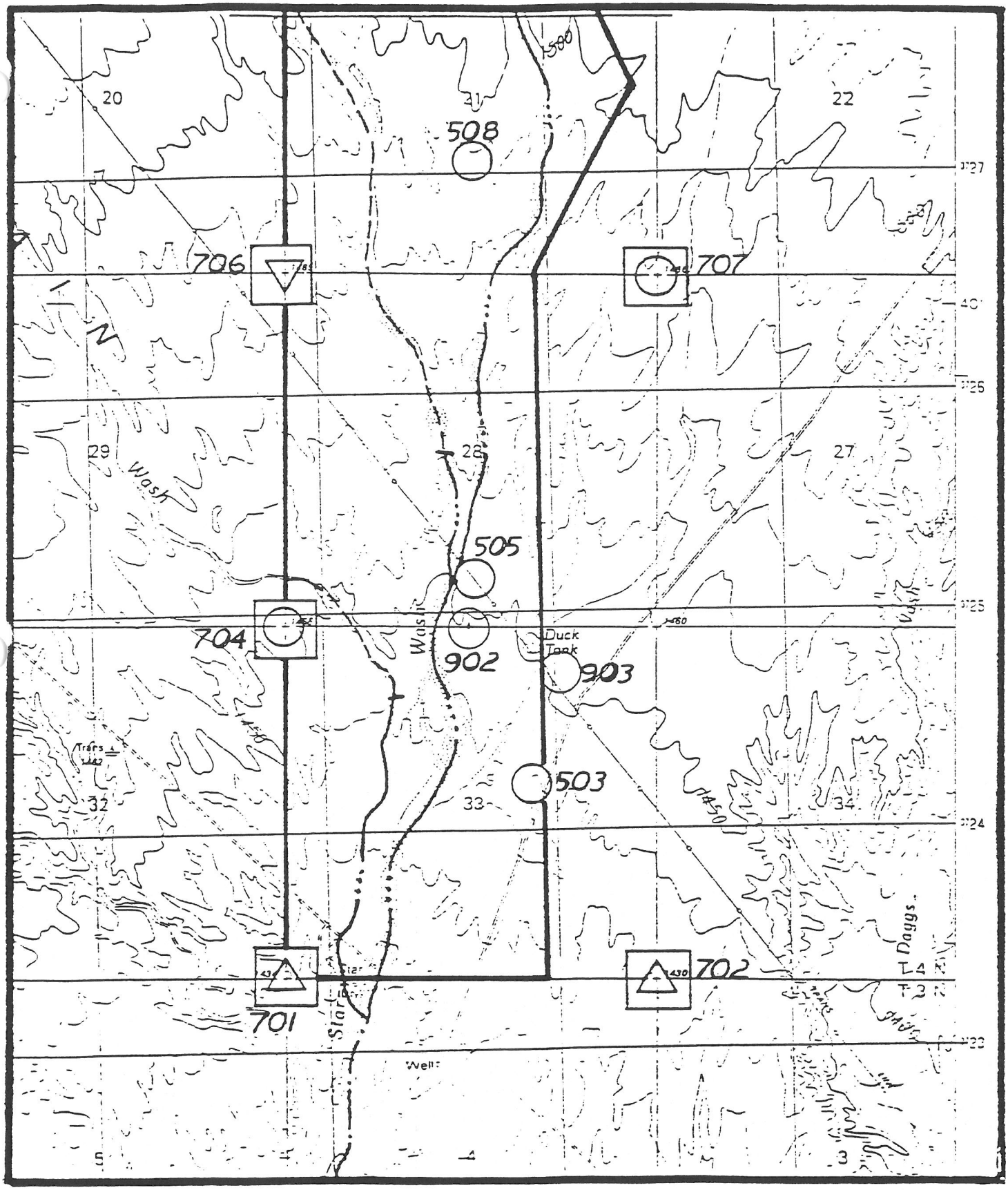


PLATE 1
2 of 3

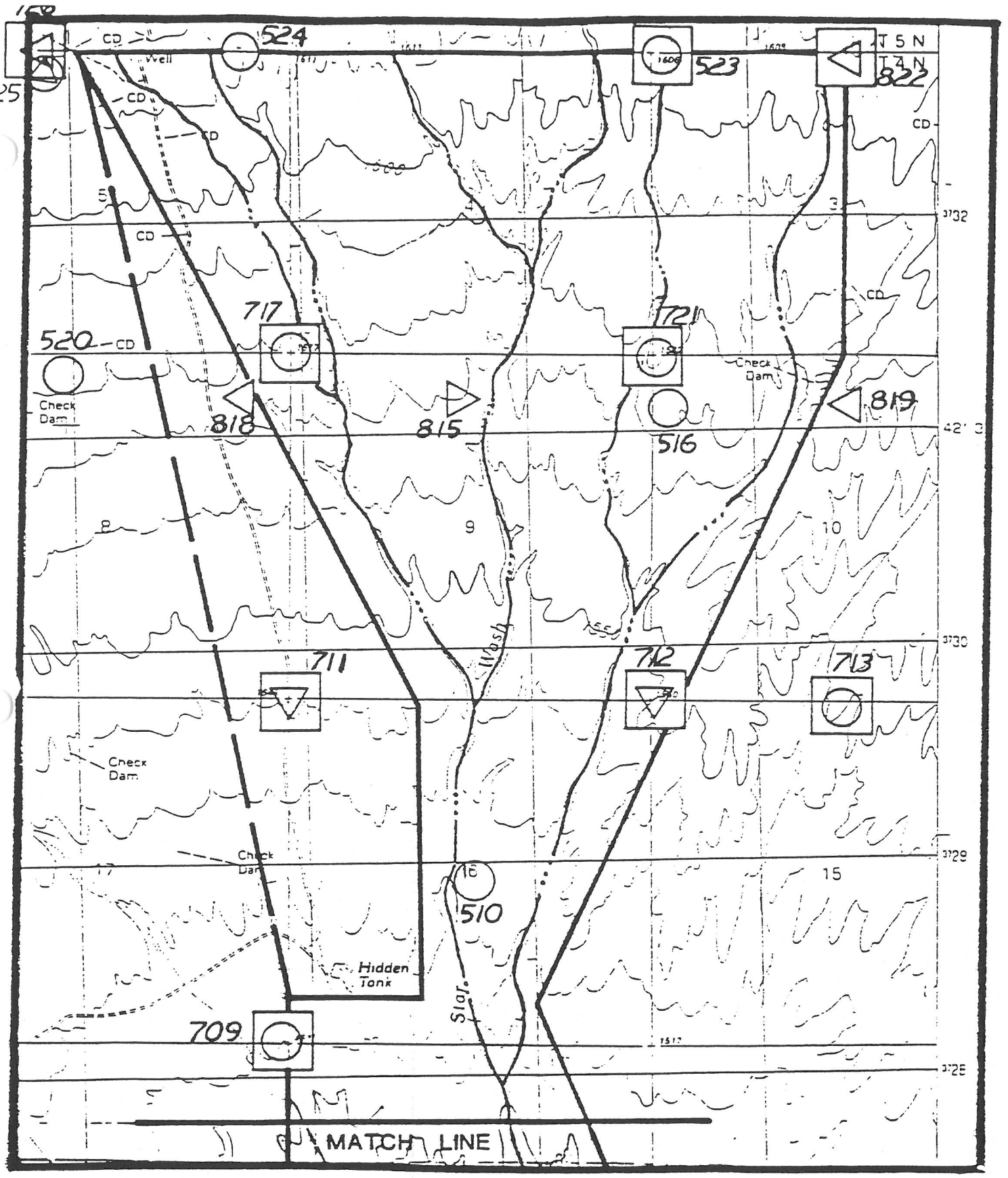

T 5 N
T 4 N
524
523
822
825
CD
Well
717
721
520
Check Dam
818
815
516
819
9
10
Wash
711
712
713
Check Dam
15
510
Hidden Tank
709
MATCH LINE

PLATE 1
3 of 3

COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	SE 33	
OCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	SE 33 T5N R5W	GLO	1610,979
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
		ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

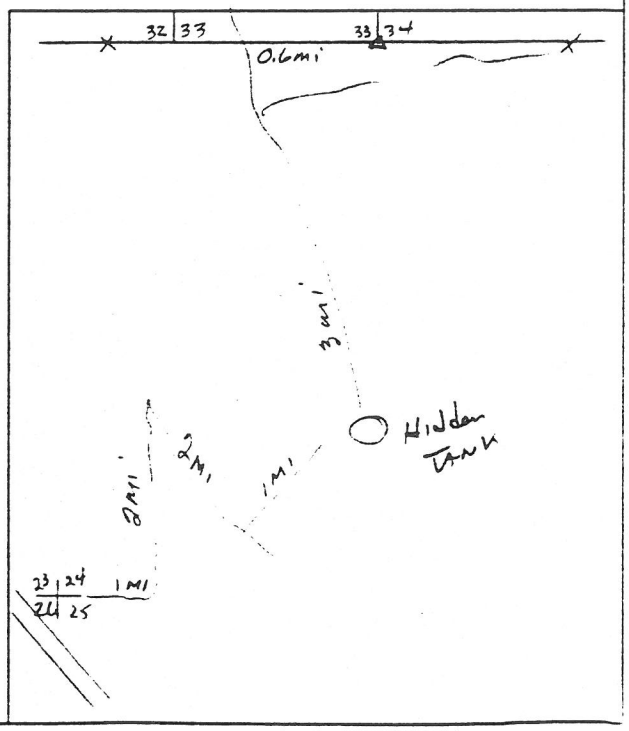
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles +½± to a fence and cattle guard, take track road east along south side of fence.

This station is located at

SE COR OF SEC 33 T%n R5W

This station is a

BRASS CAP ON 3" I.P.
APPROX 1.17' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	SE 34	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	SE 34 T5N R5W	GLO	1610.036
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
		ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

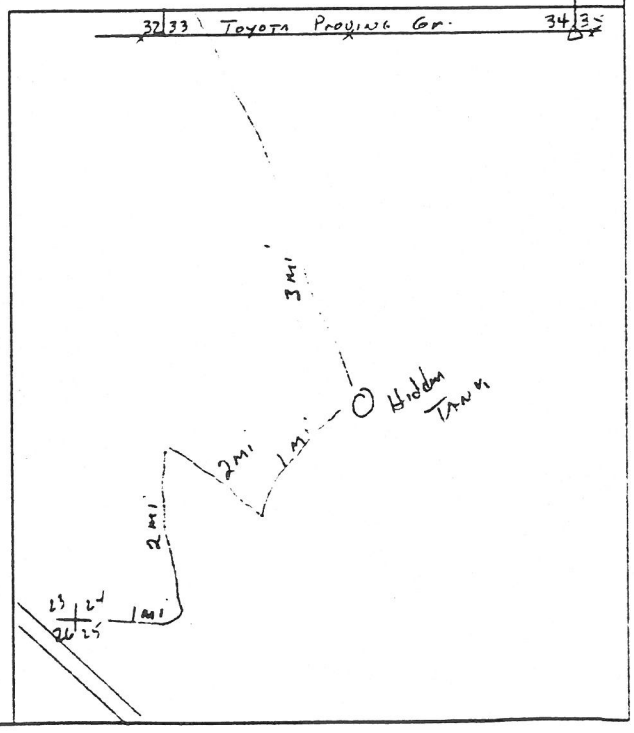
This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence.

This station is located at

SE COR OF SEC 34 T5N R5W



This station is a

BRASS CAP ON 3" I.P.

APPROX 0.70' ABOVE GROUND

COUNTRY	TYPE OF MARK	STATION	
U. S. A.	BRASS CAP	HYR 72	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	HYR 72	BUR. OF REC.	1484.127
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
		ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

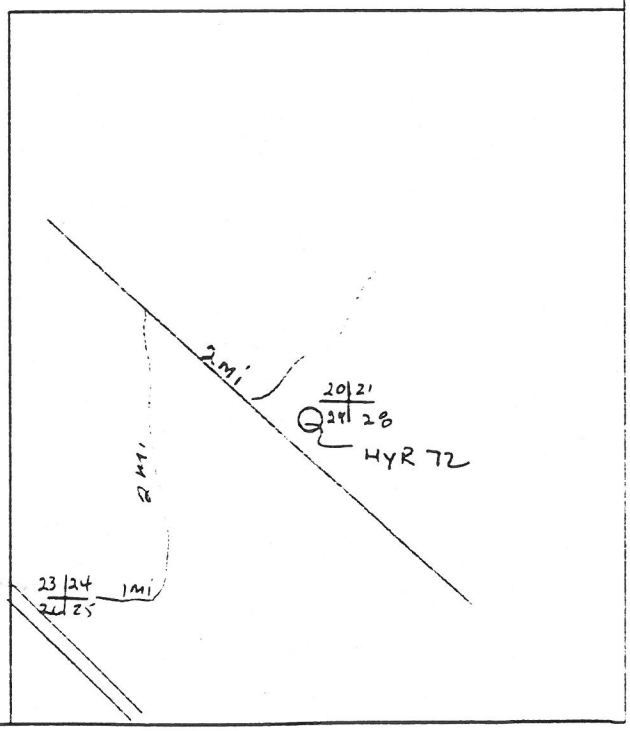
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

3.5' WEST OF NE COR SEC 29 T4N R5W

This station is a

BRASS CAP SET IN CONCRETE POST
FLUSH



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	503	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	NONE	NONE	1440.213 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT)	(EASTING)(NORTHING) (FT)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
963929.8 (M)	240421.9 (M)	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city), MARICOPA (county), ARIZONA (state)

To reach this station from the

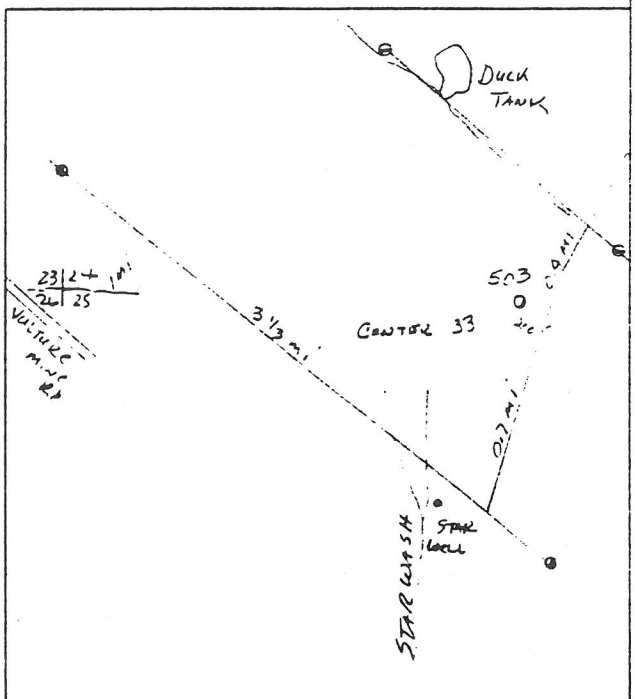
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

APPROX 800' EAST OF THE CENTER OF SECTION 33
T 4N R5W
APPROX 200' WEST OF DIRT ROAD

This station is a

1/2" RE BAR
APPROX 0.06' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	505	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	NONE	NONE	1453.564 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) 966966.9 (M)	(EASTING)(NORTHING) (FT) 239657.5 (M)	GRID AND ZONE ARIZ, CENTRAL ZONE	ESTABLISHED BY (AGENCY) AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

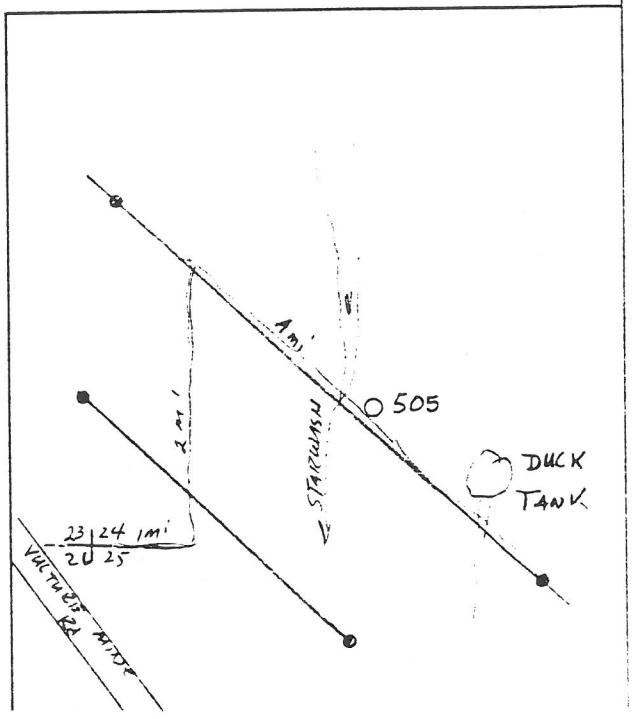
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4 1/4 ± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

NORTH OF STEEL TOWER
POWER LINE APPROX 700+ NORTH
OF N 1/4 OF SEC 33 T4N R5W

This station is a

1/2" RE BAR
APPROX 0.10' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	508	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1486.116
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
973127.4	239376.0	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

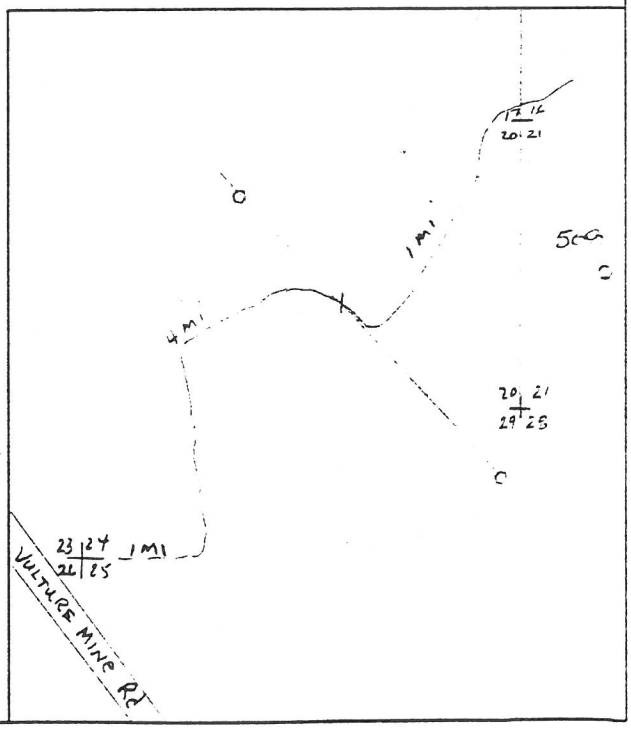
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

APPROX 1000' SOUTH OF THE CENTER OF SEC 21 T4N R5W

This station is a

1/2" RE BAR FLUSH WITH GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	510	
CALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1521.959
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
979338.2	239839.9	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

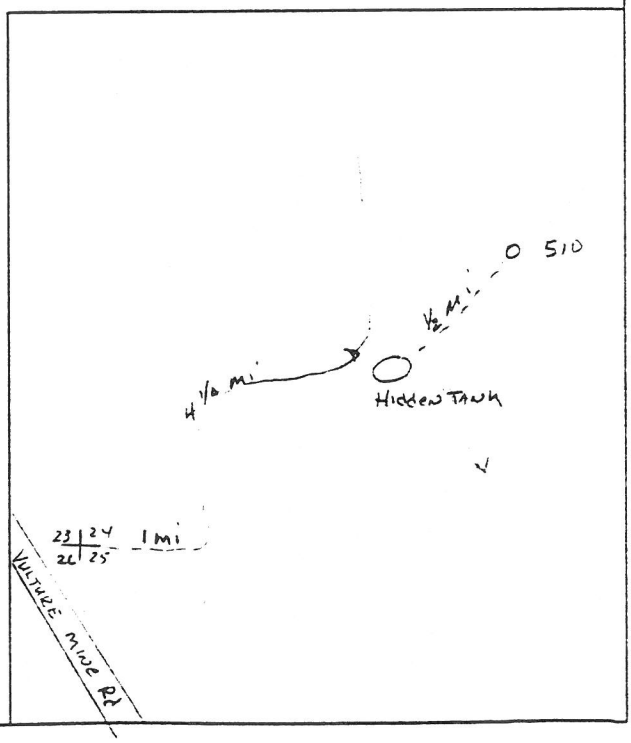
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

APPROX 200 SOUTH OF THE
CENTER OF SEC 16 T4N R5W

This station is a

1/2" RE BAR
APPROX 0.11' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	516	
CALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	NONE	NONE	1573.420 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT)	(EASTING)(NORTHING) (FT)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
986656.5 (M)	242360.8 (M)	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

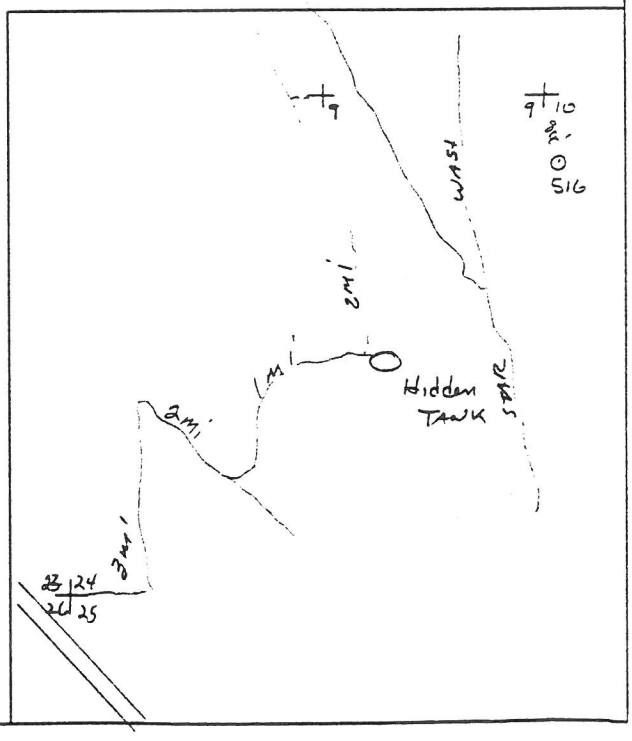
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles +½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at
APPROX 800' SOUTH OF THE
NE COR OF SEC 9 T4n R5W

This station is a
1/2" RE BAR
FLUSH WITH GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	520	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1578.588
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
987013.6	234056.9	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

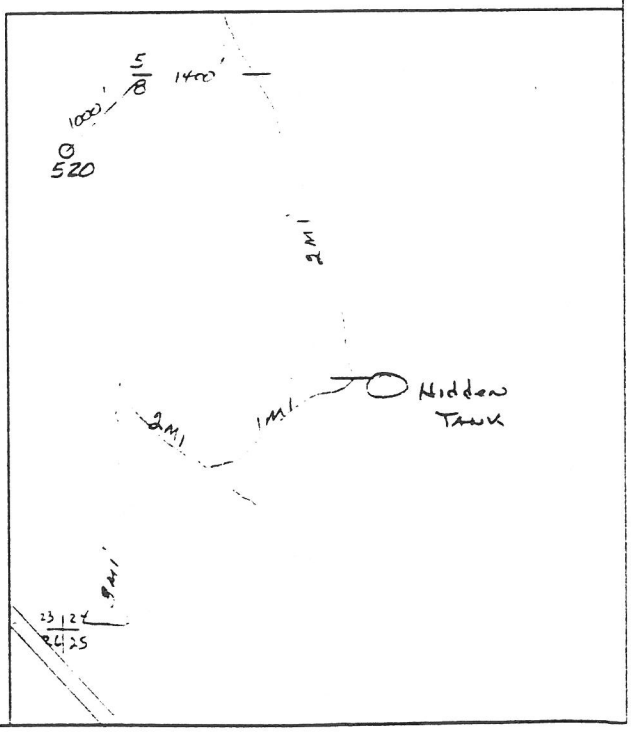
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city), MARICOPA (county), ARIZONA (state)

To reach this station from the
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at
APPROX 1000' WSW OF
THE N 1/4 COR OF SEC 8 T4N R5W

This station is a
1/2" RE BAR
APPROX 0.09' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1x2x12" STAKE	523	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1606.544
LATITUDE	LONGITUDE	DATUM	DATUM
992026.0	242440.2	N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
		ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

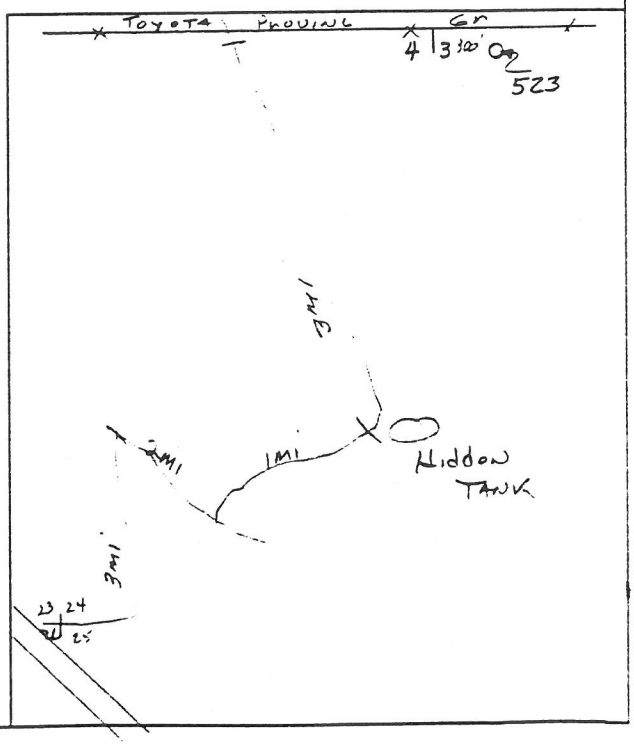
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

APPROX 300' EAST OF
THE NE COR OF SEC 4 T4N R5W

This station is a

1x2x12" STAKE
APPROX 0.17' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	524	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1609.787
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
992077.7	236531.4	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city), MARICOPA (county), ARIZONA (state)

To reach this station from the

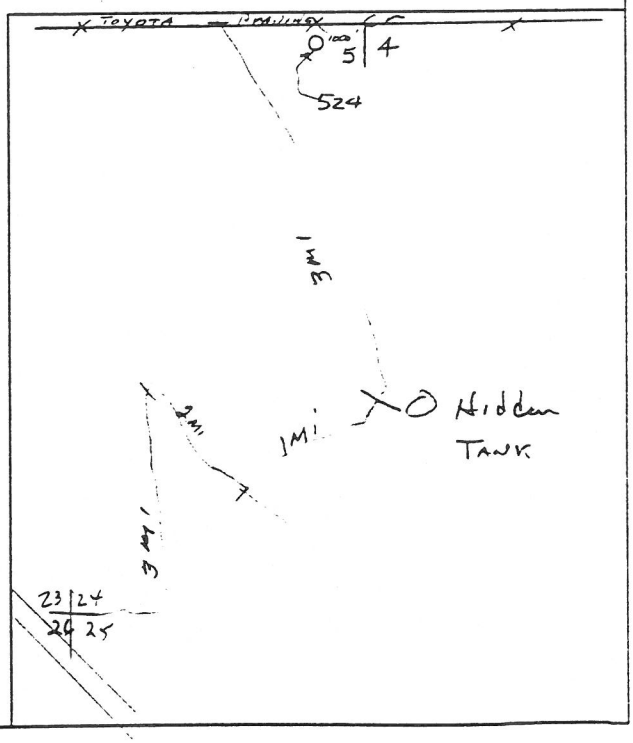
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles +½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

APPROX 1000' WEST OF THE
NE COR SEC 5 T4N R5W

This station is a

1/2" RE BAR
APPROX 0.13' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	701	
CALITY	STAMPING ON MARK: SE COR SEC 32 T4N R5W	AGENCY (CAST IN MARK): GLO	ELEVATION: 1434.540 (FT) (M)
LATITUDE: 33-38-19.71419"	LONGITUDE: 112-46-52.370390	DATUM: N.A.D. '27	DATUM: M.S.L. '29
(NORTHING)(EASTING) (FT) (M): 961024.226	(EASTING)(NORTHING) (FT) (M): 236869.193	GRID AND ZONE: ARIZ, CENTRAL ZONE	ESTABLISHED BY (AGENCY): AMCI
(NORTHING)(EASTING) (FT) (M):	(EASTING)(NORTHING) (FT) (M):	GRID AND ZONE:	ESTABLISHED BY (AGENCY):

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

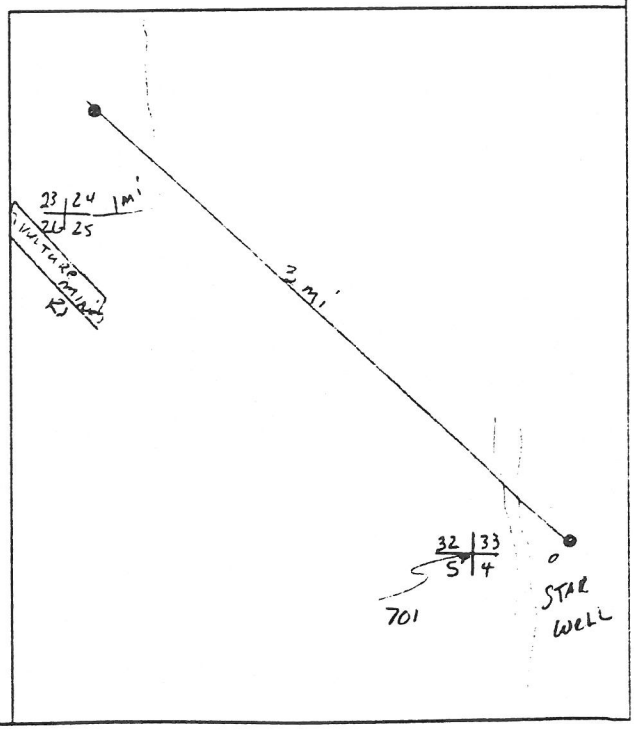
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles +½± to a fence and cattle guard, take track road east along south side of fence.

This station is located at

The southeast corner of section 32
T4N R5W

This station is a

GLO Brass Cap on 3" I.P.
1.2 ft above ground



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	702	
QUALITY	STAMPING ON MARK: NE COR SEC. 4 T3N R5W	AGENCY (CAST IN MARK): GLO	ELEVATION (FT): 1429.712 (M)
LATITUDE: 33-38-19.61695	LONGITUDE: 112-45-49.604870	DATUM: N.A.D. '27	DATUM: M.S.L. '29
(NORTHING)(EASTING) (FT) (M): 960970.523	(EASTING)(NORTHING) (FT) (M): 242175.684	GRID AND ZONE: ARIZ, CENTRAL ZONE	ESTABLISHED BY (AGENCY): AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city), MARICOPA (county), ARIZONA (state)

To reach this station from the

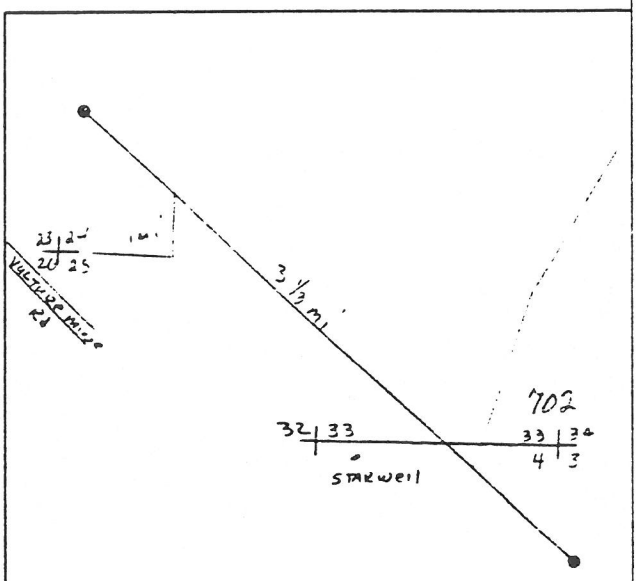
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

NE CORNER OF SECTION
4 T3N R5W

This station is a

GLO BRASS CAP ON 3" I.P.
1.1' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	704	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	NE COR SEC 32 T4N R5W	GLO	1454.929 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) 966304.5 (M)	(EASTING)(NORTHING) (FT) 236936.8 (M)	GRID AND ZONE ARIZ, CENTRAL ZONE	ESTABLISHED BY (AGENCY) AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence.

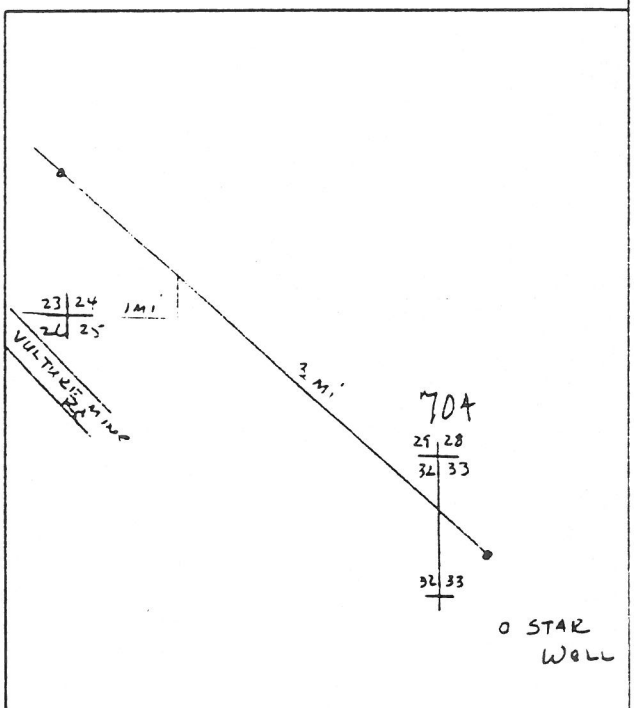
This station is located at

AT THE NE COR OF SEC 32 T4N R5W

This station is a

GLO BRASS CAP ON 2" I.P.

APPROX 1.0' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	706	
QUALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NE COR SEC 29 T4N R5W	GLO	1485.077
LATITUDE	LONGITUDE	DATUM	DATUM
33-40-04".19401	112-46'52.018770	N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
971584.208	236987.221	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

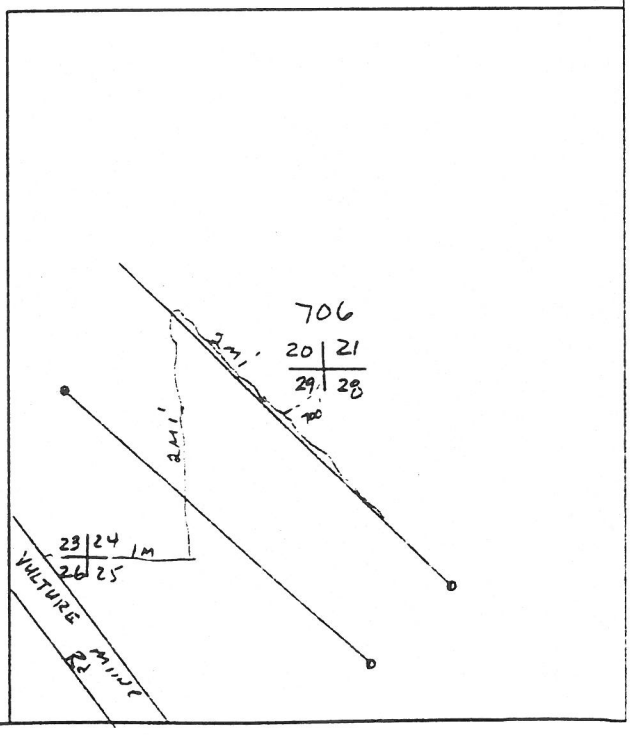
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

NE COR OF SEC 29 T4N R5W

This station is a

BRASS CAP ON 2" I.P.
APPROX 1.2' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	707	
QUALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NE COR SEC 28 T4N R5W	GLO	1485.185
LATITUDE	LONGITUDE	DATUM	DATUM
971531.7	242263.6	N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
		ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

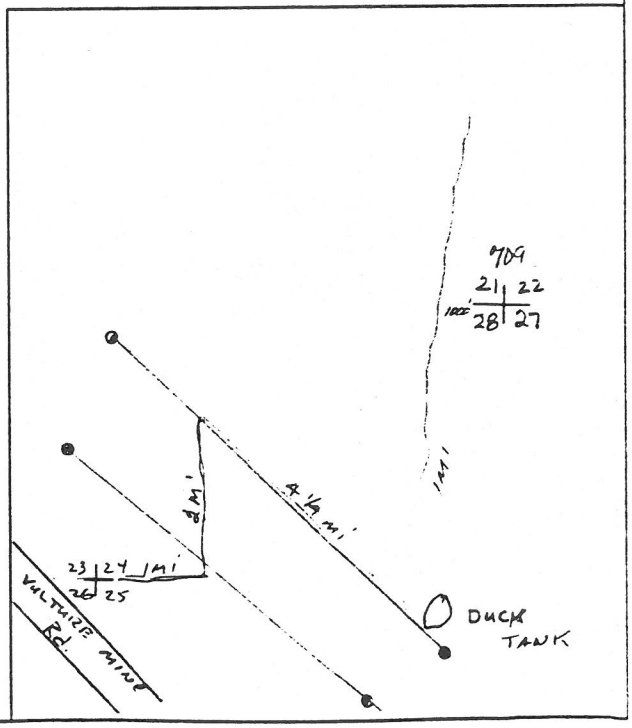
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

NE COR OF SEC 28 T4N R5W

This station is a

BRASS CAP ON 2" I.P.
APPROX 0.9' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	709	
CALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	NE COR SEC 20 T4N R5W	GLO	1508.493 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) 976860.9 (M)	(EASTING)(NORTHING) (FT) 237028.1 (M)	GRID AND ZONE ARIZ, CENTRAL ZONE	ESTABLISHED BY (AGENCY) AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

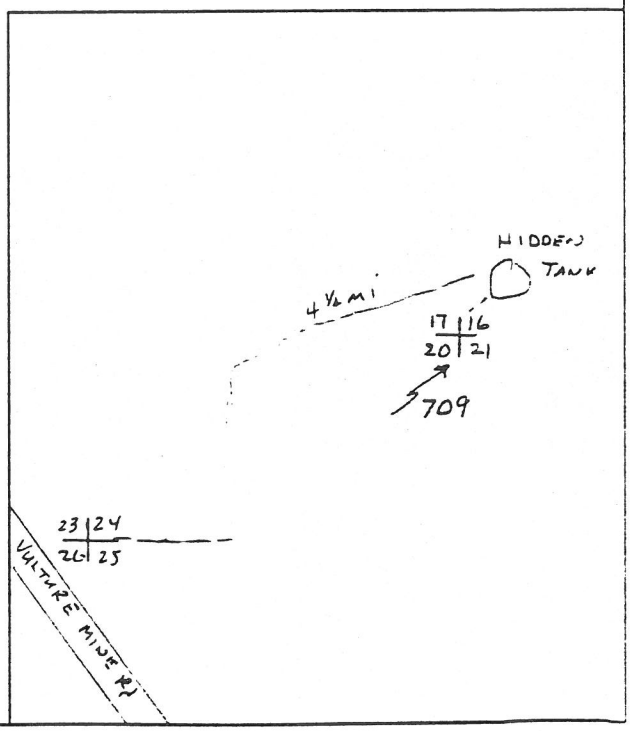
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

NE COR OF SEC 20 T4N R5W

This station is a

BRASS CAP ON 2" I.P.
APPROX 0.6' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	711	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NE COR SEC 17 T4N R5W	GLO	
LATITUDE	LONGITUDE	DATUM	DATUM
33-41'48.64557"	112-46'52.089220	N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
982141.641	237069.613	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

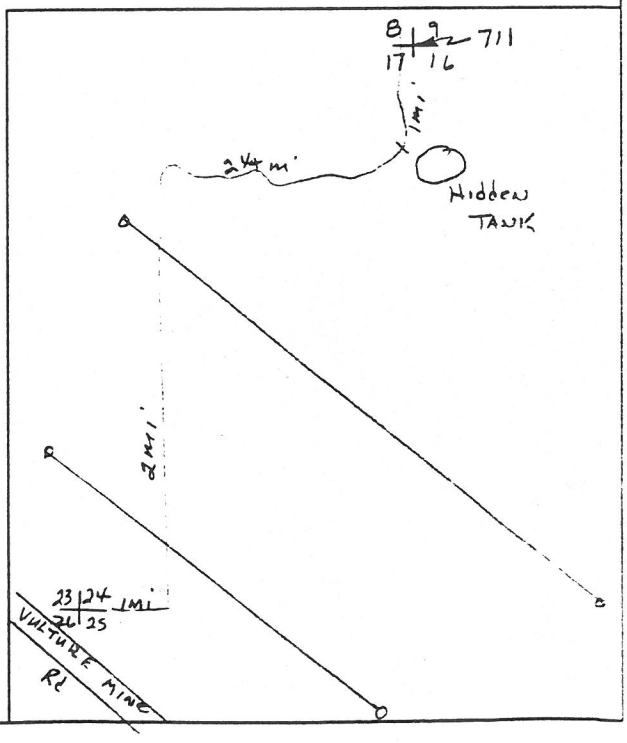
This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

NE COR SEC 17 T4N R5W



This station is a

BRASS CAP ON 2" I.P.
APPROX 1.10 ABOVE GROUND

COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	712	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NE COR SEC 16 T4N R5W	GLO	1548.404
LATITUDE	LONGITUDE	DATUM	DATUM
33-41'48.60092	112-45'49.55870	N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
982093.344	242352.714	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

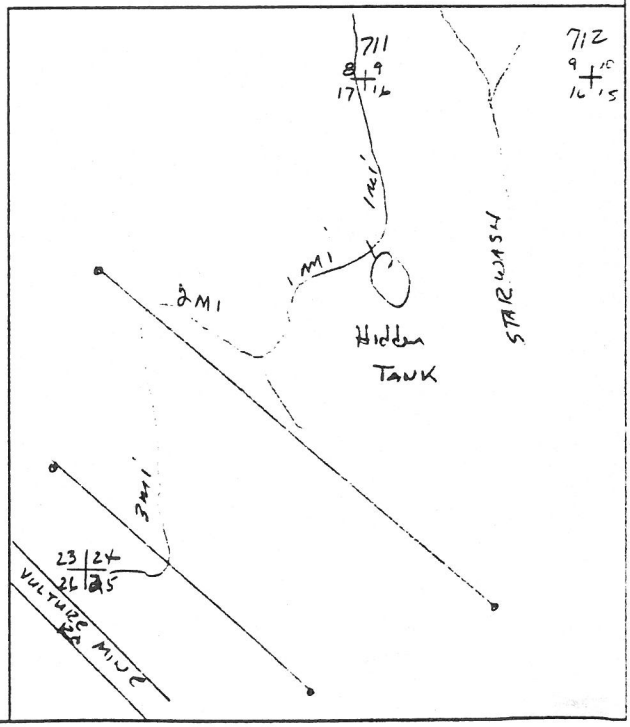
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

NE COR OF SEC 16 T4N R5W

This station is a

BRASS CAP ON 2" I.P.
APPROX 1.3' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	713	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	N 1/4 SEC 15 T4N R5W	GLO	1551.800 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT)	(EASTING)(NORTHING) (FT)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
982073.9 (M)	244995.2 (M)	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

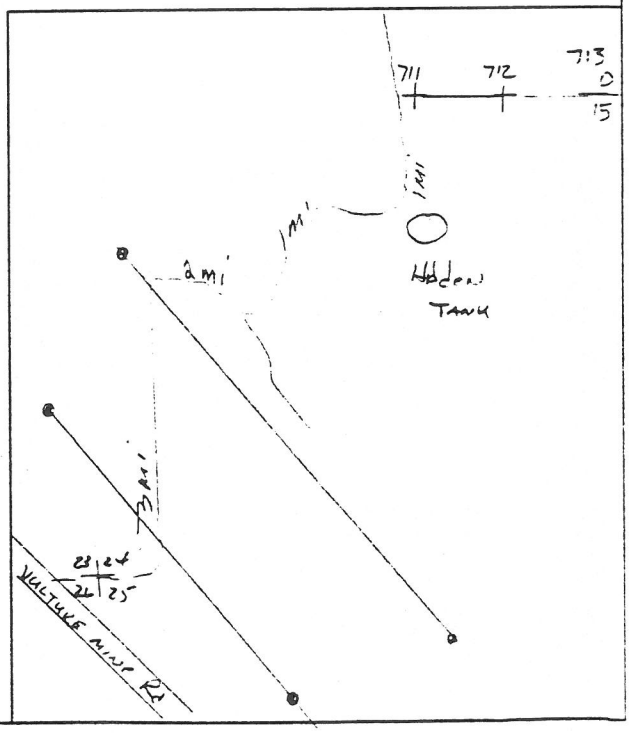
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4 1/2± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

N 1/4 OF SEC 15 T4N R5W

This station is a

BRASS CAP ON 3/4 I.P.
APPROX 1.23' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	717	
QUALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NE COR SEC 8 T4N R5W	GLO	1576.910
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
987422.2	237110.4	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

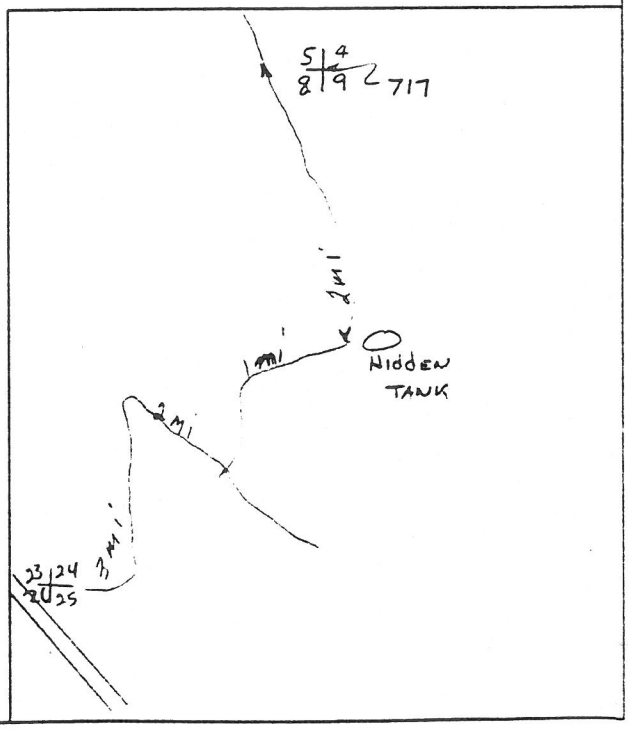
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

NE COR OF SEC 8 T4N R5W

This station is a

BRASS CAP ON 2" I.P.
APPROX 1.14 ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	721	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	NE COR SEC 9 T4N R5W	GLO	1580.030 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) 987373.6 (M)	(EASTING)(NORTHING) (FT) 242395.5 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
		ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

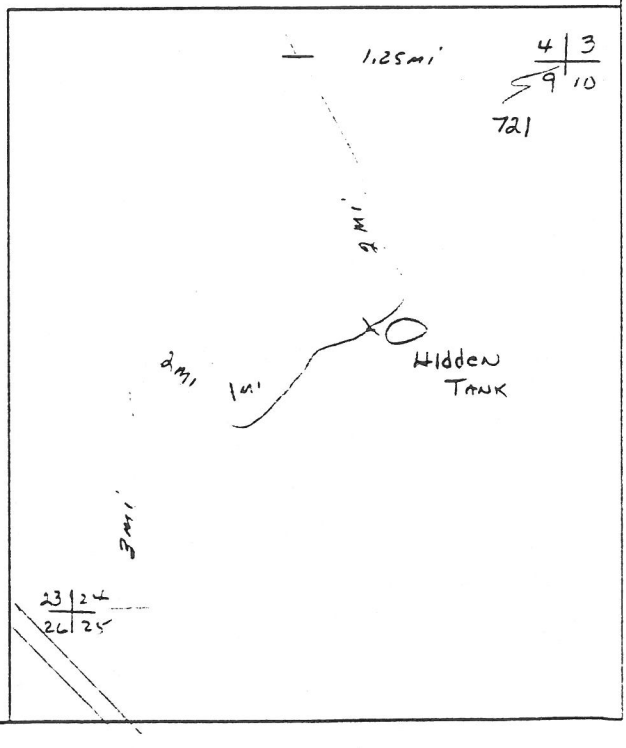
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

NE COR OF SEC 9 T4N R5W

This station is a

BRASS CAP ON 2" I.P.
APPROX 0.85' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	726 OR 55973	
LOCALITY	STAMPING ON MARK SE SEC 32 T5N R5W	AGENCY (CAST IN MARK) GLO	ELEVATION (FT) (M) 1622.623
LATITUDE	LONGITUDE	DATUM N.A.D. '27	DATUM M.S.L. '29
(NORTHING)(EASTING) (FT) 992121.6 (M)	(EASTING)(NORTHING) (FT) 233381.6 (M)	GRID AND ZONE ARIZ, CENTRAL ZONE	ESTABLISHED BY (AGENCY) AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

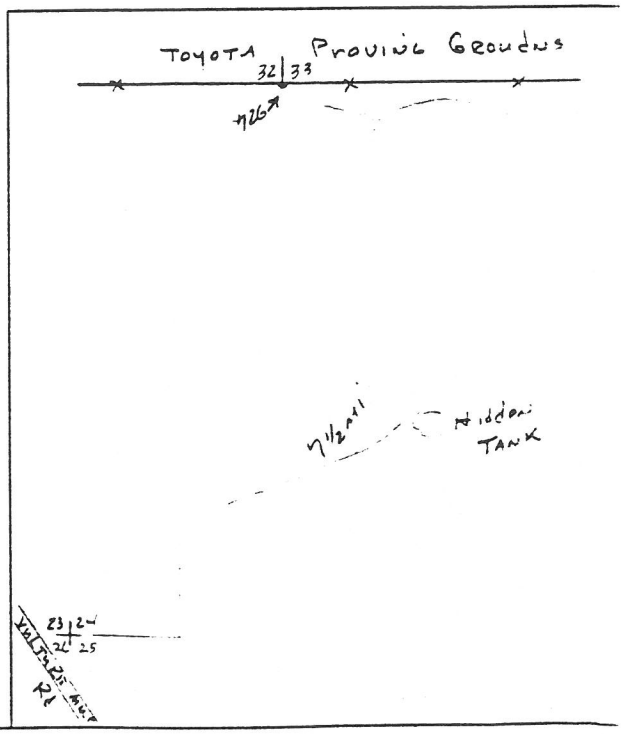
TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles +½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at
SE COR OF SEC 32 T5N R5W



This station is a
BRASS CAP ON 3" I.P.
APPROX. 0.40' ABOVE GROUND

COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	815	
QUALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1567.540
LATITUDE	LONGITUDE	DATUM	DATUM
33-42'33.83864	112-46'21.082660	N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
986687.695	239727.198	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

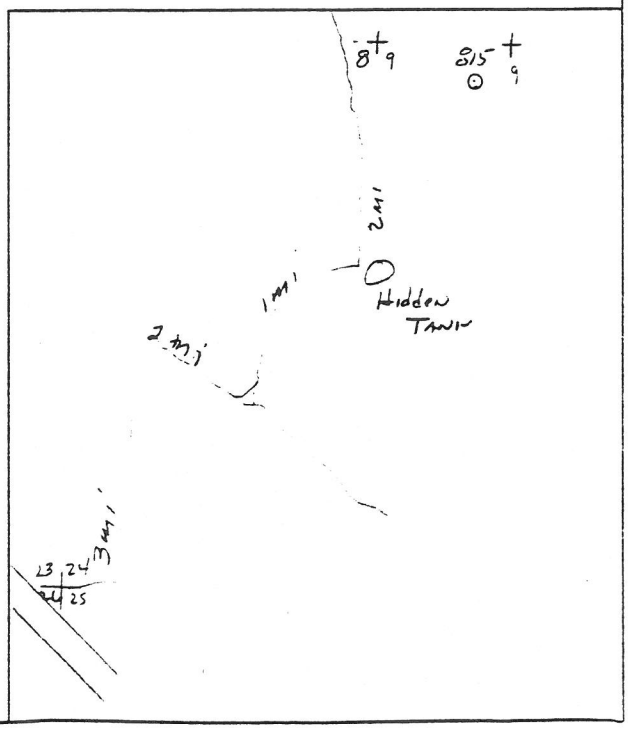
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

APPROX 800 SW OF THE N1/4 OF
SEC 9 T4n R5W

This station is a

1/2" RE BAR FLUSH WITH GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	818	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1574.516
LATITUDE	LONGITUDE	DATUM	DATUM
33-42'34.09467	112-47'00.768550	N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
986741.548	236374.872	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city), MARICOPA (county), ARIZONA (state)

To reach this station from the

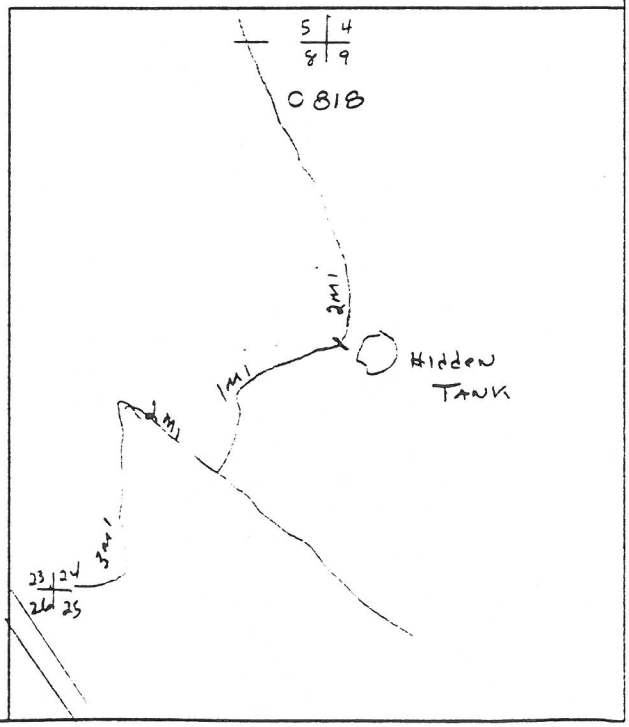
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

APPROX 1000' SW OF THE
NE COR OF SEC 8 T4N R5W

This station is a

1/2" RE BAR
APPROX 0.15' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	819	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1585.195
LATITUDE	LONGITUDE	DATUM	DATUM
33-42'32.94542	112-45'15.672090"	N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
986552.085	245252.141	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

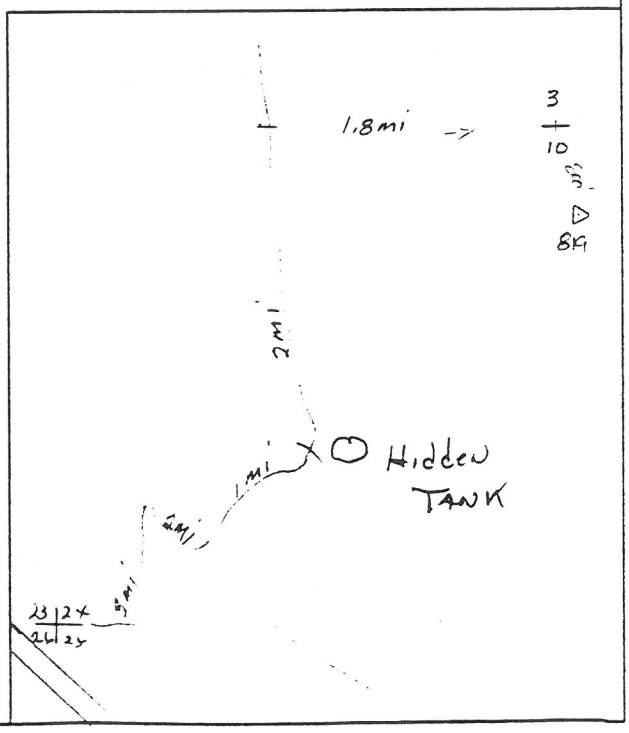
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles +½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

APPROX 800 SOUTH OF THE
N 1/4 COR OF SEC 10 T4N R5W

This station is a

1/2" RE BAR
APPROX 0.32' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	825	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1622.243
LATITUDE	LONGITUDE	DATUM	DATUM
33-43'26.90916"	112-47'36.736520	N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
992105.444	23381.761	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

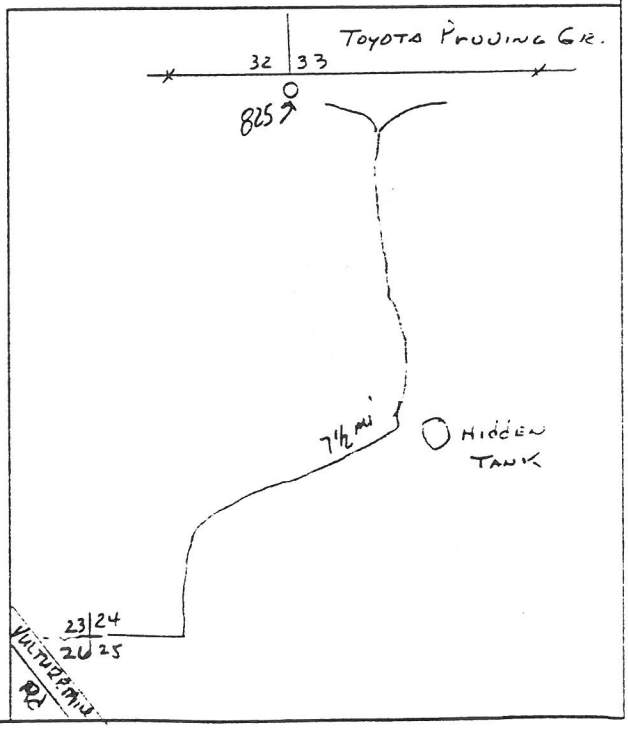
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

APPROX. 30' SOUTH OF
SE COR SEC 32 T5N R5W

This station is a

1/2" RE BAR
APPROX. 0.24' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	822	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1612.117
LATITUDE	LONGITUDE	DATUM	DATUM
33-43'26.87307"	112-45'16.185750	N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
992003.160	245252.995	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

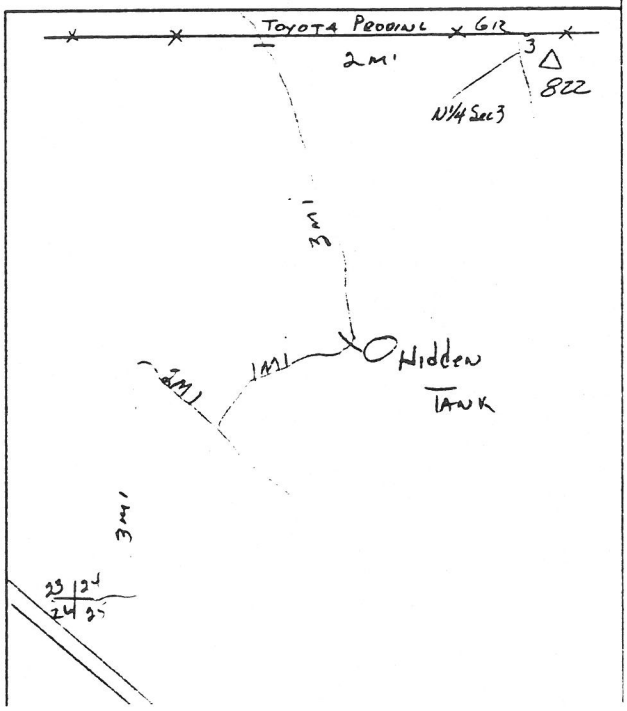
This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

NEAR APPROX N 1/4 SEC 3 T4N R5W



This station is a

1/2" RE BAR

APPROX 0.11' ABOVE GROUND

COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	825	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1622.243
LATITUDE	LONGITUDE	DATUM	DATUM
33-43'26.90916"	112-47'36.736520	N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
992105.444	23381.761	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

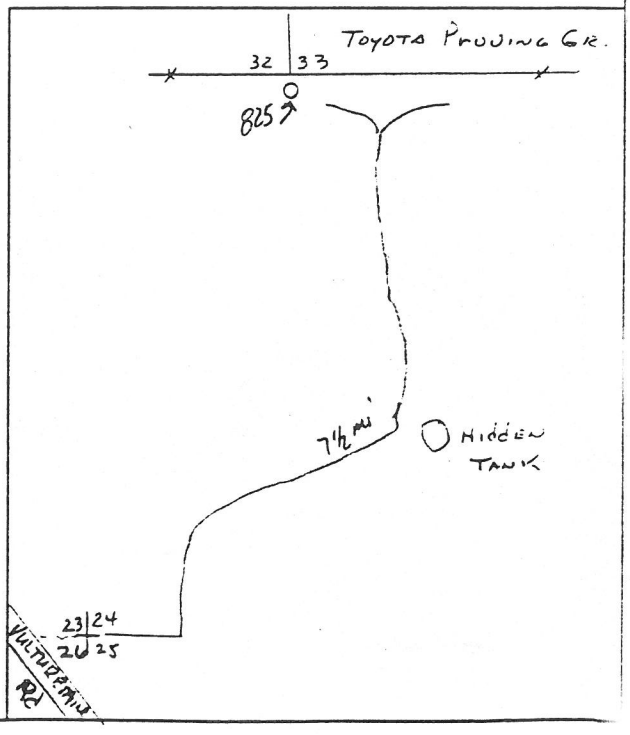
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

APPROX. 30' SOUTH OF
SE COR SEC 32 T5N R5W

This station is a

1/2" RE BAR
APPROX. 0.24' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	902	
LOCALITY	STAMPING ON MARK: N 1/4 SEC 33 T4N R5W	AGENCY (CAST IN MARK): GLO	ELEVATION: 1449.720 (FT) (M)
LATITUDE	LONGITUDE	DATUM: N.A.D. '27	DATUM: M.S.L. '29
(NORTHING)(EASTING) (FT) (M): 966278.5	(EASTING)(NORTHING) (FT) (M): 239577.6	GRID AND ZONE: ARIZ, CENTRAL ZONE	ESTABLISHED BY (AGENCY): AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

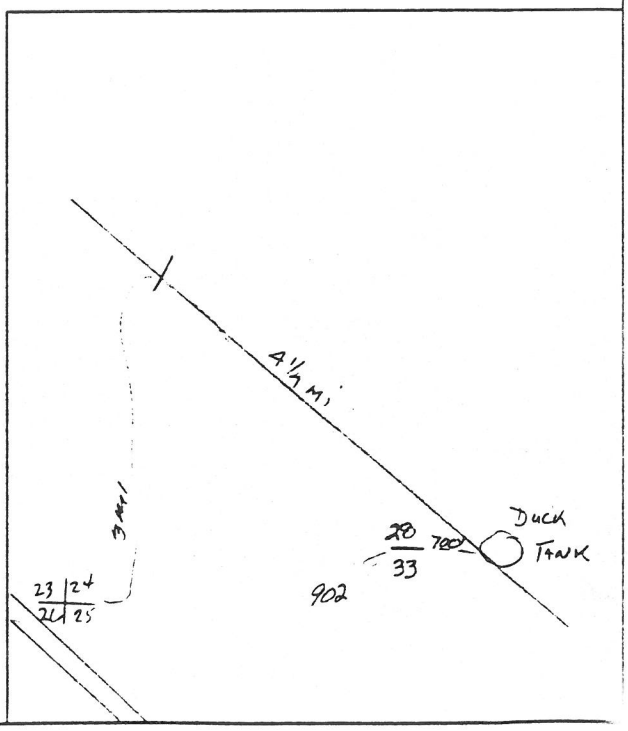
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles 4½± to a fence and cattle guard, take track road east along south side of fence.

This station is located at

N1/4 OF SEC 33 T4N R5W

This station is a

BRASS CAP ON 2" I.P.
APPROX 0.67' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	R/R SPIKE	903	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	NONE	NONE	1451.323
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
965601.3	240837.2	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

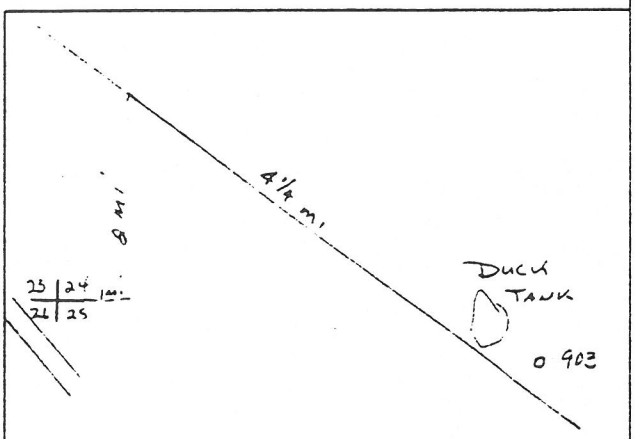
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles +½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

APPROX 800 E SE ON N 1/4
COR OF SEC 33 T4N R5W

This station is a

RAILROAD SPIKE SET FLUSH



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	GLO BRASS CAP	904	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	N 1/4 SEC 21 T4N R5W	GLO	1509.420 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT)	(EASTING)(NORTHING) (FT)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
976836.2 (M)	239668.4 (M)	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

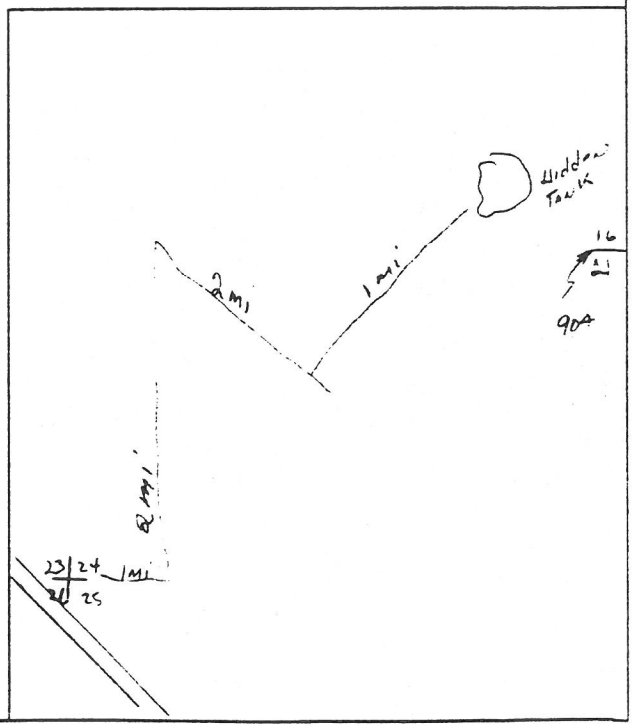
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles +½± to a fence and cattle guard, take track road east along south side of fence,

This station is located at

N 1/4 OF SEC 21 T4N R5W

This station is a

BRASS CAP ON 3/4" I.P.
APPROX 1.16' ABOVE GROUND



COUNTRY	TYPE OF MARK	STATION	
U. S. A.	1/2" RE BAR	905	
CALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	NONE	NONE	1508.490 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
		N.A.D. '27	M.S.L. '29
(NORTHING)(EASTING) (FT)	(EASTING)(NORTHING) (FT)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
976805.5 (M)	240945.7 (M)	ARIZ, CENTRAL ZONE	AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

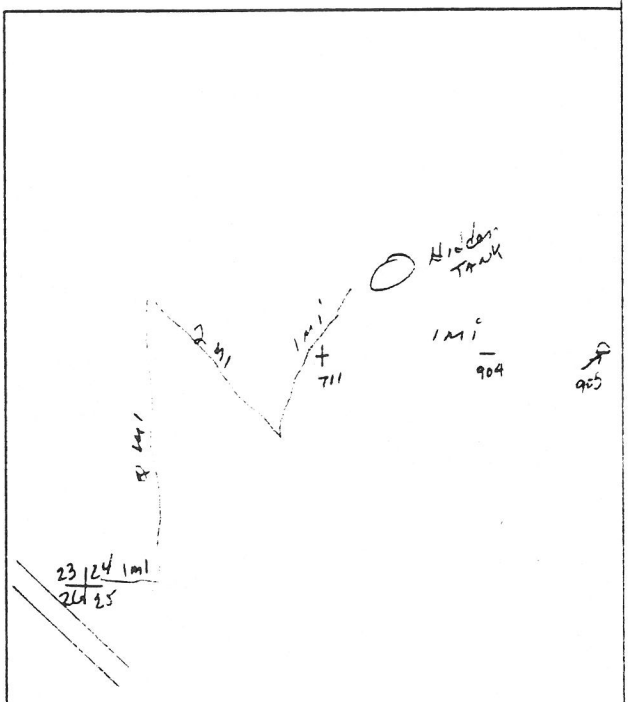
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near WICKENBURG (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the
Town of Wickenburg, go south on the Vulture Mine Road 20 miles +/− to the intersection of the Aquila Road, south on Vulture Mine Road miles +½± to a fence and cattle guard, take track road east along south side of fence.

This station is located at
APPROX 1/4 MI. WEST OF
NE COR SEC 21 T4N R5W

This station is a
1/2" RE BAR SET FLUSH



SECTION 2

GPS Horizontal Tabulation NAD '27
GPS Horizontal Tabulation NAD '83

ARIZONA, CENTRAL ZONE

Star & Power Line Wash NAD'27 (Elev.+/-)

	POINT	NORTHING-Y	EASTING-X	ELEV/FEET	LATITUDE	LONGITUDE	CONVERGENCE	SC.FACT	EL.FACT
701	S006	961024.266	236869.193	1434.941	33 38 19.71419	112 46 52.370390	- 0 28 44.21	0.99997927	0.99993137
	S007	964453.832	234473.379	1462.238	33 38 53.44400	112 47 21.048000	- 0 29 00.52	0.99998072	0.99993006
	S008	1002612.442	211736.381	1777.398	33 45 08.95800	112 51 54.130000	- 0 31 37.03	0.99999514	0.99991499
	S009	985740.752	210881.244	1681.151	33 42 21.97366	112 52 02.415860	- 0 31 39.33	0.99999571	0.99991959
822	S010	992003.160	245252.995	1612.264	33 43 26.87307	112 45 16.185750	- 0 27 54.65	0.99997430	0.99992289
825	S011	992105.444	233381.761	1622.169	33 43 26.90916	112 47 36.736520	- 0 29 12.70	0.99998139	0.99992241
818	S012	986741.548	236374.872	1574.600	33 42 34.09467	112 47 00.768550	- 0 28 52.06	0.99997957	0.99992469
815	S013	986687.695	239727.198	1568.091	33 42 33.83864	112 46 21.082660	- 0 28 30.03	0.99997756	0.99992500
819	S014	986552.085	245252.141	1585.476	33 42 32.94542	112 45 15.672090	- 0 27 53.71	0.99997430	0.99992417
712	S015	982093.344	242352.714	1548.744	33 41 48.60092	112 45 49.558870	- 0 28 11.98	0.99997600	0.99992592
711	S016	982141.641	237069.613	1541.142	33 41 48.64557	112 46 52.089220	- 0 28 46.67	0.99997915	0.99992629
PEC17	S017	977476.576	237983.344	1510.427	33 41 02.56963	112 46 40.814780	- 0 28 39.84	0.99997860	0.99992776
	S018	974298.296	237013.195	1497.330	33 40 31.04669	112 46 51.980100	- 0 28 45.64	0.99997919	0.99992838
706	S019	971584.208	236987.221	1485.666	33 40 04.19401	112 46 52.018770	- 0 28 45.32	0.99997920	0.99992894
	S020	968063.313	238750.761	1463.563	33 39 29.50707	112 46 30.808250	- 0 28 33.13	0.99997814	0.99993000
	S021	964638.691	236968.402	1450.732	33 38 55.48015	112 46 51.554340	- 0 28 44.20	0.99997921	0.99993061
	S022	961025.581	236894.131	1435.538	33 38 19.72927	112 46 52.075580	- 0 28 44.04	0.99997926	0.99993134
702	S023	960970.523	242175.684	1430.814	33 38 19.61695	112 45 49.604870	- 0 28 09.43	0.99997611	0.99993156
	S024	974327.015	226704.787	1537.225	33 40 30.46083	112 48 53.951840	- 0 29 53.27	0.99998552	0.99992648
	S025	979607.344	226756.065	1563.386	33 41 22.70309	112 48 53.888400	- 0 29 53.92	0.99998548	0.99992522
	S026	981584.887	228778.627	1561.296	33 41 42.44015	112 48 30.155640	- 0 29 41.01	0.99998422	0.99992532
	S027	983987.160	214554.690	1642.867	33 42 04.95831	112 51 18.748250	- 0 31 14.86	0.99999329	0.99992142
	S028	987634.146	216264.958	1658.222	33 42 41.19049	112 50 58.896660	- 0 31 04.34	0.99999217	0.99992069
	S029	991205.950	217471.316	1663.396	33 43 16.63319	112 50 44.997880	- 0 30 57.10	0.99999139	0.99992044
	S030	993406.856	219816.254	1664.485	33 43 38.61428	112 50 17.470810	- 0 30 42.11	0.99998988	0.99992039
	S031	995081.926	204865.308	1757.818	33 43 53.82886	112 53 14.660040	- 0 32 20.73	0.99999973	0.99991593
	S032	997659.840	207010.131	1751.722	33 44 19.53018	112 52 49.551700	- 0 32 07.14	0.99999829	0.99991622

PROGRAM GPPC83

NATIONAL GEODETIC SURVEY
GP TO PC PROGRAM
1983 DATUM

VERSION 1.0

Star & Power Line Wash NAD'83 (Elev.+/-)

THE U.S. SURVEY FOOT WAS USED IN CONVERTING COORDINATES!
THE U.S. SURVEY FOOT WAS USED IN CONVERTING ELEVATIONS!

NAME	LATITUDE	LONGITUDE	NORTH(Y) METERS	EAST(X) METERS	NORTH(Y) FEET	EAST(X) FEET	ZONE	ELEV METERS	ELEV FEET
S006	33 38 19.83943	112 46 55.00234	292934.549	133091.564	961069.433	436651.240	AZ C	437.37	1434.94
S007	33 38 53.56900	112 47 23.68179	293979.912	132361.296	964499.095	434255.352	AZ C	445.69	1462.22
S008	33 45 9.08076	112 51 56.78187	305611.002	125430.833	1002658.762	411517.625	AZ C	541.69	1777.19
S009	33 42 22.09644	112 52 5.06638	300468.350	125170.178	985786.578	410662.492	AZ C	512.42	1681.15
S010	33 43 26.99884	112 45 18.81598	302377.216	135647.010	992049.249	445035.232	AZ C	491.28	1611.82
S011	33 43 27.03388	112 47 39.37401	302408.384	132028.545	992151.507	433163.651	AZ C	494.34	1621.85
S012	33 42 34.21969	112 47 3.40363	300773.420	132940.877	986787.462	436156.861	AZ C	479.85	1574.31
S013	33 42 33.96395	112 46 23.71569	300757.008	133962.697	986733.617	439509.282	AZ C	477.86	1567.77
S014	33 42 33.07123	112 45 18.30172	300715.677	135646.753	986598.017	445034.389	AZ C	483.14	1585.09
S015	33 41 48.72649	112 45 52.18979	299356.608	134762.982	982139.138	442134.883	AZ C	471.97	1548.45
S016	33 41 48.77068	112 46 54.72338	299371.326	133152.643	982187.425	436851.630	AZ C	469.67	1540.90
S017	33 41 2.69485	112 46 43.44787	297949.370	133431.159	977522.225	437765.394	AZ C	460.32	1510.23
S018	33 40 31.17184	112 46 54.61343	296980.599	133135.450	974343.849	436795.222	AZ C	456.34	1497.18
S019	33 40 4.31918	112 46 54.65181	296153.320	133127.535	971629.684	436769.254	AZ C	452.80	1485.54
S020	33 39 29.63242	112 46 33.43983	295080.119	133665.080	968108.690	438532.850	AZ C	446.06	1463.46
S021	33 38 55.60537	112 46 54.18663	294036.261	133121.802	964683.966	436750.445	AZ C	442.17	1450.69
S022	33 38 19.85451	112 46 54.70752	292934.950	133099.166	961070.748	436676.180	AZ C	437.55	1435.54
S023	33 38 19.74265	112 45 52.23358	292918.171	134709.033	961015.699	441957.886	AZ C	436.10	1430.76
S024	33 40 30.58508	112 48 56.59145	296989.346	129993.350	974372.546	426486.516	AZ C	468.53	1537.18
S025	33 41 22.82730	112 48 56.52856	298598.840	130008.977	979653.028	426537.785	AZ C	476.49	1563.28
S026	33 41 42.56453	112 48 32.79479	299201.616	130625.472	981630.635	428560.403	AZ C	475.84	1561.15
S027	33 42 5.08143	112 51 21.39633	299933.841	126289.880	984032.943	414336.048	AZ C	500.74	1642.85
S028	33 42 41.31373	112 51 1.54411	301045.478	126811.183	987680.039	416046.356	AZ C	505.40	1658.14
S029	33 43 16.75652	112 50 47.64499	302134.199	127178.891	991251.951	417252.745	AZ C	506.96	1663.26
S030	33 43 38.73780	112 50 20.11673	302805.058	127893.649	993452.928	419597.747	AZ C	507.28	1664.30
S031	33 43 53.95106	112 53 17.31527	303315.624	123336.456	995128.010	404646.363	AZ C	535.77	1757.78
S032	33 44 19.65255	112 52 52.20590	304101.398	123990.219	997706.003	406791.244	AZ C	533.90	1751.63

11/05/92 18:23:48.77

GPA Associates
UNO Box 1200
New Orleans, LA 70148
504) 286-1200

STAR WASH FLOOD CONTROL STUDY for WOOD/PATEL. AMC JN 92155

Object Space Reference System is Rectangular

Rotation Angles are Object-to-Photo

Complete Triangulation process is requested

Error Propagation is not requested

Image Residuals greater than 0.005 (mm) will be listed

Triangulated Object Coordinates will be saved

Adjusted Camera Station Parameters will be saved

Images are in millimeters. Object space is in feet

	TRIANGULATED IMAGE POINTS (in thousandths of millimeters)			RESIDUALS		
55102	1002	1003	1001			
	9	-4				
	-6	5				
55104	1003	1004	1002			
	0	0				
	-7	5				
55505 *3*	1002	1004	1003			
	0	0				
	6	-5				
55903 *3*	1003	1002				
	5	-5				
	0	0				
55106	1004	1005	1003			
	4	-2				
	-7	5				
55108	1004	1003	1005			
	-2	1				
	6	-7				
55109	1004	1005	1006			
	-2	4				
	7	-8				
55112	1006	1005	1007			
	-1					
	7					
55709 *3*	1006	1005	1007			
	6	-5				
	-11	8				
55113	1007	1006	1008			
	0					
	-5					
55205	2001	2003	2002			
	0					
	-6					
55516	2002	2003	3001	2001	3002	3003
	0	3				
	6	-5				
55721	2003	2002	3003	3002	2001	3001
	-3	-3	9			
	-6	7	-5			

T R I A N G U L A T E D I M A G E P O I N T S R E S I D U A L S
(in thousandths of millimeters)

55822	*0*	2002	2001				
		7					
		-2					
55204		2003	2002	2004			
		3	-1				
		6	-5				
55815	*4*	2004	2002	3002	2003	3003	3004
		2	-3	6	-5	6	
		-5	-6	6	7	-4	
55524	*3*	2004	2003	2005			
		2					
		-5					
55717		2003	3003	2004	3004		
		6	-6				
		-4	-3				
55818	*0*	2004	2005	2003	3003	3004	
		0					
		8					
55725	*0*	2004	2005				
		-5					
		0					
55304		3003	3001	3002			
		2	2				
		9	-9				
55303		3003	3002	3004			
		-8	4				
		2	-5				
55514		3003	3004	3002			
		0	0				
		5	-6				

Weighted Sum of Squares (Camera) = 0.0
Weighted Sum of Squares (Object) = 2.4
Weighted Sum of Squares (Plates) = 37.1

Weighted Sum of Squares (Total) = 39.5
Degrees of Freedom..... = 110

a posteriori Variance of Unit Weight = 0.359

T R I A N G U L A T E D O B J E C T P O I N T S

Ident		Position (feet)		
55101		X = 239475.4129	Y = 960765.1792	Z = 1423.4015
55102		X = 237007.5435	Y = 963917.0068	Z = 1439.6490
55103		X = 241913.3288	Y = 963888.9413	Z = 1445.5512
55104		X = 237027.3271	Y = 967192.5917	Z = 1455.2699
55105		X = 241829.2334	Y = 966910.7866	Z = 1454.6628
55106		X = 236927.9214	Y = 970564.2896	Z = 1477.7377
55107		X = 239277.1877	Y = 970403.4694	Z = 1470.3750
55108		X = 241999.3392	Y = 970223.4458	Z = 1476.4452
55109		X = 237149.0566	Y = 973624.1518	Z = 1491.5660
55110		X = 242103.8958	Y = 973443.6981	Z = 1496.6603
55112		X = 242251.3706	Y = 976784.1244	Z = 1513.6301
55113		X = 237306.0082	Y = 980023.3850	Z = 1525.8656
55114		X = 239741.5450	Y = 979884.7201	Z = 1524.1146
55115		X = 242242.6930	Y = 979883.0098	Z = 1534.1655
55116		X = 239888.2639	Y = 982407.5729	Z = 1538.3822
55201		X = 233397.4624	Y = 989618.4368	Z = 1599.7730
55202		X = 236359.0754	Y = 989349.7957	Z = 1593.1626
55203		X = 239358.4352	Y = 992113.6991	Z = 1608.2440
55204		X = 239611.9661	Y = 989672.3992	Z = 1589.7517
55205		X = 242861.6412	Y = 989554.0776	Z = 1591.5008
55206		X = 245680.4192	Y = 989393.3716	Z = 1593.7417
55301		X = 236034.3933	Y = 984364.8239	Z = 1556.3549
55302		X = 235950.6385	Y = 982209.7877	Z = 1540.5954
55303		X = 239293.9013	Y = 982142.3936	Z = 1540.4198
55304		X = 242586.7554	Y = 984293.8991	Z = 1554.1292
55305		X = 245488.8466	Y = 984062.0605	Z = 1557.8017
55503		X = 240421.8877	Y = 963929.8208	Z = 1440.3636
55505	*3*	X = 239657.4511	Y = 966966.8611	Z = 1453.4672
55508	*3*	X = 239375.8667	Y = 973127.4491	Z = 1486.0222
55510	*3*	X = 239839.7461	Y = 979338.2628	Z = 1521.7695
55514		X = 239601.8432	Y = 983691.4451	Z = 1547.5442
55516		X = 242360.7831	Y = 986656.4664	Z = 1572.4675
55520	*3*	X = 234056.8385	Y = 987013.6517	Z = 1578.4417
55523	*3*	X = 242440.0788	Y = 992026.1575	Z = 1606.5067
55524	*3*	X = 236531.3602	Y = 992077.7094	Z = 1609.6717
55701	*0*	X = 236894.0281	Y = 961025.6239	Z = 1433.3453
55702	*0*	X = 242175.7553	Y = 960970.4753	Z = 1428.6399
55704	*3*	X = 236936.7786	Y = 966304.4568	Z = 1453.9423
55706	*0*	X = 236987.1195	Y = 971584.2007	Z = 1483.9383
55707	*3*	X = 242263.5556	Y = 971531.7579	Z = 1484.3062
55709	*3*	X = 237027.4286	Y = 976860.8282	Z = 1507.9949
55711	*0*	X = 237069.6998	Y = 982141.5823	Z = 1539.8122
55712	*0*	X = 242352.7103	Y = 982093.2034	Z = 1547.0121
55713	*3*	X = 244995.1496	Y = 982073.9042	Z = 1550.5761
55717		X = 237110.4624	Y = 987422.2985	Z = 1576.2691
55721		X = 242395.3699	Y = 987373.7228	Z = 1579.2861
55725	*0*	X = 233381.8932	Y = 992105.4789	Z = 1621.9218
55815	*4*	X = 239727.0999	Y = 986687.8227	Z = 1568.0591
55818	*0*	X = 236374.9051	Y = 986741.5695	Z = 1574.4996
55819	*0*	X = 245252.1298	Y = 986552.0143	Z = 1584.8570
55822	*0*	X = 245252.8812	Y = 992003.2444	Z = 1611.9227
55900		X = 236842.3308	Y = 962300.1630	Z = 1439.5634

T R I A N G U L A T E D O B J E C T P O I N T S

Ident		Position (feet)		
55901	*0*	X = 236869.3008	Y = 961024.2797	Z = 1433.8808
55902		X = 239577.5863	Y = 966278.5331	Z = 1449.0981
55903	*3*	X = 240837.1831	Y = 965601.3211	Z = 1451.4255
55904	*3*	X = 239668.1349	Y = 976836.2761	Z = 1508.3488
55905		X = 240945.4583	Y = 976805.5822	Z = 1508.4684
55906		X = 235819.5091	Y = 987606.3760	Z = 1580.7587
55972		X = 236982.6647	Y = 971584.6747	Z = 1484.1752
55973	*3*	X = 233381.6748	Y = 992121.5837	Z = 1622.2154
55974		X = 243950.0098	Y = 992029.2581	Z = 1608.9171

CORRECTIONS APPLIED TO OBJECT CONTROL

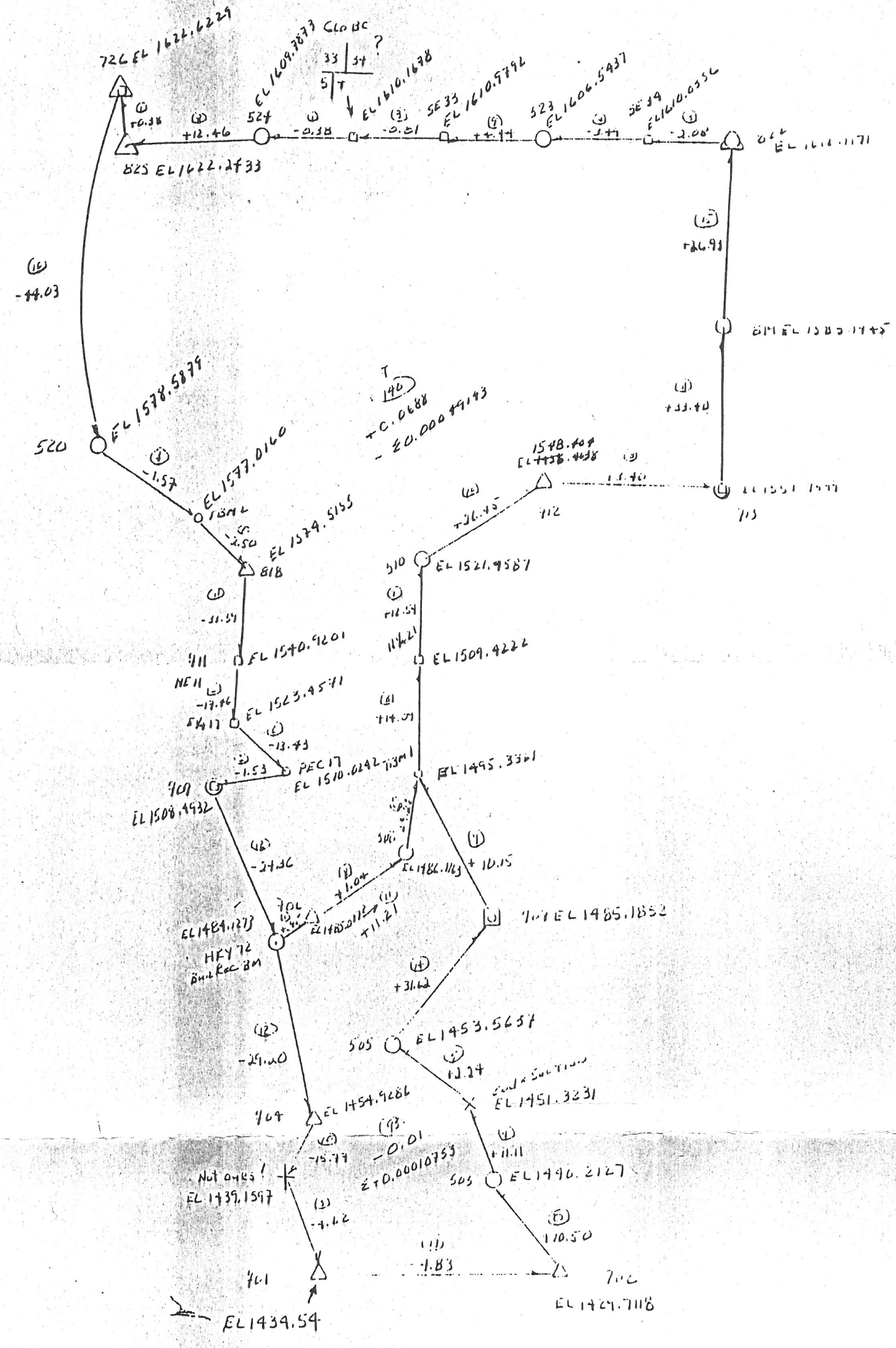
	X =(	0.0067 ft)		X =(	0.0251 ft)
55510	Y =(	-0.0530 ft)	55520	Y =(	0.1366 ft)
	Z =	-0.0795 ft		Z =	-0.0563 ft
	X =	-0.1029 ft		X =	0.1078 ft
55701	Y =	0.0429 ft	55901	Y =	0.0137 ft
	Z =	0.0053 ft		Z =	-0.0892 ft
	X =	0.0868 ft		X =	0.0713 ft
55711	Y =	-0.0587 ft	55702	Y =	-0.0477 ft
	Z =	-0.0088 ft		Z =	0.0079 ft
	X =	-0.0037 ft		X =	-0.1138 ft
55712	Y =	-0.1406 ft	55822	Y =	0.0844 ft
	Z =	-0.0919 ft		Z =	-0.0843 ft
	X =(	0.0999 ft)		X =(	0.1148 ft)
55903	Y =(	-0.0044 ft)	55713	Y =(	0.0601 ft)
	Z =	0.1025 ft		Z =	0.0061 ft
	X =(	0.0235 ft)		X =(	0.0040 ft)
55523	Y =(	0.0877 ft)	55973	Y =(	-0.0080 ft)
	Z =	0.1327 ft		Z =	-0.0076 ft
	X =(	0.0465 ft)		X =(	0.0172 ft)
55704	Y =(	-0.0145 ft)	55904	Y =(	0.0289 ft)
	Z =	-0.0367 ft		Z =	0.0868 ft
	X =(	0.0068 ft)		X =(	-0.0360 ft)
55524	Y =(	0.0249 ft)	55505	Y =(	-0.0112 ft)
	Z =	0.0147 ft		Z =	-0.0068 ft
	X =	-0.0981 ft		X =	0.1322 ft
55815	Y =	0.1277 ft	55725	Y =	0.0349 ft
	Z =(	-0.0561 ft)		Z =	-0.0812 ft
	X =	-0.1015 ft		X =(	-0.0094 ft)
55706	Y =	-0.0073 ft	55707	Y =(	-0.0238 ft)
	Z =	0.0713 ft		Z =	-0.0088 ft
	X =(	0.0246 ft)		X =	0.0331 ft
55508	Y =(	0.0160 ft)	55818	Y =	0.0215 ft
	Z =	-0.0938 ft		Z =	0.1336 ft
	X =(	-0.0458 ft)		X =	-0.0112 ft
55709	Y =(	0.0199 ft)	55819	Y =	-0.0707 ft
	Z =	0.1019 ft		Z =	-0.0180 ft

X .... Number of Components =	11	RMS =	0.0886 feet
Y .... Number of Components =	11	RMS =	0.0724 feet
Z .... Number of Components =	23	RMS =	0.0721 feet

SECTION 3

Level Loop Diagram
Field Book #1 Field Notes
Vertical Survey

STAR WASH LEVEL LOOP.



Book 1

STARWASH Flood Study
Wood + Patel
Job # 92155
CREW Barbeie
Butheibaugh
Dusan

PAGE Index

1 Thru 22 Level Notes

23 - 28 Pt descriptions

GLO B.C. #701 (Rec 1434.54)

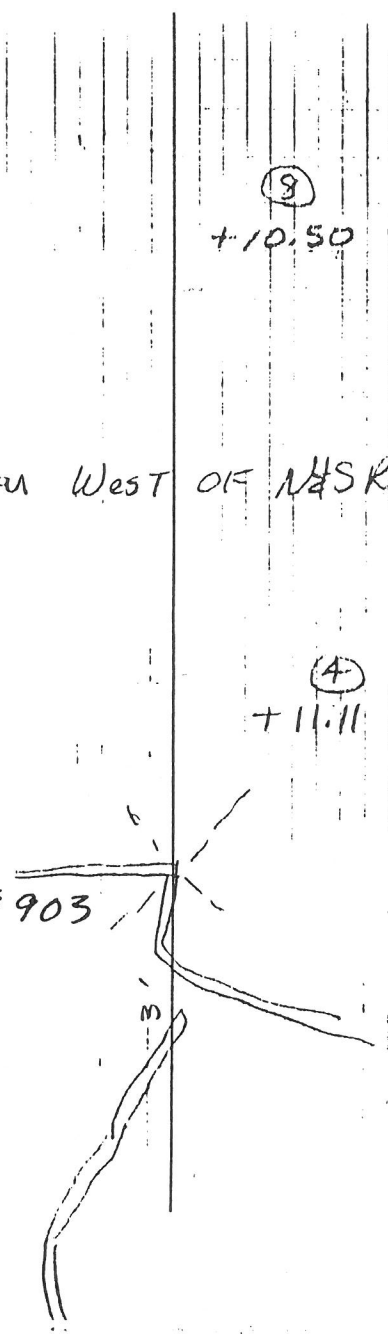
PANEL West 25'± RB?

Bm (70)	2.77			
SEC COR ME 5			1434	540
PMK		3.97		
S.S		3.34		
T.P.		10.61		
	2.76			
		9.66		
	5.18			
		1.47		
	4.27			
		7.01		
	5.48			
		5.08		
	5.01			
		6.31		
	8.28			
		6.22		
	8.45			
		3.84		
	5.19			
		5.57		
	7.59			
		4.49		

	5.22							
		4.97						
	6.43							
		3.57						
	4.25							
		8.29						
	4.96							
		2.10						
	4.20							
		5.51						
	6.62							
		6.28						
	4.08							
		5.67						
PMK 702 NE4		4.59	1429.712	GLO BC	702	NE	4	143
	5.67							
		4.68						
	4.05							
		4.39						
	7.69							
		6.72						
	6.17							
		5.47						

(17)
-4.83

	5.91					
		3.87				
	5.97					
		3.86				
	5.75					
		3.56				
	5.60					
PMK		3.82				
503		3.76	1440	213	1/2" Rebar West of N&S Road	144+10
	5.51					
		3.39				
	6.39					
		3.26				
	8.88					
		3.70				
	5.14					
PMK E. End's X Sec. 903		4.46	1451.	323	R/R Spike #903	145+32
	2.17					
		6.90				
	4.30					
		5.53				



	7.58				
		5.87			
	6.39				
		2.96			
	7.12				
		4.15			
PMK 505		4.06	1453.564	½" RB under Steel Tank Line	1453.56
	4.96				
		2.52			
	5.88				
		4.49			
	5.02				
		3.68			
	9.07				
		1.59			
	4.22				
		3.35			
	7.12				
		3.56			
	6.61				
		4.24			
	5.63				
		4.25			

5

+2.24

	6.09		3.84				
	6.63		3.78				
	6.31		3.89				
	5.73		6.57				
	6.08		1.66				
	6.55		7.73				
PMK NE(OR 28 (707)	8.88		6.86	1485.185	GLO BC	707	1485.18
	5.89		8.50				
	5.51		2.91				
	6.74		6.38				
	2.91		5.73				
			5.63				

(14)
+ 31.62

	6.66			
			4.36	
	5.64			
			2.92	
	3.27			
			2.06	
	8.60			
TBM1			5.46	1495.336
		CH		
HYR#72	4.60			1484.127
BR BC PMK			4.75	
PMK			4.86	
706 NE Corner Sec 29			3.65	1485.077
	2.86			
			4.51	
	6.11			
			5.61	
	4.77			
			6.51	

(9) +10.15

1495.33
By Buffalo Cactus White Rock (Temp)

CH
BC. Bar Rec. HYR 72 (Rec 1483.96) (89.12 US)

(1) +0.95

GLO BC #706 NE 29

	5.81							
			4.60					
	4.83							
			4.58					
	9.03							
			6.83					
	5.81							
			3.16					
	4.78							
PMK			7.16					
508			7.16	1486.116		1½" RB		1496.11
	6.02							
			1.01					
	8.49							
TBM 1			4.28	1495.336		White Rock		
		(H)					(H)	
TBM 1	6.20			1495.336				
			3.73					
	6.25							
			3.03					
	5.10							
			3.95					
	4.99							
			4.05					

(8) +1.04

(2) + 9.22 ✓

	x5.68					
			2.75			
	5.58					
			6.05			
	5.66					(8)
			3.87			+14.09
	5.31					
PMK			4.41			
N¼ COR			3.25	1509.422	GLO BC on ¾ IP,	N¼ 21
21	3.17				"Glo" "904"	
			3.58			
	5.71					
			4.93			
	7.27					
			4.44			
	5.68					
			4.11			
	6.25					(7)
			3.66			+12.54
	5.82					
			3.71			
	5.98					
PMK			3.02			
5 10			2.91	1521.959	½"RB	Mark Center 16

	5.76	2.98		
	4.92	3.48		
	6.49	3.20		
	5.66	4.14		
	6.01	3.80		
	5.76	4.12		
	9.56	4.29		
	8.28	3.05		
	5.53	2.49		
	6.49	7.76		
PMK 712	8.13	6.46	1548.404	NECOR16 GLO BC.
		3.09		

(16)

(9)

(10)
+26.45

	4.81				
		5.33			
	7.47				
		4.46			
	4.31				
		9.37			
	1.68				
		6.55			
	3.96				
		4.86			
	5.35				
		3.60			
	7.95				
PMK		4.23			
713		3.00	1551.800	N 1/4 Sec 15 GLO BC	
	5.62				
		4.35			
	6.07				
		8.98			
	5.32				
		4.39			
	5.88				
		2.89			

(8)
+3.40

	8.30				
		0.46			
	8.71				
		2.41			
	5.76				
		3.23			
	6.62				
		3.55			
	8.14				
		3.83			
	3.76				
		3.95			
	9.88				
		2.94			
PMK 819		2.62	1585.195		½", RB, WEST OF JEEP TRAIL NEAR N¼ SEC 10
	4.74				
		2.77			
	7.48				
		3.70			
	5.52				
		3.35			
	5.07				
		6.93			

+33.40

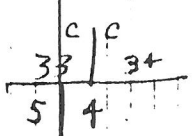
	3.60				
		1.10			
	5.19				
		9.75			
	3.14				
		2.49			
	7.45				
		4.26			
	5.04				
		3.95			(15) +26.93
	7.26				
		3.86			
	6.81				
		2.06			
	5.08				
		3.06			
	6.64				
		4.42			
	7.11				
		3.46			
	5.78				
PMK 822		3.93			
		3.82	1612.117		1/2" RB By Chain Link Fence NE|| N1/4 3

	4.78				
		7.28			
	4.95				③
		4.81			-2.08
	3.43				
B.C SE 34		3.15	1610.036	GLO BC SE 34 5N 5W	
	4.98				
		6.65			
	4.96				
		5.14			
	4.15				④
		5.42			+3.49
	5.24				
		5.78			
PMK 5 23		5.61	1606.544	Nub 1½ x 2 x 1"	
	5.45				
		4.41			
	3.28				
		5.90			
	6.71				
		4.38			
	3.40				
		4.51			

	5.77			
		5.95		
	5.55			
		3.09		
	4.60			
		4.71		
	5.42			
		2.96		
	2.26			
PMK		Below		
B.C		2.09	1610.979	GLO BC SE 33
	4.73			
PMK		5.90		at SE 33 (PMK missed Coming in)
TP		5.83		
	5.30			
		5.41		
	4.60			
NES				
3C.		4.20	1610.168	GLO BC
	4.00			
PMK		4.51		
524		4.38	1609.787	½" RB By Fence
	7.04			
		2.75		

(9)
+4.49

(3)
+0.81



(1)
-0.38

	4.64		4.04			(8) +12.46
	4.94		6.87			
	5.18		4.82			
	5.97		3.42			
	6.17		2.87			
	5.52		3.70			
	5.52		4.29			
PMK 8.25			4.05	1622.243	South Panel ½" RB	(1) +0.38'
	4.50		4.52			
PMK BC. 726	2.82		4.12	1622.623	GLO BC SE 32 726	16.22' Nathof 8.25
			7.04			
	2.70					
SS TP			2.40 8.45	1618.703	Top CK Dam	South SE 32 1/4 mi

	2.81	7.12			
	2.97	7.58			
	3.07	6.98			
	2.64	7.23			
	2.98	7.18			
	3.14	6.82			
	2.75	7.01			
	3.52	8.11			
PMK 520		8.02	1578.588	1/2' RB	
	5.19	5.42			
	4.56	5.98			
	5.87	6.73			

-44.03

(10)

	5.66					(4) -1.57
TBM 2			4.72	1577.016	1X2 X12" Hub East side dirt Rt NB	
	4.25					(1) -2.50
PMK 818			6.90			
			6.75	1574.516	1/2" KP	(PEC 12)
	2.44					
			5.89			
	3.91					
			7.87			
	2.53					
			6.17			
	2.43					
			7.36			
	3.62					
			6.12			
	2.96					
			5.98			
	3.47					
			6.84			
	3.13					
			6.02			
	2.74					
			5.58			

	2.55				
		5.35			
	4.68				
PMK		5.97			
711		4.87	1540.920	GLO BC NE/17	
	3.10				
		6.85			
	3.90				
		6.86			
	4.02				
		4.76			
	3.89				
		6.03			
	3.55				
		6.78			
	3.97				
PMK		926			
1/4 Cor		861	1523.457	3/4" IP & GLO B.C E1/4 17	
	6.44				
		5.25			
	3.33				
		6.03			
	4.12				
		8.13			

(11)
-33.59

8	9
17	16

(SEC 16)

(4)
-17.46

	3.86				
		6.00			
	4.67				
		7.19			
	6.29				
PEC 17		9.54	1510.024	PEC #17 ½" Rebar, South Hidden Tank	
	6.60				
		5.21			
	3.22				
		6.74			
PMK 709		6.14	1508.493	GLO BC NE 20	
	4.29				
		7.61			
	5.79				
		4.24			
	5.27				
		5.37			
	3.82				
		6.77			
	3.28				
		6.35			
	4.54				
		4.94			

④ -13.43

② -1.53

	2.84	7.24					
	4.12	5.47					
	3.30	5.77				(12) -24.36	
	5.25	6.00					
	4.32	6.74					
	3.46	6.11					
HYR72	3.71	5.45	1484,127		Bur Rec BC.	4.5 west of NE29	
	3.13	6.51					
	2.91	6.85					
	2.71	6.87					
	3.05	6.64					
	5.28	6.93					

	4.61				
		9.41			
	3.76				
		6.17			
	4.24				(12)
		4.02			-29.20
	4.99				
		4.37			
	3.78				
		7.08			
	4.83				
PMK		6.85			
704		5.90	1454.929		NE 32 GLO BC
	2.88				
		6.09			
	3.61				
		6.87			
	4.26				
		6.00			
	4.73				
		7.44			
	8.80				
		8.16			

	5.66				
		10.13			
	1.55				
		6.93			
	6.48				
		4.71			
	6.02				
		4.68			
	6.30				
NAIL?		5.05			
	3.08				
		9.19			
	2.13				
		3,82			
	8.81				
BC (701)		5.63	1434.540		
TBM2	6.31		1577 ave		
		2.91	1580 416		

(10)
-15.77

Aprox 1000' N of Sec Cor

(3)
-4.62

BM NE 5 (701)

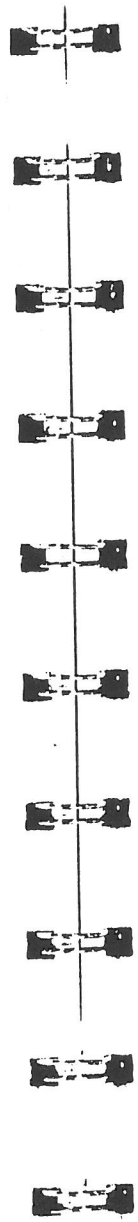
	Description
701	GLO B.C SW COR SEC 33 T4N R5W
702	GLO BC NE 4 T3N R5W
503	SET ½" RB 200' West OF Road Thru Sec 33 T4N R5W Aprox 2000' South of duck TANK
704	GLO BC NE 32 T4N R5W
505	Set ½" RB Aprox 700' NORTH ON N¼ Sec 33 T4N R5W
706	GLO BC NE Sec 29 T4N R5W
HRY72	Bur of Rec BC 4.5' West OF NE Sec 32 T4N R5W

Hidden Tank

STA				
BM1	4.92		1509	42
22+29		5.70	1508	6
23+56		5.6	1508	7
24+00		5.1	1509	2
+50		4.6	1509	7
+83		5.0	1509	3
25+00		5.0	1509	3
26+00		5.7	1508	6
BM1		4.92	1509	42

Hidden Tank

0+00	5.01		1508	49
0+00		5.61	1507	89
0+55		6.46	1507	04
+75		7.00	1506	50
+97		6.95	1506	55
1+02		7.75	1505	75
+04		7.95	1505	55
+08		7.4	1506	10
+11		6.6	1506	90
+22		6.4	1507	10
+27		7.3	1506	20
+32		7.3	1506	20
+39		7.1	1506	40
+42		7.6	1505	90



904 1/4 Coil STA 24+41.06

904 1/4 Coil STA 41.56

BC Sec Coil 709

Pages 37 & 38 CK of X-Section Various Places

+50		6.8	1506	70	
+58		7.1	1506	40	
+67		6.7	1506	80	
+73		6.9	1506	60	
+99		6.95	1508	55	
2+00		4.4	1509	10	
+20		4.8	1508	70	
+52		5.9	1507	60	
+73		6.0	1507	50	
+88		5.3	1508	20	
3+00		5.3	1508	20	
BM1		5.01	1508	45	709
	CH7				

RERUN X SEC FROM STA 32+50.28 TO 39+48

	Diff From HI - Total STA				
32+50.28		1509	83	PT "A"	HIDDEN TANK
+62	-1.63	1508	82		
+67	-4.57	1505	88		
33+01	-3.82	1506	63		
+06	-2.79	1507	66		
+31	-1.82	1508	63		
+61	-2.55	1507	90		
+93	-1.62	1508	83		
34+09	-1.71	1508	79		
+30	-1.89	1508	56		
+34	-2.85	1507	60		
+41	-1.38	1509	07		
+83	-0.90	1509	55		
35+22	+1.66	1512	11		
+52	+2.50	1512	95		
35+91.4	-5.0	1513	45	LAST STA TOTAL STA.	
36+47	+1.91	1512	36	HI 5.41	
37+19	+0.21	1510	66		
+29	-0.59	1509	86		
+57	-0.65	1509	80		
+91	-0.51	1509	94		
38+43	+0.35	1510	80		
+96	-0.54	1509	91		
39+48	-1.55	1508	86	END OF SEC	

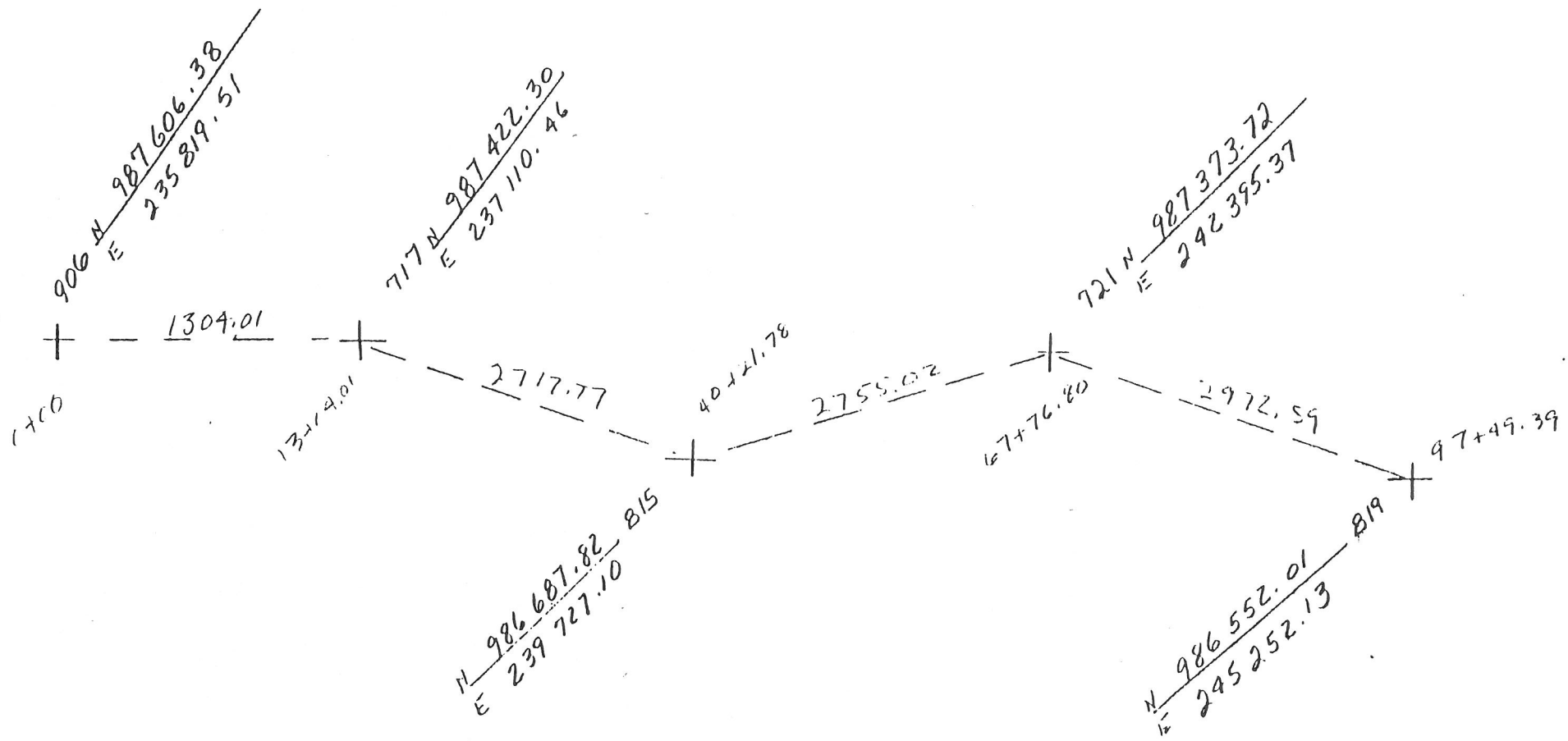
SECTION 5

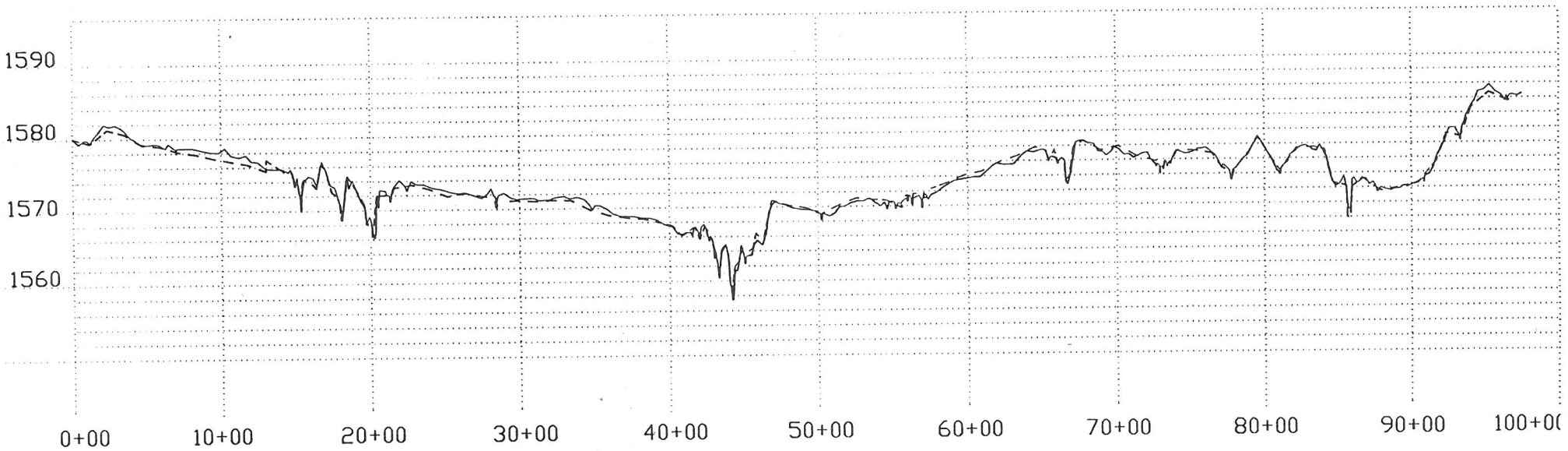
Field Cross Section Diagrams
Cross Section Comparison Plots
Field vs. Photogrammetric

NORTH X SECTION

STAR WASH Job# 92155.

STAR WASH STATION 7.5±





NORTH SECTION

LEGEND

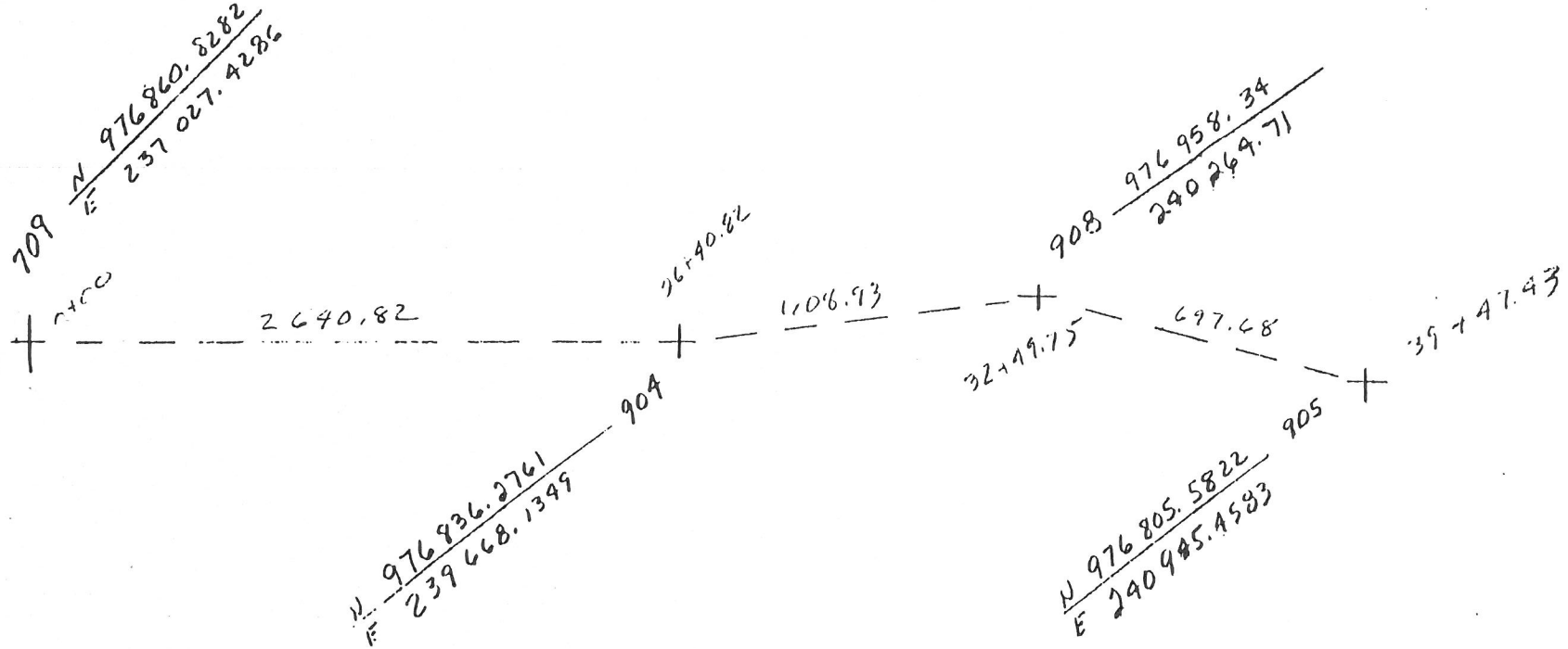
FIELD ------

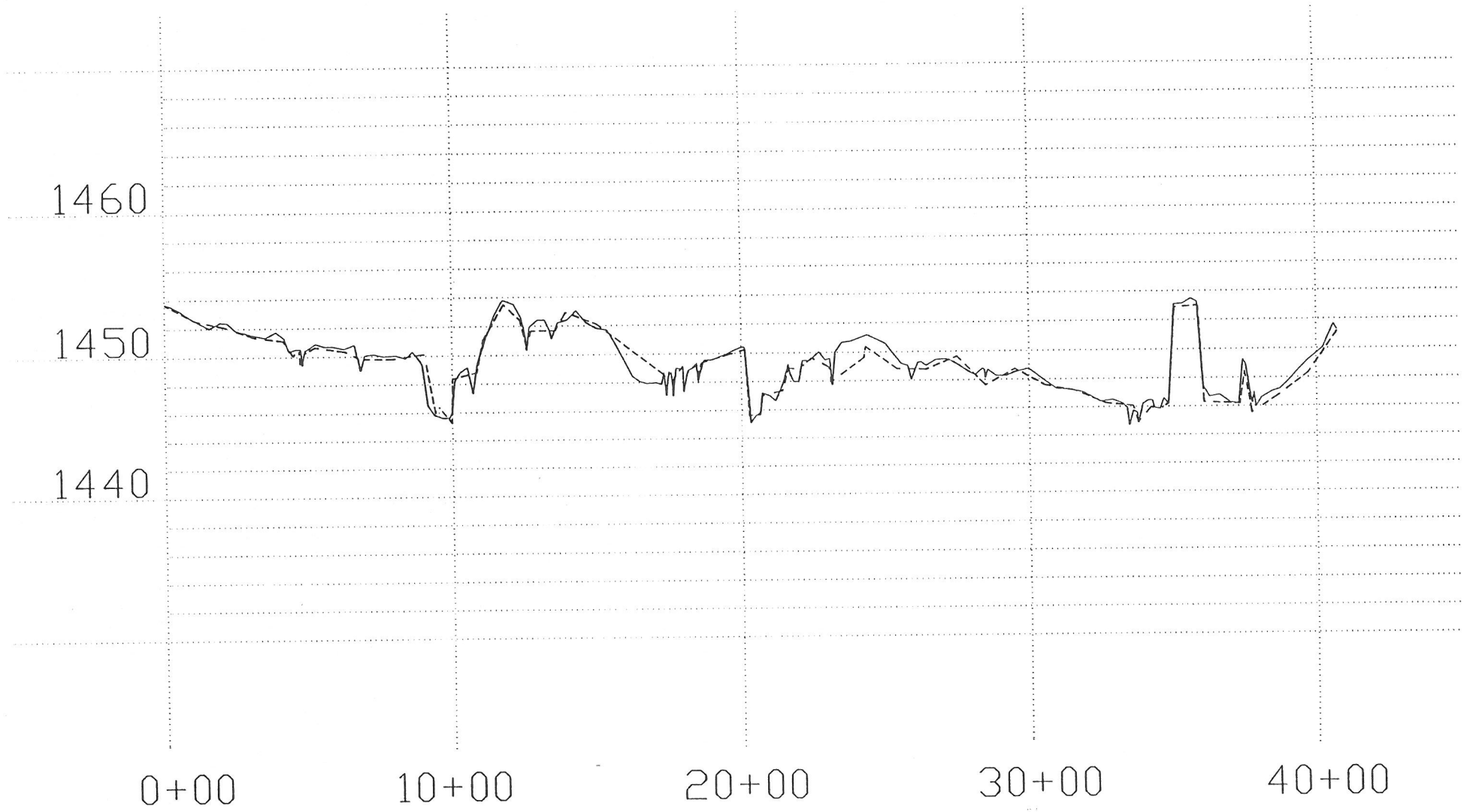
PHOTOGRAMMETRIC CHECK ———

MID X SECTION

STAR WASH Job # 92155

HIDDEN TANK
STAR WASH STATION 5.3±

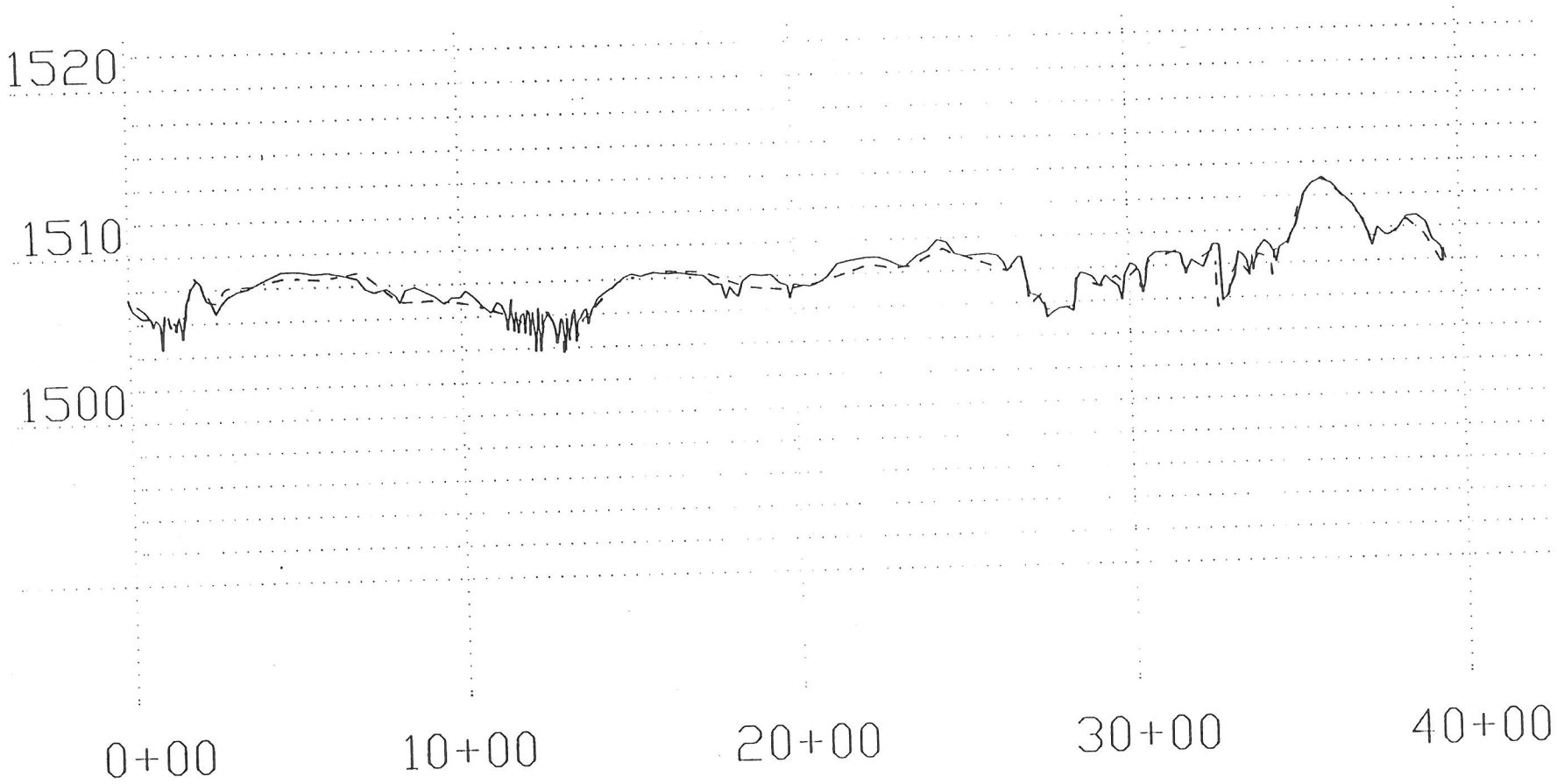




DUCK TANK

LEGEND

FIELD ----------



HIDDEN TANK

LEGEND

FIELD ------

PHOTOGRAMMETRIC CHECK ——————

713 GLO BC
N 1/4 Sec 15 T4N R5W

CH

714 NO WIE

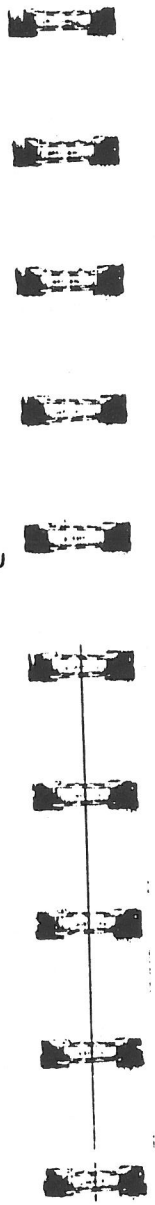
CH

815 Set 1/2" RB
Approx 800 South west of N 1/4 Sec 9 T4N R5W

CH

516 Set 1/2" RB
Approx 800' South of NE Sec 9
T4N R5W

CH



717 GLO BC.
NE Cor of Sec 8 T4N R5W

CH

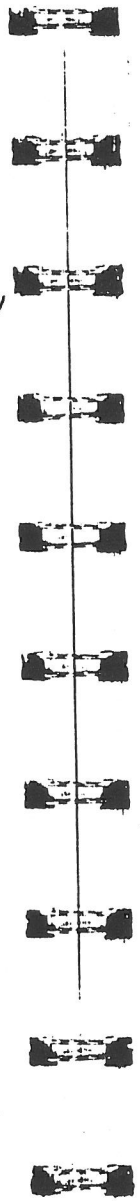
818 Set 1/2" RB
Approx 1000' SW of NE Sec 8 T4N R5W

CH

819 Set 1/2" RB
Arox 800 South of
N 1/4 Cor Sec 10 T4N R5W

CH

520 Set 1/2" RB
Arox 1000' WSW of
N 1/4 Cor of Sec 8 T4N R5W



721 GLO Brass Cap
NE Cor of Sec 9 T4N R5W

CH

822 Set 1/2" RB.
Near Aprox W1/4 Sec 3 T4N R5W

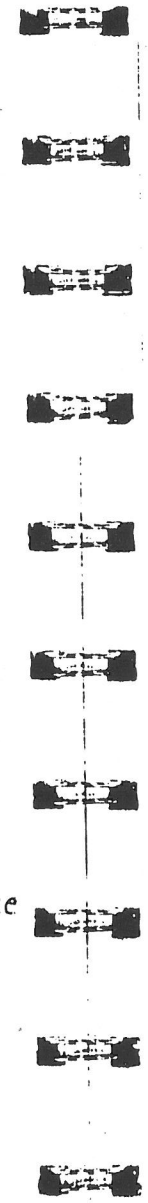
CH

523 Set 1x2x12" Nub
Aprox 300' East of
NE Cor Sec 4 T4N R5W
30' South of Toyota Fence

CH

524 Set 1/2" RB
Aprox 1000' West of
NE Sec 5 30' South Toyota Fence
T4N R5W

CH



825	Set 1/2" RB 30' South Toyota Fence & SE Cor Sec 32 T5N R5W	
	"	
726	GLO BC SE Cor Sec 32 T5N R5W	
	"	
902	GLO BC N1/4 Cor Sec 33 T4N R5W	
	"	
903	Set R/R Spike N Powerline approx 700 East of Duck Tank.	

904	GLO BC	
	S 1/4 of Sec 16	T4N R5W
	N 1/4 of Sec 21	T4N R5W
	CH	
905	Set 1/2" RB	
	Approx 1/4 MI West of	
	NE 21 T4N R5W	
	CH	
906	Set 1x2x12" Hub	
	Near E & W Sec line of SEC 8	
	Approx 1320± West of	
	NE Sec 8 T4N R5W	
	CH	
SE34	GLO BC	
	SE Cor Sec 34	T5N R5W

SE 33

GLO BC
SE COR 33 T5N R5W
ELEV only

CH7

		π ℄ Road		8/10,12	905 #712
BS	Vert & Road	H 15.42	Slope		Tg
712	89-38-07		4447.20		8.29
BS	FS		F		Tg
R05	Road	5.42	Slop		9.18
	Vert		1069.20		
	90 33	25	+1		

28.34
28.31 Vert & ETC

-10.34 Vert & ETC
-10.33 MACHine
38.77

509 EL 1507.60
38.77
1546.37
712 1543.90 —

1507.60
+9.18
1516.78
+10.33
1527.11
+18.44
1555.55
8.29
1546.26

45.41
46.30
2.10

	Hi	Ken	
T	9.65		Slope
Sec		89	2972.93
Vert	89-49-11	= +9.35	✓
Vert diff	+9.41	✓	

TG
8.90

Machine +9.41
Vert & diff +9.35

8.90 465
465 941
14.06
8.90
5.16

STA	HI	Tgt at	(815)
721	4.42	4.63	
D	90	34	25
R	269	25	16
R	00	34	44

(-6.92)

721	4.42	6.00	(819)
D	89	52	06
	00	07	54
R	270	07	35
	+ 00	07'	44.5"

Dist 2772

+(6.69) 1579.879 + 4.92 + 6.69 - 6.00 = 1585.171

815	5.00	7.03	(721)
	89	59	60
	89	42	40
	0	17	20
	270	17	03
	+ 00	17'	11.5

Dist 2755

+ (13.88) 1567.873 + 5.00 + 13.88 - 7.03 = 1579.879

STA	N1	Tgt L	
717	4.17	11.19	@815
	90	03	06
	269	56	33
	00	03	27
	00	3'	16.5
818	5.05	4.68	(717)
	89	51	35
	00	08	25
	270	08	07
N1	+00	08'	16
0+00	5.01	4.68	(717)
	90	08	58
	269	50	45
	00	09	15
N1	00	09	06.5

Dist 2718

Dist 1042.11

Dist 1394.0

(+2.59) 1577.331 + 4.17 - 2.59 - 11.19 = 1567.873

(717)

(+2.41) 1574.52 + 5.05 + 2.41 - 4.68 = 1577.327

1577.331

(717)

(-3.45) 1580.42 + 5.01 - 3.45 - 4.68 = 1577.335

(1574.52

44+18	1558	99
44+37	1562	29
44+65	1562	99
44L78	1565	09
45+06	1563	89
45+57	1564	69
45+80	1566	79
46+23	1565	69
46+37	1566	59
46+88	1571	23
48+08	1570	51
49+26	1570	15
50+20	1569	30

51+36			1570	48	
52+57			1571	40	
53+73			1571	24	
54+58			1571	12	
55+52			1570	12	
55+62			1570	12	
55+49			1570	94	
55+93			1571	87	
55+98			1571	37	
56+08			1571	87	
56+21			1571	91	
56+31			1570	97	
56+36			1571	97	

56+88			1572	06	
56+96			1570	06	
57+08			1572	06	
57+33			1571	58	
57+43			1572	58	
58+57			1573	39	
59+77			1574	46	
60+97			1574	94	
62+17			1576	21	
63+39			1577	03	
64+54			1578	14	
65+23			1578	08	
65+47			1576	31	

65+85				1577	81
66+08				1576	16
66+49				1576	87
66+61				1573	73
66+79				1574	02
66+95				1575	50
67+13				1578	13
				~~1578~~ 79	~~20~~ .029
67+77.78	PMK			~~1579~~ 78	~~05~~ 879
67+77.78	BC				
68+98				1577	68
70+13				1578	23
71+34				1576	89
72+67				1576	11

(721) G10 BC
NE COR 9

PN 15 R.14
1580.06

72+91			1576	47	
72+95			1574	43	
72+99			1575	91	
73+19			1575	24	
73+30			1576	20	
73+48			1575	19	
74+07			1577	52	
75+27			1577	51	
76+76			1577	07	
77+12			1575	14	
77+73			1574	53	
77+76			1573	68	
77+94			1579	80	

79+03				1577	53
79+52				1579	38
80+53				1576	22
81+04				1574	73
82+18				1577	74
83+34				1577	85
84+09				1577	53
84+64				1573	05
85+59				1572	55
85+64				1568	55
85+84				1567	55
85+96				1572	45
86+74				1573	52

87+76				1571	85
90+44				1572	86
91+68				1575	79
92+36				1579	56
93+35				1579	10
94+06				1583	06
95+28				1585	06
96+57				1583	88
97+50 SB Pmt				1584	87
97+50 SB (819)				1585	19

STA				EL 50.03 '0"
721	4.70			1579.24
				73.42
PMK			11.31	1572.63 .44
516			11.31	1572.63
	11.80			
721			5.19	1579.24

701 GLO BC
NE COR of Sec 5 T3N R5W
SW " " " 33 T4N 5W

702 GLO BC
NE COR OF SEC 4
T3N R5W

503 Set 1/2" RB 200 West of
dirt Road Aprox 800 E
of Center of Sec 33 T4N R5W

704 GLO BC
NE COR OF SEC 32
T4N R5W

505 Set ½" RB NORTH OF
Power Line APROX 700'
NORTH OF N¼ Sec 33 T4N R5W

706 GLO BC
NE COR OF Sec 29 T4N R5W

707 GLO BC
NE COR OF Sec 28 T4N R5W

508 Set ½" RB. APROX 1000'
South of Center of Sec 21

709 GLO BC
NE Cor of Sec 20 T4N R5W

CH

510 Set 1/2" RB
Aprox 300' South of
Center of Sec 16 T4N R5W

CH

711 GLO BC
NE Cor of Sec 17 T4N R5W

CH

712 GLO BC
NE Cor of Sec 16 T4N R5W

CH

STA		EL
21+42		1447 65
21+64		1449 20
22+01		1449 14
22+45		1449 91
23+06		1449 25
23+11		1448 23
23+17		1448 30
24+27		1449 92
24+32		1450 69
25+42		1449 11
26+42	(Pmk)	1449 05
26+42	BC (902)	1449 72
26+42	INST. Set at N¼ Sec 33	
27+49		1449 94
28+47		1447 91
29+50		1449 04
30+54		1447 87
31+59		1447 48
32+65		1446 57
33+61		1446 37
33+78		1445 25
34+21		1446 27
34+51		1446 05
34+82		1446 54

GIZ at ¼ Coiz N¼ 33 (Pmk)
Top BC (902) " "

M 963
M 985
M 1022
M 1066
M 1127
M 1137
M 1138
M 1248
M 1253
M 1365
M 1463

M 105
M 203
M 306
M 410
M 515
M 621
M 717
M 734
M 777
M 807
M 839

STA	EL
35+05	1453 16
35+88	1453 29
36+07	1446 60
37+32	1446 48
37+49	1448 76
37+74	1445 89
38+67	1447 07
39+70	1448 61
40+72	1451 42

(903) End X Section (903) FIST OF DUCK TANK

M	861
M	944
M	963
M	1088
M	1105
M	1130
M	1223
M	1324
M	1428

X Section from NE Sec 20 below Hidden Tank East of Stateline

6

STA	EL			dist
709 = 0+00 E	1508 49			
	1507 89		GR AT 709 = 0+00 E	
+55	1506 99			55
+75	1506 24			75
+97	1506 47			97
1+02	1505 50			102
+04	1505 50			104
+11	1506 71			111
+22	1506 83			122
+50	1505 83			150
+68	1505 86			168
+87	1507 36			187
2+73	1507 30			273
3+73	1508 96			373
4+80	1508 90			480
5+89	1508 75			589
7+07	1509 18			707
8+20	1507 30			820
9+25	1507 37			925
10+35	1507 09			1035
11+32	1506 45			1132
11+42	1505 68			1142
11+55	1507 33			1155
11+61	1505 58			1161

Sta	EL		Dist
11+66	1506 25		1166
11+96	1505 74		1196
12+20	1506 23		1220
12+27	1504 03		1227
12+35	1506 34		1235
12+41	1504 16		1241
12+48	1506 83		1248
12+84	1505 80		1284
12+90	1504 57		1290
13+00	1506 10		1300
13+10	1503 98		1310
13+20	1506,35		1320
13+28	1504 80		1328
13+36	1506 23		1336
13+52	1504 98		1352
13+68	1506 00		1368
14+75	1508 18		1475
16+00	1508 81		1600
17+30	1508 68		1730
18+57	1507 72		1857
19+80	1507 49		1980
21+05	1508 03		2105
22+29	1508 86		2229
23+56	1507 38		2356
24+83	1508 98		2483

STA		EL		M. DIST
2641.06	(PMK)	1507.26 / 1507.88	1/4 COR / N 1/4 21	M 2641.06
26+41.06	BC ((90°))	1508.98	" / "	TP's CAP.
		ADD 1509.42		609.22
26+85		1508.03		565
27+08		1505.22		542
27+46		1505.54		504
27+55		1507.50		495
28+36		1505.08		414
28+45		1506.78		405
29+19		1506.20		371
29+65		1506.83		285
29+87		1506.42		263
30+28		1507.20		222
30+37		1506.07		213
30+43		1506.07		207
30+60		1507.59		190
31+44		1508.22		106
31+74		1507.13		76
32+50.28		1508.57	Δ = 155°47'21"	0
STA "A"		ADJ. 1508.83		
32+59		1508.57		9
32+67		1507.84		17
33+01		1505.55		51
33+07		1506.78		57
33+60		1506.69		110

STA				EL		M Dist
34+01				1508	30	151
34+41				1507	77	191
34+92				1508	78	242
35+31				1511	23	281
36+21				1511	68	371
37+38				1508	85	488
38+52				1509	56	602
~~39+48.28~~	PNK	—		~~1507~~	~~60~~	698
39+48.28				1508.86		
				ADJ 1508	44	

PANEL END (905)

End Section

Tie Road	HI	R@	Tgt HT	Slope Dist	
Road	5.42	712	8.29		
Vert ∠	89°38'07"			4997.2	
	Diff EL From HI		To 712	+28.31	Vert ∠
	"	"	"	+28.34	CDM
Road	5.42	905	9.18		
Vie ∠	90-33-25			1064.20	
	Diff EL HI		To 905	-10.34	Vert ∠
				-10.33	CDM

NORTH MOST SECTION

10

STA	EL		Mi Dist
0+00	1580.42	PANEL EAST Rd NEAR NORTH LINE Sec 8	
1+18	1579.68		118
2+37	1581.58		237
3+58	1580.92		358
4+75	1579.44		475
5+91	1579.26		591
7+10	1578.48		710
8+26	1578.13		826
9+45	1577.57		945
10+63	1577.62		1063
11+84	1576.67		1184
13+03.85 PM	1575.77	GLOBE NE 8 PANEL	1303.85
13+03.85 (717)	1576.91		

STA		EL	
1303.85	717	7,331 1576	91
℄			
14+12		1575	88
14+45		1575	05
14+76		1575	59
14+94		1573	68
15+04		1574	95
15+29		1572	16
15+34		1570	41
15+36		1570	41
15+43		1574	31
15+67		1575	03
16+38		1573	38

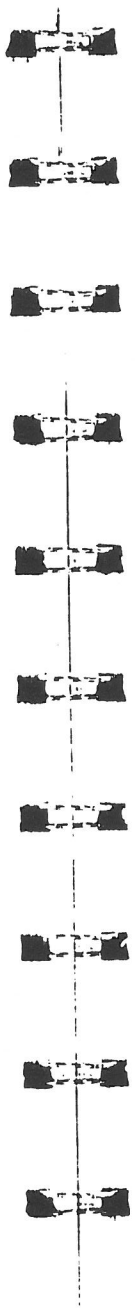
BC, HA 8 77.37 1.14 6.21

16+66	1576 60
16+97	1576 13
17+42	1572 79
17+88	1572 06
18+04	1569 02
18+07	1569 02
18+26	1571 88
18+45	1575 06
19+06	1573 12
19+58	1571 29
19+72	1568 42
20+02	1568. 80
20+13	1566 69

20+39	1572	35
20+51	1572	35
20+55	1570	73
20+60	1572	28
21+24	1572	42
21+33	1571	49
21+56	1573	34
22+76	1573	76
23+99	1573	11
25+18	1572	10
26+39	1572	55
27+60	1572	10
28+29	1571	90

28+93			1570	57	
28+59			1571	31	
29+79			1571	45	
31+03			1571	34	
32+24			1571	41	
33+44			1571	41	
34+69			1570	11	
35+93			1569	33	
37+14			1568	96	
38+37			1568	76	
40+22.08	PMH		1567	873/54	
40+22.08	815		1567	873/54	
40+84			1564	45	

41+71	1567	67	
42+04	1566	03	
42+38	1567	65	
42+58	1567	17	
42+66	1565	69	
42+75	1566	43	
43+13	1563	99	
43+33	1561	09	
43+36	1561	19	
43+45	1564	59	
43+78	1565	19	
43+96	1563	69	
44+03	1560	99	



707	GLO BC NE 28 T4N R5W
	CH
508	Set 1/2" R.B. APPROX 1000' South OF THE CENTER OF Sec 21 T4N R5W
	CH
709	GLO BC NE Sec 20 T4N R5W
	CH
SEC 17	1/2" RB 200' South OF Hidden TANK SW OF SEC 16 T4N R5W
E1/4 17	GLO BC E1/4 17 T4N R5W APPROX 1500 NORTH OF Hidden TANK 150 ± WEST OF dirt Road
	CH
N1/4 21	GLO BC. N1/4 Sec 21 T4N R5W
	CH
510	Set 1/2" RB NEAR CENTER OF Sec 16 T4N R5W

711 GLO BC NE COR Sec 17
T4N R5W

CH

712 GLO BC NE COR Sec 16
T4N R5W

CH

713 GLO BC N1/4 COR Sec 15
T4N R5W

CH

815 Set 1/2" RB APROX 800' South
South west OF N1/4 Sec 9 T4N R5W

CH

516 Set 1/2" RB 800'± South of
NE COR Sec 9 T4N R5W

CH

717 GLO BC NE COR Sec 8 T4N R5W

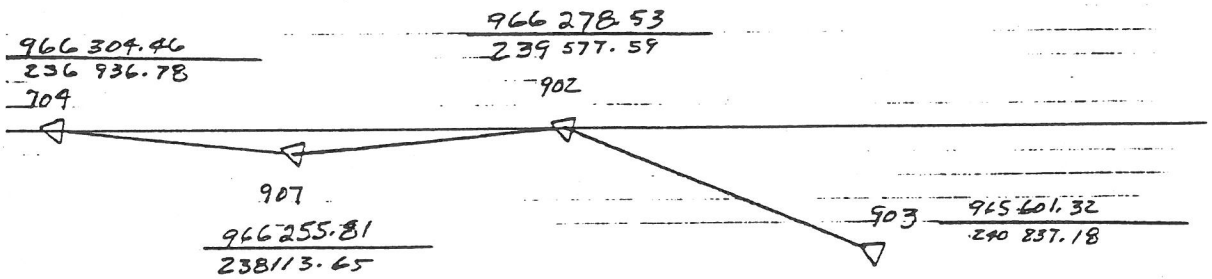
CH

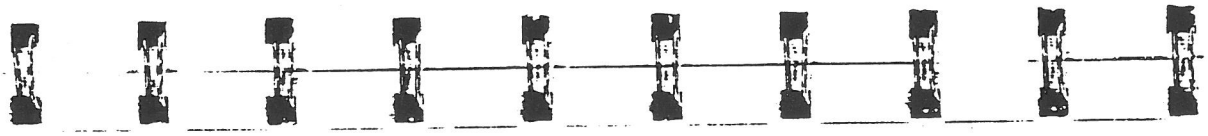
810	Set 1/2" RB Apvox 1000' SW of NE Cor Sec 8 T4N R5W	
819	Set 1/2" RB. Aprox 800' South South East of N 1/4 Sec 10 T4N R5W	
520	Set 1/2" RB Aprox 1000'± west south west of N 1/4 of Sec 8 T4N R5W	
721	GLO BC NE Cor Sec 9 T4N R5W	
822	Set 1/2" RB. NEAR N 1/4 Sec 3 T4N R5W 30' South of Chain Link Fence	
523	Set 1x2x12" Hub 30' South of Chain link Fence 300' East of NE Cor Sec 4 T4N R5W	

524	set 1/2" RB 30' South of Chain Link Fence Aprox 1000' West of NE COR Sec 5 T4N R5W	
	CH	
825	Set 1/2" RB Aprox 30' South of SE COR Sec 32 T5N R5W	
	CH	
726	GLO BC By Chain Link Fence SE COR Sec 32 T5N R5W	
	CH	
SE 34	GLO BC SE Cor Sec 34 T5N R5W	
	CH	
SE 33	GLO BC SE COR Sec 33 T5N R5W	
	CH	
NE 5	GLO BC NE COR Sec 5 T4N R5W	
	CH	
903	Set R/R Spike 700 EAST OF Duck Tank	

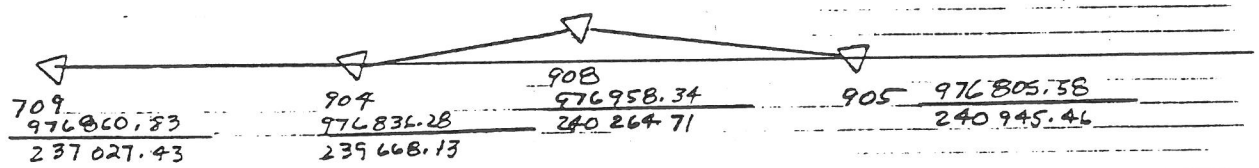
904	GLO BC N1/4 Sec 21 T4N R5W	
	CH	
905	Set 1/2" Rb. 1/4 mi. West of NE Cor Sec 21 T4N R5W	
	CH	
906	Set 1x2x12" Nub 1320 West of NE Cor Sec 8 T4N R5W	
	CH	
902	GLO BC N1/4 Cor Sec 33 T4R R5W	
	CH	

X SECTION

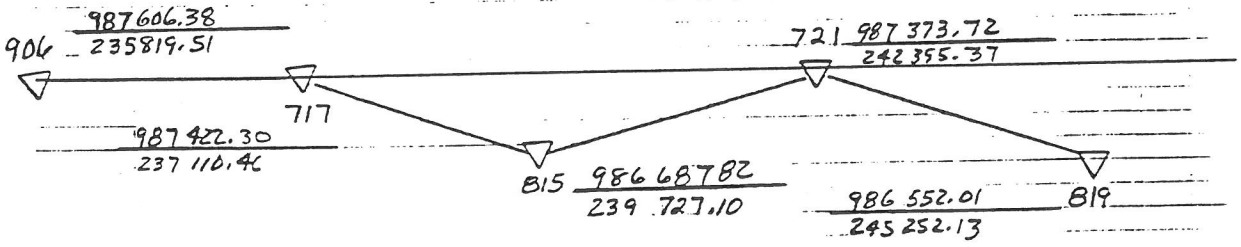

966 304.46
236 936.78
904
907
966 255.81
238113.65
966 278.53
239 577.59
902
903
965 601.32
240 837.18



X Section


709
976860.83
237027.43
904
976836.28
239668.13
908
976958.34
240264.71
905
976805.58
240945.46

X Section


906
987606.38
235819.51
717
987422.30
237110.46
815
986687.82
239727.10
721
987373.72
242355.37
986552.01
245252.13
819

SECTION 4

Field Book #2 Field Notes
Field Check Cross Section Information

JO 92155

X Sections

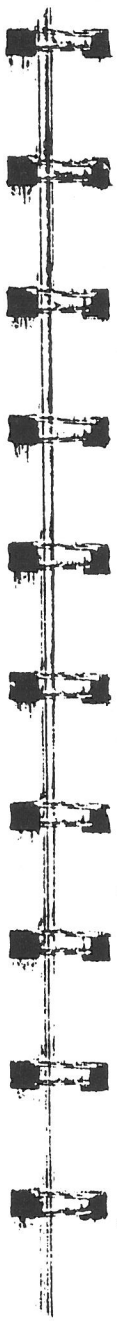
STARWASH

Wood-Patel

CREW BARBEE
BUTTERBAUGH
DEISAN

BOOK TWO

Page	INDEX
1-5	X Section From NE 32 To 700' East of Duck Tank
6-9	X Section From NE Sec 20 To East of Starwash
10-22	X Section From ¼ Mi West of NE Cor Sec 8 To Point # 819
24-32	Pt descriptions



X Section From NE Cor 32
To East of Duck Tank (1)

⊼ STA				EL @ STA		
"A" HI 5.3	RH 8.4	INST EL	=	1453	79	INST AT STA. "A" (B.S 704 EL1454.9286) GR. EL AT 704 1455.95 — EAST OF Glo Sec Cor DIST A TO 704 1178.57
0+00				1453	98	
1+06				1455.	94	HI 1072.97
2+11				1455.	47	HI 967.37
3+15				1454.	75	HI 865.30
4+14				1454	50	HI 745.07
4+47				1453.	47	HI 751.65
4+67				1454	03	HI 711.90
4+71				1452	91	HI 707.96
4+73				1453	51	HI 705.55
5+23				1454.	06	HI 555.41
6+28				1453.	74	HI 550.93

Cor. Elev's -3.1 Ft
Rod Top of HI Not The Same for 1st Loc.

STA	EL
6+73	1453.29
6+80	1452.41
6+92	1453.19
7+95	1453.18
8+92	1453.49
9+04	1453.50
9+40	1449.36
9+44	1450.00
9+97	1448.68
10+00	1451.77
10+85	1452.19
11+07	1454.46
11+78.59 ("A")	1453.79

COR. ELEV. -3.1 FT
See Note #1

T @ A"

M 505.78

M 498.87

M 486.57

M 384.59

M 286.32

M 274.32

M 238.59

M 234.59

M 181.81

M 177.31

M 93.86

M 71.62

M 0

STA	EL
12+36	1452 69
12+58	1450 95
12+60	1450 95
12+73	1451 94
13+57	1451 96
13+94	1453 22
15+00	1452 41
17+36	1448 79
17+39	1447 74
17+50	1449 04
17+61	1448 65
17+64	1447 38
17+66	1448 56
17+98	1449 41
18+02	1448 69
18+45	1449 60
18+51	1448 84
18+62	1449 64
19+61	1450 25
20+13	1450 53
20+26	1445 91
20+64	1445 98
20+71	1447 31

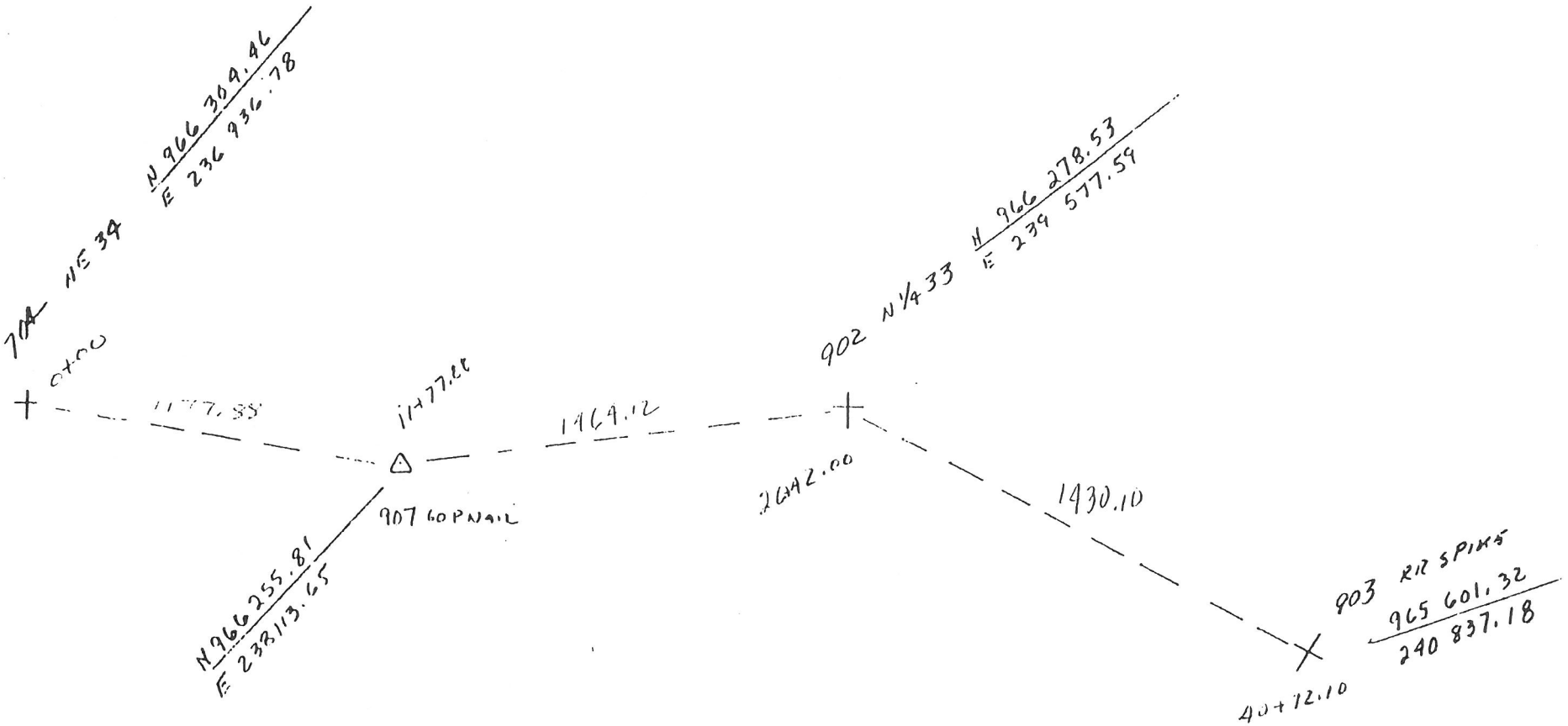
M 57.65
M 79.81
M 80.89
M 94.74
M 178
M 215
M 321
M 557
M 5480
M 570
M 582
M 585
M 587
M 619
M 623
M 666
M 672
M 683
M 782
M 834
M 847
M 886
M 892

SOUTH X SECTION STAR WASH

Job # 92155

DUCK TANK

STAR WASH STATION 3.2

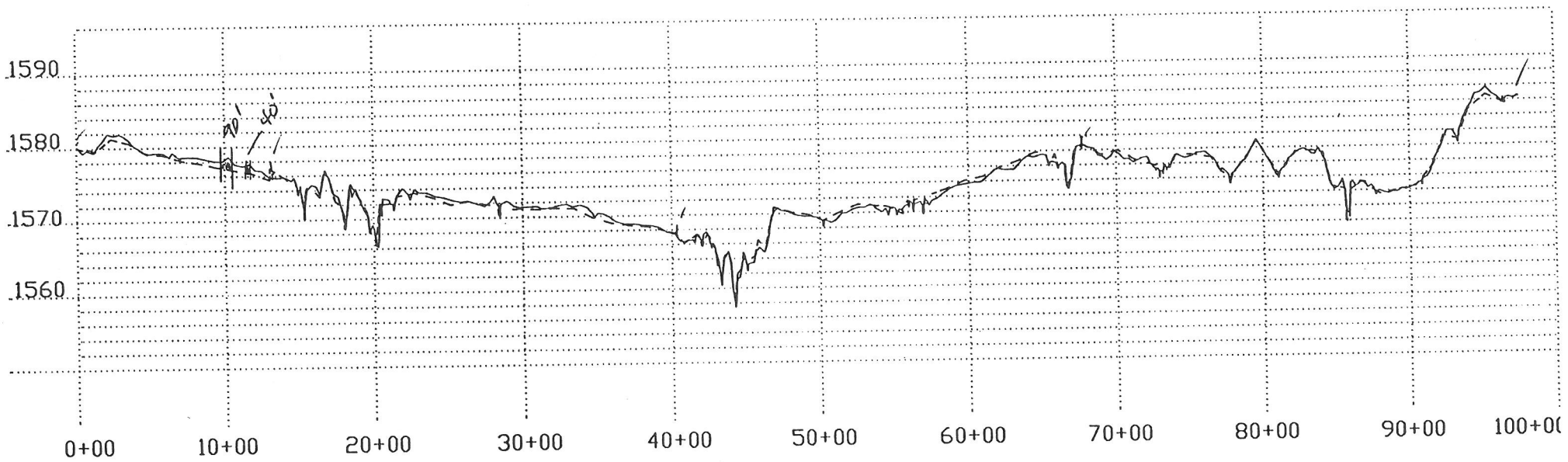


130 ft Δ elev > 1 ft.

all Δ elev < 2 ft OK

horiz. OK

$\frac{130}{9749} = 1.3\% < 10\%$ OK



NORTH SECTION

LEGEND

FIELD ------

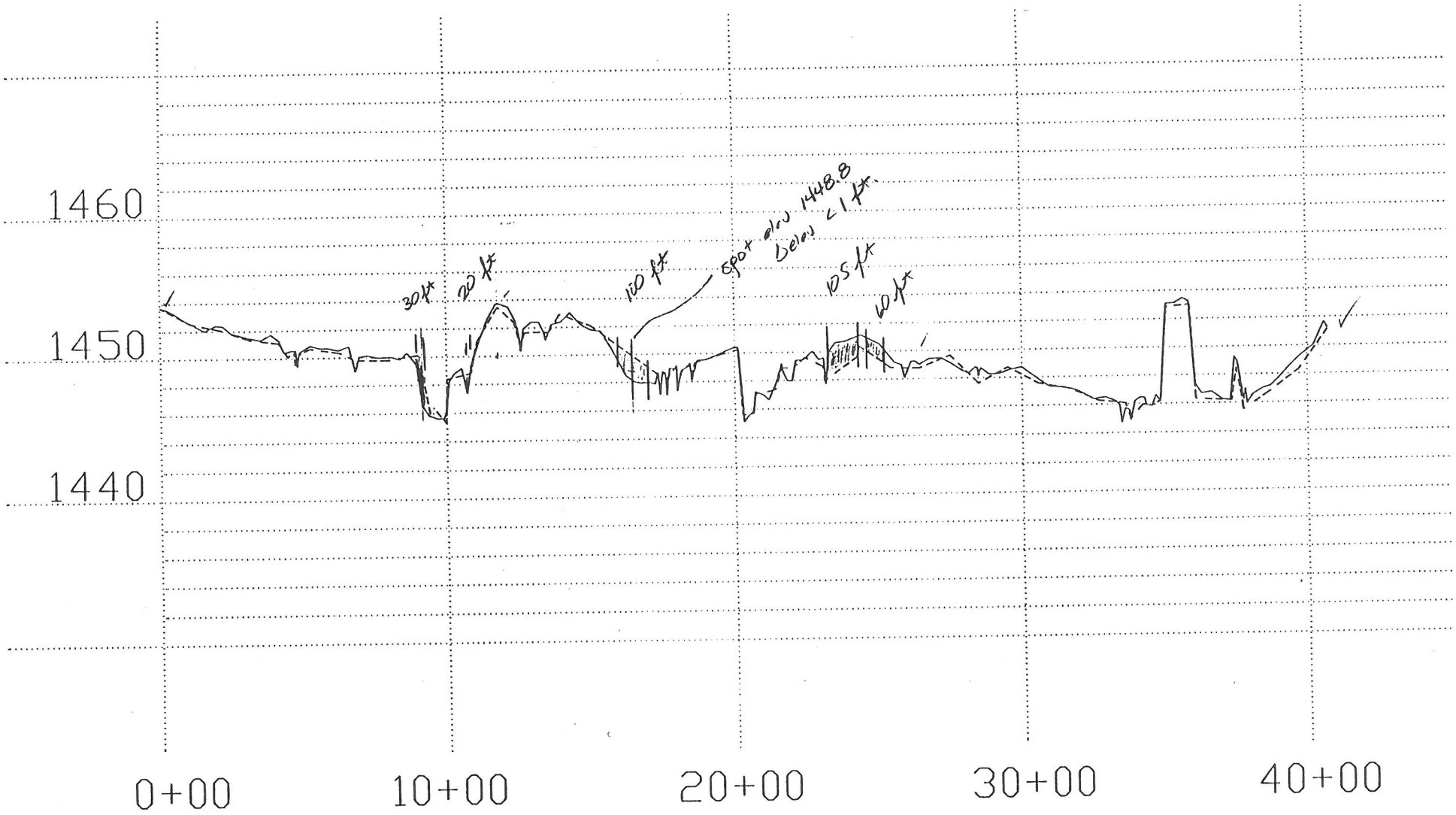
PHOTOGRAMMETRIC CHECK ——

horiz. OK

all within 2 feet vert.

315 ft Δelev > 1 ft

$\frac{315}{4072.1} = 7.7\% < 10\%$ ∴ OK



DUCK TANK

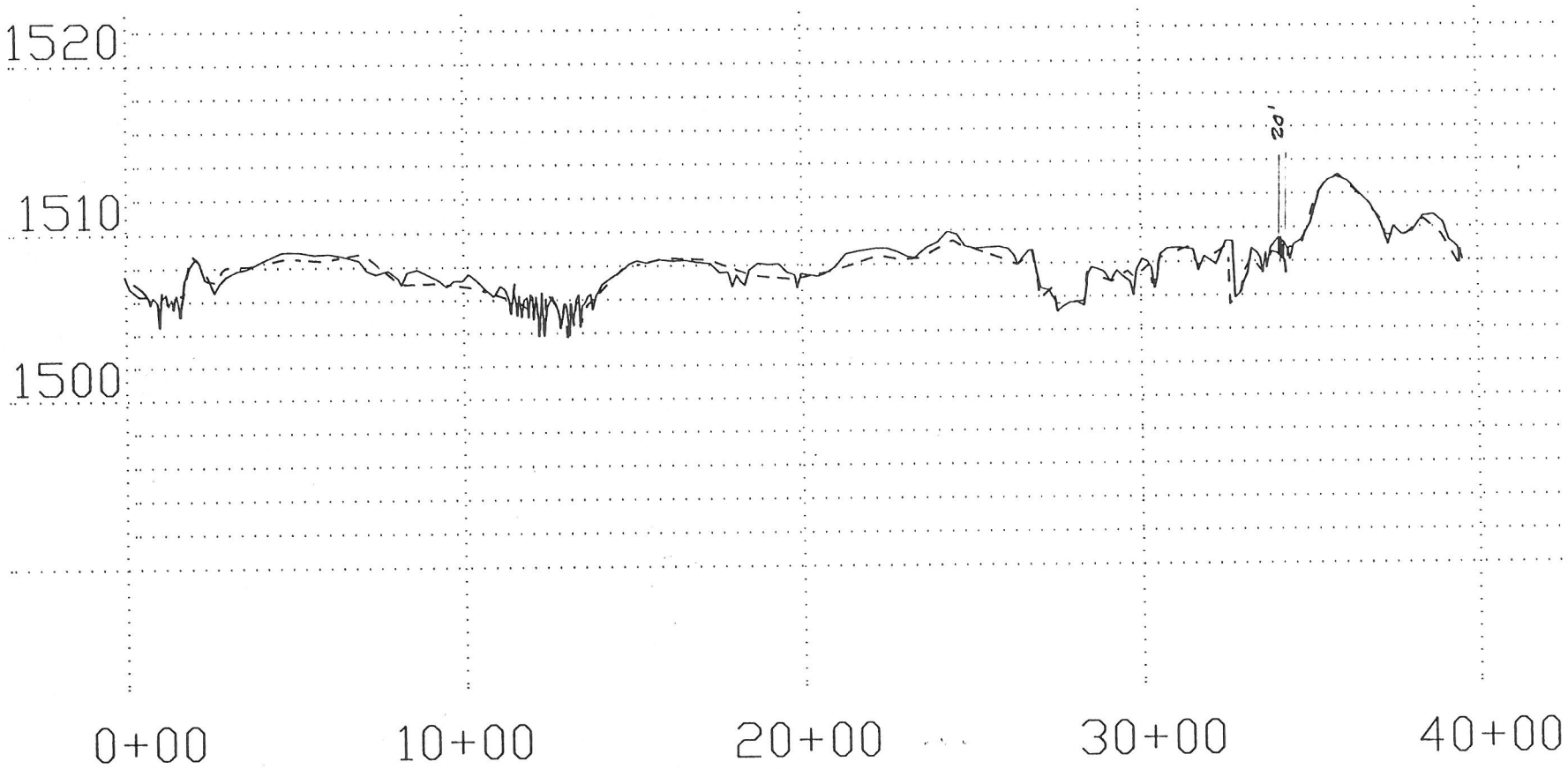
STAR WASH

LEGEND

FIELD ----------

PHOTOGRAMMETRIC _____

20' Δ ELEV 7 1 ft $\frac{20}{3842} = 0.5\% < 16\%$ OK



HIDDEN TANK

LEGEND

FIELD ------

PHOTOGRAMMETRIC CHECK _____

SECTION 6

GPS Coordinates
(By Project Engineering Consultants, Inc.)

PROJECT ENGINEERING
CONSULTANTS, LTD.
3130 N. 35th AVENUE, SUITE 1
PHOENIX, ARIZONA 85017

RECEIVED
OCT 30 1992
WOOD, PATEL & ASSOCIATES

LETTER OF TRANSMITTAL

DATE 10-27-92	JOB NO.
ATTENTION Ash Patel	
RE: Star Wash	

TO Wood / Patel & Associates
4105 N. 20th Street, Suite 130
Phoenix, Arizona 85016

GENTLEMEN:

WE ARE SENDING YOU ☑ Herewith ☐ Under separate cover via _____

1) Point Plot
2) NAD 27 and NAD 83 Coordinates file

Note: I understand that the county wants to use NAD27. I sent NAD 27 and NAD83 files to the Mapping Company with a note to check with you for a final datum to use. Our 1st Order survey results were adjusted to local NAD Coordinates creating a high 3rd Order results.

THESE ARE TRANSMITTED as checked below:

☐ For Review	☐ For Approval	☐ Resubmit For Approval
☐ Per Your Request	☑ For Your Use	☐ For Bid
☐ For Recording	☐ Return With Signature(s)	☐ For Your Records

REMARKS: _____

COPY TO: _____

VERY TRULY YOURS

Signed Larry Maldonado

ARIZONA, CENTRAL ZONE

Star & Power Line Wash NAD'27 (Elev.+/-)

POINT	NORTHING-Y	EASTING-X	ELEV/FEET	LATITUDE	LONGITUDE	CONVERGENCE	SC.FACT	EL.FACT
S006	961024.266	236869.193	1434.941	33 38 19.71419	112 46 52.370390	- 0 28 44.21	0.99997927	0.99993137
S007	964453.832	234473.379	1462.238	33 38 53.44400	112 47 21.048000	- 0 29 00.52	0.99998072	0.99993006
S008	1002612.442	211736.381	1777.398	33 45 08.95800	112 51 54.130000	- 0 31 37.03	0.99999514	0.99991499
S009	985740.752	210881.244	1681.151	33 42 21.97366	112 52 02.415860	- 0 31 39.33	0.99999571	0.99991959
S010	992003.160	245252.995	1612.264	33 43 26.87307	112 45 16.185750	- 0 27 54.65	0.99997430	0.99992289
S011	992105.444	233381.761	1622.169	33 43 26.90916	112 47 36.736520	- 0 29 12.70	0.99998139	0.99992241
S012	986741.548	236374.872	1574.600	33 42 34.09467	112 47 00.768550	- 0 28 52.06	0.99997957	0.99992469
S013	986687.695	239727.198	1568.091	33 42 33.83864	112 46 21.082660	- 0 28 30.03	0.99997756	0.99992500
S014	986552.085	245252.141	1585.476	33 42 32.94542	112 45 15.672090	- 0 27 53.71	0.99997430	0.99992417
S015	982093.344	242352.714	1548.744	33 41 48.60092	112 45 49.558870	- 0 28 11.98	0.99997600	0.99992592
S016	982141.641	237069.613	1541.142	33 41 48.64557	112 46 52.089220	- 0 28 46.67	0.99997915	0.99992629
S017	977476.576	237983.344	1510.427	33 41 02.56963	112 46 40.814780	- 0 28 39.84	0.99997860	0.99992776
S018	974298.296	237013.195	1497.330	33 40 31.04669	112 46 51.980100	- 0 28 45.64	0.99997919	0.99992838
S019	971584.208	236987.221	1485.666	33 40 04.19401	112 46 52.018770	- 0 28 45.32	0.99997920	0.99992894
S020	968063.313	238750.761	1463.563	33 39 29.50707	112 46 30.808250	- 0 28 33.13	0.99997814	0.99993000
S021	964638.691	236968.402	1450.732	33 38 55.48015	112 46 51.554340	- 0 28 44.20	0.99997921	0.99993061
S022	961025.581	236894.131	1435.538	33 38 19.72927	112 46 52.075580	- 0 28 44.04	0.99997926	0.99993134
S023	960970.523	242175.684	1430.814	33 38 19.61695	112 45 49.604870	- 0 28 09.43	0.99997611	0.99993156
S024	974327.015	226704.787	1537.225	33 40 30.46083	112 48 53.951840	- 0 29 53.27	0.99998552	0.99992648
S025	979607.344	226756.065	1563.386	33 41 22.70309	112 48 53.888400	- 0 29 53.92	0.99998548	0.99992522
S026	981584.887	228778.627	1561.296	33 41 42.44015	112 48 30.155640	- 0 29 41.01	0.99998422	0.99992532
S027	983987.160	214554.690	1642.867	33 42 04.95831	112 51 18.748250	- 0 31 14.86	0.99999329	0.99992142
S028	987634.146	216264.958	1658.222	33 42 41.19049	112 50 58.896660	- 0 31 04.34	0.99999217	0.99992069
S029	991205.950	217471.316	1663.396	33 43 16.63319	112 50 44.997880	- 0 30 57.10	0.99999139	0.99992044
S030	993406.856	219816.254	1664.485	33 43 38.61428	112 50 17.470810	- 0 30 42.11	0.99998988	0.99992039
S031	995081.926	204865.308	1757.818	33 43 53.82886	112 53 14.660040	- 0 32 20.73	0.99999973	0.99991593
S032	997659.840	207010.131	1751.722	33 44 19.53018	112 52 49.551700	- 0 32 07.14	0.99999829	0.99991622

PROGRAM GPPC83

NATIONAL GEODETIC SURVEY
GP TO PC PROGRAM
1983 DATUM

VERSION 1.0

Star & Power Line Wash NAD'83 (Elev.+/-)

THE U.S. SURVEY FOOT WAS USED IN CONVERTING COORDINATES!
THE U.S. SURVEY FOOT WAS USED IN CONVERTING ELEVATIONS!

NAME	LATITUDE	LONGITUDE	NORTH(Y) METERS	EAST(X) METERS	NORTH(Y) FEET	EAST(X) FEET	ZONE	ELEV METERS	ELEV FEET
S006	33 38 19.83943	112 46 55.00234	292934.549	133091.564	961069.433	436651.240	AZ C	437.37	1434.94
S007	33 38 53.56900	112 47 23.68179	293979.912	132361.296	964499.095	434255.352	AZ C	445.69	1462.22
S008	33 45 9.08076	112 51 56.78187	305611.002	125430.823	1002658.762	411517.625	AZ C	541.69	1777.19
S009	33 42 22.09644	112 52 5.06638	300468.350	125170.178	985786.578	410662.492	AZ C	512.42	1681.15
S010	33 43 26.99884	112 45 18.81598	302377.216	135647.010	992049.249	445035.232	AZ C	491.28	1611.82
S011	33 43 27.03388	112 47 39.37401	302408.384	132028.545	992151.507	433163.651	AZ C	494.34	1621.85
S012	33 42 34.21969	112 47 3.40363	300773.420	132940.877	986787.462	436156.861	AZ C	479.85	1574.31
S013	33 42 33.96395	112 46 23.71569	300757.008	133962.697	986733.617	439509.282	AZ C	477.36	1567.77
S014	33 42 33.07123	112 45 18.30172	300715.677	135646.753	986598.017	445034.389	AZ C	483.14	1585.09
S015	33 41 48.72649	112 45 52.18979	299356.608	134762.382	982139.138	442134.883	AZ C	471.97	1548.45
S016	33 41 48.77068	112 46 54.72338	299371.326	133152.643	982187.425	436851.630	AZ C	469.67	1540.90
S017	33 41 2.69485	112 46 43.44787	297949.370	133431.159	977522.225	437765.394	AZ C	460.32	1510.23
S018	33 40 31.17184	112 46 54.61343	296980.599	133135.450	974343.849	436795.222	AZ C	456.34	1497.18
S019	33 40 4.31918	112 46 54.65181	296153.320	133127.535	971629.684	436769.254	AZ C	452.80	1485.54
S020	33 39 29.63242	112 46 33.43983	295080.119	133665.080	968108.690	438532.850	AZ C	446.06	1463.46
S021	33 38 55.60537	112 46 54.18663	294036.261	133121.802	964683.966	436750.445	AZ C	442.17	1450.69
S022	33 38 19.85451	112 46 54.70752	292934.950	133099.166	961070.748	436676.180	AZ C	437.55	1435.54
S023	33 38 19.74265	112 45 52.23358	292918.171	134709.033	961015.699	441957.886	AZ C	436.10	1430.78
S024	33 40 30.58508	112 48 56.59145	296989.346	129993.350	974372.546	426486.516	AZ C	468.53	1537.18
S025	33 41 22.82730	112 48 56.52856	298598.840	130008.977	979653.028	426537.785	AZ C	476.49	1563.28
S026	33 41 42.56453	112 48 32.79479	299201.616	130625.472	981630.635	428560.403	AZ C	475.84	1561.15
S027	33 42 5.08143	112 51 21.39633	299933.841	126299.880	984032.943	414336.048	AZ C	500.74	1642.85
S028	33 42 41.31373	112 51 1.54411	301045.478	126811.183	987680.039	416046.356	AZ C	505.40	1658.14
S029	33 43 16.75652	112 50 47.64499	302134.199	127178.891	991251.951	417252.745	AZ C	506.96	1663.26
S030	33 43 38.73780	112 50 20.11673	302805.058	127893.649	993452.928	419597.747	AZ C	507.28	1664.30
S031	33 43 53.95106	112 53 17.31527	303315.624	123336.458	995128.010	404646.363	AZ C	535.77	1757.78
S032	33 44 19.65255	112 52 52.20590	304101.398	123990.219	997706.003	406791.244	AZ C	533.90	1751.63

SECTION 2: MAPPING AND SURVEYING INFORMATION

2.5 Hydraulic Analysis Maps
2.6 Firm, FHBM Draft Maps

SEE WORK MAPS

SECTION 2: MAPPING AND SURVEYING INFORMATION

2.7 Community Map

SEE LOCATION MAP, FIGURE 1

SECTION 3: HYDROLOGIC ANALYSIS

SECTION 3: HYDROLOGIC ANALYSIS

3.1 Method Description

Hydrologic analysis for the Star Wash Floodplain Delineation Study was performed as part of the Jackrabbit Wash Floodplain Delineation Study, February, 1991 (Reference 4). The Jackrabbit Wash report was approved by FEMA in 1991. Exhibit 3 is from that study and shows the locations of flows used in the hydraulic analysis of Star Wash and Tributaries. Another hydrology study was performed upstream of the Star Wash and Tributaries area as part of the Toyota Arizona Proving Grounds (Reference 7). Upon review by the District and Wood/Patel, it was concluded that the Proving Grounds study was inconsistent and inadequately substantiated. Furthermore, the results were not consistent with those of the FEMA-approved Jackrabbit Wash Study. Therefore, the hydrology results of the Jackrabbit Wash Study were used for the hydraulic analysis of Star Wash and Tributaries.

○ = Star Wash Points (13)
△ = Power Line Wash Points (14)

27 Points
6 Receivers + 7 Sessions
15 Vectors Per Session
105 Total Vectors

PROJECT ENGINEERING CONSULTANTS, LTD.
3130 N. 35th Avenue, Suite 1
Phoenix, Arizona 85017 (602) 484-7691

STAR WASH and POWER LINE WASH GPS POINTS

SURVEYED BY	CHECKED BY	DATE	JOB NO.
K. MORTENSEN		3/93	92017/92019
DRAWN BY	SCALE	SHEET NO.	DRAWING NO.
	1"=2000'	1 OF 1	

SEE SHEET 5

SEE SHEET 2

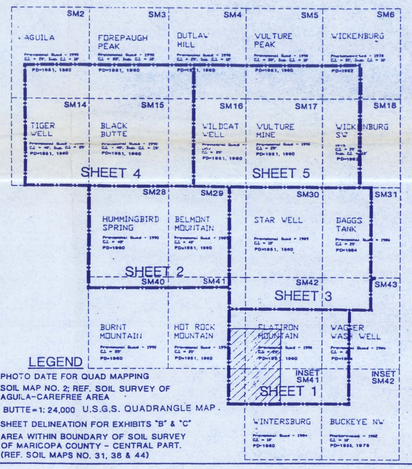
SEE SHEET 1

N

SCALE: 1" = 2000'

0' 2000' 4000'

SHEET INDEX



LEGEND

PD - PHOTO DATE FOR QUAD MAPPING

SM2 - SOIL MAP NO. 2: REF. SOIL SURVEY OF AGUILA-CAREFREE AREA

BLACK BUTTE = 1:24,000 U.S.G.S. QUADRANGLE MAP.

SHEET DELINEATION FOR EXHIBITS "B" & "C"

AREA WITHIN BOUNDARY OF SOIL SURVEY OF MARICOPA COUNTY - CENTRAL PART. (REF. SOIL MAPS NO. 31, 38 & 44)

= PROPOSED DELINEATION (DELINEATION FROM CAP TO POWERLINES WAS CONDUCTED BY BURGESS & NIPLE IN 1991. SEE ATTACHED SHEETS FOR DELINEATION OF THIS AREA)

Identifier	USBR Sta.	Structure Description	USBR 50-Year 6-Hour Storm In Q	In Vol	Out Q	100-Year 6-Hour Storm In USBR Q	In USBR Vol	In B&N Q	Out USBR Q	Out B&N Q	Drainage Area (sq. miles) USBR	Drainage Area (sq. miles) B&N
CAP-1	121+60	1-30" Culvert	16	2	16	21	3	180	21	1	0.06	0.1
CAP-2	146+50	2-48" Culverts	406	56	184	496	71	1,200	-	270	0.76	0.8
CAP-3	180+50	Box Flume Overchute, W=67'-6"	5,387	2,414	-	6,696	3,007	2,400	2,917	930	41.35	36.0
CAP-4	293+50	Box Flume Overchute, W=67'-6"			-			2,100	2,917	1,100		40.3
CAP-5	366+54	Jackrabbit Wash Siphon	-	-	-	25,536	-	7,500	25,536	7,500	291.0	319.2
CAP-6	393+00	66" Pipe Overchute	325	59	69	431	82	1,500	-	240	2.39	2.2
CAP-7	402+50	66" Pipe Overchute			69							
CAP-8	485+00	Box Flume Overchute, W=47'-4"	1,710	946	1,576	2,288	1,259	2,600	545	-	2,000	28.18	26.1
CAP-9	544+25	2-36" Culverts	170	26	163	233	36	1,600	65	-	200	0.96	0.9
CAP-10	561+50	1-30" Culvert	17	2	17	22	3	280	7	22	70	0.08	0.1
CAP-11	571+50	1-30" Culvert	9	1	9	12	1	90	2	12	30	0.05	0.1

Note: Q = Discharge in cfs
Vol = Runoff Volume in acre feet

EXHIBIT 3 STAR WASH

REVISIONS	DATE	BY	CHK.

Burgess & Niple, Inc.
Engineers and Architects
Akron, OH • Cincinnati, OH • Cleveland, OH • Columbus, OH • Covington, KY
Meadow, OH • Parkersburg, WV • Payson, AZ • Phoenix, AZ

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

JACKRABBIT WASH FLOODPLAIN DELINEATION STUDY

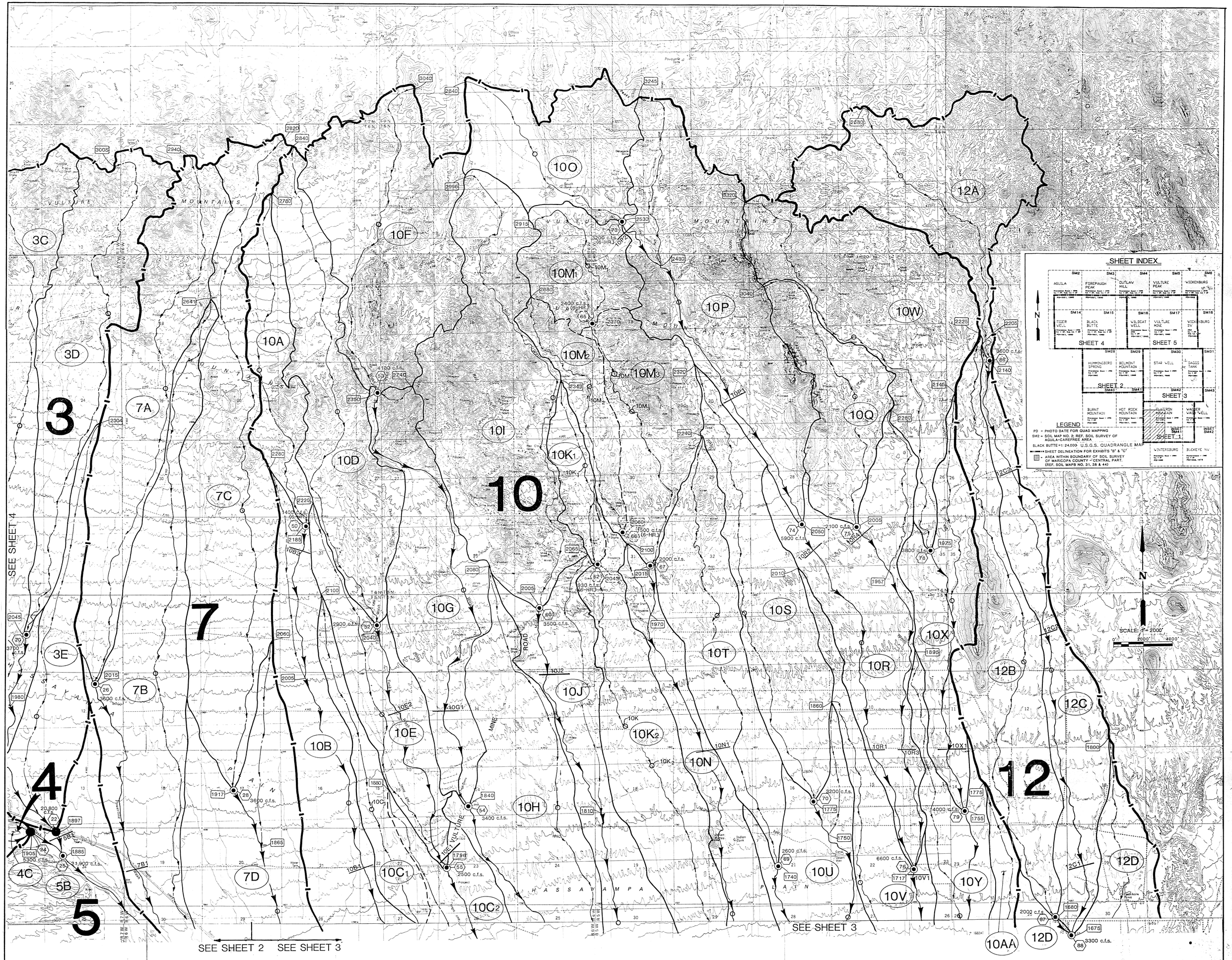
FCD 90-05

JOB NO:	10310
DESIGNED BY:	A.J.R.
DRAWN BY:	R.E.M.
CHECKED BY:	T.R.L.
APPROVED BY:	
DATE:	

DRAINAGE SUB-BASIN DELINEATION, TIME OF CONCENTRATION FLOW PATHS AND FLOOD ROUTING MAP

SCALE: 1"=2000'

SHEET NO. 3 OF 5



NO.	REVISIONS	DATE	BY	CHK.

Burgess & Niple, Inc.
Engineers and Architects
Akron, OH • Cincinnati, OH • Cleveland, OH • Columbus, OH • Covington, KY
Kenton, OH • Parkersburg, WV • Payson, AZ • Phoenix, AZ

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

JACKRABBIT WASH FLOODPLAIN DELINEATION STUDY

FCD 90-05

JOB NO.	10310
DESIGNED BY:	A.J.R.
DRAWN BY:	R.E.M.
CHECKED BY:	T.R.L.
APPROVED BY:	12-90
DATE:	T.R.L.

EXHIBIT 3 STAR WASH

DRAINAGE SUB-BASIN DELINEATION, TIME OF CONCENTRATION FLOW PATHS AND FLOOD ROUTING MAP

SCALE:	
1"=2000'	
SHEET NO.	OF
5	5