WAGNER WASH
FLOOD INSURANCE STUDY

FINAL HYDRAULIC REPORT

Prepared for
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

by
HDR ENGINEERING

November 1, 1991

FLOOD INSURANCE STUDY

MARICOPA COUNTY,
ARIZONA
UNINCORPORATED AREA

APRIL 1991

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

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1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in an unincorporated area of Maricopa County, Arizona, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for an area of the County that will be used to establish actuarial flood insurance rates and assist the County in their effors to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic analyses for this study were prepared by the Flood Control District of Maricopa County, Arizona. The hydraulic analyses were prepared by HDR Engineering, Inc., the study contractor. This work was completed in April 1991.

1.3 Coordination

2.0 AREA STUDIED

2.1 Scope of Study

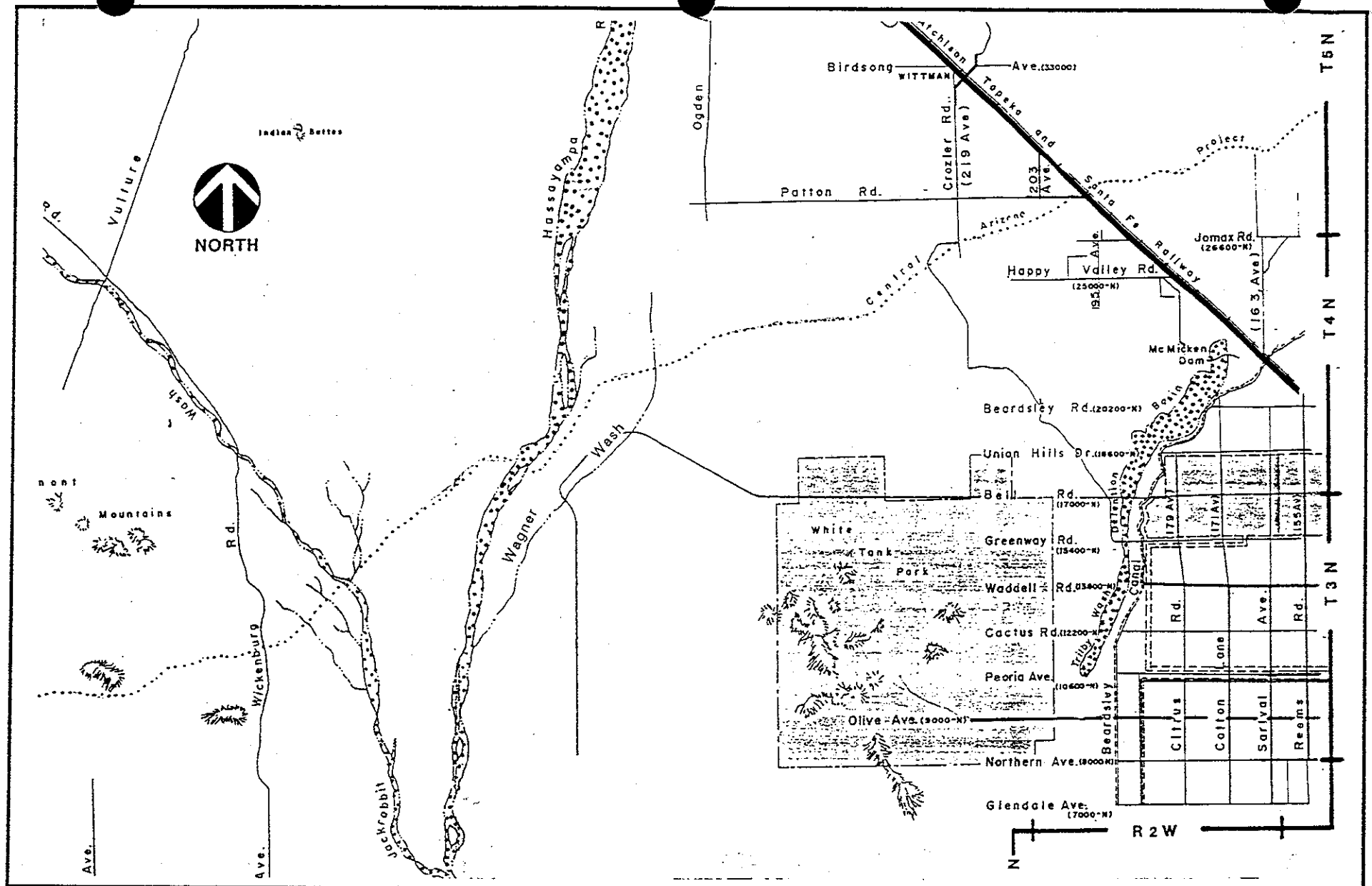
This Flood Insurance Study covers an unincorporated area of Maricopa County, Arizona. The area of study is shown on the Vicinity Map (Figure 1).

Riverine flooding on Wagner Wash from Central Arizona Project (CAP) Canal downstream to the stream's confluence with the Hassayampa River was studied by detailed methods. Ponded flooding above the CAP Canal was mapped at a single water surface elevation which was determined in the hydrologic analyses performed by the Flood Control District of Maricopa County. The scope and methods of study were proposed to, and agreed upon by, the Arizona Department of Water Resources and the Flood Control District of Maricopa County, Arizona.

2.2 Community Description

Maricopa County, encompassing a total area of 9238 square miles, is located in south-central Arizona. It is bordered by Yavapai County to the north, Pinal and Gila Counties to the east, Pima County to the south and Yuma and La Paz Counties to the west. The incorporated communities within the county cover an area in excess of 100 square miles and an additional 3,330 square miles are Government-owned lands. A large portion of the the remaining county is undeveloped. The Wagner Wash drainage area is largely undeveloped at this time. The 1980 population of the county was 1.5 million.

The topography of Maricopa County varies from rugged mountainous areas in the north to arid plain and desert in southern areas. Small intermittent streams and washes traverse most of the county.



FEDERAL EMER. MANAGEMENT AGENCY

MARICOPA COUNTY
(UNINCORPORATED AREAS)

VICINITY MAP

The climate in Maricopa County is mild with short, moderate winters and long, hot summers. Mean annual precipitation ranges from 7 inches in the southern desert regions of the county to more than 25 inches in the mountainous northern areas. Two periods of the year produce the heaviest rainfall amounts. Winter storms occur during the December to March period and summer storms occur most frequently from June through October.

2.3 Principal Flood Problems

Historically, large portions of Maricopa County are prone to destructive floods. However, there are no severe flood problems, life or property threatening, evident in the area of study. The area is still largely in its natural state and manmade structures within the flood plain limits are minimal, with the exception of electrical transmission towers which have been constructed in the flood plain at several locations.

The two roadway crossings, both Sun Valley Parkway, are of recent construction and the adequacy of the culvert structures under flood conditions of any frequency has not been observed.

The installation of the Central Arizona Project Canal at the upstream area of study has created a levee that impounds flood waters on its north side. Relief through the canal is provided by overchutes located at periodic intervals along the canal.

2.4 Flood Protection Measures

No flood protection measures currently exist in Wagner Wash watershed, nor are any planned in the foreseeable future. The effect of the CAP Canal serves as a protection measure, but it was not constructed for that purpose. Cursory inspection of the canal indicates that it is adequate to withstand the hydraulic pressures induced by the expected impoundment of water during the study's rainfall event; however, this study does not warrant that the canal levees will not fail, either partially or fully, under rainfall events of any frequency.

3.0 ENGINEERING METHODS

For the flooding source studied in detail, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. A flood event of a magnitude which is expected to be equalled or exceeded once on the average during any 100-year period (recurrence interval) has been selected as having special significance for flood plain management and for flood insurance premium rates. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual occurrence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported here reflect flooding potentials based on conditions existing in the county at the time of completion of the study. Maps and flood elevations may be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

The hydrologic analyses were performed by the study's sponsor, the Flood Control District of Maricopa County. The study contractor reviewed the hydrologic model at the initial stages of the flood study and prepared review comments for the Flood Control District, as did the Arizona Department of Water Resources. The Flood Control District made adjustments to their hydrologic analysis and revised the hydrology for use in the flood plain analysis. The study contractor felt the revised hydrology was sufficient for use on this study.

Table 2. Summary of Discharges

Flooding Source and Location	Drainage Area (Square miles)	100-year Peak Discharge (cubic feet per second)
Wagner Wash at confluence with Hassayampa River	42.07	15717
Wagner Wash at east quarter corner of Section 13, T. 3 N, R. 5 W.	40.21	15351
Wagner Wash near center of the SE 1/4 SW 1/4, Section 7, T. 3 N, R. 4 W.	38.63	12861
Wagner Wash near center of Section 7, T. 3 N, R. 4 W.	38.17	12363
Wagner Wash, 1700 feet below confluence with Bootlegger Wash	37.39	10964
Wagner Wash at Sun Valley Parkway (south crossing)	28.62	10358
Wagner Wash, 2000 feet upstream of Sun Valley Parkway (south crossing)	25.93	8904
Wagner Wash, 5200 feet upstream of Sun Valley Parkway (south crossing)	24.54	8079
Wagner Wash, 3700 feet downstream of Sun Valley Parkway (north crossing)	22.72	7225
Wagner Wash, downstream side of Sun Valley Parkway (north crossing)	20.38	5906
Wagner Wash, upstream of Sun Valley Parkway (north crossing)	15.99	3446
Wagner Wash, 3200 feet north of Sun Valley Parkway (north crossing)	15.07	2894
Wagner Wash, 1700 feet downstream of CAP canal	13.14	1723
Wagner Wash downstream of CAP canal	11.89	873

3.2 Hydraulic Analysis

Analysis of the hydraulic characteristics of flooding from the riverine source studied was carried out to provide an estimate of the elevation of flooding of the selected 100-year recurrence interval.

Cross-section data for the backwater analysis was obtained photogrammetrically from aerial photographs obtained by aerial survey in September, 1990. Topographic maps were also compiled from the aerial survey and were used for base map information and to supplement the cross-section data, where required. The topographic maps were computer generated at a scale of 1:2400 with a contour interval of 2 feet. All culvert crossings were field surveyed to obtain elevation data and structural geometry.

Water-surface elevations of the flood of the selected recurrence interval were computed using the COE HEC-2 step-backwater computer program. The starting water-surface elevation for Wagner Wash was determined using the slope-area method. HY-8, a Federal Highways Administration culvert analysis computer program was supplementally used to calculate hydraulic losses through the modeled culvert structures.

Channel and overbank roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the stream and flood plain areas. The channel "n" values for Wagner Wash ranged from 0.04 to 0.105 and overbank "n" values ranged from 0.065 to 0.10.

The hydraulic analysis for this study was based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if the hydraulic structures remain unobstructed.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100-year floodplain and floodway boundaries to assist communities in developing flood plain management measures.

4.1 Flood Plain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. For the stream studied in detail, the 100-year flood plain boundary has been delineated using the flood elevations determined at each cross section.

Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:2400 with a contour interval of 2 feet.

The 100-year flood plain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

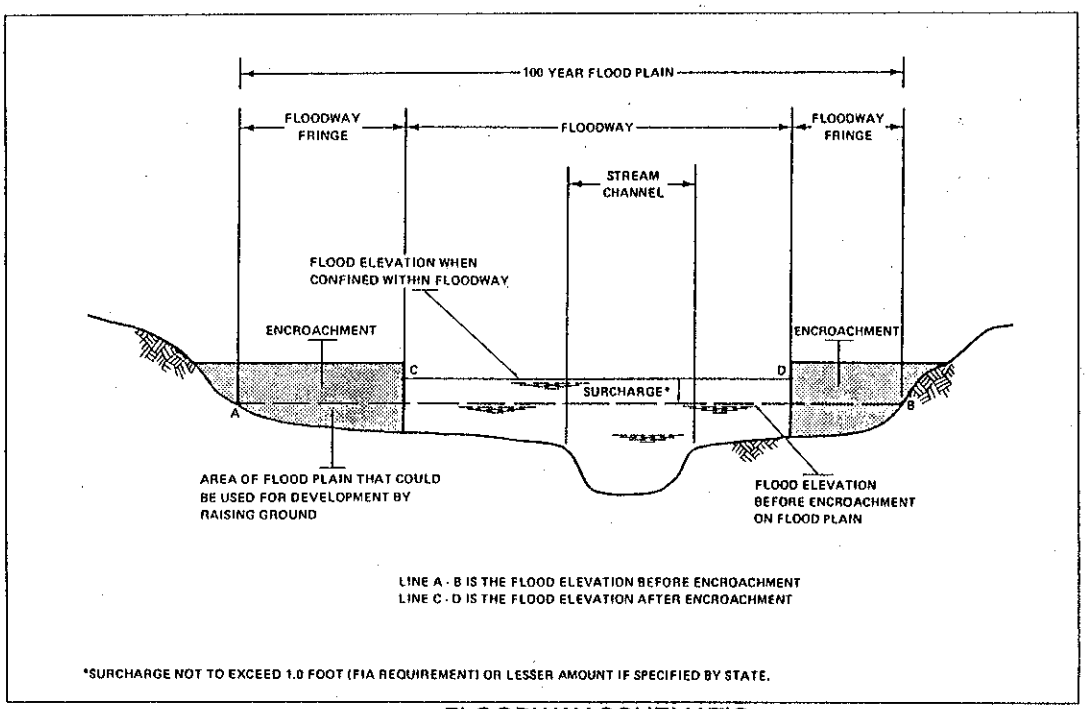
4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increases in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodway in this study is presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodway presented in this study was computed for the entire stream length on the basis of engineering judgment which consisted of utilizing equal conveyance methodology as a starting point but completing the floodway delineation by specifying the exact location of the encroachment for any given cross section. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table _). In cases where the floodway and 100-year flood plain boundaries are either close together or collinear, only the floodway boundary is shown.

The area between the floodway and 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the flood plain 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. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure _.

Development or encroachment shall be prohibited within the flood plain area shown upstream of the CAP Canal.



FLOODWAY SCHEMATIC

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE (NOTE)	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY	INCREASE
Wagner Wash								
A	475	540	2426	6.5	1257.3	1257.3	1258.3	1.0
B	945	570	1960	8.0	1263.7	1263.7	1264.2	0.5
C	1360	501	1948	8.1	1269.6	1269.6	1270.2	0.6
D	1840	511	2063	7.6	1276.0	1276.0	1276.6	0.6
E	2330	450	1852	8.5	1282.6	1282.6	1283.5	0.9
F	2750	280	1585	9.9	1288.0	1288.0	1288.8	0.8
G	3180	322	1645	9.6	1292.5	1292.5	1293.0	0.5
H	3690	334	1493	10.5	1297.5	1297.5	1298.0	0.5
I	4150	442	1749	9.0	1303.3	1303.3	1303.9	0.6
J	4670	509	2129	7.4	1309.9	1309.9	1310.8	0.9
K	4970	327	1394	11.3	1313.8	1313.8	1313.9	0.1
L	5390	580	2530	6.2	1319.2	1319.2	1319.6	0.4
M	5880	476	1860	8.4	1323.2	1323.2	1323.6	0.4
N	6370	333	1530	10.3	1328.7	1328.7	1328.8	0.1
O	6860	334	1645	9.6	1333.2	1333.2	1333.8	0.6
P	7330	214	1217	12.9	1339.0	1339.0	1339.0	0.0
Q	7780	200	1565	9.8	1343.8	1343.8	1343.9	0.1
R	8300	314	1736	8.8	1346.2	1346.2	1347.1	0.9
S	8800	462	1808	8.5	1350.5	1350.5	1350.9	0.4
T	9330	570	2016	7.6	1355.5	1355.5	1355.4	-0.1
U	9830	375	1588	9.7	1359.1	1359.1	1359.3	0.2
V	10270	540	2525	6.1	1362.9	1362.9	1363.8	0.9
W	10770	550	1988	7.7	1366.3	1366.3	1367.0	0.7
X	11260	650	2493	6.2	1370.8	1370.8	1371.7	0.9
Y	11740	650	2387	6.4	1374.1	1374.1	1375.0	0.9
Z	12250	550	2175	5.9	1377.8	1377.8	1378.7	0.9
AA	12910	600	2345	5.5	1381.7	1381.7	1382.5	0.8

NOTE: Distance in Feet Above Mouth Along Profile Base Line

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE (NOTE)	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY	INCREASE
Wagner Wash								
AB	13420	600	2010	6.4	1385.6	1385.6	1385.9	0.3
AC	13920	540	1896	6.8	1389.1	1389.1	1389.5	0.4
AD	14440	490	1957	6.3	1392.9	1392.9	1393.3	0.4
AE	14900	500	1633	7.6	1396.5	1396.5	1397.1	0.6
AF	15590	590	2691	4.6	1400.5	1400.5	1401.5	1.0
AG	16080	553	2257	5.5	1402.6	1402.6	1403.4	0.8
AH	16580	625	1818	6.8	1412.8	1407.1	1407.4	0.3
AI	17050	660	2649	4.7	1410.2	1410.2	1411.2	1.0
AJ	17550	650	2320	5.3	1412.8	1412.8	1413.7	0.9
AK	18050	650	2232	5.5	1416.0	1416.0	1416.9	0.9
AL	18400	650	2475	5.0	1418.2	1418.2	1419.2	1.0
AM	18830	625	2181	5.7	1421.0	1421.0	1421.8	0.8
AN	19280	625	2159	5.1	1423.6	1423.6	1424.6	1.0
AO	19800	475	1748	6.3	1426.3	1426.3	1427.2	0.9
AP	20310	425	1545	7.1	1429.6	1429.6	1430.4	0.8
AQ	20910	450	1834	6.0	1433.5	1433.5	1434.3	0.8
AR	21350	551	2410	4.5	1435.2	1435.2	1435.9	0.7
AS	21590	590	1933	5.4	1436.0	1436.0	1436.5	0.5
AT	21750	647	913	11.3	1437.7	1437.7	1437.7	0.0
AU	21920	798	1591	6.5	1440.8	1440.8	1440.8	0.0
AV	22420	600	2548	4.1	1443.7	1443.7	1443.9	0.2
AW	22920	450	1533	6.8	1445.3	1445.3	1445.7	0.4
AX	23420	400	1752	5.9	1448.5	1448.5	1449.1	0.6
AY	23890	375	1616	6.4	1450.9	1450.9	1451.8	0.9
AZ	24400	330	1659	5.4	1453.9	1453.9	1454.7	0.8
BA	24920	330	1626	5.5	1455.9	1455.9	1456.7	0.8
BB	25410	300	1213	7.3	1458.5	1458.5	1458.9	0.4

NOTE: Distance In Feet Above Mouth Along Profile Base Line

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE (NOTE)	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
Wagner Wash								
BC	25910	355	1803	4.9	1461.6	1461.6	1462.6	1.0
BD	26410	300	1466	6.1	1463.7	1463.7	1464.4	0.7
BE	26870	450	1532	5.8	1466.0	1466.0	1466.9	0.9
BF	27360	450	1613	5.0	1469.0	1469.0	1469.9	0.9
BG	27860	250	1244	6.5	1471.8	1471.8	1472.2	0.4
BH	28360	250	1008	8.0	1474.4	1474.4	1474.9	0.5
BI	28860	250	1434	5.6	1477.3	1477.3	1478.2	0.9
BJ	29360	270	1305	6.2	1479.2	1479.2	1479.9	0.7
BK	29810	300	1106	6.5	1481.4	1481.4	1482.3	0.9
BL	30310	250	1022	7.1	1484.7	1484.7	1485.1	0.4
BM	30810	250	1058	6.8	1487.4	1487.4	1488.0	0.6
BN	31300	250	1510	4.8	1490.1	1490.1	1491.0	0.9
BO	31800	320	1640	4.4	1491.9	1491.9	1492.9	1.0
BP	32290	250	1185	5.7	1494.0	1494.0	1494.8	0.8
BQ	32730	300	1602	4.2	1495.9	1495.9	1496.9	1.0
BR	33090	300	1703	3.2	1497.0	1497.0	1497.8	0.8
BS	33380	80	589	5.8	1497.5	1497.5	1498.2	0.7
BT	33526	200	416	8.3	1499.4	1499.4	1499.9	0.9
BU	33776	400	2010	1.7	1500.5	1500.5	1501.5	1.0
BV	34026	350	1282	2.7	1500.7	1500.7	1501.6	0.9
BW	34526	200	906	3.8	1502.2	1502.2	1502.6	0.4
BX	35036	150	587	5.9	1504.1	1504.1	1504.4	0.3
BY	35486	163	611	5.6	1506.6	1506.6	1507.1	0.5
BZ	35956	250	807	4.3	1509.1	1509.1	1509.9	0.8
CA	36216	250	871	4.0	1510.2	1510.2	1511.1	0.9
CB	36616	275	1011	3.4	1511.8	1511.8	1512.6	0.8
CC	37086	225	590	4.9	1514.3	1514.3	1514.6	0.3

NOTE: Distance in Feet Above Mouth Along Profile Base Line

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE (NOTE)	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY	INCREASE
Wagner Wash								
CD	37546	225	1062	2.7	1515.7	1515.7	1516.4	0.7
CE	37956	200	653	4.4	1516.8	1516.8	1517.4	0.6
CF	38206	154	730	4.0	1518.6	1518.6	1519.3	0.7
CG	38346	122	498	5.8	1520.3	1520.3	1520.7	0.4
CH	38496	200	1029	2.8	1521.7	1521.7	1522.1	0.4
CI	38896	320	1586	1.8	1522.7	1522.7	1523.3	0.6
CJ	39296	300	1163	2.5	1523.6	1523.6	1524.3	0.7
CK	39796	293	1201	2.4	1525.6	1525.6	1526.3	0.7
CL	40226	297	1069	2.7	1527.6	1527.6	1528.1	0.5
CM	40706	325	1022	2.8	1530.0	1530.0	1530.9	0.9
CN	41196	420	1348	2.1	1533.1	1533.1	1533.7	0.6
CO	41636	300	1111	2.6	1535.3	1535.3	1535.8	0.5
CP	42136	308	1227	1.4	1536.5	1536.5	1537.4	0.9
CQ	42636	285	820	2.1	1537.6	1537.6	1538.4	0.8
CR	43106	370	999	1.7	1540.4	1540.4	1540.6	0.2
CS	43606	275	619	1.4	1542.3	1542.3	1542.5	0.2
CT	44006	200	387	0.3	1542.7	1542.7	1543.2	0.5

NOTE: Distance In Feet Above Mouth Along Profile Base Line

5.0 INSURANCE APPLICATION

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

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year flood plains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed in such areas, 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 flood plains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and flood plain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year flood plains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For flood plain management applications, the map shows by tints, screens, and symbols, the 100-year flood plains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The Sun Valley Development Company of Phoenix, Arizona prepared one-foot contour topographic mapping for most portions of the Wagner Wash stream reach. Hydrologic analyses was performed for purposes of design for the two Sun Valley Parkway roadway crossings over Wagner Wash.

A Flood Insurance Re-Study for the Hassayampa River, of which Wagner Wash is tributary, was performed by Cella-Barr Associates of Phoenix, Arizona in 1989.

This study is authoritative for the purposes of the National Flood Insurance Program; data presented herein either supersede or are compatible with all previous determinations.

8.0 LOCATION OF DATA

9.0 BIBLIOGRAPHY AND REFERENCES

1. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, White Tank Mts NE, Arizona (1957) Photorevised (1971); White Tank Mts SE, Arizona (1957) Photorevised (1971); Daggs Tank, Arizona (Provisional Ed. 1988); Wagner Wash Well, Arizona (Provisional Ed. 1988)

2. U.S. Department of the Interior, Geological Survey, 15-Minute Series Topographic Map, Scale 1:62500, Contour Interval 40 feet, White Tank Mts., Arizona (1957)

3. Federal Emergency Management Agency, Flood Insurance Study, Maricopa County and Incorporated Areas (Preliminary), 1990

4. U.S. Department of the Interior, Geological Survey, Mannings's Roughness Coefficients For Stream Channels and Flood Plains in Maricopa County, Arizona (Prelliminary Draft), 1990

5. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles User's Manual, Davis, California 1990

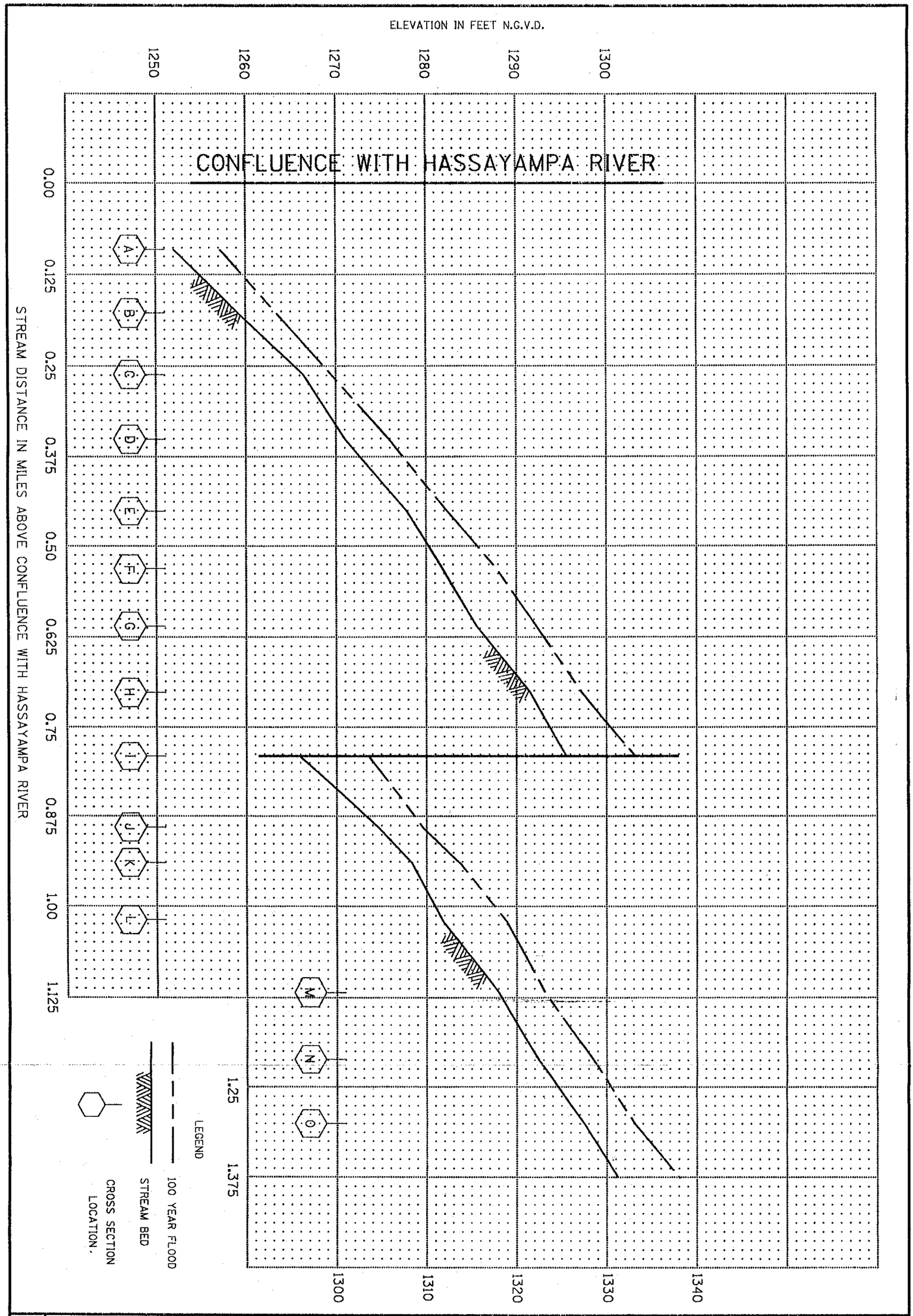
6. U.S. Army Corps of Engineers, Hydrologic Engineering Center, Computer Program HEC-2 Water Surface Profiles, Davis, California, Version 4.5.1, February, 1991 (Haestad Methods Version 6.2)

7. McLain Harbers Aerial Survey, Topographic Maps, Scale 1:2,400, Contour Interval 2 feet, Wagner Wash, Arizona (1990)

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (feet NGVD)	Description of Location
ERM 1	1538.51	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 22 and 23, Township 4 North, Range 4 West.
ERM 3	1556.71	Brass cap stamped U.S. Government Land Office at corner of Sections 15, 14, 22 and 23, Township 4 North, Range 4 West.
ERM 5	1329.17	Brass cap stamped U.S. Government Land Office at corner of Sections 13, 18, 19 and 24, Township 3 North, Range 5 West.
ERM 5A	1352.57	Brass cap stamped U.S. Government Land Office at east quarter corner of Section 13, Township 3 North, Range 5 West.
ERM 7	1417.95	Brass cap stamped U.S. Government Land Office at corner of Sections 6, 5, 7 and 8, Township 3 North, Range 4 West.
ERM 10	1492.23	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 28 and 33, Township 4 North, Range 4 West.
ERM 10A	1558.63	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 15 and 22, Township 4 North, Range 4 West.
ERM 11	1296.44	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 23 and 24, Township 3 North, Range 5 West.
ERM 15	1522.07	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 22 and 27, Township 4 North, Range 4 West.
ERM 17	1377.56	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 7 and 18, Township 3 North, Range 4 West.
ERM 19	1471.87	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 32 and 33, Township 4 North, Range 4 West.
ERM 23	1380.14	Brass cap stamped U.S. Government Land Office at corner of Sections 12, 7, 13 and 18, Township 3 North, Range 5 West.
ERM 27	1448.07	Brass cap stamped U.S. Government Land Office at north quarter corner of Section 5, Township 3 North, Range 4 West.
ERM 28	1510.32	Brass cap stamped U.S. Government Land Office at quarter corner of Section 28 and 27, Township 4 North, Range 4 West.
ERM 31	1548.09	Bureau of Land Management brass cap marked TR39 at quarter corner of Sections 20 and 21, Township 4 North, Range 4 West.

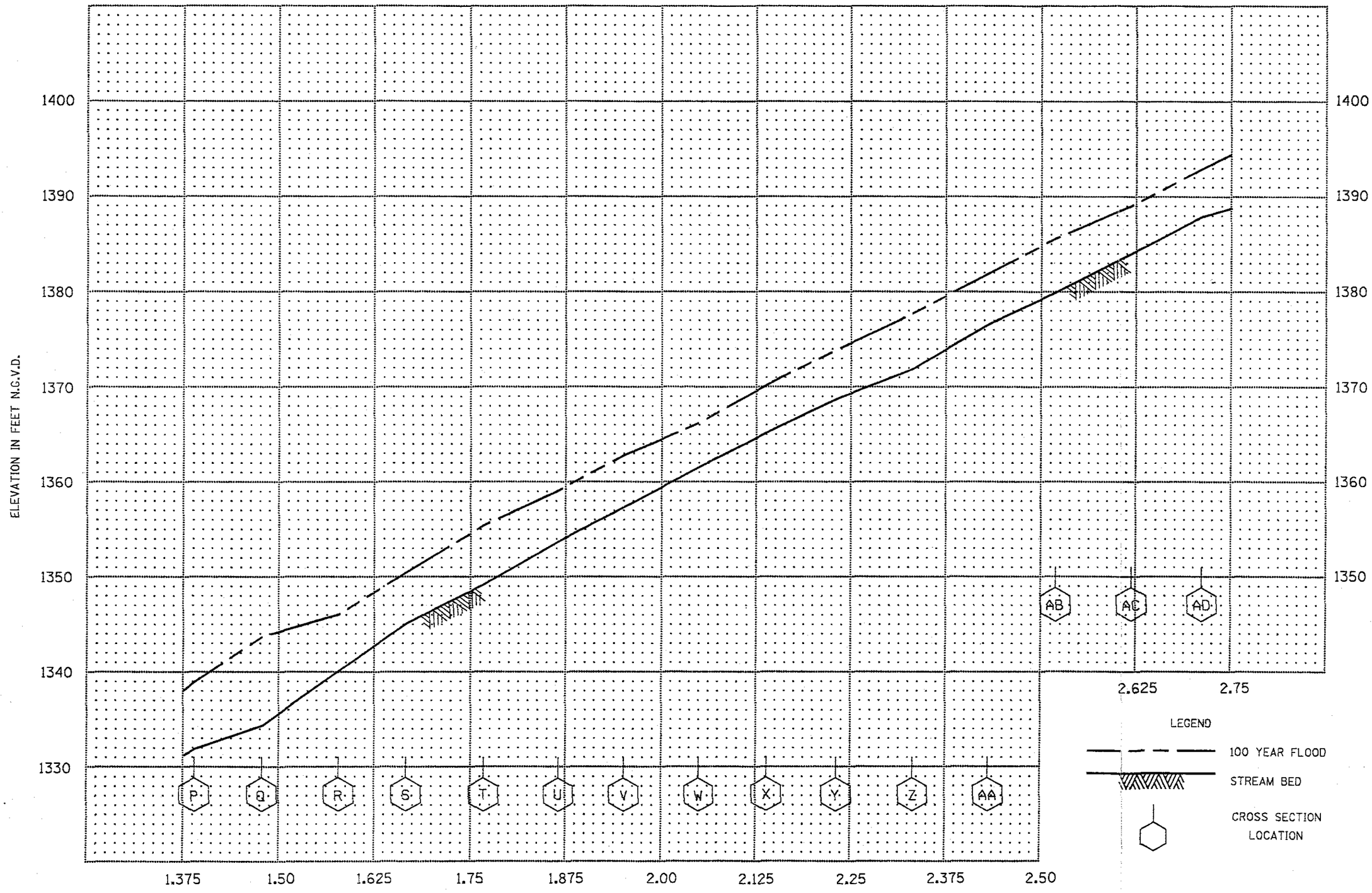
ERM 31A	1440.49	Brass cap in NE corner of center box culvert at Wagner Wash and Sun Valley Parkway. Stamped 1442.00. Near center of Section 5, Township 3 North, Range 4 West.
ERM 34	1418.00	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 6 and 7, Township 3 North, Range 4 West.
ERM 38	1524.24	Brass cap stamped U.S. Government Land Office at corner of Sections 21, 22, 28 and 27, Township 4 North, Range 4 West.
ERM 38A	1544.20	Central Arizona Project R/W brass cap located at R/W station 164+00.18, 125' rt., near center of Section 21, Township 4 North, Range 4 West.
ERM 44	1541.60	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 21 and 22, Township 4 North, Range 4 West.



1P	FEDERAL EMERGENCY MANAGEMENT AGENCY MARICOPA COUNTY, ARIZONA	FLOOD PROFILES WAGNER WASH

WAGNER WASH

FLOOD PROFILES



FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, ARIZONA

2P

WAGNER WASH

FLOOD PROFILES

ELEVATION IN FEET N.G.V.D.

1450
1440
1430
1420
1410
1400
1390
1380

SUN VALLEY PARKWAY

AE AF AG AH AI AJ AK AL AM AN AO AP AQ AR AS AT AU

2.75 2.875 3.00 3.125 3.25 3.375 3.50 3.625 3.75 3.875 4.00 4.125

STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH HASSAYAMPA RIVER

LEGEND

100 YEAR FLOOD

STREAM BED

CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, ARIZONA

3P

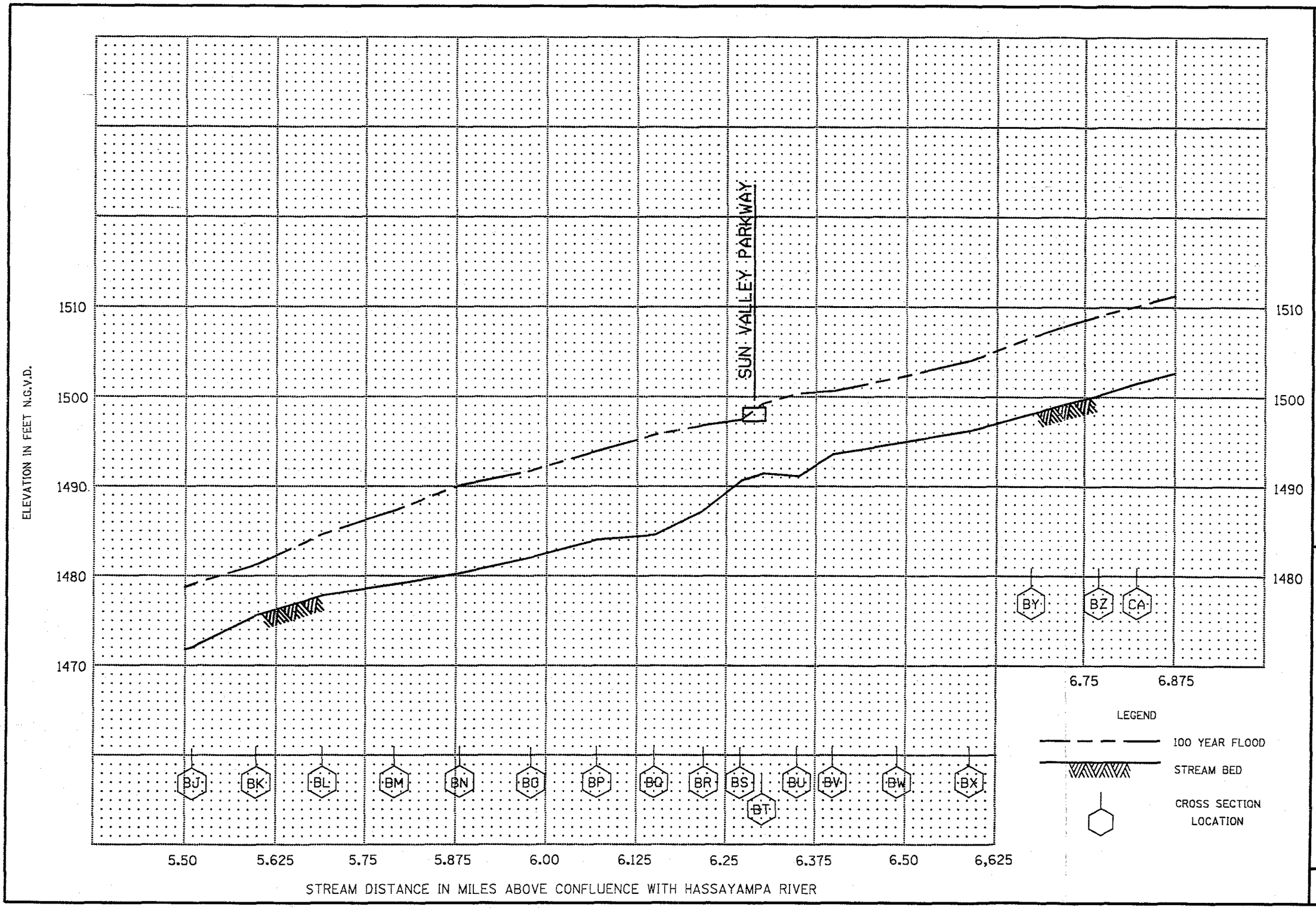
FLOOD PROFILES

WAGNER WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, ARIZONA

4P



FLOOD PROFILES

WAGNER WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, ARIZONA

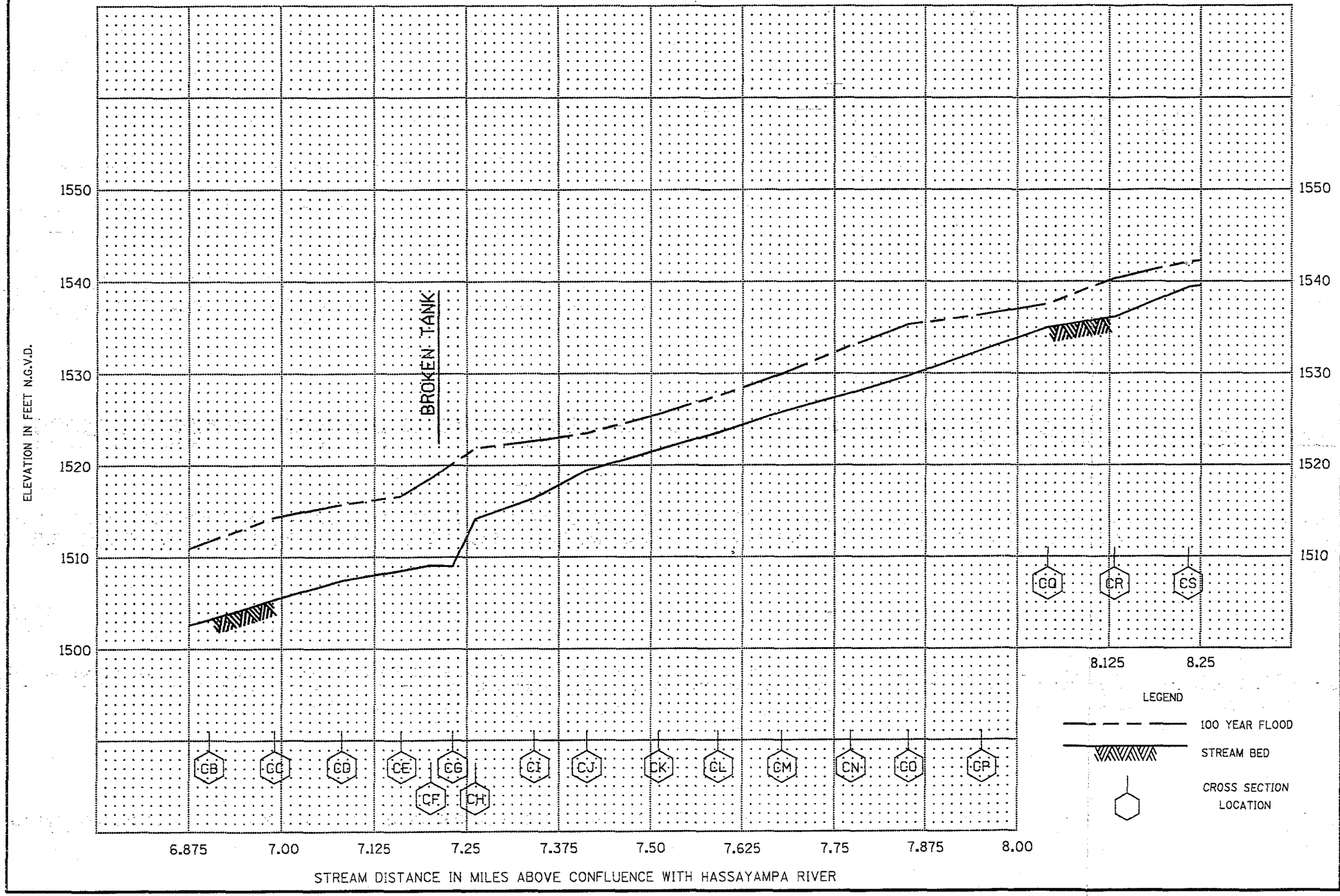
5P

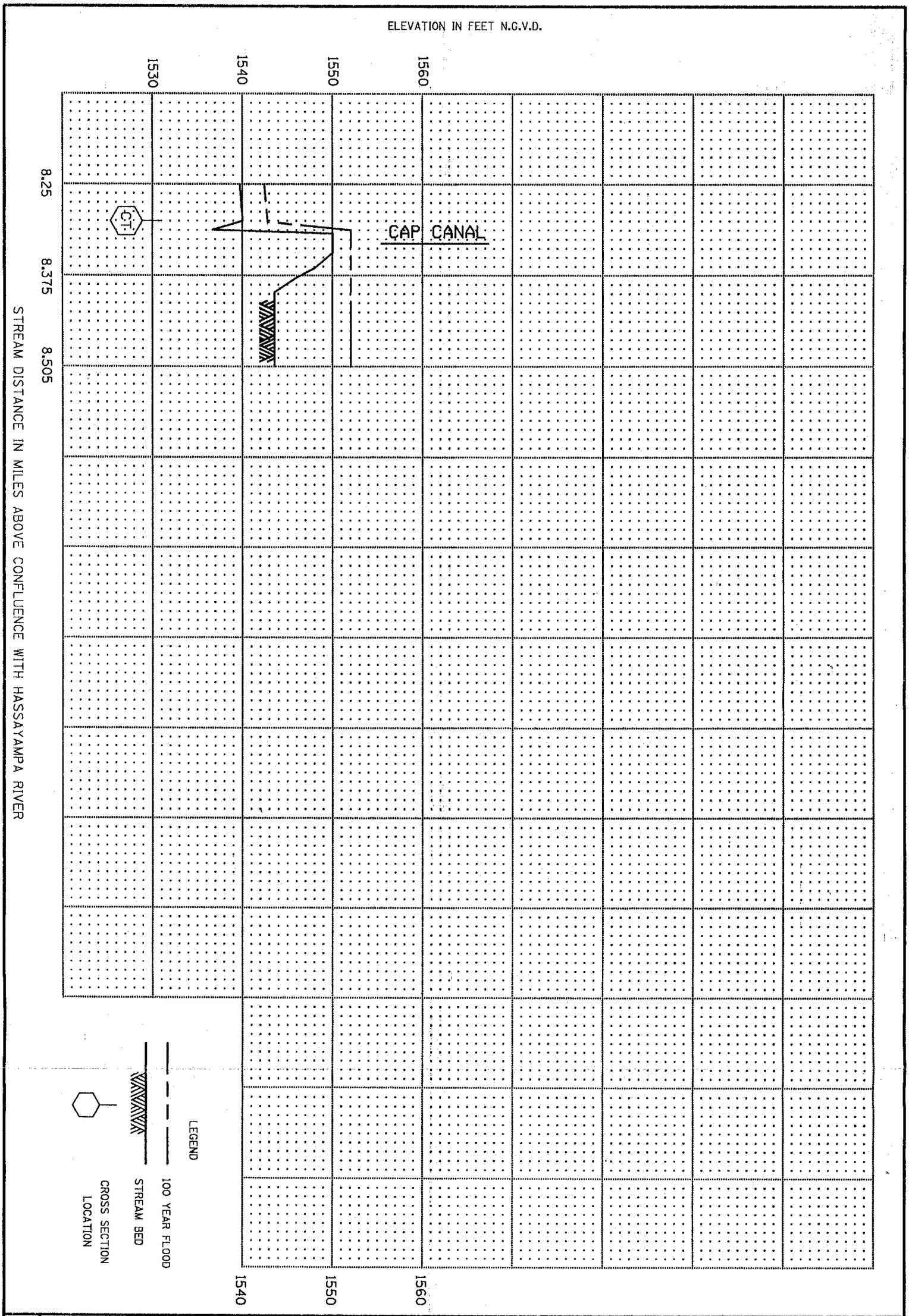
WAGNER WASH

FLOOD PROFILES

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, ARIZONA



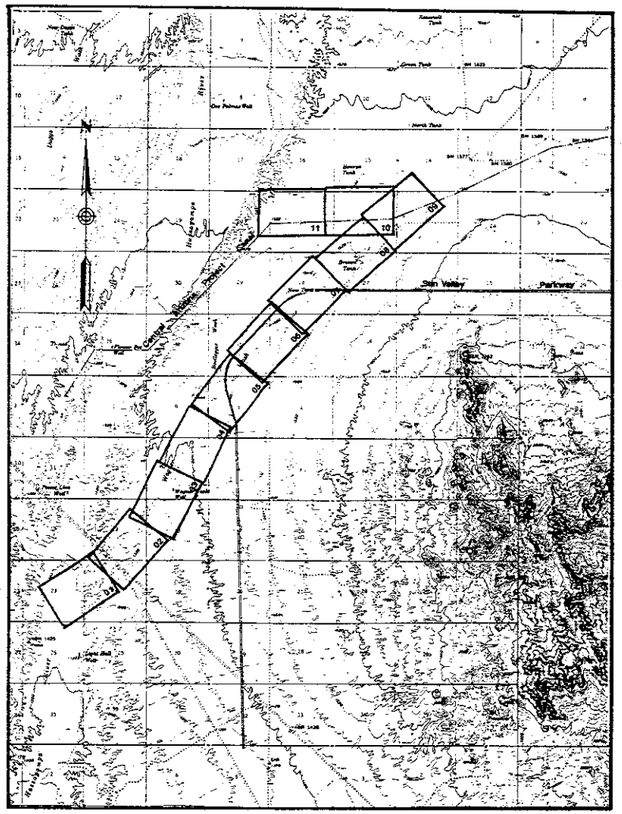


7P	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOOD PROFILES
	MARICOPA COUNTY, ARIZONA	WAGNER WASH

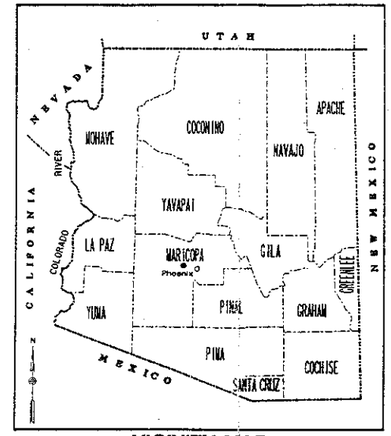
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

D. E. SAGRAMOSO, CHIEF ENGINEER AND GENERAL MANAGER

WAGNER WASH FLOOD DELINEATION STUDY



SHEET INDEX MAP



VICINITY MAP

100 YEAR PEAK DISCHARGE	
WAGNER WASH AT CONFLUENCE	15717 CFS

STUDY DATE - 1991

MAPPING DATE - 1990

MCLAIN-HARBERS AERIAL CO., TUCSON, AZ.

PREPARED BY: HDR ENGINEERING, INC.

	BY	DATE
DESIGN	ETL	3/91
DESIGN CHK.	DWB	4/91
PLAN	ETL	3/91
PLAN CHK.	DWB	4/91

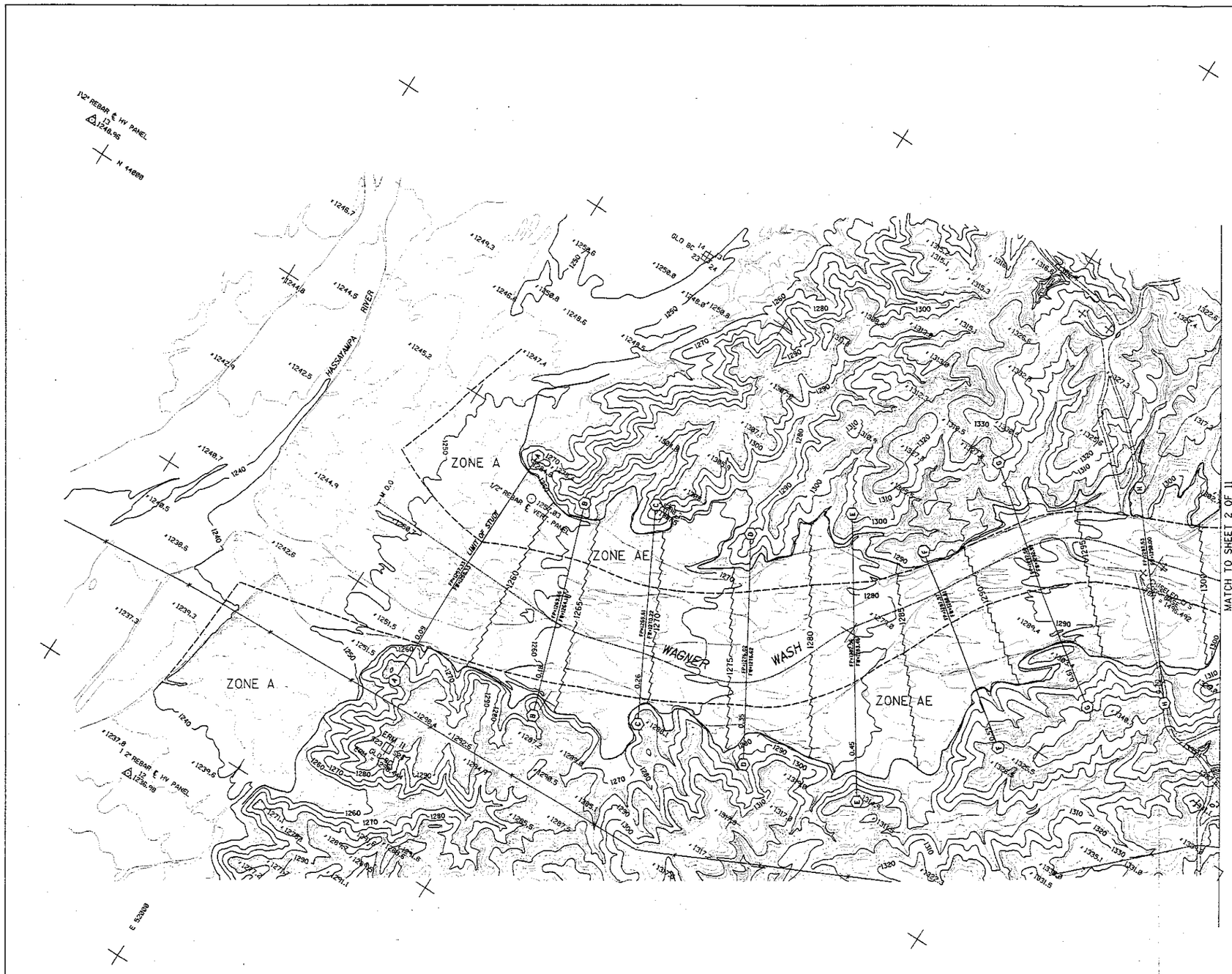
SUBMITTED BY: DATE

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET OF



FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
WAGNER WASH
WORK MAP

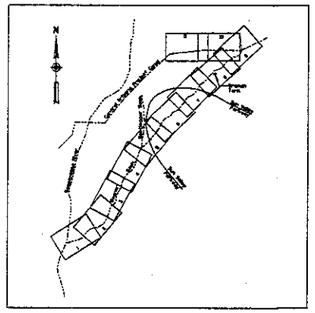
LEGEND

100-Yr Floodplain Boundary	
Floodway Boundary	
Hydraulic Base Line With River Mile	M75.0 M76.0
Cross Section	A FP=100 Yr. WSE FW = FLOODWAY WSE A
Elevation Reference Marks	ERM7 X
Base Flood Elevations	580
Zone Designations	ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM II	1296.44	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 23 and 24, Township 3 North, Range 5 West.

INDEX MAP



0 200 400
Scale: 1" = 200'
Contour Interval = 2 Feet

PREPARED BY:
HDR
HDR ENGINEERING, INC.

	BY	DATE	SUBMITTED BY:	DATE	SHEET
DESIGN	ETL	3-91			01
DESIGN CHK.	DWB	4-91	RECOMMENDED BY:	DATE	
PLAN	ETL	3-91	APPROVED BY:	DATE	OF 11
PLAN CHK.	DWB	4-91	CHIEF ENGINEER AND GENERAL MANAGER		

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90

WWASHO1 USER 9 PEN

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

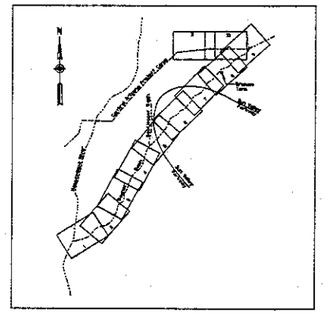
LEGEND

- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile — M75.0 M76.0
- Cross Section — A (FP=100 Yr. WSE, FW = FLOODWAY WSE) A
- Elevation Reference Marks — ERM7 x
- Base Flood Elevations — 580
- Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 5	1329.17	Brass Cap Stamped U.S. Government Land Office at Corner of Sections 13, 18, 19,and 24, Township 3 North, Range 5 West.
ERM 5A	1352.57	Brass Cap Stamped U.S. Government Land Office at East Quarter Corner of Section 13, Township 3 North, Range 5 West

INDEX MAP



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Scale: 1" = 200'

Contour Interval = 2 Feet

PREPARED BY:

HDR ENGINEERING, INC.

	BY	DATE
DESIGN	ETL	3/91
DESIGN CHK.	DWB	4/91
PLAN	ETL	3/91
PLAN CHK.	DWB	4/91

SUBMITTED BY: DATE

RECOMMENDED BY: DATE

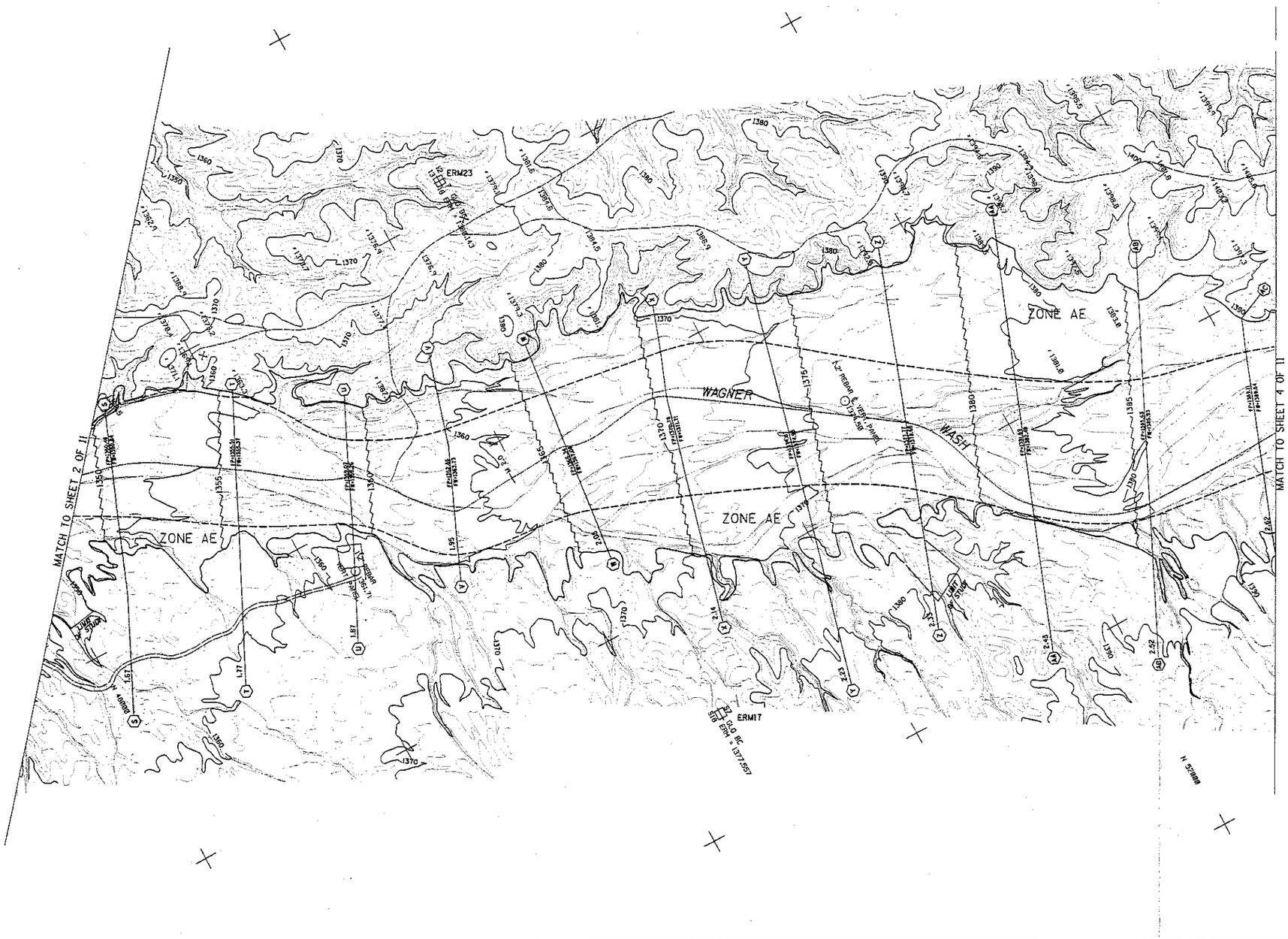
APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 02 OF 11

WWASH02 USER 9 PEN

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

LEGEND

100-Yr Floodplain Boundary

Floodway Boundary

Hydraulic Base Line With River Mile. M75.0 M76.0

Cross Section — FP=100 Yr. WSE, FW = FLOODWAY WSE

Elevation Reference Marks ERM7 X

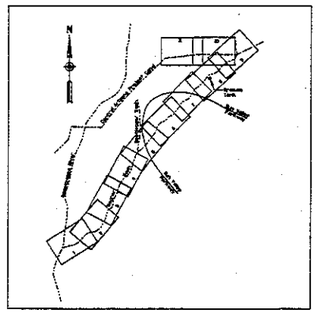
Base Flood Elevations 580

Zone Designations ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 17	1377.56	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 7 and 18, Township 3 North, Range 4 West.
ERM 23	1380.14	Brass Cap Stamped U.S. Government Land Office at Corner of Sections 7, 12, 13 and 18, Township 3 North, Range 5 West.

INDEX MAP



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Scale: 1" = 200'

Contour interval = 2 Feet

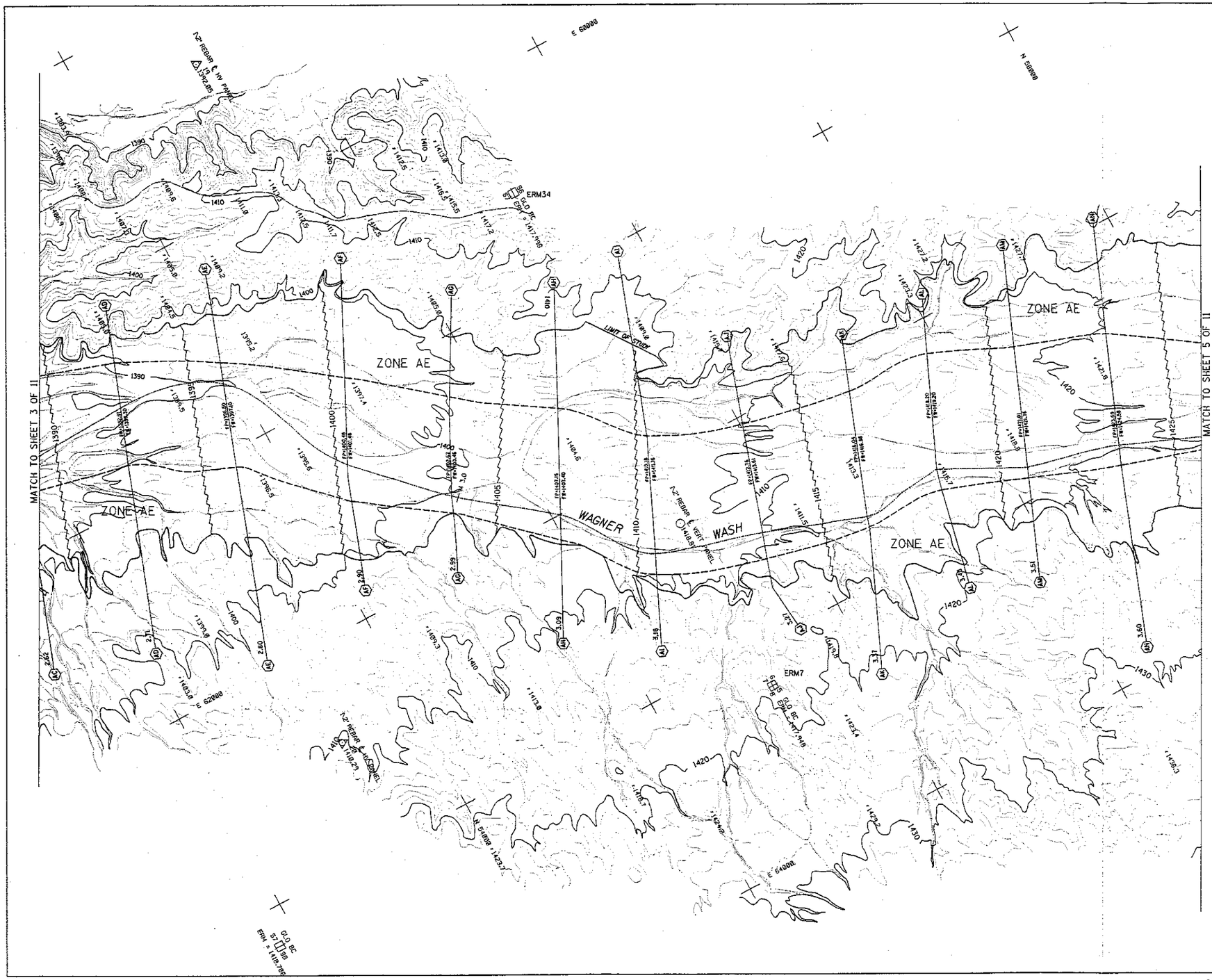
PREPARED BY:

HDR ENGINEERING, INC.

	BY	DATE	SUBMITTED BY: DATE	SHEET
DESIGN	ETL	3/91		
DESIGN CHK.	DWB	4/91	RECOMMENDED BY: DATE	03
PLAN	ETL	3/91	APPROVED BY: DATE	
PLAN CHK.	DWB	4/91	CHIEF ENGINEER AND GENERAL MANAGER	OF 11

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90

WWASHO3 USER 9 PEN



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

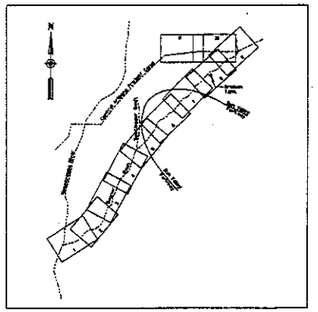
LEGEND

- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile (M75.0 — M76.0)
- Cross Section (A — FP=100 Yr. WSE / FW = FLOODWAY WSE — A)
- Elevation Reference Marks (ERM7 X)
- Base Flood Elevations (580)
- Zone Designations (ZONE AE)

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 34	1418.00	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 6 and 7, Township 3 North, Range 4 West.
ERM 7	1417.95	Brass Cap Stamped U.S. Government Land Office at Corner of Sections 5,6, 7 and 8, Township 3 North, Range 4 West.

INDEX MAP



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Scale: 1" = 200'

Contour Interval = 2 Feet

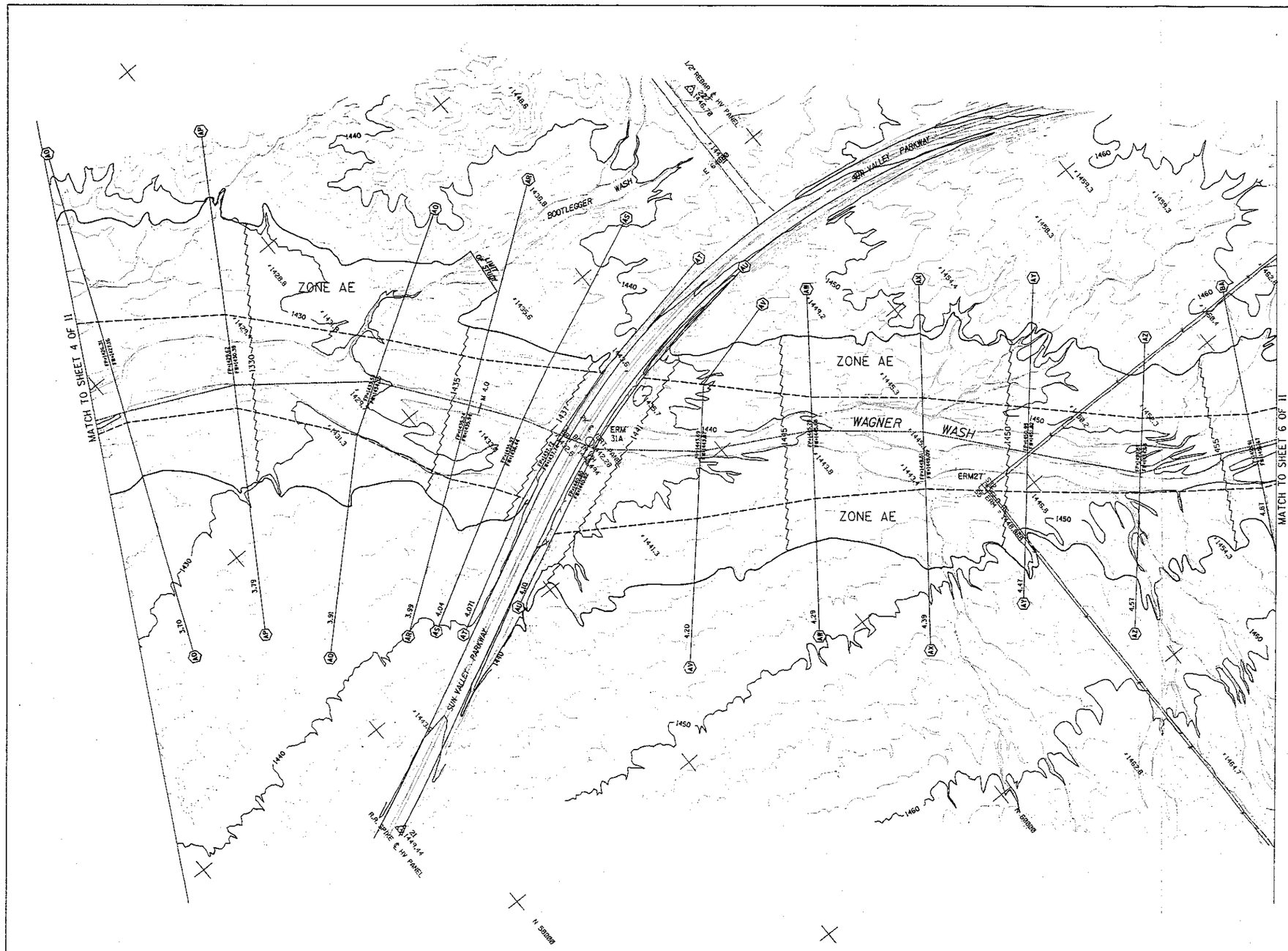
PREPARED BY: HDR ENGINEERING, INC.

	BY	DATE	SUBMITTED BY:	DATE
DESIGN	ETL	3/91		
DESIGN CHK.	DWB	4/91	RECOMMENDED BY:	DATE
PLAN	ETL	3/91	APPROVED BY:	DATE
PLAN CHK.	DWB	4/91	CHIEF ENGINEER AND GENERAL MANAGER	

SHEET 04 OF 11

WWASH04 USER 9 PEN

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

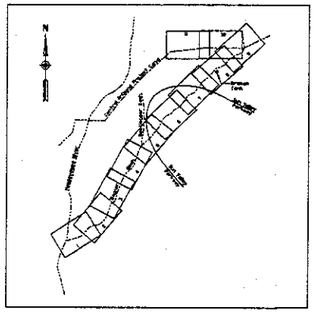
LEGEND

- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile — M75.0 M76.0
- Cross Section — A FP=100 Yr. WSE / FW = FLOODWAY WSE A
- Elevation Reference Marks — ERM7 X
- Base Flood Elevations — 580
- Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 27	1448.07	Brass Cap Stamped U.S. Government Land Office at North Quarter Corner of Section 5, Township 3 North, Range 4 West.
ERM 31A	1440.49	Brass Cap in NE Corner of Center Box Culvert at Wagner Wash and Sun Valley Parkway. Stamped 1442.00. Near Center of Section 5, Township 3 North, Range 4 West.

INDEX MAP



0 200 400

Scale: 1" = 200'

Contour Interval = 2 Feet

PREPARED BY: HDR ENGINEERING, INC.

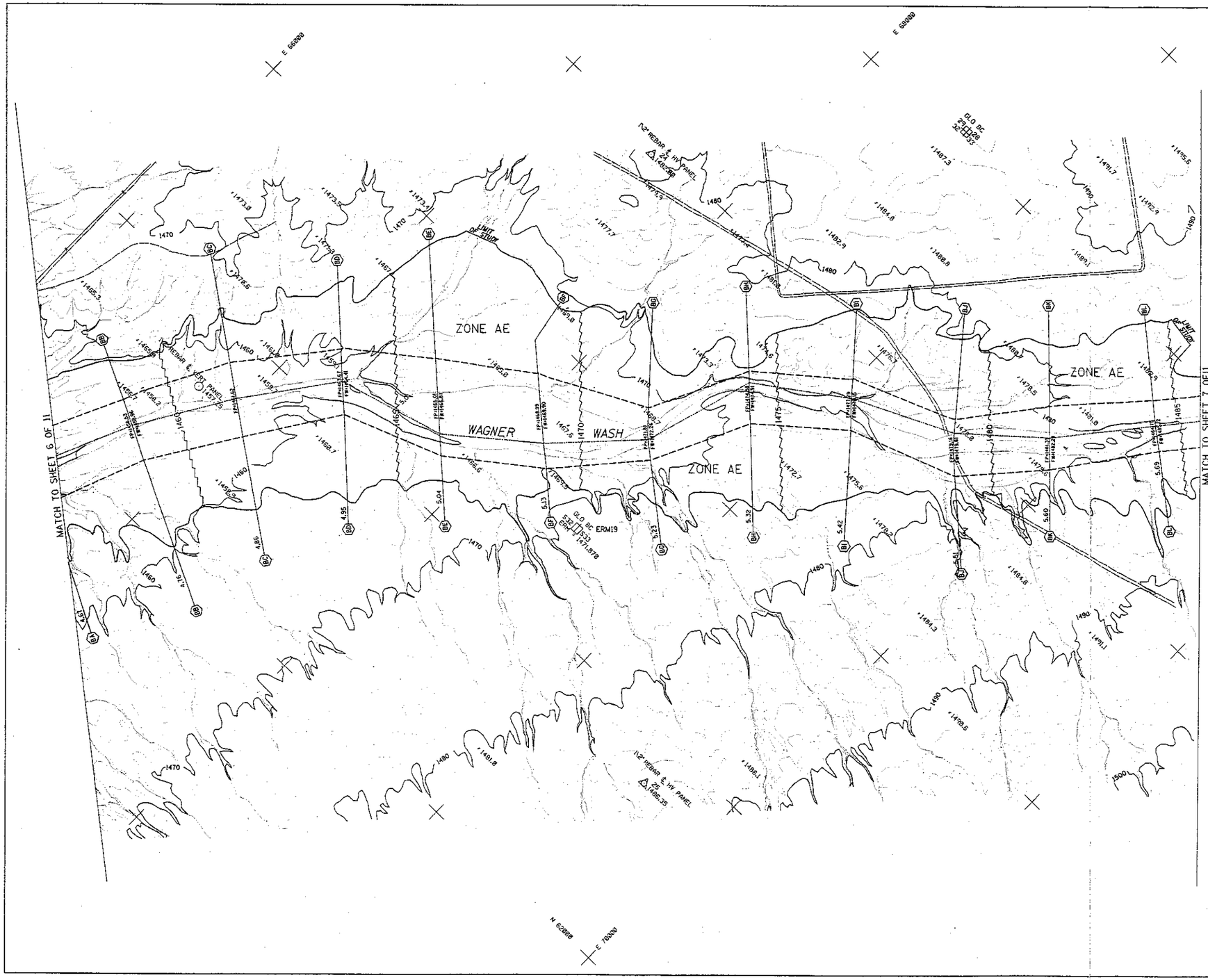
	BY	DATE
DESIGN	ETL	3/91
DESIGN CHK.	DWB	4/91
PLAN	ETL	3/91
PLAN CHK.	DWB	4/91

SUBMITTED BY: DATE
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 05 OF 11

WWASH05 USER 9 PEN

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

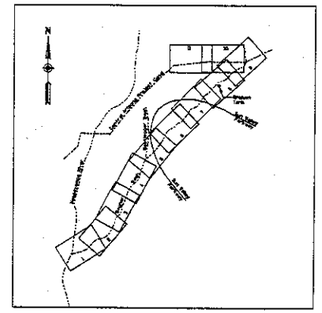
LEGEND

- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile — M75.0 M76.0
- Cross Section — A FP=100 Yr. WSE / FW = FLOODWAY WSE A
- Elevation Reference Marks — ERM7 X
- Base Flood Elevations — 580
- Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 19	1471.87	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 32 and 33, Township 4 North, Range 4 West.

INDEX MAP



0 200 400

Scale: 1" = 200'

Contour Interval = 2 Feet

PREPARED BY:

HDR ENGINEERING, INC.

	BY	DATE
DESIGN	ETL	3/91
DESIGN CHK.	DWB	4/91
PLAN	ETL	3/91
PLAN CHK.	DWB	4/91

SUBMITTED BY: DATE

RECOMMENDED BY: DATE

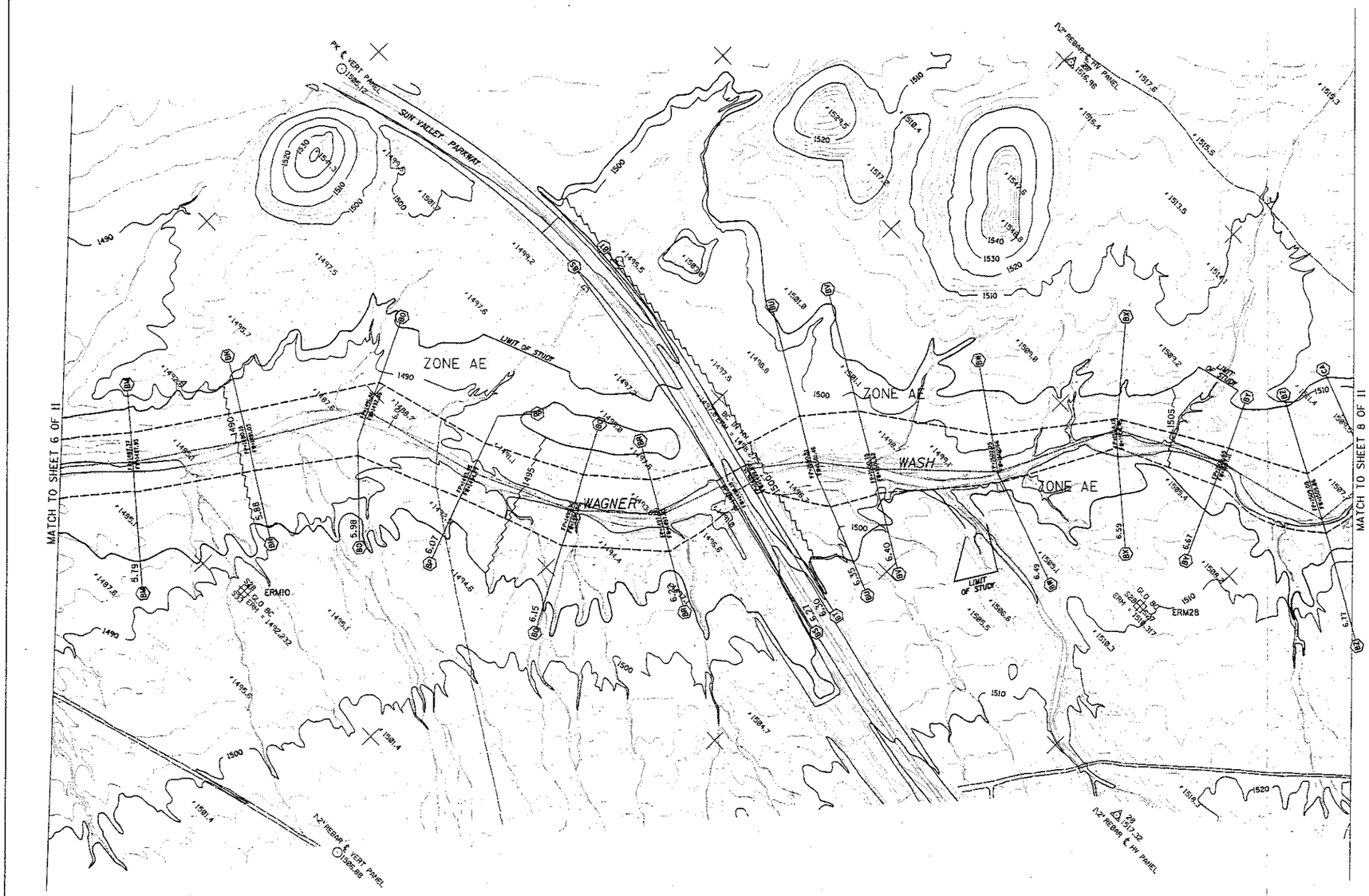
APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 06 OF 11

WKMAP06 USER 9 PEN

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

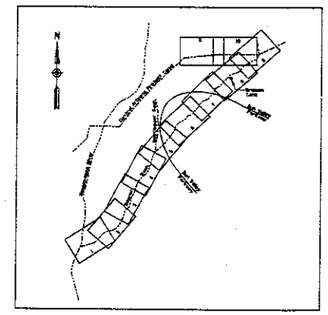
LEGEND

- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile — M75.0 M76.0
- Cross Section — FP=100 Yr. WSE, FW = FLOODWAY WSE
- Elevation Reference Marks — ERM7 X
- Base Flood Elevations — 580
- Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 10	1492.23	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 28 and 33, Township 4 North, Range 4 West.
ERM 28	1510.32	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 28 and 27, Township 4 North, Range 4 West.

INDEX MAP



0 200 400

Scale: 1" = 200'

Contour Interval = 2 Feet

PREPARED BY:

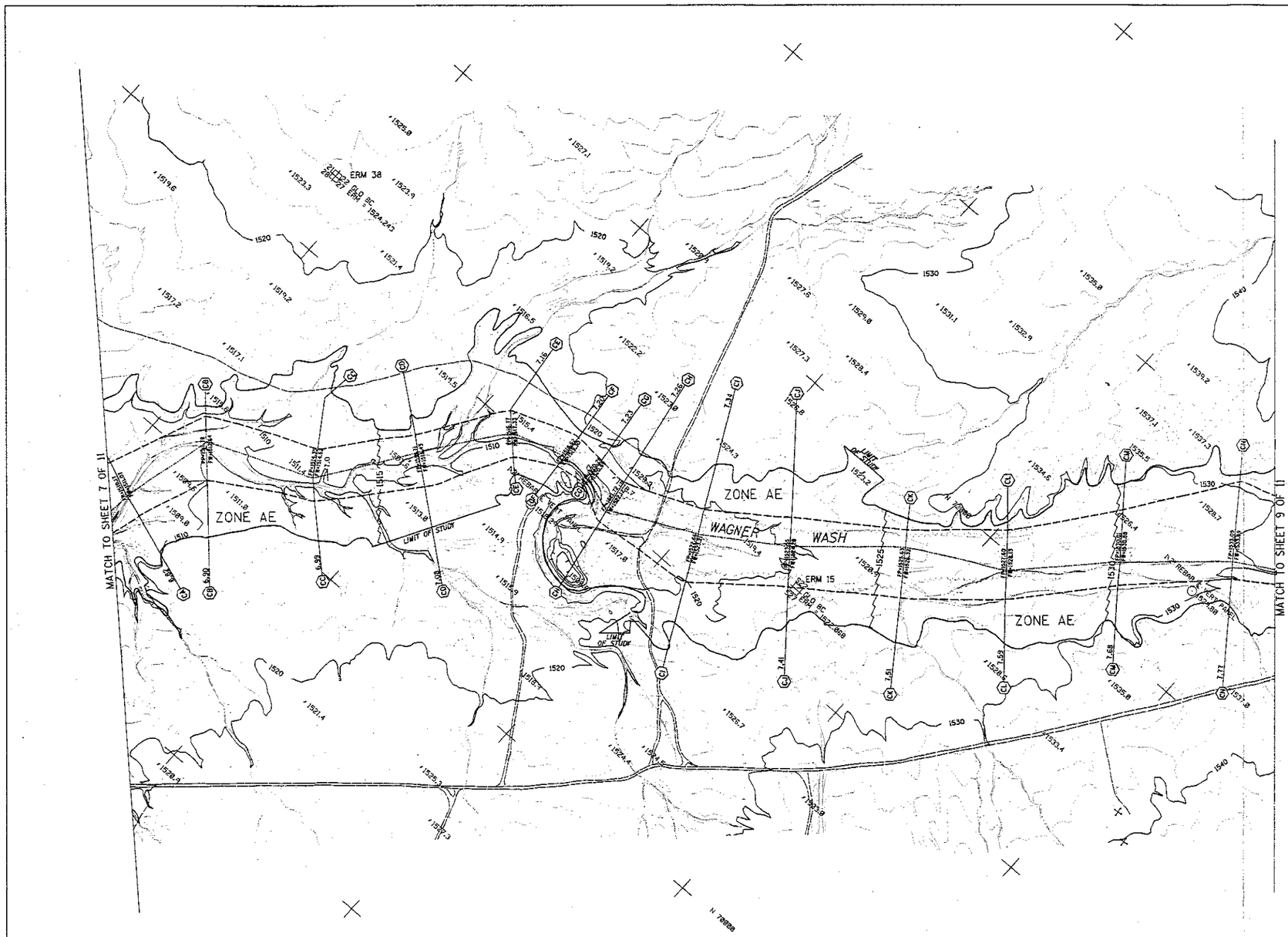
HDR ENGINEERING, INC.

	BY	DATE		
DESIGN	ETL	3/91	SUBMITTED BY:	DATE
DESIGN CHK.	DWB	4/91	RECOMMENDED BY:	DATE
PLAN	ETL	3/91	APPROVED BY:	DATE
PLAN CHK.	DWB	4/91	CHIEF ENGINEER AND GENERAL MANAGER	

SHEET 07 OF 11

WMASHOT USER 9 PEN

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90 .



FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
WAGNER WASH
WORK MAP

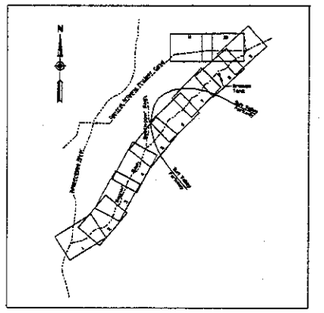
LEGEND

100-Yr Floodplain Boundary
Floodway Boundary
Hydraulic Base Line With River Mile — M75.0 M76.0
Cross Section — A FP=100 Yr. WSE / FW = FLOODWAY WSE A
Elevation Reference Marks — ERM7 X
Base Flood Elevations — 580
Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 38	1524.24	Brass Cap Stamped U.S. Government Land Office at Corner of Sections 21,22, 27 and 28, Township 4 North, Range 4 West.
ERM 15	1522.07	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 22 and 27, Township 4 North, Range 4 West.

INDEX MAP



0 200 400
Scale: 1" = 200'
Contour Interval = 2 Feet

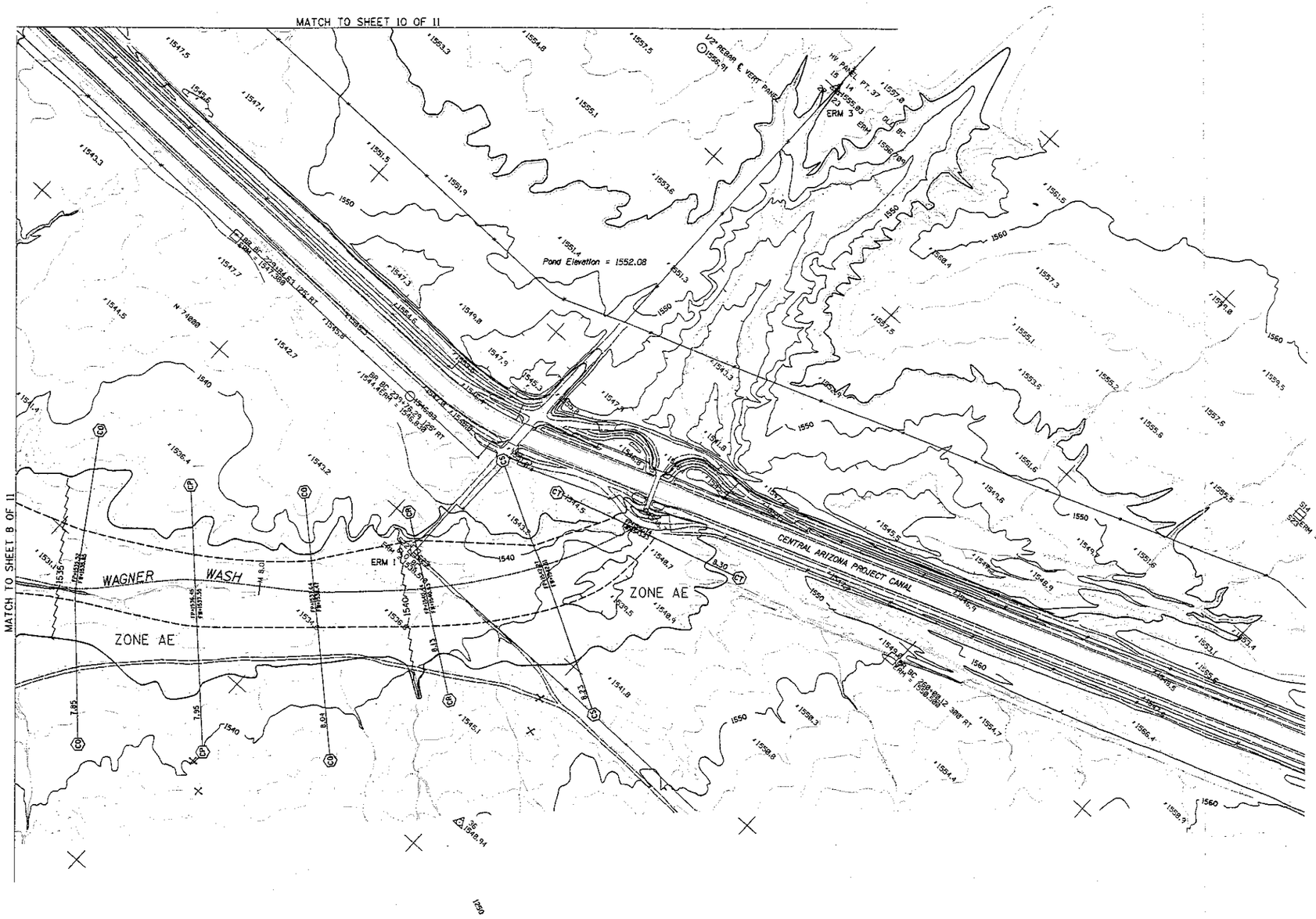
PREPARED BY:
HDR ENGINEERING, INC.

	BY	DATE	SUBMITTED BY: DATE
DESIGN	ETL	3-91	
DESIGN CHK.	DWB	4-91	RECOMMENDED BY: DATE
PLAN	ETL	3-91	APPROVED BY: DATE
PLAN CHK.	DWB	4-91	CHIEF ENGINEER AND GENERAL MANAGER

SHEET 08 OF 11

WWASHOB USER 9 PEN

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

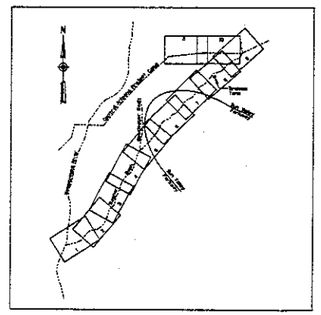
LEGEND

- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile — M75.0 M76.0
- Cross Section — FP=100 Yr. WSE, FW = FLOODWAY WSE
- Elevation Reference Marks — ERM7 X
- Base Flood Elevations — 580
- Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 1	1538.51	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 22 and 23, Township 4 North, Range 4 West.
ERM 3	1556.71	Brass Cap Stamped U.S. Government Land Office at Corner of Sections 14,15, 22 and 23, Township 4 North, Range 4 West.

INDEX MAP



0 200 400

Scale: 1" = 200'

Contour Interval = 2 Feet

PREPARED BY:

HDR ENGINEERING, INC.

	BY	DATE
DESIGN	ETL	3-91
DESIGN CHK.	DWB	4-91
PLAN	ETL	3-91
PLAN CHK.	DWB	4-91

SUBMITTED BY: DATE

RECOMMENDED BY: DATE

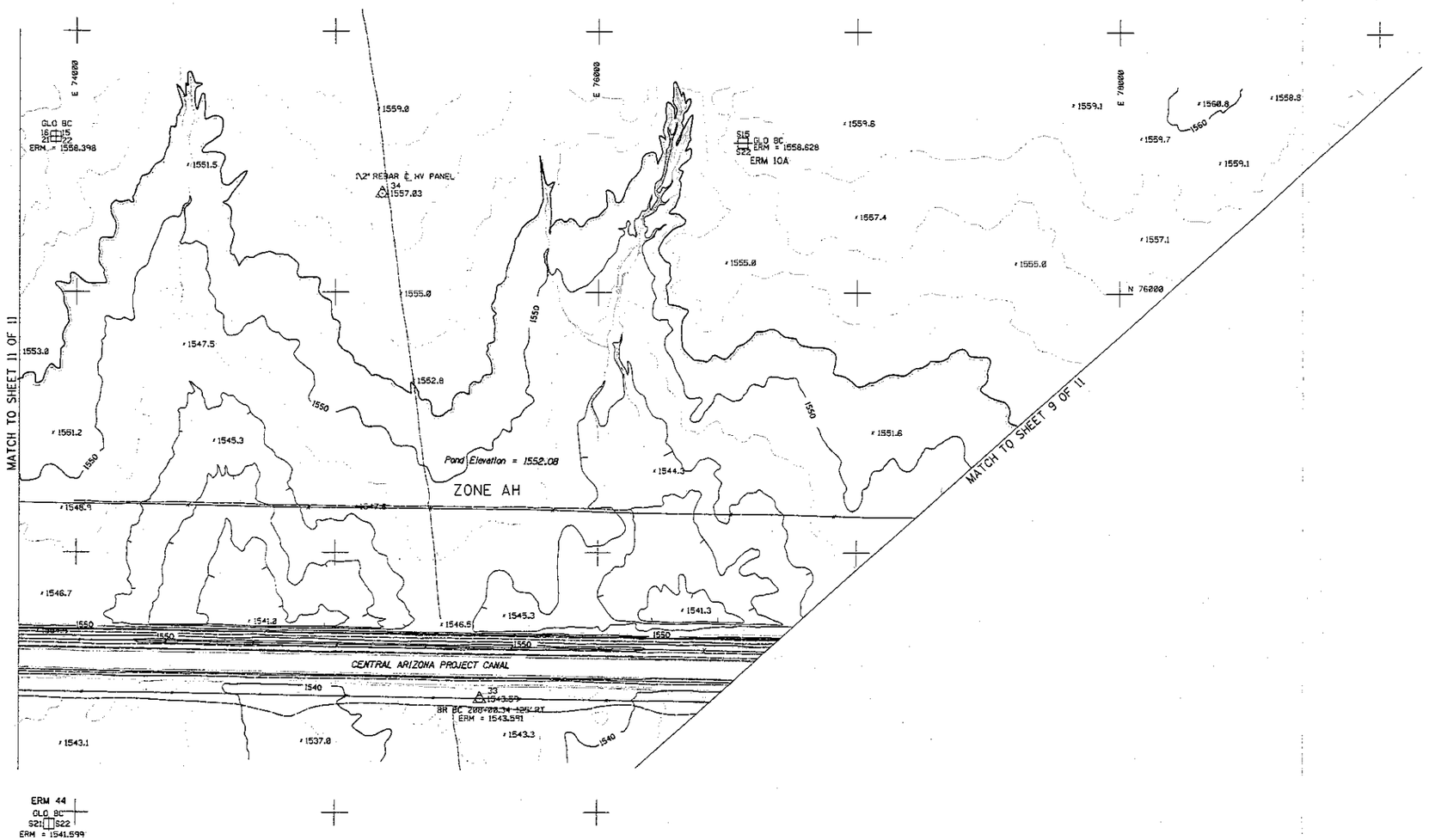
APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 09 OF 11

WAGNER09 USER 9 PEN

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

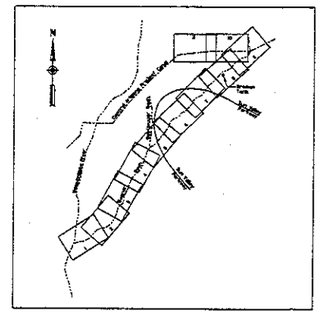
LEGEND

- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile (M75.0, M76.0)
- Cross Section (A — FP=100 Yr. WSE, FW = FLOODWAY WSE — A)
- Elevation Reference Marks (ERM7 X)
- Base Flood Elevations (580)
- Zone Designations (ZONE AE)

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 10A	1558.63	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 15 and 22, Township 4 North, Range 4 West.
ERM 44	1541.60	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 21 and 22, Township 4 North, Range 4 West.

INDEX MAP



0 200 400
Scale: 1" = 200'
Contour Interval = 2 Feet

PREPARED BY:
HDR ENGINEERING, INC.

	BY	DATE	SUBMITTED BY: DATE	SHEET
DESIGN	ETL	3-91		10
DESIGN CHK.	DWB	4-91	RECOMMENDED BY: DATE	
PLAN	ETL	3-91	APPROVED BY: DATE	OF 11
PLAN CHK.	DWB	4-91	CHIEF ENGINEER AND GENERAL MANAGER	

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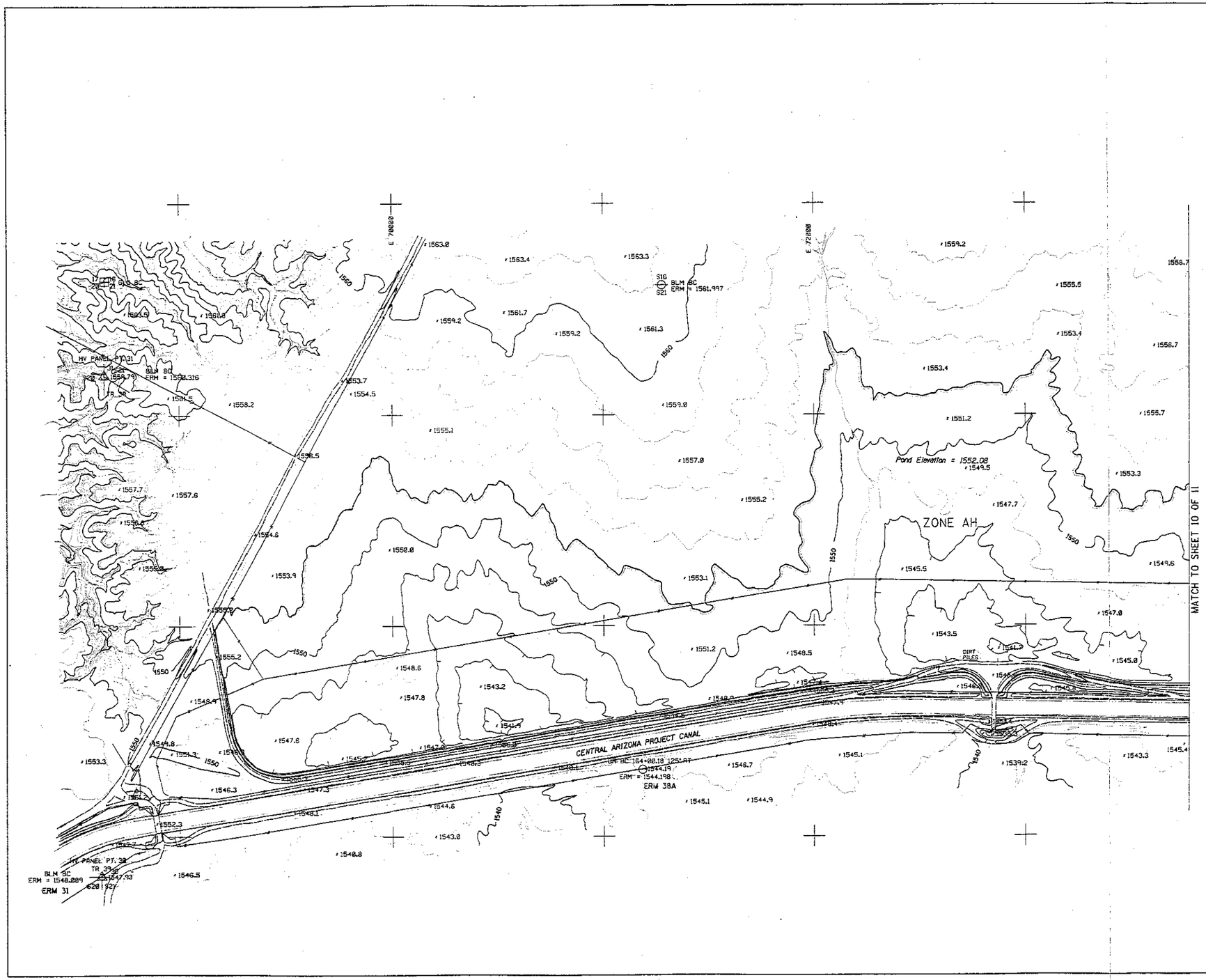
Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

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- 100-Yr Floodplain Boundary
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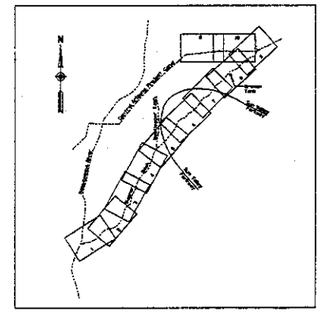
- Elevation Reference Marks (ERM7 x)
- Base Flood Elevations (580)
- Zone Designations (ZONE AE)

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 31	1548.09	Bureau of Land Management Brass Cap Marked T8 39 at Quarter Corner of Sections 20 and 21, Township 4 North, Range 4 West.
ERM 38A	1544.20	Central Arizona Project R/W Brass Cap Located at R/W Sta. 164+00.18, 125' Rt. Near Center of Section 21, Township 4 North, Range 4 West.

INDEX MAP



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Scale: 1" = 200'

Contour Interval = 2 Feet

PREPARED BY:

HDR ENGINEERING, INC.

	BY	DATE	SUBMITTED BY: DATE	SHEET
DESIGN	ETL	3-91		11
DESIGN CHK.	DWB	4-91	RECOMMENDED BY: DATE	
PLAN	ETL	3-91	APPROVED BY: DATE	OF 11
PLAN CHK.	DWB	4-91	CHIEF ENGINEER AND GENERAL MANAGER	

WWASHII USER 9 PEN

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90

WAGNER WASH
FLOOD INSURANCE STUDY

FINAL HYDRAULIC REPORT

Prepared for
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

by
HDR ENGINEERING

November 1, 1991

FLOOD INSURANCE STUDY

MARICOPA COUNTY,
ARIZONA
UNINCORPORATED AREA

APRIL 1991

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in an unincorporated area of Maricopa County, Arizona, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for an area of the County that will be used to establish actuarial flood insurance rates and assist the County in their effors to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic analyses for this study were prepared by the Flood Control District of Maricopa County, Arizona. The hydraulic analyses were prepared by HDR Engineering, Inc., the study contractor. This work was completed in April 1991.

1.3 Coordination

2.0 AREA STUDIED

2.1 Scope of Study

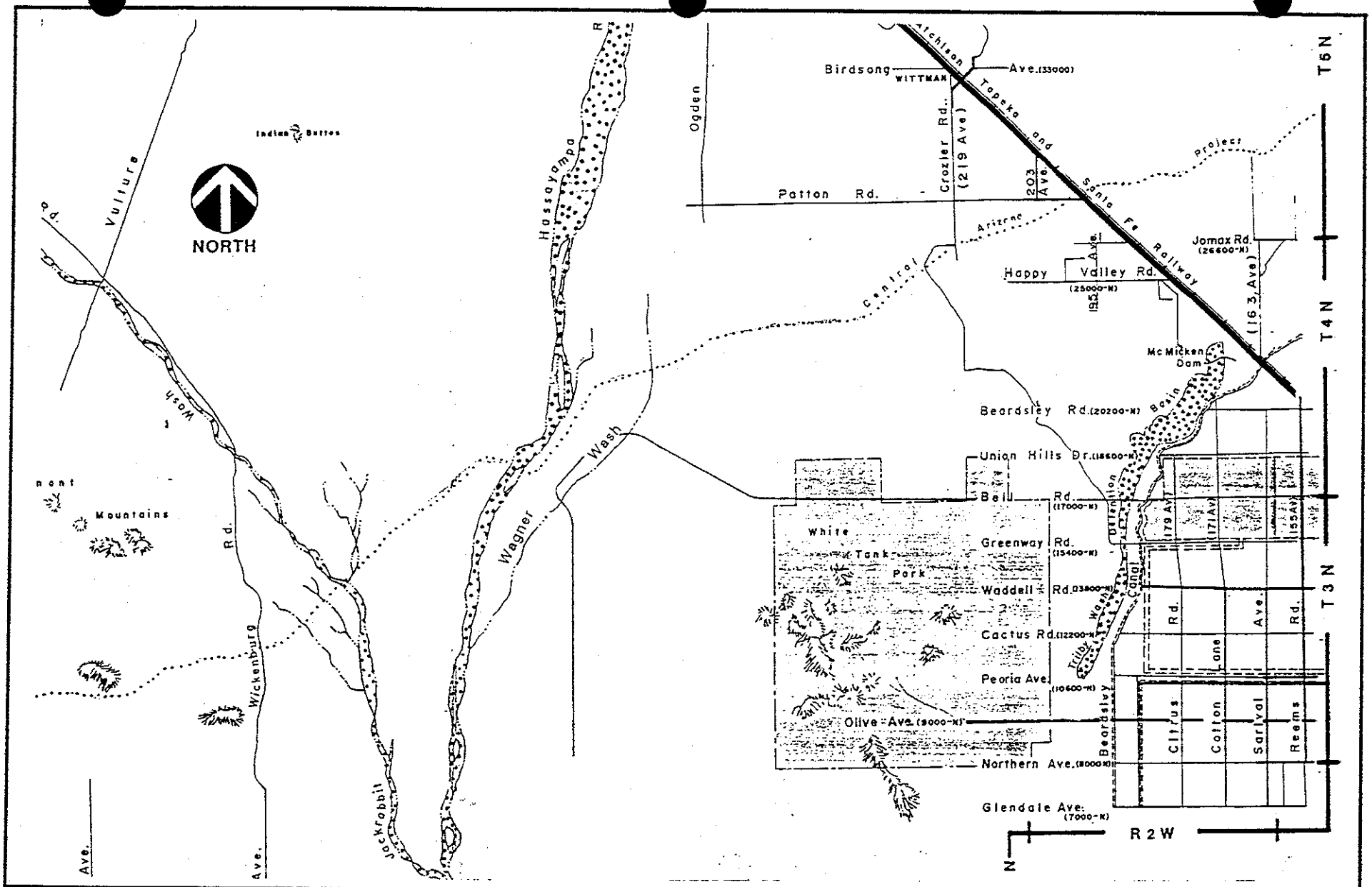
This Flood Insurance Study covers an unincorporated area of Maricopa County, Arizona. The area of study is shown on the Vicinity Map (Figure 1).

Riverine flooding on Wagner Wash from Central Arizona Project (CAP) Canal downstream to the stream's confluence with the Hassayampa River was studied by detailed methods. Ponded flooding above the CAP Canal was mapped at a single water surface elevation which was determined in the hydrologic analyses performed by the Flood Control District of Maricopa County. The scope and methods of study were proposed to, and agreed upon by, the Arizona Department of Water Resources and the Flood Control District of Maricopa County, Arizona.

2.2 Community Description

Maricopa County, encompassing a total area of 9238 square miles, is located in south-central Arizona. It is bordered by Yavapai County to the north, Pinal and Gila Counties to the east, Pima County to the south and Yuma and La Paz Counties to the west. The incorporated communities within the county cover an area in excess of 100 square miles and an additional 3,330 square miles are Government-owned lands. A large portion of the the remaining county is undeveloped. The Wagner Wash drainage area is largely undeveloped at this time. The 1980 population of the county was 1.5 million.

The topography of Maricopa County varies from rugged mountainous areas in the north to arid plain and desert in southern areas. Small intermittent streams and washes traverse most of the county.



FEDERAL EMER. MANAGEMENT AGENCY

MARICOPA COUNTY
(UNINCORPORATED AREAS)

VICINITY MAP

The climate in Maricopa County is mild with short, moderate winters and long, hot summers. Mean annual precipitation ranges from 7 inches in the southern desert regions of the county to more than 25 inches in the mountainous northern areas. Two periods of the year produce the heaviest rainfall amounts. Winter storms occur during the December to March period and summer storms occur most frequently from June through October.

2.3 Principal Flood Problems

Historically, large portions of Maricopa County are prone to destructive floods. However, there are no severe flood problems, life or property threatening, evident in the area of study. The area is still largely in its natural state and manmade structures within the flood plain limits are minimal, with the exception of electrical transmission towers which have been constructed in the flood plain at several locations.

The two roadway crossings, both Sun Valley Parkway, are of recent construction and the adequacy of the culvert structures under flood conditions of any frequency has not been observed.

The installation of the Central Arizona Project Canal at the upstream area of study has created a levee that impounds flood waters on its north side. Relief through the canal is provided by overchutes located at periodic intervals along the canal.

2.4 Flood Protection Measures

No flood protection measures currently exist in Wagner Wash watershed, nor are any planned in the foreseeable future. The effect of the CAP Canal serves as a protection measure, but it was not constructed for that purpose. Cursory inspection of the canal indicates that it is adequate to withstand the hydraulic pressures induced by the expected impoundment of water during the study's rainfall event; however, this study does not warrant that the canal levees will not fail, either partially or fully, under rainfall events of any frequency.

3.0 ENGINEERING METHODS

For the flooding source studied in detail, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. A flood event of a magnitude which is expected to be equalled or exceeded once on the average during any 100-year period (recurrence interval) has been selected as having special significance for flood plain management and for flood insurance premium rates. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual occurrence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported here reflect flooding potentials based on conditions existing in the county at the time of completion of the study. Maps and flood elevations may be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

The hydrologic analyses were performed by the study's sponsor, the Flood Control District of Maricopa County. The study contractor reviewed the hydrologic model at the initial stages of the flood study and prepared review comments for the Flood Control District, as did the Arizona Department of Water Resources. The Flood Control District made adjustments to their hydrologic analysis and revised the hydrology for use in the flood plain analysis. The study contractor felt the revised hydrology was sufficient for use on this study.

Table 2. Summary of Discharges

Flooding Source and Location	Drainage Area (Square miles)	100-year Peak Discharge (cubic feet per second)
Wagner Wash at confluence with Hassayampa River	42.07	15717
Wagner Wash at east quarter corner of Section 13, T. 3 N, R. 5 W.	40.21	15351
Wagner Wash near center of the SE 1/4 SW 1/4, Section 7, T. 3 N, R. 4 W.	38.63	12861
Wagner Wash near center of Section 7, T. 3 N, R. 4 W.	38.17	12363
Wagner Wash, 1700 feet below confluence with Bootlegger Wash	37.39	10964
Wagner Wash at Sun Valley Parkway (south crossing)	28.62	10358
Wagner Wash, 2000 feet upstream of Sun Valley Parkway (south crossing)	25.93	8904
Wagner Wash, 5200 feet upstream of Sun Valley Parkway (south crossing)	24.54	8079
Wagner Wash, 3700 feet downstream of Sun Valley Parkway (north crossing)	22.72	7225
Wagner Wash, downstream side of Sun Valley Parkway (north crossing)	20.38	5906
Wagner Wash, upstream of Sun Valley Parkway (north crossing)	15.99	3446
Wagner Wash, 3200 feet north of Sun Valley Parkway (north crossing)	15.07	2894
Wagner Wash, 1700 feet downstream of CAP canal	13.14	1723
Wagner Wash downstream of CAP canal	11.89	873

3.2 Hydraulic Analysis

Analysis of the hydraulic characteristics of flooding from the riverine source studied was carried out to provide an estimate of the elevation of flooding of the selected 100-year recurrence interval.

Cross-section data for the backwater analysis was obtained photogrammetrically from aerial photographs obtained by aerial survey in September, 1990. Topographic maps were also compiled from the aerial survey and were used for base map information and to supplement the cross-section data, where required. The topographic maps were computer generated at a scale of 1:2400 with a contour interval of 2 feet. All culvert crossings were field surveyed to obtain elevation data and structural geometry.

Water-surface elevations of the flood of the selected recurrence interval were computed using the COE HEC-2 step-backwater computer program. The starting water-surface elevation for Wagner Wash was determined using the slope-area method. HY-8, a Federal Highways Administration culvert analysis computer program was supplementally used to calculate hydraulic losses through the modeled culvert structures.

Channel and overbank roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the stream and flood plain areas. The channel "n" values for Wagner Wash ranged from 0.04 to 0.105 and overbank "n" values ranged from 0.065 to 0.10.

The hydraulic analysis for this study was based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if the hydraulic structures remain unobstructed.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100-year floodplain and floodway boundaries to assist communities in developing flood plain management measures.

4.1 Flood Plain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. For the stream studied in detail, the 100-year flood plain boundary has been delineated using the flood elevations determined at each cross section.

Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:2400 with a contour interval of 2 feet.

The 100-year flood plain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

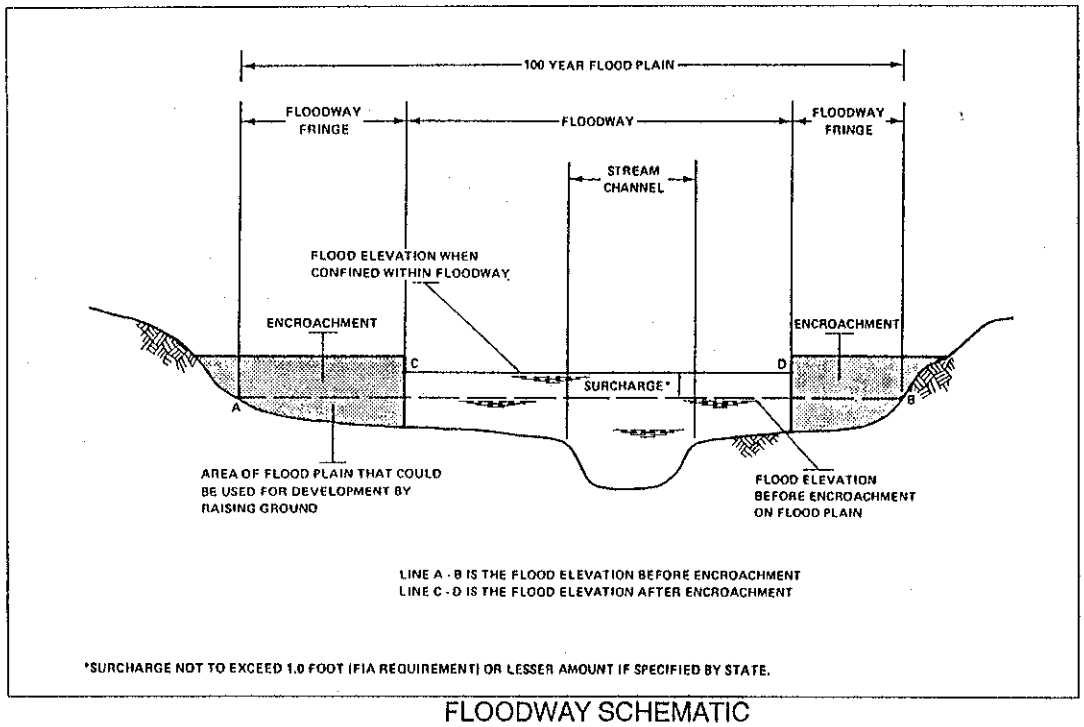
4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increases in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodway in this study is presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodway presented in this study was computed for the entire stream length on the basis of engineering judgment which consisted of utilizing equal conveyance methodology as a starting point but completing the floodway delineation by specifying the exact location of the encroachment for any given cross section. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table _). In cases where the floodway and 100-year flood plain boundaries are either close together or collinear, only the floodway boundary is shown.

The area between the floodway and 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the flood plain 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. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure _.

Development or encroachment shall be prohibited within the flood plain area shown upstream of the CAP Canal.



FLOODWAY SCHEMATIC

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE (NOTE)	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY	INCREASE
Wagner Wash								
A	475	540	2426	6.5	1257.3	1257.3	1258.3	1.0
B	945	570	1960	8.0	1263.7	1263.7	1264.2	0.5
C	1360	501	1948	8.1	1269.6	1269.6	1270.2	0.6
D	1840	511	2063	7.6	1276.0	1276.0	1276.6	0.6
E	2330	450	1852	8.5	1282.6	1282.6	1283.5	0.9
F	2750	280	1585	9.9	1288.0	1288.0	1288.8	0.8
G	3180	322	1645	9.6	1292.5	1292.5	1293.0	0.5
H	3690	334	1493	10.5	1297.5	1297.5	1298.0	0.5
I	4150	442	1749	9.0	1303.3	1303.3	1303.9	0.6
J	4670	509	2129	7.4	1309.9	1309.9	1310.8	0.9
K	4970	327	1394	11.3	1313.8	1313.8	1313.9	0.1
L	5390	580	2530	6.2	1319.2	1319.2	1319.6	0.4
M	5880	476	1860	8.4	1323.2	1323.2	1323.6	0.4
N	6370	333	1530	10.3	1328.7	1328.7	1328.8	0.1
O	6860	334	1645	9.6	1333.2	1333.2	1333.8	0.6
P	7330	214	1217	12.9	1339.0	1339.0	1339.0	0.0
Q	7780	200	1565	9.8	1343.8	1343.8	1343.9	0.1
R	8300	314	1736	8.8	1346.2	1346.2	1347.1	0.9
S	8800	462	1808	8.5	1350.5	1350.5	1350.9	0.4
T	9330	570	2016	7.6	1355.5	1355.5	1355.4	-0.1
U	9830	375	1588	9.7	1359.1	1359.1	1359.3	0.2
V	10270	540	2525	6.1	1362.9	1362.9	1363.8	0.9
W	10770	550	1988	7.7	1366.3	1366.3	1367.0	0.7
X	11260	650	2493	6.2	1370.8	1370.8	1371.7	0.9
Y	11740	650	2387	6.4	1374.1	1374.1	1375.0	0.9
Z	12250	550	2175	5.9	1377.8	1377.8	1378.7	0.9
AA	12910	600	2345	5.5	1381.7	1381.7	1382.5	0.8

NOTE: Distance In Feet Above Mouth Along Profile Base Line

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE (NOTE)	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY	INCREASE
Wagner Wash								
AB	13420	600	2010	6.4	1385.6	1385.6	1385.9	0.3
AC	13920	540	1896	6.8	1389.1	1389.1	1389.5	0.4
AD	14440	490	1957	6.3	1392.9	1392.9	1393.3	0.4
AE	14900	500	1633	7.6	1396.5	1396.5	1397.1	0.6
AF	15590	590	2691	4.6	1400.5	1400.5	1401.5	1.0
AG	16080	553	2257	5.5	1402.6	1402.6	1403.4	0.8
AH	16580	625	1818	6.8	1412.8	1407.1	1407.4	0.3
AI	17050	660	2649	4.7	1410.2	1410.2	1411.2	1.0
AJ	17550	650	2320	5.3	1412.8	1412.8	1413.7	0.9
AK	18050	650	2232	5.5	1416.0	1416.0	1416.9	0.9
AL	18400	650	2475	5.0	1418.2	1418.2	1419.2	1.0
AM	18830	625	2181	5.7	1421.0	1421.0	1421.8	0.8
AN	19280	625	2159	5.1	1423.6	1423.6	1424.6	1.0
AO	19800	475	1748	6.3	1426.3	1426.3	1427.2	0.9
AP	20310	425	1545	7.1	1429.6	1429.6	1430.4	0.8
AQ	20910	450	1834	6.0	1433.5	1433.5	1434.3	0.8
AR	21350	551	2410	4.5	1435.2	1435.2	1435.9	0.7
AS	21590	590	1933	5.4	1436.0	1436.0	1436.5	0.5
AT	21750	647	913	11.3	1437.7	1437.7	1437.7	0.0
AU	21920	798	1591	6.5	1440.8	1440.8	1440.8	0.0
AV	22420	600	2548	4.1	1443.7	1443.7	1443.9	0.2
AW	22920	450	1533	6.8	1445.3	1445.3	1445.7	0.4
AX	23420	400	1752	5.9	1448.5	1448.5	1449.1	0.6
AY	23890	375	1616	6.4	1450.9	1450.9	1451.8	0.9
AZ	24400	330	1659	5.4	1453.9	1453.9	1454.7	0.8
BA	24920	330	1626	5.5	1455.9	1455.9	1456.7	0.8
BB	25410	300	1213	7.3	1458.5	1458.5	1458.9	0.4

NOTE: Distance In Feet Above Mouth Along Profile Base Line

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE (NOTE)	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
Wagner Wash								
BC	25910	355	1803	4.9	1461.6	1461.6	1462.6	1.0
BD	26410	300	1466	6.1	1463.7	1463.7	1464.4	0.7
BE	26870	450	1532	5.8	1466.0	1466.0	1466.9	0.9
BF	27360	450	1613	5.0	1469.0	1469.0	1469.9	0.9
BG	27860	250	1244	6.5	1471.8	1471.8	1472.2	0.4
BH	28360	250	1008	8.0	1474.4	1474.4	1474.9	0.5
BI	28860	250	1434	5.6	1477.3	1477.3	1478.2	0.9
BJ	29360	270	1305	6.2	1479.2	1479.2	1479.9	0.7
BK	29810	300	1106	6.5	1481.4	1481.4	1482.3	0.9
BL	30310	250	1022	7.1	1484.7	1484.7	1485.1	0.4
BM	30810	250	1058	6.8	1487.4	1487.4	1488.0	0.6
BN	31300	250	1510	4.8	1490.1	1490.1	1491.0	0.9
BO	31800	320	1640	4.4	1491.9	1491.9	1492.9	1.0
BP	32290	250	1185	5.7	1494.0	1494.0	1494.8	0.8
BQ	32730	300	1602	4.2	1495.9	1495.9	1496.9	1.0
BR	33090	300	1703	3.2	1497.0	1497.0	1497.8	0.8
BS	33380	80	589	5.8	1497.5	1497.5	1498.2	0.7
BT	33526	200	416	8.3	1499.4	1499.4	1499.9	0.9
BU	33776	400	2010	1.7	1500.5	1500.5	1501.5	1.0
BV	34026	350	1282	2.7	1500.7	1500.7	1501.6	0.9
BW	34526	200	906	3.8	1502.2	1502.2	1502.6	0.4
BX	35036	150	587	5.9	1504.1	1504.1	1504.4	0.3
BY	35486	163	611	5.6	1506.6	1506.6	1507.1	0.5
BZ	35956	250	807	4.3	1509.1	1509.1	1509.9	0.8
CA	36216	250	871	4.0	1510.2	1510.2	1511.1	0.9
CB	36616	275	1011	3.4	1511.8	1511.8	1512.6	0.8
CC	37086	225	590	4.9	1514.3	1514.3	1514.6	0.3

NOTE: Distance In Feet Above Mouth Along Profile Base Line

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE (NOTE)	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
Wagner Wash								
CD	37546	225	1062	2.7	1515.7	1515.7	1516.4	0.7
CE	37956	200	653	4.4	1516.8	1516.8	1517.4	0.6
CF	38206	154	730	4.0	1518.6	1518.6	1519.3	0.7
CG	38346	122	498	5.8	1520.3	1520.3	1520.7	0.4
CH	38496	200	1029	2.8	1521.7	1521.7	1522.1	0.4
CI	38896	320	1586	1.8	1522.7	1522.7	1523.3	0.6
CJ	39296	300	1163	2.5	1523.6	1523.6	1524.3	0.7
CK	39796	293	1201	2.4	1525.6	1525.6	1526.3	0.7
CL	40226	297	1069	2.7	1527.6	1527.6	1528.1	0.5
CM	40706	325	1022	2.8	1530.0	1530.0	1530.9	0.9
CN	41196	420	1348	2.1	1533.1	1533.1	1533.7	0.6
CO	41636	300	1111	2.6	1535.3	1535.3	1535.8	0.5
CP	42136	308	1227	1.4	1536.5	1536.5	1537.4	0.9
CQ	42636	285	820	2.1	1537.6	1537.6	1538.4	0.8
CR	43106	370	999	1.7	1540.4	1540.4	1540.6	0.2
CS	43606	275	619	1.4	1542.3	1542.3	1542.5	0.2
CT	44006	200	387	0.3	1542.7	1542.7	1543.2	0.5

NOTE: Distance In Feet Above Mouth Along Profile Base Line

5.0 INSURANCE APPLICATION

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

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year flood plains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed in such areas, 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 flood plains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and flood plain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year flood plains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For flood plain management applications, the map shows by tints, screens, and symbols, the 100-year flood plains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The Sun Valley Development Company of Phoenix, Arizona prepared one-foot contour topographic mapping for most portions of the Wagner Wash stream reach. Hydrologic analyses was performed for purposes of design for the two Sun Valley Parkway roadway crossings over Wagner Wash.

A Flood Insurance Re-Study for the Hassayampa River, of which Wagner Wash is tributary, was performed by Cella-Barr Associates of Phoenix, Arizona in 1989.

This study is authoritative for the purposes of the National Flood Insurance Program; data presented herein either supersede or are compatible with all previous determinations.

8.0 LOCATION OF DATA

9.0 BIBLIOGRAPHY AND REFERENCES

1. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, White Tank Mts NE, Arizona (1957) Photorevised (1971); White Tank Mts SE, Arizona (1957) Photorevised (1971); Daggs Tank, Arizona (Provisional Ed. 1988); Wagner Wash Well, Arizona (Provisional Ed. 1988)

2. U.S. Department of the Interior, Geological Survey, 15-Minute Series Topographic Map, Scale 1:62500, Contour Interval 40 feet, White Tank Mts., Arizona (1957)

3. Federal Emergency Management Agency, Flood Insurance Study, Maricopa County and Incorporated Areas (Preliminary), 1990

4. U.S. Department of the Interior, Geological Survey, Mannings's Roughness Coefficients For Stream Channels and Flood Plains in Maricopa County, Arizona (Preliminary Draft), 1990

5. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles User's Manual, Davis, California 1990

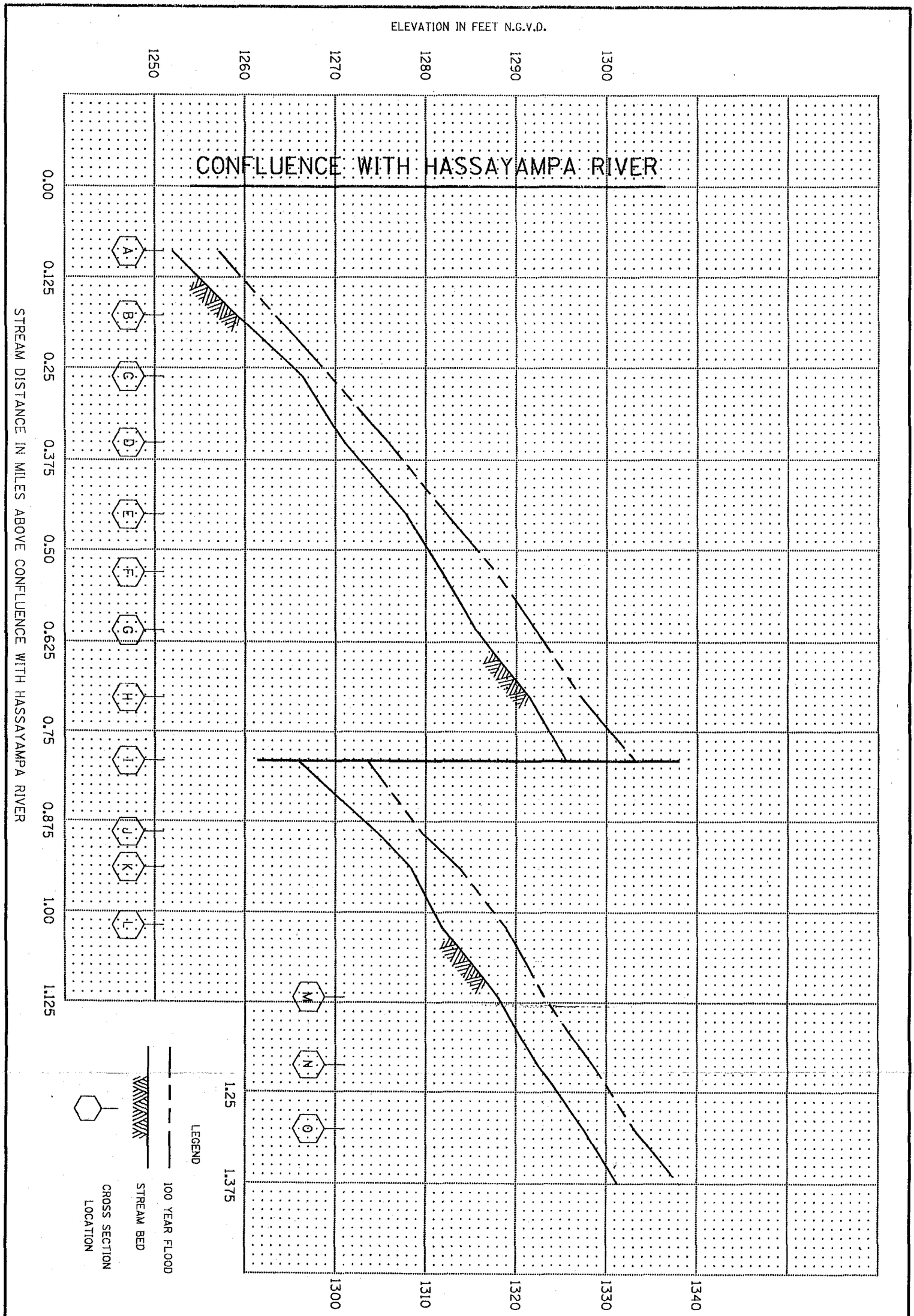
6. U.S. Army Corps of Engineers, Hydrologic Engineering Center, Computer Program HEC-2 Water Surface Profiles, Davis, California, Version 4.5.1, February, 1991 (Haestad Methods Version 6.2)

7. McLain Harbers Aerial Survey, Topographic Maps, Scale 1:2,400, Contour Interval 2 feet, Wagner Wash, Arizona (1990)

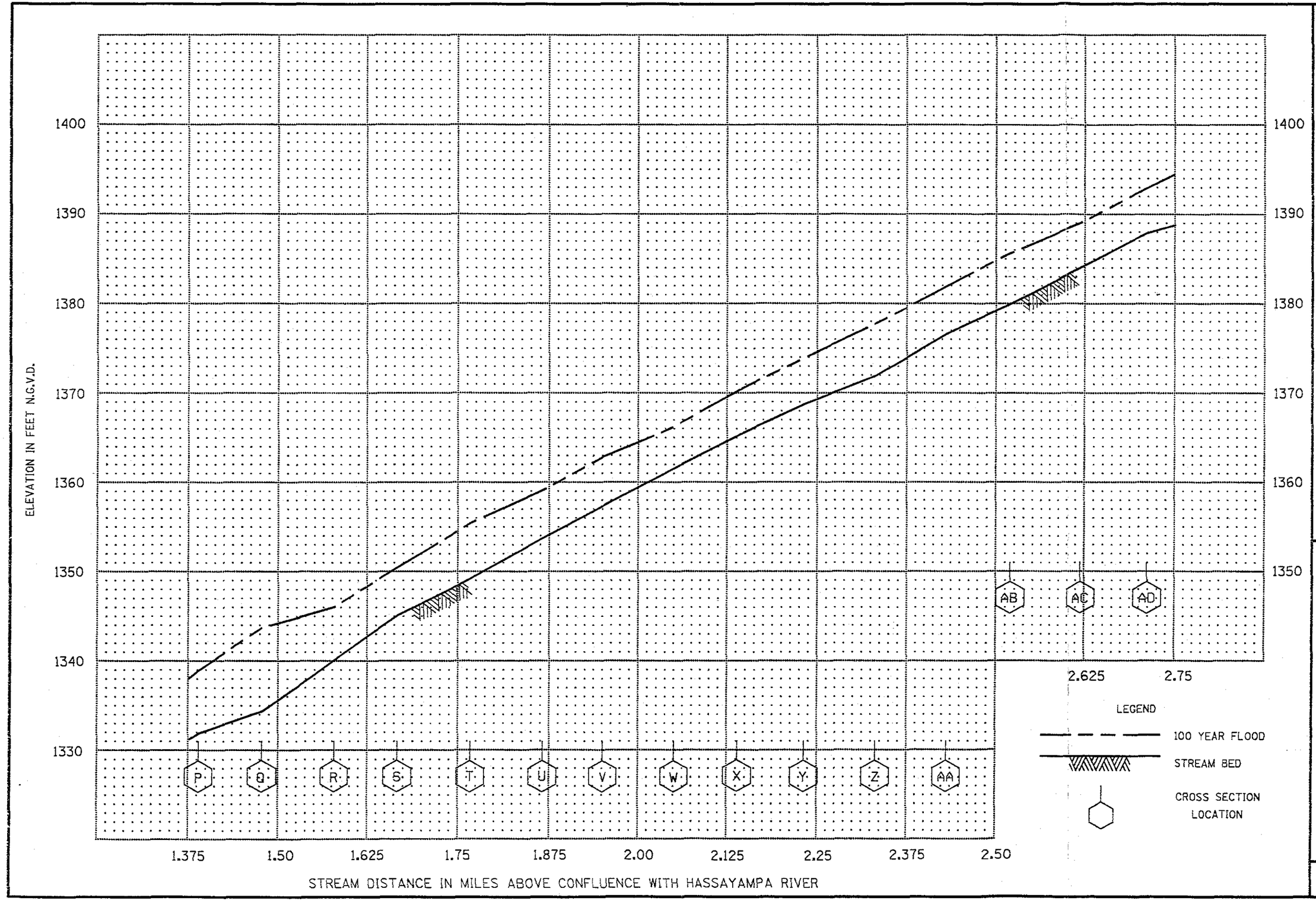
EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (feet NGVD)	Description of Location
ERM 1	1538.51	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 22 and 23, Township 4 North, Range 4 West.
ERM 3	1556.71	Brass cap stamped U.S. Government Land Office at corner of Sections 15, 14, 22 and 23, Township 4 North, Range 4 West.
ERM 5	1329.17	Brass cap stamped U.S. Government Land Office at corner of Sections 13, 18, 19 and 24, Township 3 North, Range 5 West.
ERM 5A	1352.57	Brass cap stamped U.S. Government Land Office at east quarter corner of Section 13, Township 3 North, Range 5 West.
ERM 7	1417.95	Brass cap stamped U.S. Government Land Office at corner of Sections 6, 5, 7 and 8, Township 3 North, Range 4 West.
ERM 10	1492.23	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 28 and 33, Township 4 North, Range 4 West.
ERM 10A	1558.63	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 15 and 22, Township 4 North, Range 4 West.
ERM 11	1296.44	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 23 and 24, Township 3 North, Range 5 West.
ERM 15	1522.07	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 22 and 27, Township 4 North, Range 4 West.
ERM 17	1377.56	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 7 and 18, Township 3 North, Range 4 West.
ERM 19	1471.87	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 32 and 33, Township 4 North, Range 4 West.
ERM 23	1380.14	Brass cap stamped U.S. Government Land Office at corner of Sections 12, 7, 13 and 18, Township 3 North, Range 5 West.
ERM 27	1448.07	Brass cap stamped U.S. Government Land Office at north quarter corner of Section 5, Township 3 North, Range 4 West.
ERM 28	1510.32	Brass cap stamped U.S. Government Land Office at quarter corner of Section 28 and 27, Township 4 North, Range 4 West.
ERM 31	1548.09	Bureau of Land Management brass cap marked TR39 at quarter corner of Sections 20 and 21, Township 4 North, Range 4 West.

ERM 31A	1440.49	Brass cap in NE corner of center box culvert at Wagner Wash and Sun Valley Parkway. Stamped 1442.00. Near center of Section 5, Township 3 North, Range 4 West.
ERM 34	1418.00	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 6 and 7, Township 3 North, Range 4 West.
ERM 38	1524.24	Brass cap stamped U.S. Government Land Office at corner of Sections 21, 22, 28 and 27, Township 4 North, Range 4 West.
ERM 38A	1544.20	Central Arizona Project R/W brass cap located at R/W station 164+00.18, 125' rt., near center of Section 21, Township 4 North, Range 4 West.
ERM 44	1541.60	Brass cap stamped U.S. Government Land Office at quarter corner of Sections 21 and 22, Township 4 North, Range 4 West.



1P	FEDERAL EMERGENCY MANAGEMENT AGENCY MARICOPA COUNTY, ARIZONA	FLOOD PROFILES WAGNER WASH



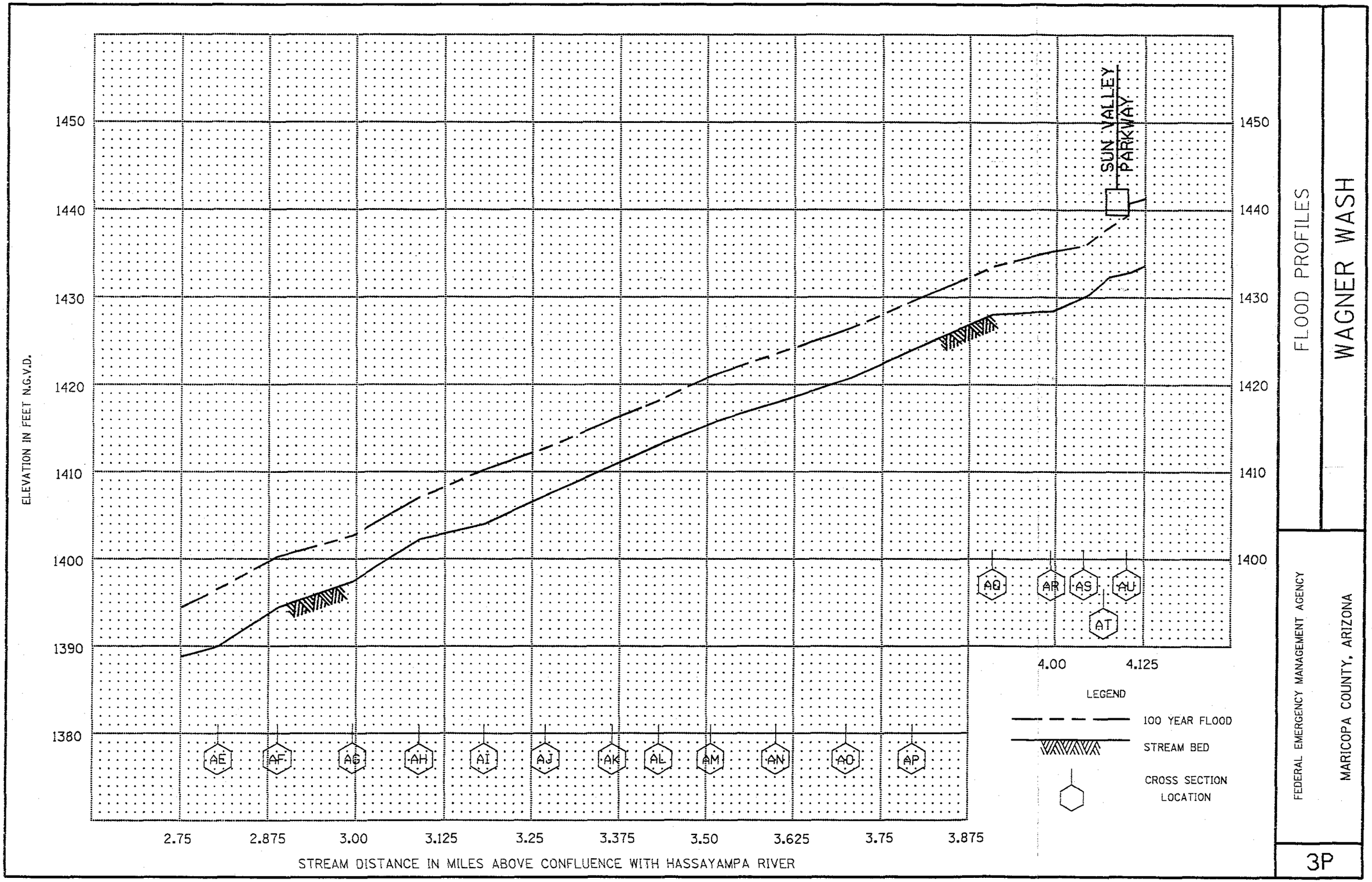
FLOOD PROFILES

WAGNER WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, ARIZONA

2P



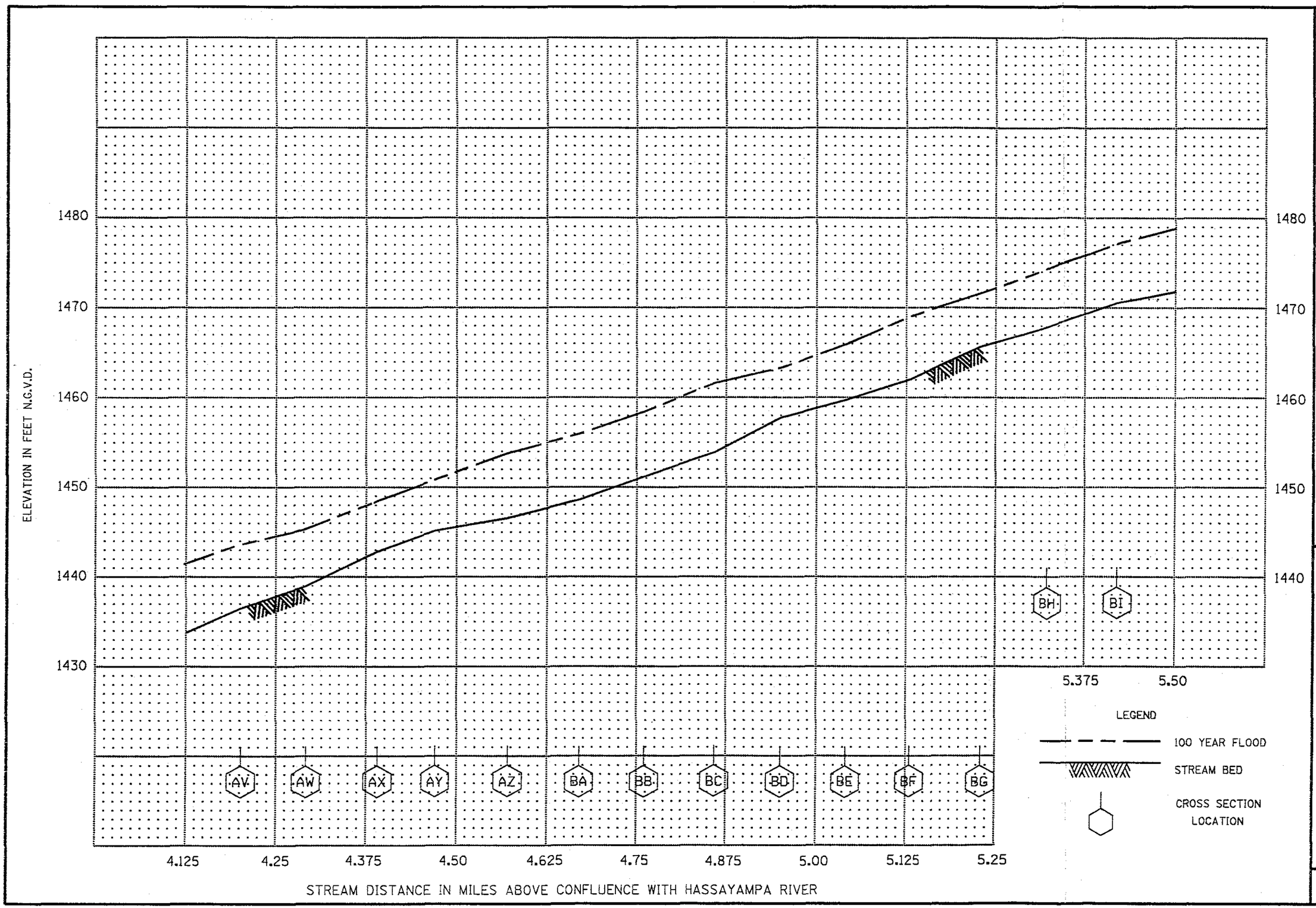
FLOOD PROFILES

WAGNER WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, ARIZONA

3P



FLOOD PROFILES

WAGNER WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, ARIZONA

4P

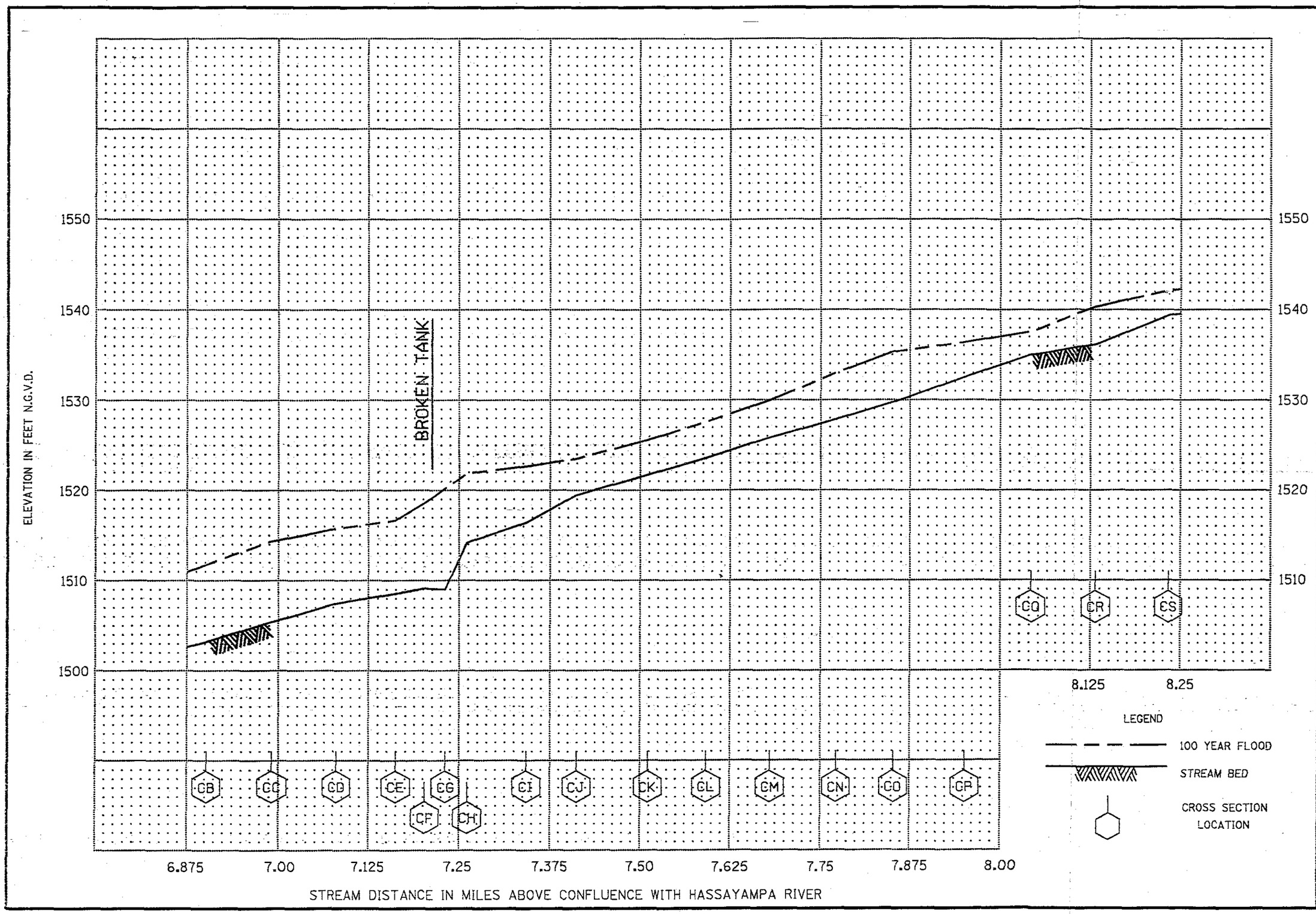
FLOOD PROFILES

WAGNER WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, ARIZONA

5P



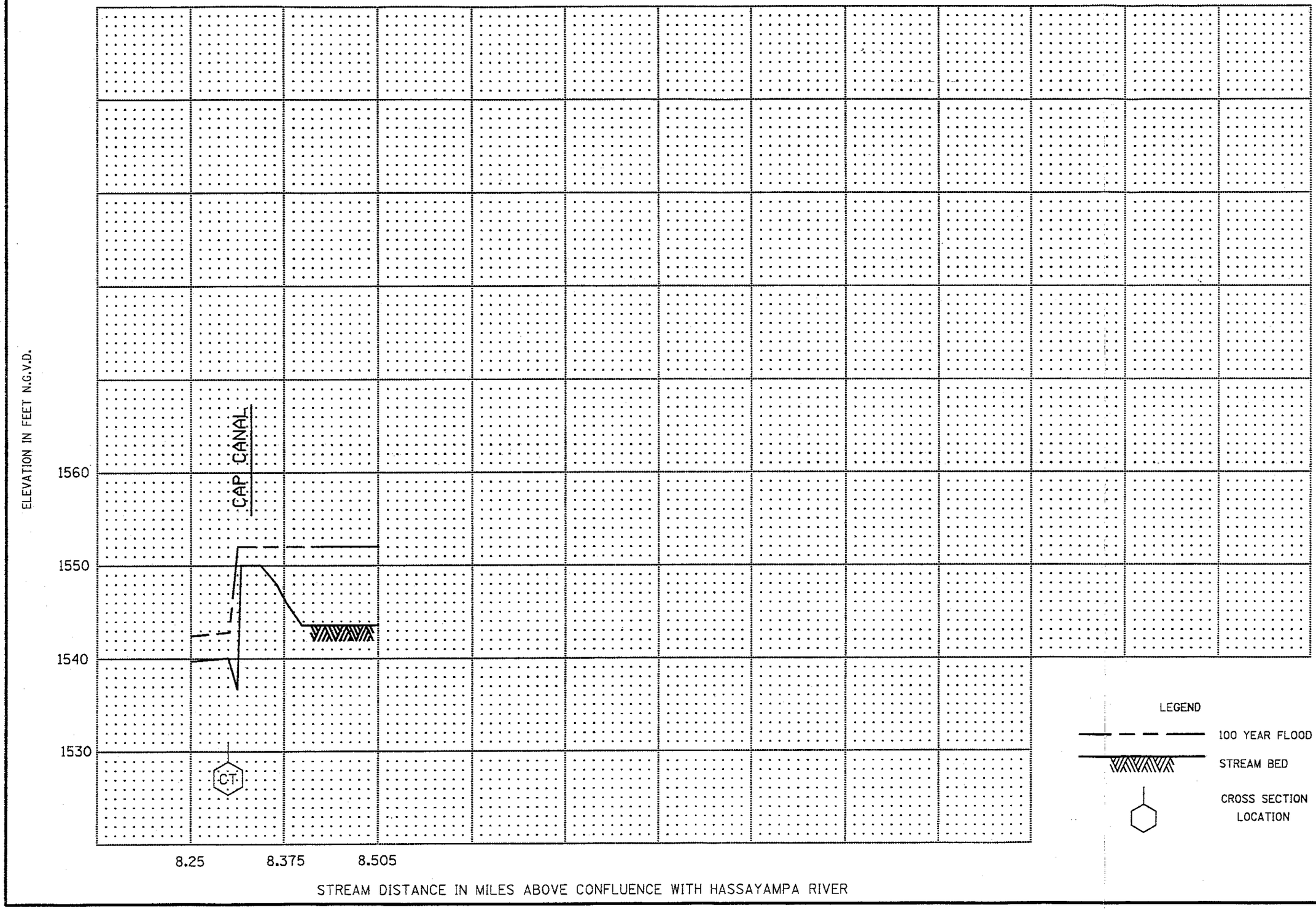
FLOOD PROFILES

WAGNER WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, ARIZONA

6P



FLOOD PROFILES

WAGNER WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

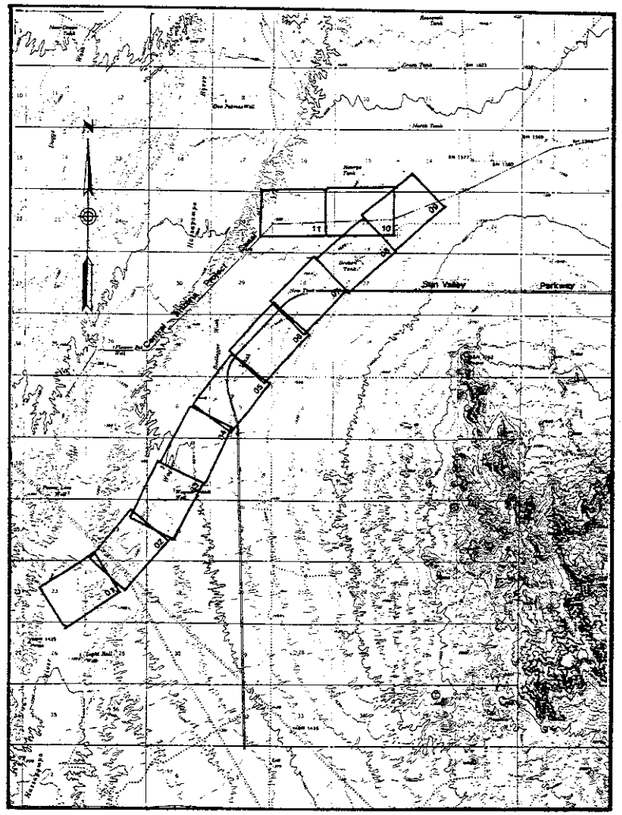
MARICOPA COUNTY, ARIZONA

7P

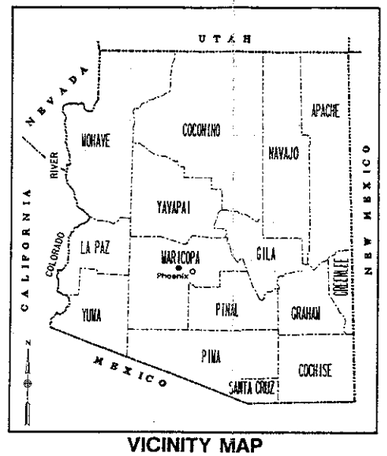
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

D. E. SAGRAMOSO, CHIEF ENGINEER AND GENERAL MANAGER

WAGNER WASH FLOOD DELINEATION STUDY



SHEET INDEX MAP



VICINITY MAP

100 YEAR PEAK DISCHARGE	
WAGNER WASH AT CONFLUENCE	15717 CFS

STUDY DATE - 1991

MAPPING DATE - 1990

MCLAIN-HARBERS AERIAL CO., TUCSON, AZ.

PREPARED BY: HDR ENGINEERING, INC.

	BY	DATE
DESIGN	ETL	3/91
DESIGN CHK.	DWB	4/91
PLAN	ETL	3/91
PLAN CHK.	DWB	4/91

SUBMITTED BY: DATE

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET OF

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

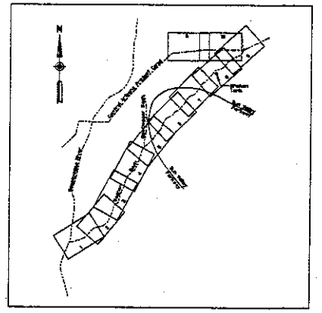
LEGEND

100-Yr Floodplain Boundary
Floodway Boundary
Hydraulic Base Line With River Mile — M75.0 M76.0
Cross Section — A FP=100 Yr. WSE / FW = FLOODWAY WSE A
Elevation Reference Marks — ERM7 X
Base Flood Elevations — 580
Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 11	1296.44	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 23 and 24, Township 3 North, Range 5 West.

INDEX MAP



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Scale: 1" = 200'
Contour Interval = 2 Feet

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HDR ENGINEERING, INC.

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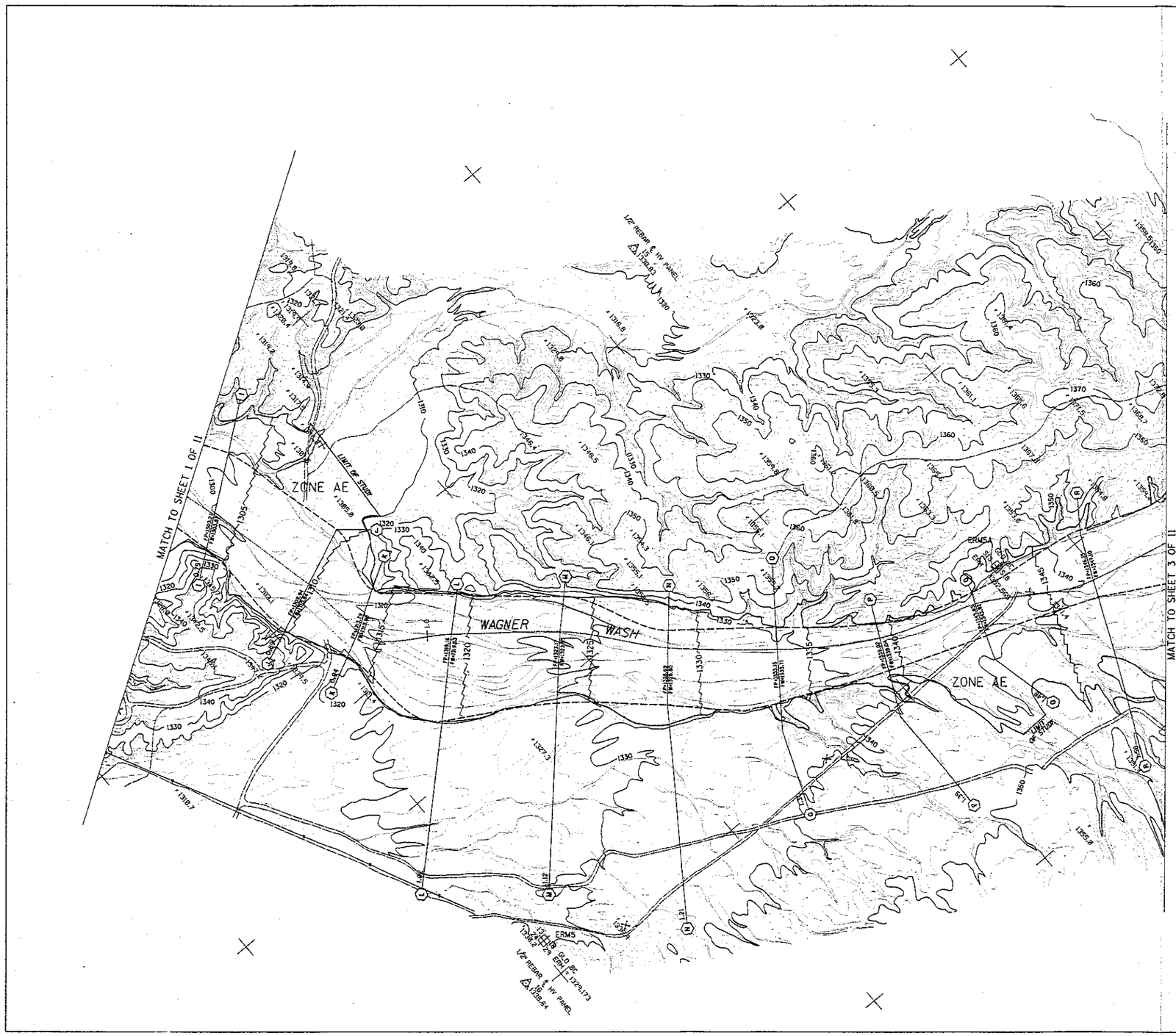
PLAN	ETL	3-91	APPROVED BY: DATE	OF 11
PLAN CHK.	DWB	4-91	CHIEF ENGINEER AND GENERAL MANAGER	

#WASH01 USER 9 PEN

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90



FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
WAGNER WASH
WORK MAP

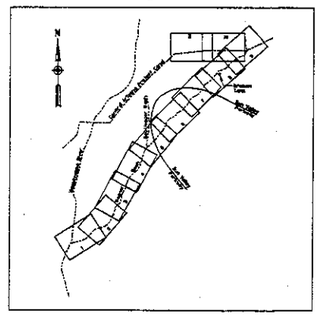
LEGEND

100-Yr Floodplain Boundary
Floodway Boundary
Hydraulic Base Line With River Mile — M75.0 M76.0
Cross Section — FP=100 Yr. WSE / FW = FLOODWAY WSE
Elevation Reference Marks — ERM7 X
Base Flood Elevations — 580
Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 5	1329.17	Brass Cap Stamped U.S. Government Land Office at Corner of Sections 13, 18, 19 and 24, Township 3 North, Range 5 West.
ERM 5A	1352.57	Brass Cap Stamped U.S. Government Land Office at East Quarter Corner of Section 13, Township 3 North, Range 5 West

INDEX MAP



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PLAN CHK.	DWB	4/91	CHIEF ENGINEER AND GENERAL MANAGER	

WWASH02 USER 9 PEN

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

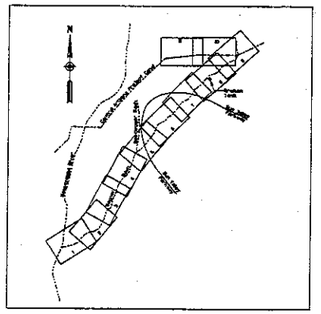
LEGEND

- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile. (M75.0 — M76.0)
- Cross Section (A — FP=100 Yr. WSE, FW = FLOODWAY WSE — A)
- Elevation Reference Marks ERM7 X
- Base Flood Elevations 580
- Zone Designations ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 17	1377.56	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 7 and 18, Township 3 North, Range 4 West.
ERM 23	1380.14	Brass Cap Stamped U.S. Government Land Office at Corner of Sections 7, 12, 13 and 18, Township 3 North, Range 5 West.

INDEX MAP



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HDR ENGINEERING, INC.

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DESIGN CHK.	DWB	4/91
PLAN	ETL	3/91
PLAN CHK.	DWB	4/91

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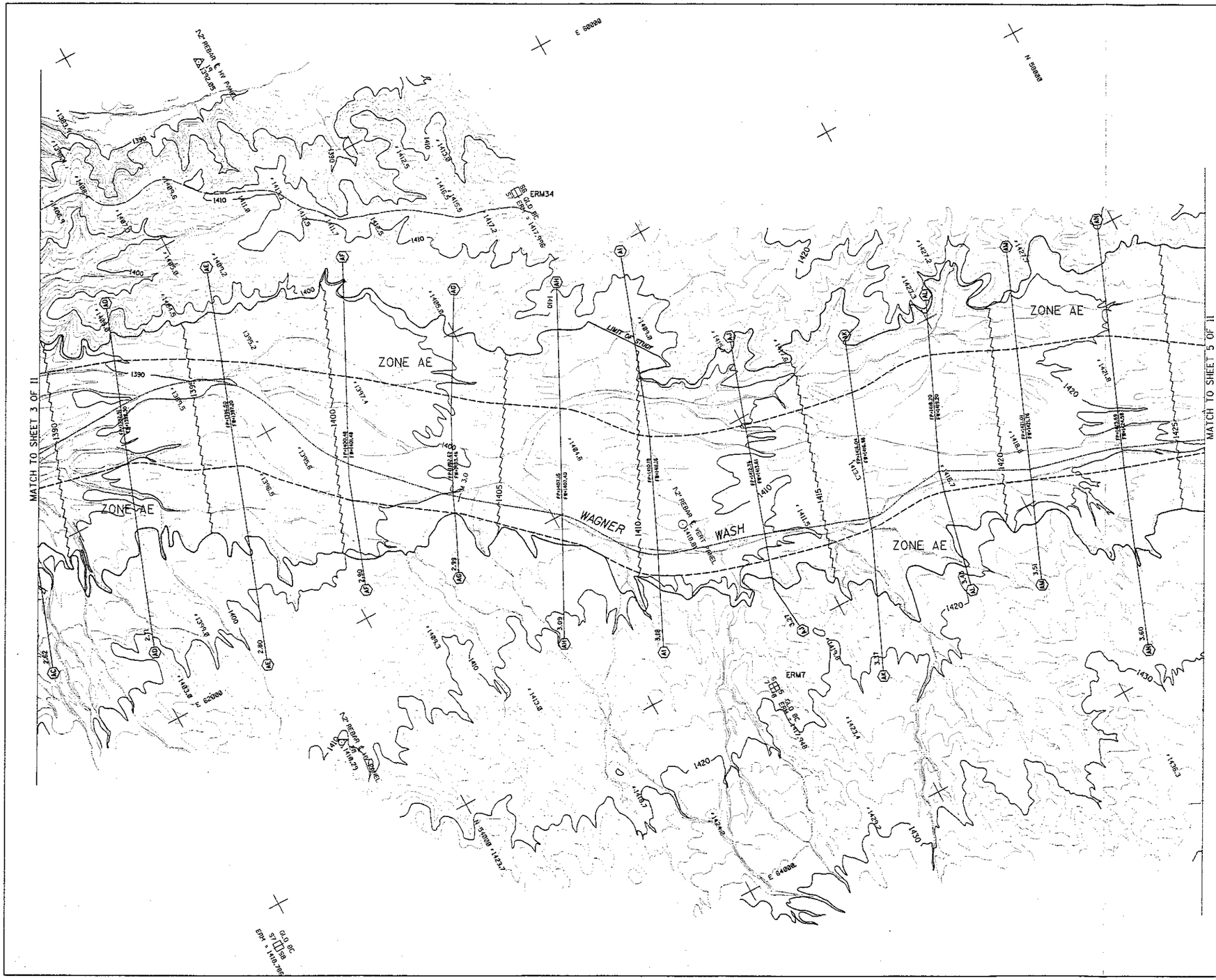
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 03 OF 11

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90

SCHEMA USER 9 PEN



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

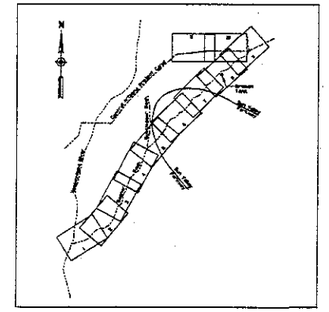
LEGEND

100-Yr Floodplain Boundary
Floodway Boundary
Hydraulic Base Line With River Mile
Cross Section — FP=100 Yr. WSE, FW = FLOODWAY WSE
Elevation Reference Marks — ERM7 X
Base Flood Elevations — 580
Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 34	1418.00	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 6 and 7, Township 3 North, Range 4 West.
ERM 7	1417.95	Brass Cap Stamped U.S. Government Land Office at Corner of Sections 5,6, 7 and 8, Township 3 North, Range 4 West.

INDEX MAP



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RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 04 OF 11

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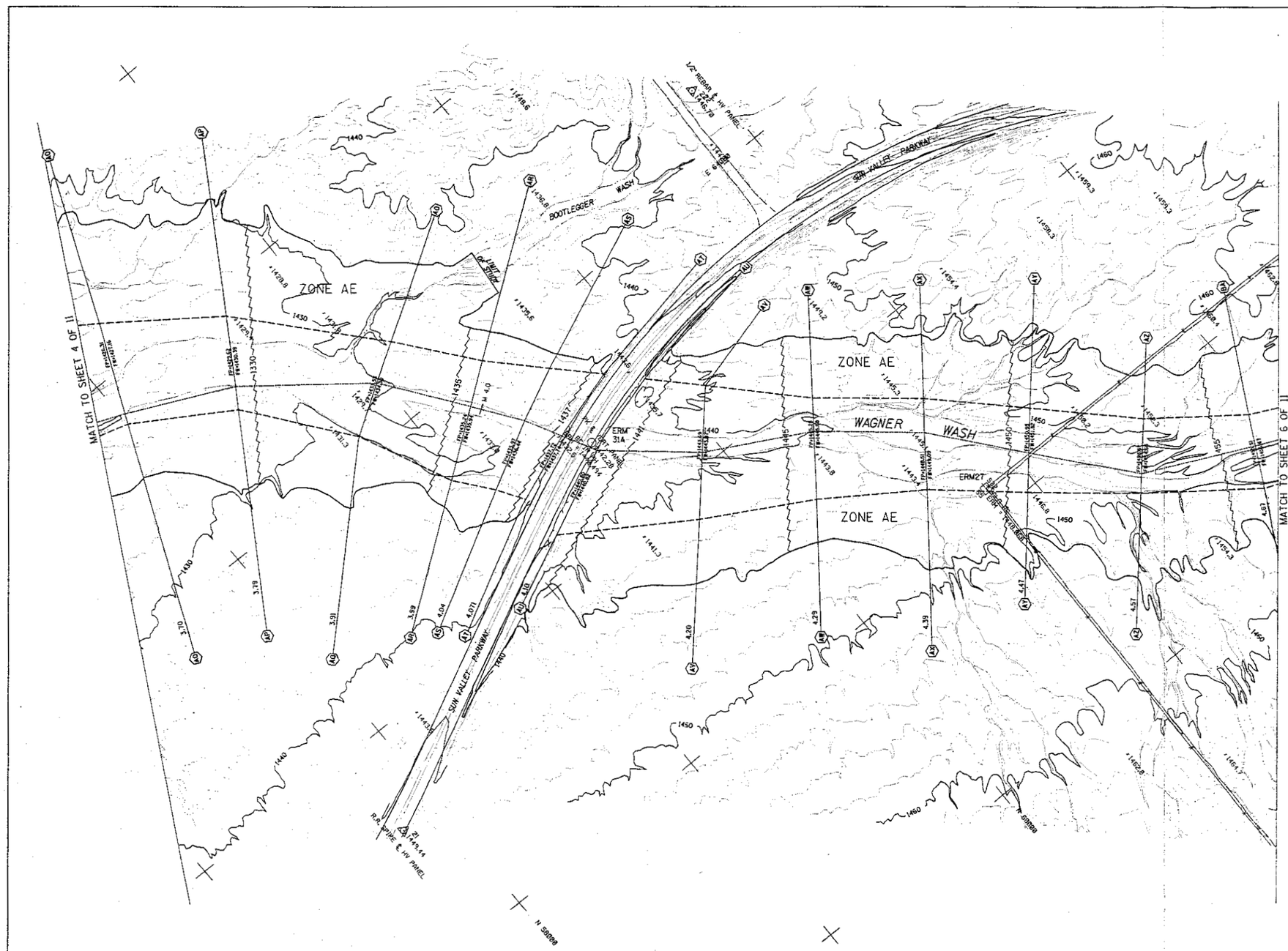


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

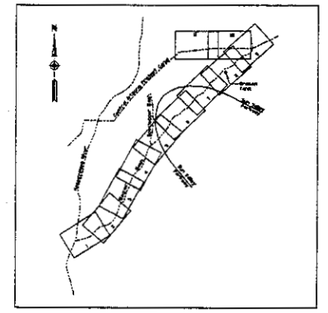
LEGEND

- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile — M75.0 M76.0
- Cross Section — A FP=100 Yr. WSE / FW = FLOODWAY WSE A
- Elevation Reference Marks — ERM7 X
- Base Flood Elevations — 580
- Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 27	1448.07	Brass Cap Stamped U.S. Government Land Office at North Quarter Corner of Section 5, Township 3 North, Range 4 West.
ERM 31A	1440.49	Brass Cap in NE Corner of Center Box Culvert at Wagner Wash and Sun Valley Parkway. Stamped 1442.00. Near Center of Section 5, Township 3 North, Range 4 West.

INDEX MAP



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HDR ENGINEERING, INC.

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PLAN CHK.	DWB	4/91	CHIEF ENGINEER AND GENERAL MANAGER		OF 11

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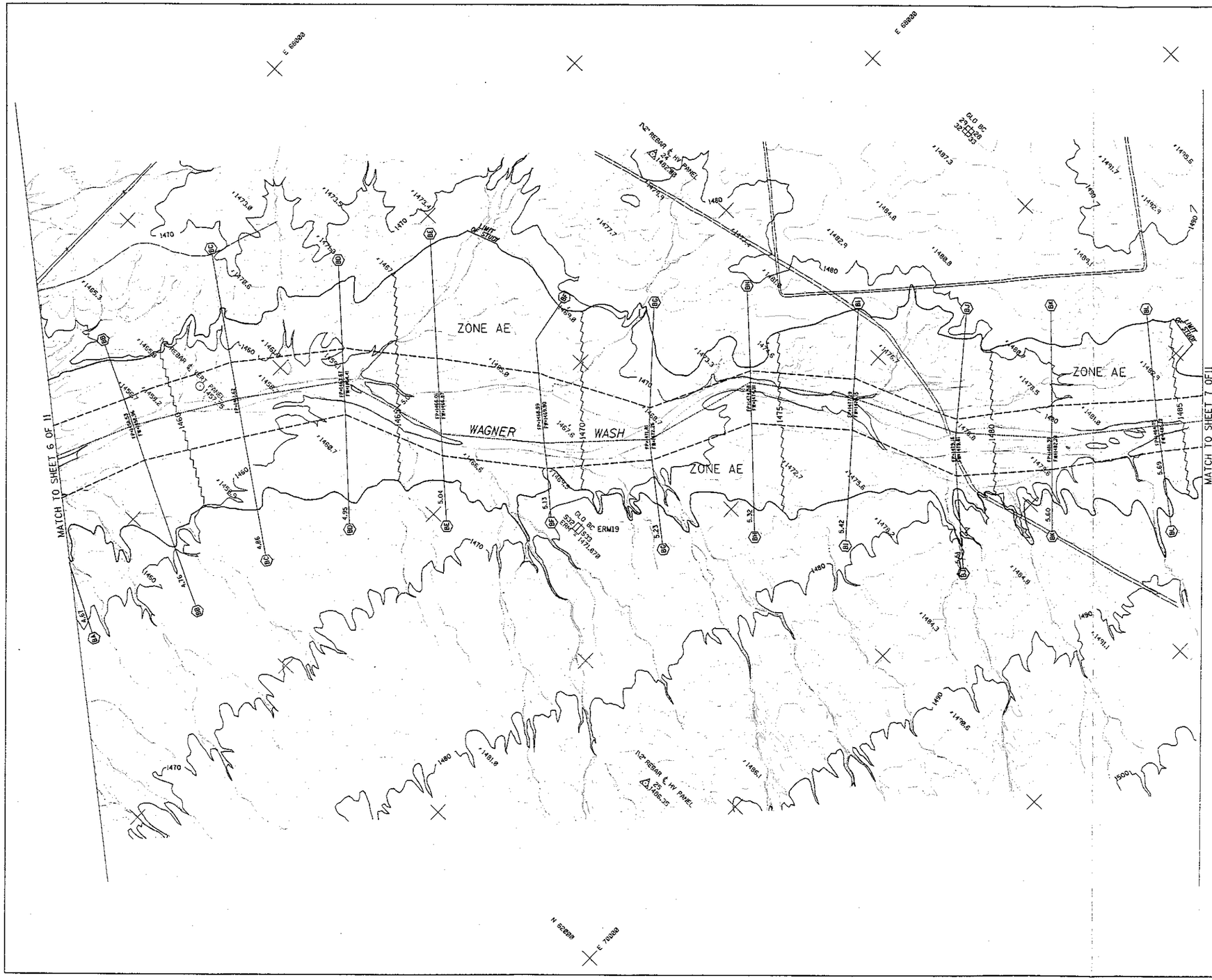


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

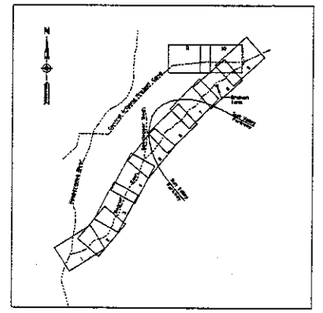
LEGEND

- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile (M75.0 — M76.0)
- Cross Section (A — FP=100 Yr. WSE; FW = FLOODWAY WSE — A)
- Elevation Reference Marks (ERM7 X)
- Base Flood Elevations (580)
- Zone Designations (ZONE AE)

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 19	1471.87	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 32 and 33, Township 4 North, Range 4 West.

INDEX MAP



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Scale: 1" = 200'

Contour Interval = 2 Feet

PREPARED BY:

HDR ENGINEERING, INC.

	BY	DATE
DESIGN	ETL	3/91
DESIGN CHK.	DWB	4/91
PLAN	ETL	3/91
PLAN CHK.	DWB	4/91

SUBMITTED BY: DATE

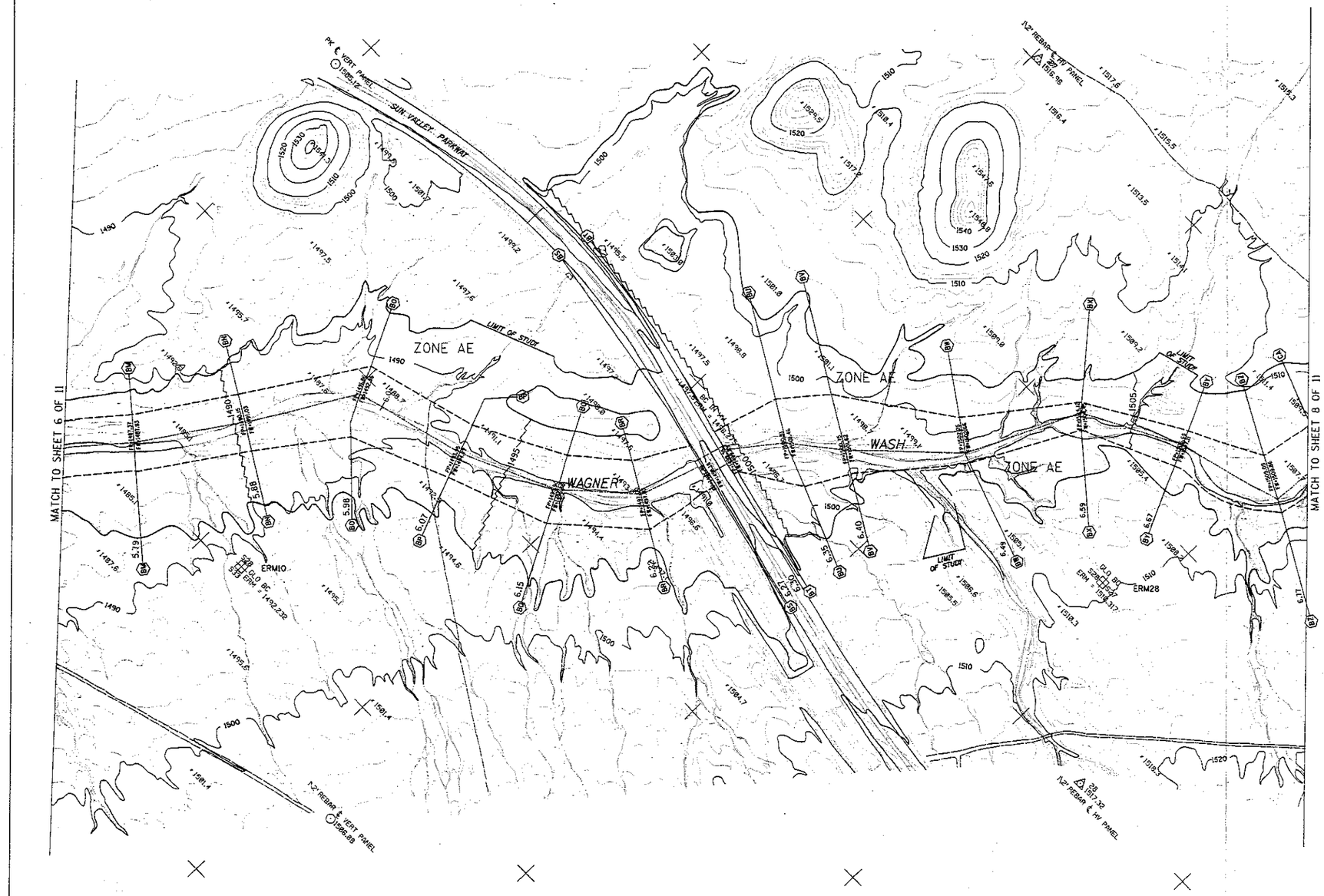
RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 06 OF 11

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90



FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
WAGNER WASH
WORK MAP

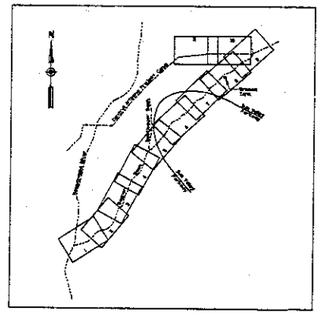
LEGEND

100-Yr Floodplain Boundary	
Floodway Boundary	
Hydraulic Base Line With River Mile	M75.0 M76.0
Cross Section	FP=100 Yr. WSE, FW = FLOODWAY WSE
Elevation Reference Marks	ERM7 X
Base Flood Elevations	580
Zone Designations	ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 10	1492.23	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 28 and 33, Township 4 North, Range 4 West.
ERM 28	1510.32	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 28 and 27, Township 4 North, Range 4 West.

INDEX MAP



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Scale: 1" = 200'
Contour Interval = 2 Feet

PREPARED BY:
HDR ENGINEERING, INC.

	BY	DATE	SUBMITTED BY:	DATE	SHEET
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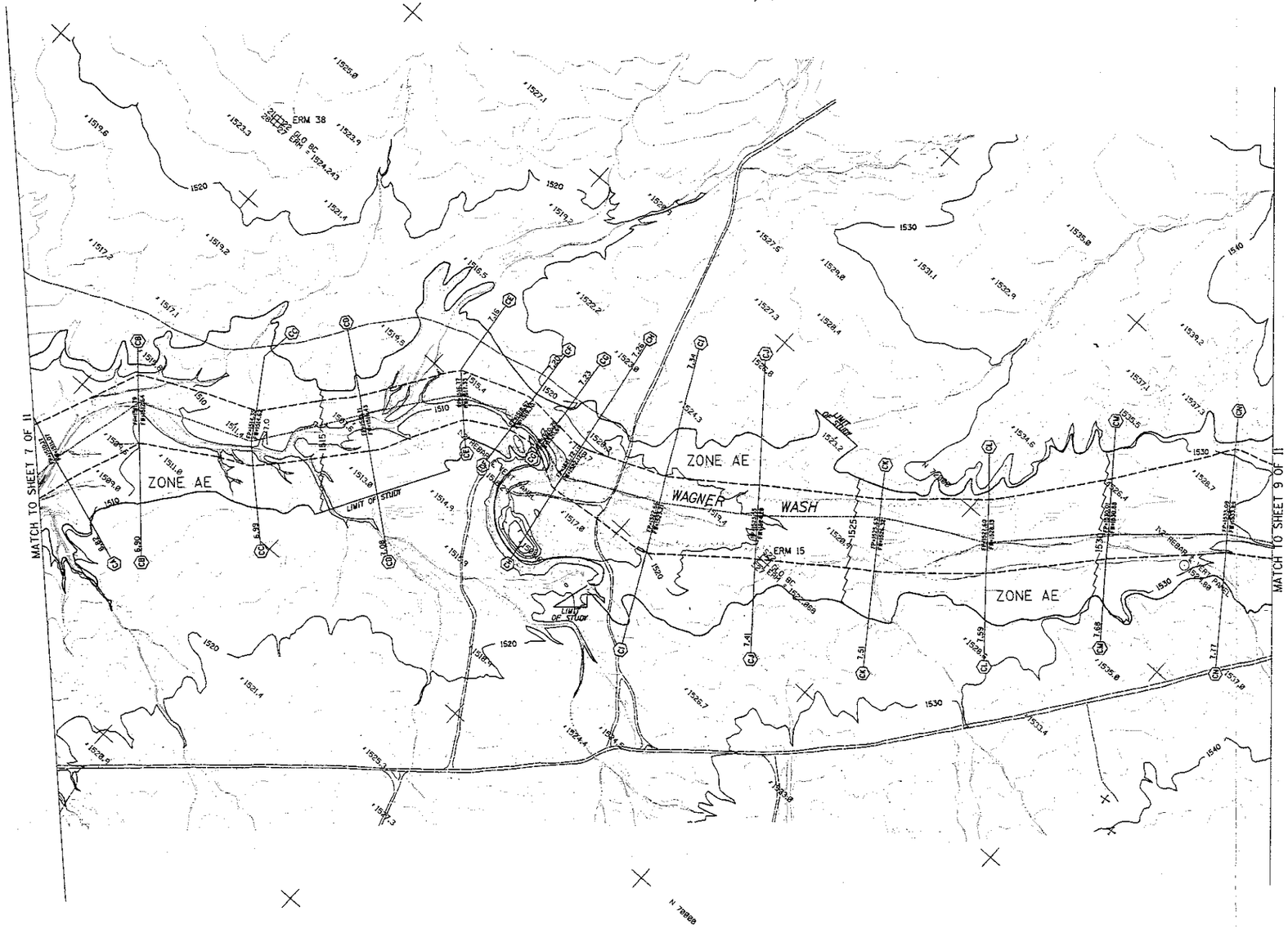
PLAN	ETL	3/91	APPROVED BY:	DATE	OF 11
PLAN CHK.	DWB	4/91	CHIEF ENGINEER AND GENERAL MANAGER		

WWASHO7 USER 9 PEN

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 9-90 .



FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
WAGNER WASH
WORK MAP

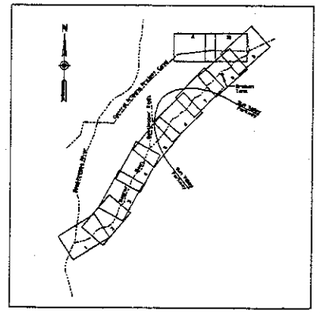
LEGEND

100-Yr Floodplain Boundary
Floodway Boundary
Hydraulic Base Line With River Mile . M75.0 M76.0
Cross Section A FP=100 Yr. WSE FW = FLOODWAY WSE A
Elevation Reference Marks ERM7 X
Base Flood Elevations 580
Zone Designations ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 38	1524.24	Brass Cap Stamped U.S. Government Land Office at Corner of Sections 21,22, 27 and 28, Township 4 North, Range 4 West.
ERM 15	1522.07	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 22 and 27, Township 4 North, Range 4 West.

INDEX MAP



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Scale: 1" = 200'
Contour Interval = 2 Feet

PREPARED BY:
HDR ENGINEERING, INC.

	BY	DATE
DESIGN	ETL	3-91
DESIGN CHK.	DWB	4-91
PLAN	ETL	3-91
PLAN CHK.	DWB	4-91

SUBMITTED BY: DATE
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 08 OF 11

WMASHOR USER 9 PEN

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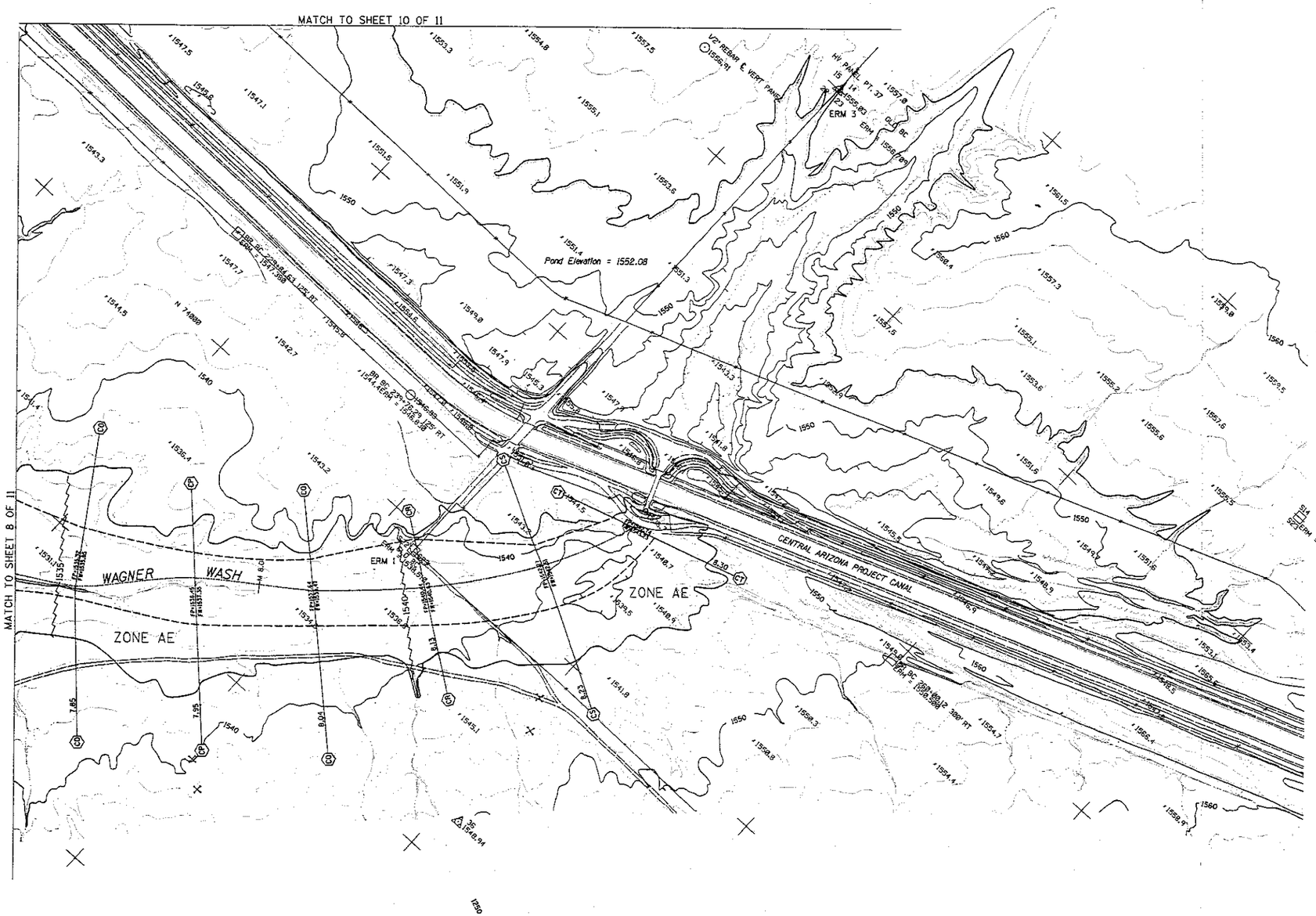


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

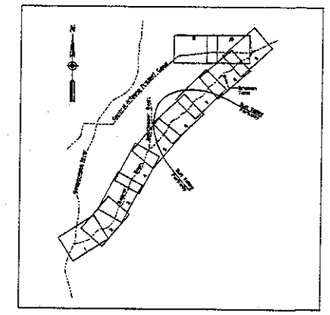
LEGEND

- 100-Yr Floodplain Boundary
- Floodway Boundary
- Hydraulic Base Line With River Mile — M75.0 M76.0
- Cross Section — (A) FP=100 Yr. WSE, FW = FLOODWAY WSE (A)
- Elevation Reference Marks — ERM7 X
- Base Flood Elevations — 580
- Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 1	1538.51	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 22 and 23, Township 4 North, Range 4 West.
ERM 3	1556.71	Brass Cap Stamped U.S. Government Land Office at Corner of Sections 14,15, 22 and 23, Township 4 North, Range 4 West.

INDEX MAP



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Scale: 1" = 200'

Contour Interval = 2 Feet

PREPARED BY:

HDR ENGINEERING, INC.

	BY	DATE	SUBMITTED BY: DATE	SHEET
DESIGN	ETL	3-91		09
DESIGN CHK.	DWB	4-91	RECOMMENDED BY: DATE	
PLAN	ETL	3-91	APPROVED BY: DATE	OF 11
PLAN CHK.	DWB	4-91	CHIEF ENGINEER AND GENERAL MANAGER	

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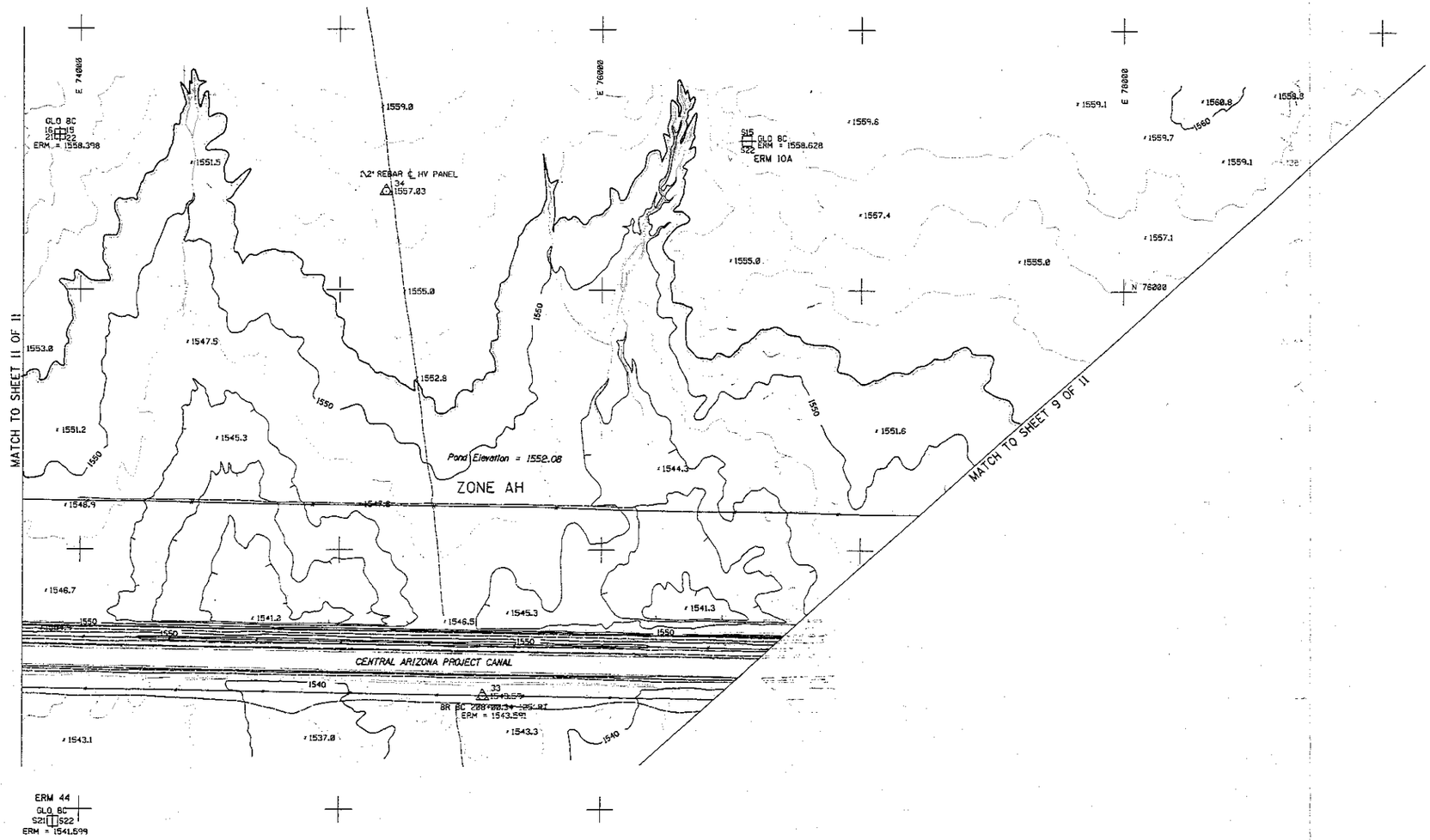


FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF WAGNER WASH WORK MAP

LEGEND

100-Yr Floodplain Boundary

Floodway Boundary

Hydraulic Base Line With River Mile — M75.0 M76.0

Cross Section — A FP=100 Yr. WSE FW = FLOODWAY WSE A

Elevation Reference Marks ERM7 x

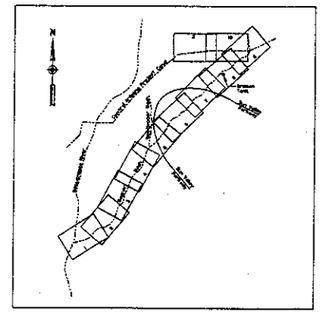
Base Flood Elevations 580

Zone Designations ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 10A	1558.63	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 15 and 22, Township 4 North, Range 4 West.
ERM 44	1541.60	Brass Cap Stamped U.S. Government Land Office at Quarter Corner of Sections 21 and 22, Township 4 North, Range 4 West.

INDEX MAP



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Scale: 1" = 200'
Contour Interval = 2 Feet

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HDR ENGINEERING, INC.

	BY	DATE	SUBMITTED BY:	DATE	SHEET
DESIGN	ETL	3-91			10
DESIGN CHK.	DWB	4-91	RECOMMENDED BY:	DATE	
PLAN	ETL	3-91	APPROVED BY:	DATE	OF 11
PLAN CHK.	DWB	4-91	CHIEF ENGINEER AND GENERAL MANAGER		

Topographic Mapping Prepared By McLain Harbers Co., Inc. Photo Date 3-90

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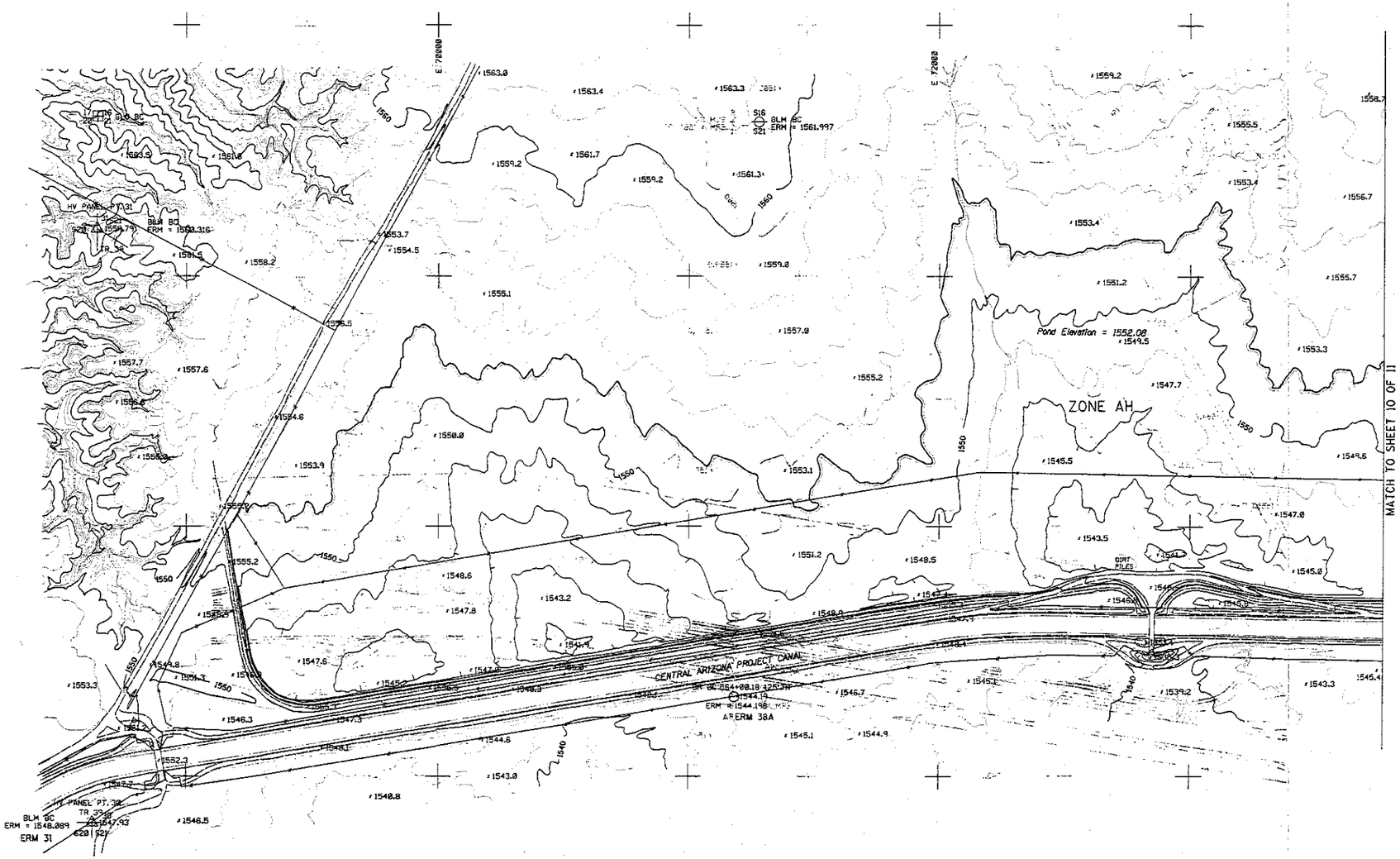


FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
WAGNER WASH
WORK MAP

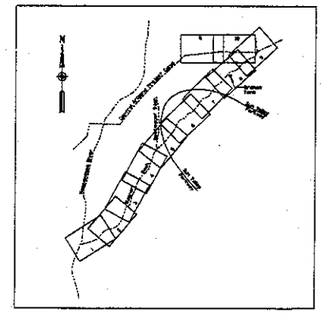
LEGEND

100-Yr Floodplain Boundary
Floodway Boundary
Hydraulic Base Line With River Mile — M75.0 M76.0
Cross Section — A FP=100 Yr. WSE, FW = FLOODWAY WSE A
Elevation Reference Marks — ERM7 X
Base Flood Elevations — 580
Zone Designations — ZONE AE

ELEVATION REFERENCE MARKS

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 31	1548.09	Bureau of Land Management Brass Cap Marked TR 39 at Quarter Corner of Sections 20 and 21, Township 4 North, Range 4 West.
ERM 38A	1544.20	Central Arizona Project R/W Brass Cap Located at R/W Sta. 164+00.18, 125' Rt. Near Center of Section 21, Township 4 North, Range 4 West.

INDEX MAP



0 200 400
Scale: 1" = 200'
Contour Interval = 2 Feet

PREPARED BY:
HDR ENGINEERING, INC.

	BY	DATE
DESIGN	ETL	3-91
DESIGN CHK.	DWB	4-91
PLAN	ETL	3-91
PLAN CHK.	DWB	4-91

SUBMITTED BY: DATE
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 11 OF 11

WMASHII USER 9 PEN

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