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**FLOOD INSURANCE STUDY
SUN VALLEY PARKWAYS NORTH
PORTION OF TOWN OF
SURPRISE AND UNINCORPORATED AREAS
MARICOPA COUNTY, ARIZONA**

Prepared for:

**Flood Control District of Maricopa County
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**September, 1991
Revised October 10, 1991
Report Preface Added May 4, 1993**

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**FCD No. 90-04
A-N West, Inc. Job No. 7158-01**

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
NO. 90-04
A-N WEST, INC. NO. 7158-01
MAY 4, 1993

REPORT PREFACE

On January 20, 1992, the Flood Control District of Maricopa County submitted the Hydrology Report, Flood Insurance Study Report, Technical Data Notebook Report, FIRM Work Maps and supportive data to FEMA for the detailed 100-year, floodplain and floodway, Zone AE delineation of 8 washes near Sun Valley Parkway North.

On May 11, 1992, FEMA's initial review comments were received regarding this submittal. FEMA questioned the applicability of utilizing the HEC-2 model to delineate floodplains for several of these washes, because of concerns for; a) breakout of flow from the delineated limits of the floodplain; b) shifting of flow within the cross-sections from main channels to overbanks and back again along the wash reach length; and c) erosion/sediment transport which could cause further shifting of flow patterns.

A response to these FEMA review comments was transmitted by the Flood Control District on June 16, 1992 and acknowledged by FEMA in a letter of June 26, 1992.

On October 26, 1992, FEMA's second review comment letter was received regarding the supportive data and response to their May 11, 1992 comments. FEMA's concerns expressed from the May 11, 1992, comment letter remained and FEMA further stated that a detailed Zone AE was not considered appropriate. If potential breakout areas for several washes were included, an approximate 100-year Flood Hazard Zone A would be applicable.

On February 3, 1993, the Flood Control District of Maricopa County resubmitted the revised floodplain mapping for all eight washes as approximate Zone A delineations, which was acknowledged by FEMA on February 17, 1993.

On April 15, 1993, FEMA transmitted preliminary FIRM maps reflecting the eight washes as approximate Zone A.

As such, the detailed hydrologic/hydraulic analysis data and a report following this preface do not reflect the accepted FEMA FIRM mapping, but provide the preliminary detailed analysis initially submitted. This data is proposed to be used by the Flood Control District as the best available data on these washes for subsequent floodplain regulation over these washes.

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
1.1 Purpose of Study	1
1.2 Authority and Acknowledgements	1
1.3 Coordination	1
2.0 AREA STUDIED	2
2.1 Scope of Study	2
2.2 Community Description	2
2.3 Principal Flood Problems	3
2.4 Flood Protection Measures	4
3.0 ENGINEERING METHODS	5
3.1 Hydrologic Analysis	5
3.2 Hydraulic Analysis	9
4.0 FLOODPLAIN MANAGEMENT APPLICATIONS	12
4.1 Floodplain Boundaries	12
4.2 Floodways	13
5.0 INSURANCE APPLICATIONS	15
6.0 OTHER STUDIES	16
7.0 LOCATION OF DATA	17
8.0 BIBLIOGRAPHY AND REFERENCES	18

FIGURES

FIGURE 1 - Vicinity Map

Follows Page 2

FIGURE 2 - Floodway Schematic

Page 15



TABLES

TABLE 1 - Summary of Discharges
TABLE 2 - Floodway Data

7
Follows Page 14

EXHIBITS

EXHIBIT 1 - Flood Profiles

(Follows References)

Wash No. 1	Panels 01P-03P
Wash No. 2	Panels 04P-05P
Wash No. 3	Panels 06P-07P
Wash No. 4	Panels 08P-01P
Wash No. 5	Panel 12P
Wash No. 6	Panel 13P
Wash No. 7	Panel 14P
Wash No. 8	Panel 15P-16P

EXHIBIT 2 - Reference Mark Descriptions

(Follows Exhibit 1)

EXHIBIT 3 - Flood Insurance Rate Maps

Under Separate Cover

APPENDIX A - 100-Year Floodplain/Floodway Analysis
HEC-2 Input/Output and Computer Input
Files

Under Separate Cover

Wash No. 1 and Tributary	Computer Input File: Wash 1-7.DAT (Rev. 8/14/91)
Wash No. 2 and Tributary	Computer Input File: Wash 2-4.DAT (Rev. 8/14/91)
Wash No. 3 and Tributaries	Computer Input File: Wash 3-4.DAT (Rev. 8/15/91)
Wash No. 4 and Tributaries	Computer Input File: Wash 4-8.DAT (Rev. 8/12/91)
Wash No. 5 and Tributary	Computer Input File: Wash 5-2.DAT (Rev. 8/06/91)
Wash No. 6 and Tributary	Computer Input File: Wash 6-2.DAT (Rev. 8/05/91)
Wash No. 7	Computer Input File: Wash 7-1.DAT (Date 7/25/91)
Wash No. 8 and Tributaries	Computer Input File: Wash 8-2.DAT (Date 7/25/91)

APPENDIX B - Hydraulic Analysis Discussion and
Supportive Data

(Follows Exhibit 2)

FLOOD INSURANCE STUDY
SUN VALLEY PARKWAY NORTH
PORTION OF TOWN OF
SURPRISE AND UNINCORPORATED AREAS
MARICOPA COUNTY, ARIZONA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in 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 various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in their efforts to promote sound flood plain management.

1.2 Authority and Acknowledgements

The hydrologic and hydraulic analysis for this study were performed by A-N West, Inc. for the Flood Control District of Maricopa County, under contract No. FCD 90-04. This study was completed in June, 1991.

1.3 Coordination

The areas to be studied were provided by the Flood Control District of Maricopa County during contract negotiations in May, 1990.

A public notice was published in the Arizona Republic newspaper on August 29, 1990 to notify all interested parties of the commencement of this study.

On August 7, 1990, a letter was sent to all property owners within the mapping limits of the study to notify of commencement of the study and to solicit any objections to property access for surveys.

The U.S. Army Corps. of Engineers (L.A. District), the Soil Conservation Service, the Maricopa County Highway Department, WLB Group consulting Engineers and Collar, Williams and White Consulting Engineers were contacted to obtain information on the study.

2.0 AREA STUDIED

2.1 Scope of Study

The limits of detailed study in these areas of Maricopa County, Arizona were determined by the Flood Control District of Maricopa County and were forwarded to the study contractor during contract negotiations in May, 1990. The detailed study areas included the upstream side of the Sun Valley Parkway from approximately 1 mile west to 8-1/2 miles west of McMicken Dam and eight washes between Sun Valley Parkway and the existing Trilby Wash and Tributaries floodplain delineations.

The general study is shown on the Vicinity Map (Figure 1).

2.2 Community Description

The study area north of the Sun Valley Parkway is currently in the Town of Surprise. The portion of the study area South of the Parkway is currently in Unincorporated Maricopa County. The study area is currently undeveloped desert. The ground cover consists primarily of creosote bush as well as a variety of cacti and catered paloverde and mesquite trees with a cover density of approximately 35 percent.

The study area is located north and northeast of the White Tank Mountains. The Sun Valley Parkway and the study area washes, are located at the base of the White Tank Mountains, which form a significant portion of the contributing drainage areas to the washes.

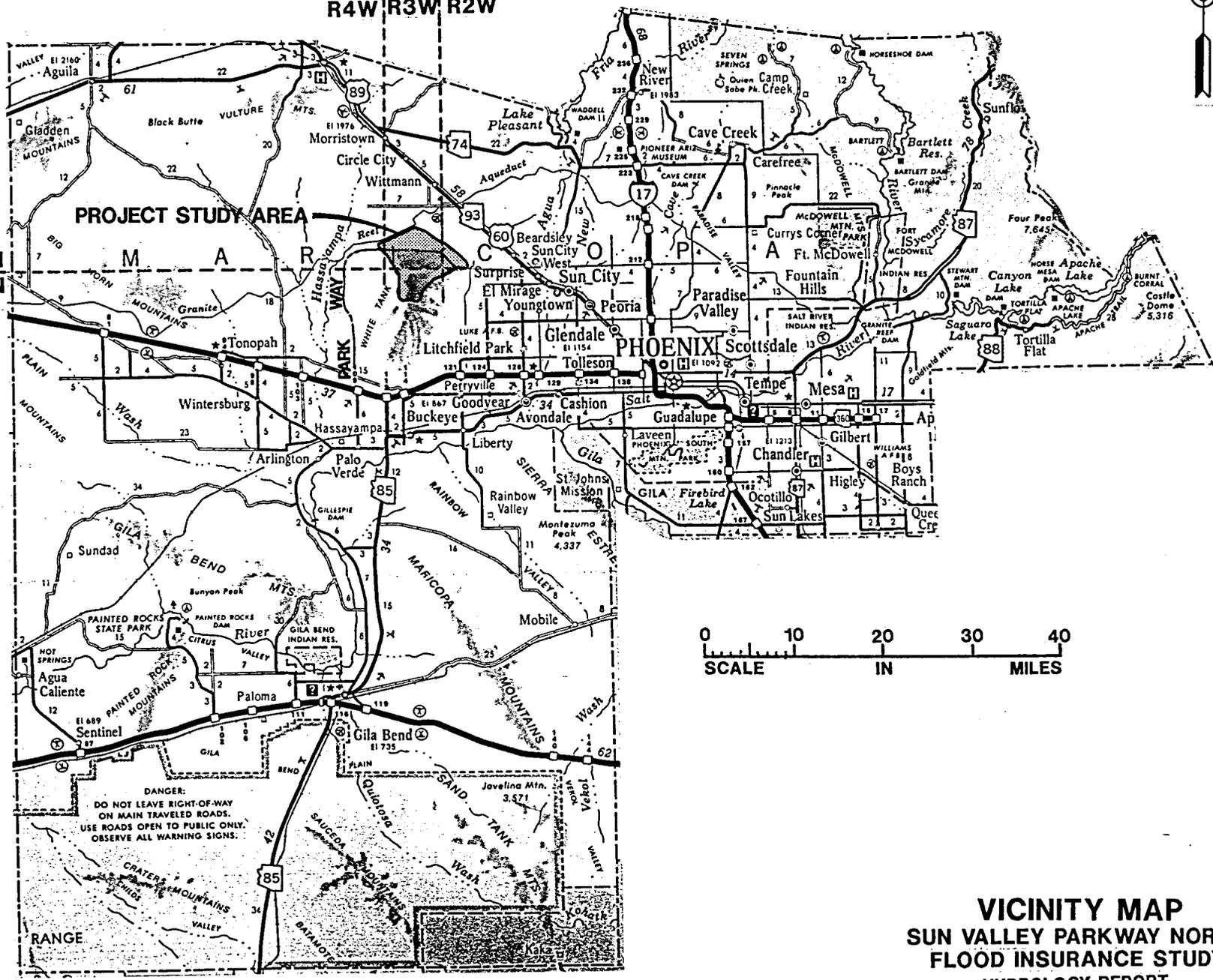
The study area lies at an elevation between 1,350 and 3,300 feet. The white Tank Mountain areas are characterized by thin soils or exposed rocks, sparse vegetation, and terrain with many narrow canyons. Where streams leave the mountain canyons and enter the valley floor, they encounter deep and porous soils on mild slopes.

The climate of the study area is typically desert in character with short, mild winters and long, hot summers. Wide diurnal temperature variations are also characteristic. Temperatures generally range between 35 degrees Fahrenheit ($^{\circ}$ F) and 105° F, with an annual average of 71° F. The prevailing winds are from the east and are usually light, although severe windstorms occur occasionally during the summer thunderstorm season. The annual precipitation for the study area averages approximately 7.4 inches.



R4W/R3W/R2W

BELL T4N
ROAD T3N



PROJECT STUDY AREA

VICINITY MAP
SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
HYDROLOGY REPORT

FIGURE 1

DANGER:
DO NOT LEAVE RIGHT-OF-WAY
ON MAIN TRAVELED ROADS.
USE ROADS OPEN TO PUBLIC ONLY.
OBSERVE ALL WARNING SIGNS.

There are two separate rainfall seasons. The first occurs during the winter months from November to March when the area is subject to storms from the Pacific Ocean. While this is classified as a rainfall season, there can be periods of a month or more, in this or any other season, when practically no precipitation falls. Snowfall occurs very rarely in the White Tank Mountains of the study area. The second rainfall season occurs during July and August when Arizona is subject to widespread thunderstorm activity. These thunderstorms are extremely variable in intensity and location. The spring and fall months are generally dry, although precipitation in substantial amounts has fallen on occasion during every month of the year.

2.3 Principal Flood Problems

The most severe floods in the study area generally occur during the summer as a result of local thunderstorms. The inadequate capacity of the stream channels causes flow to spread out posing potential problems for future developments.

Seven general summer storms of appreciable magnitude have occurred in and near Arizona since 1901. These seven storms, occurred on July 1-2 1911, September 7-10, 1916, September 15-18, 1923, September 25-27, 1926, September 4-6, 1939, September 17-19, 1946, and August 26-29, 1951. Little or no hydrologic information is available concerning the floods in the drainage areas of Trilby Wash and unnamed washes draining the east slopes of the White Tank Mountains prior to 1939. Recent storms that produced medium to large floods in those areas occurred in August-September 1939, September 1946, September 1949, January 1951, July 1951, August 1951, September 1967, December 1967, September 1972 and June 1972. A brief summary of the August 1951 occurrence, the most important of these storms and floods, is given below. (Reference 1).

Storm and flood of 26-29 August 1951.

The remnants of a tropical hurricane that entered Mexico near Tampico on 22 August and continued in a west and northwest direction produced heavy rainfall in southern and central Arizona beginning late on 26 August and ending generally during the afternoon of the 29th. The storm centered over the higher elevations in southern Yavapai County around Crown King and had another high concentration near Sunflower in northeastern Maricopa County. Maximum intensities occurred near Phoenix from noon to 1800 on the 27th and

at Poland Junction from midnight to 1000 on the 28th and from 2000 on the 28th to 1100 on the 29th. Winds during this storm were not very strong. About 65 percent of the total storm occurred in a 24-hour period. The average depth over the drainage area was approximately 7 inches. In the week prior to this storm, numerous thunderstorms occurred that conditioned at least parts of the region for high rates of runoff. A comparison of the previous general summer storms described above, indicates that the 24-hour and total-storm rainfall amounts during the August 1951 storm exceeded those of other general summer storms of record. (Reference 1)

A large part of the flood runoff was sheet flow from the White Tank Mountains and Trilby Wash areas. The failure of man-made structures such as canals and dikes, which intercepted and concentrated the waters, caused much flooding of lowland areas. No stream-gaging stations are in the area, but an estimate by the United States Soil Conservation Service based on high-water marks at the numerous breaks in the Beardsley Canal in the Trilby Wash area indicated a total nonsynchronized flow of about 34,000/cubic feet per second. The volume was estimated at 10,600 acre-feet. The peak discharge at Luke Air Force Base was estimated at 5,000 cubic feet per second by the United States Geological Survey. This occurrence is the largest observed flood from this drainage area. (Reference 1)

2.4 Flood Protection Measures

No major flood control structures have been constructed in the study area for the purpose of eliminating or reducing the magnitude of existing flood hazards. McMicken Dam was constructed in the 1950's by the United States Army Corps of Engineers, on the east side of the study area to detain flood flows and mitigate flooding to the east of the dam. Floodflows from the study area as well as Trilby Wash and tributaries and the east slope of the White Tank Mountains flow into McMicken Dam.

This study is intended to be utilized in the planning and regulation of future development within the study area to provide for adequate drainage and flood proofing of development.

3.0 ENGINEERING METHODS

3.1 Hydrologic Analysis

No streamgauge stations are located within the SVPN study area. The closest streamgauge station to the study area was located approximately 15 miles to the northeast (Aqua Fria Tributary at Youngtown, Drainage Area = 0.13 sq. mi., Length of Record = 7 years). As part of a regional hydrologic analysis performed by the United States Army Corps. of Engineers (Reference 2) a frequency discharge curve was developed for the Aqua Fria Tributary gage. The 100 - year discharge from discharge curve compared reasonably well with the study hydrology.

A hydrologic analysis was performed by the United States Army Corps of Engineers in November 1953 (Reference 1) for the design of Trilby Wash Detention Basin, (aka McMicken Dam). This hydrologic analysis computed peak discharges into McMicken Dam for the standard Project (SPF) and Probable Maximum Floods (PMF). The August 26-29, 1951 flood was used as the worst flood of record in the development of the Standard Project Flood in this report.

A hydrologic analysis the Wittman Area Drainage Master Study, (ADMS) performed for the Flood Control District of Maricopa County in March, 1989 (Reference 3) to determine the 2, 5, 10, 50, and 100 - year and SPF flood event flows into McMicken Dam at several locations along the dam. The Wittman ADMS also determined the 2, 5, 10, 50, and 100 - year peak discharges at numerous concentration points throughout the watershed for use in identifying drainage patterns and floodplains.

The Wittman ADMS utilized the United States Corps of Engineers HEC-1 flood hydrograph package computer model to compute peak discharges through the study area. The 24-hour duration SCS Type II rainfall distribution was utilized to distribute the rainfall for the analysis of the 2, 5, 10, 50, and 100 - year frequency storms. The precipitation depth - area relation was incorporated into the HEC-1 model to maintain consistency between successive downstream hydrographs by generating each from precipitation quantities that correspond to that particular basin size.

The SPF precipitation and distribution was taken from the United States Army Corps. of Engineers hydrologic analysis for McMicken Dam (Reference 1) The

SCS curve number method was utilized to calculate precipitation losses based on hydrologic soil types and vegetative cover type and density.

The Phoenix Mountain S-graph unit hydrograph method was utilized to compute flood hydrographs in the mountainous areas, while the kinematic wave method was utilized to compute flood hydrographs on the milder sloped (i.e. less than 2 percent) desert. The Muskingum method was used to route flows.

The Wittman ADMS peak discharge results (Reference 3) for the Standard Project Flood and Probable Maximum Flood (PMF) were compared to the Trilby Wash Detention Basin hydrology report (Reference 1) to validate and compare results. The SPF, and PMF peak discharges from the Wittman ADMS study were within 10 percent of the Trilby Wash hydrology report.

This Sun Valley Parkway North (SVPN) FIS is within the Wittman ADMS drainage watershed. Hence in order to maintain consistency of method and results, this SVPN hydrology study (Reference 4) utilized in general the same hydrology methodology as used in the Wittman ADMS, except for the following changes; a) a greater number of subbasins (57 vs 7) were used to better define discharges to study washes b) a more recent and detailed soil survey (Reference 5 and 6) was used to determine runoff curve number coefficients., d) the normal depth routing method was used instead of Muskingum method.

The more detailed hydrology for this SVPN study area (Reference 4) was inserted into the Wittman ADMS study hydrology (Reference 3) for comparison of peak discharges along Trilby Wash. Peak discharges from this study's hydrology were found to be within 5 percent of the Wittman ADMS results.

A summary of drainage area - peak discharge relationships for each stream studied in detail from Reference 4 is shown in Table 1.

TABLE 1
Summary of Discharges

<u>Flooding Source and Location and Location</u>	<u>Drainage Area (Square Miles)</u>	<u>Peak Discharge (Cubic Feet per Second)</u>
Wash No. 1, Tributary, At Parkway	0.19	94
Wash No. 1, At Parkway	0.10	102
Wash No. 1 (Center Section 17)	1.02	349
Wash No. 1 (1000 Ft. East of Section 16/17)	3.0	912
Wash No. 1 (1000 Ft. East of Section 15/16)	6.96	2157
Wash No. 1 (At Trib. 5 West)	9.1	2131
Wash No. 2 Tributary At Parkway	1.43	859
Wash No. 2 At Parkway	0.74	401
Wash No. 2 (At confluence with Tributary)	2.44	1250
Wash No. 2 (At confluence with Wash #1)	3.3	1293
Wash No. 3, Trib. "B" At Parkway	0.51	282
Wash No. 3, Trib. "A" At Parkway	0.30	171
Wash No. 3 At Parkway	0.19	86
Wash No. 3 (At Confluence with Tribs. A and B)	1.01	532

<u>Flooding Source and Location and Location</u>	<u>Drainage Area (Square Miles)</u>	<u>Peak Discharge (Cubic Feet per Second)</u>
Wash No. 3 (At confluence with Trib. 5 West)	2.14	766
Wash No. 4, Trib. "F" At Parkway	0.65	350
Wash No. 4, Trib. "E" At Parkway	0.18	82
Wash No. 4, Trib. "D" At Parkway	0.10	62
Wash No. 4, Trib. "C" At Parkway	0.22	134
Wash No. 4, Trib. "B" At Parkway	1.36	816
Wash No. 4, Trib. "A" At Parkway	1.28	766
Wash No. 4, At Parkway	0.29	151
Wash No. 4, At Confluence of Tribs. A-C	3.14	1825
Wash No. 4, At Confluence of Tribs. A-D	3.28	1866
Wash No. 4, At Confluence of Tribs. A-E	3.46	1939
Wash No. 4, At Confluence of Tribs. A-F	4.11	2240
Wash No. 4 (At Confluence with 5 West)	5.10	2275
Wash No. 5, Trib. "A" At Parkway	0.82	748
Wash No. 5, At Parkway	2.90	1905
Wash No. 5, At Confluence with Trib. A	3.75	2397
Wash No. 5 (At Confluence with Trib. 5 West)	4.15	2469

<u>Flooding Source and Location and Location</u>	<u>Drainage Area (Square Miles)</u>	<u>Peak Discharge (Cubic Feet per Second)</u>
Wash No. 6, Trib. "A" At Parkway	---	412
Wash No. 6, At Parkway	---	925
Wash No. 6 (At Confluence with Trilby Wash)	1.73	1408
Wash No. 7 (At Sun Valley Parkway)	1.09	1009
Wash No. 7 (At Confluence with Trilby Wash)	1.86	1248
Wash No. 8, Trib. "B", At Parkway	---	117
Wash No. 8, Trib. "A", At Parkway	---	91
Wash No. 8, At Parkway	---	891
Wash No. 8 At Confluence of Tribs. A and B)	1.21	1096
Wash No. 8 (At Confluence with McMicken Dam Flood Pool)	2.14	1447

3.2 Hydraulic Analysis

Cross-sections were obtained from topographic maps (Reference 7 and 8) that were compiled photogrammetrically from aerial photos. Culvert elevation data and structure geometry were obtained from as-built plans of the Sun Valley Parkway (Reference 9). The Sun Valley Parkway is the only road with drainage structures in the study area. Elevation reference marks utilized in the Parkway design are common to the study mapping and therefore on the same datum (N.G.V.D. 1983).

The majority of the mapping of the study area was at a scale of 1:4800 with a contour interval of 2 feet (Reference 7). At the north and east edges of

this study, where this study matches the previous Wittman ADMS study (Reference 3), the mapping from the Wittman ADMS was utilized (Reference 8). The Wittman ADMS mapping (Reference 8) was at a scale of 1:4800 with a contour interval of 4 feet.

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 10). Starting water surface elevations were determined using the slope-area method.

The land use and land cover data were obtained by field surveys, review of aerial photography (Reference 7) and soil surveys (Reference 5 and 6).

Locations of selected cross-sections used in the hydraulic analysis are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2) selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 3).

Channel and overbank roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgement and based on field observations of the stream and floodplain areas. A summary of the Manning's "n" values used in the floodplain modeling of the study washes follows:

<u>Stream</u>	<u>Roughness Coefficients</u>	
	<u>Channel</u>	<u>Overbank</u>
Wash No. 1	0.012 - 0.050	0.030 - 0.050
Wash No. 2	0.012 - 0.045	0.030 - 0.049
Wash No. 3	0.012 - 0.045	0.030 - 0.049
Wash No. 4	0.012 - 0.042	0.035 - 0.049
Wash No. 5	0.012 - 0.042	0.035 - 0.049
Wash No. 6	0.012 - 0.042	0.049
Wash No. 7	0.012 - 0.045	0.048 - 0.049
Wash No. 8	0.012 - 0.045	0.016 - 0.049

The lower Manning's "n" values of 0.012, 0.016, and 0.024 represent "n" values utilized for concrete box culverts, roadway pavement and corrugated metal pipes, respectively.

Several study washes contain areas of shallow flooding characterized by small braided channels. The braiding channels generally vary in capacity along the length of the floodplain. Study washes and reach segments exhibiting these characteristics are noted as follows;

Wash No. 1 and Tributary	Section Q to AD and Section AI to AS
Wash No. 2 and Tributary	Section B to N and Section V to X
Wash No. 4 and Tributaries	Section A - I
Wash No. 5 and Tributaries	Section A - L and Section R - T
Wash No. 6 and Tributaries	Section A - H
Wash No. 7	Section A - Q
Wash No. 8 and Tributaries	Section A - S

In these areas of shallow flooding, the most dominate and direct alignment to the stream outlet was chosen to establish bank stations and for future floodway delineation analysis.

Two private stock ponds and related diversion levees existed at the time of the study on Wash No. 1 (between section N and O) and Wash No. 4 (between section Q and R). Both of these levees were determined to be overtopped for the 100-year event and therefore were assumed breached and noneffective for this analysis.

Several armored levees exist upstream and within the Sun Valley Parkway right-of-way which train flow into the drainage structures. These levees were considered effective and in place for this analysis. The HEC-2 analysis reported that Section 1.282 of Wash #6 was extended 0.24 ft for the 100-year discharge floodplain analysis. This extended cross-section occurred at an armored levee section where weir flow was accounted for over the levee. The cross-section was not recoded as it was considered appropriate for the analysis.

The hydraulic analyses for this study were based on unobstructed flow.

Flow profiles were not compared to historical events. No information exists on flood elevations and historical discharges for the study streams with which to make this comparison.

Encroachments (ET option) were applied at several cross-sections adjacent to the Sun Valley Parkway culvert structures to limit effective flow within the 4:1 flare angle downstream and the 1:1 angle upstream of the structures per HEC-2 model users manual. The cross-sections affected include: Wash No. 2, Section 12.013; Wash No. 3, Section 12.128; Wash No. 4, Section 2.75, 12.725, 22.657, 42.401 and 62.127; Wash No. 5, Section 1.331, 1.396 and 11.210; Wash No. 6, Section 1.282 and 11.139; Wash No. 7, Section 1.718 and 1.761; Wash No. 8, Section 2.157 and 2.216. Floodplain delineations downstream of culverts, where ET option was applied for effective flow transition, were plotted based on water surface elevation intersection with topography mapping versus the HEC-2 printout floodplain stations. This was done because ponding though ineffective for conveyance was still possible beyond the encroachments applied.

Likewise both the floodway and floodplain upstream of culverts, where the effective flow encroachment was applied, were plotted based on water surface elevation as this upstream storage and conveyance capacity needed to be reserved along the road.

All elevations are referenced to the National Geodatic Vertical Datum of 1929 (NGVD). Elevation reference marks and descriptions used in this study are shown on the maps (Exhibit 3) and summarized in this report (Exhibit 2).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

4.1 Floodplain Boundaries

For the streams studied in detail 100-year flood boundaries were delineated using the topographic maps at a scale of 1:4,800 and with contour interval of 2 feet (Reference 7) and 4 feet (Reference 8).

The floodplain upstream of the Sun Valley Parkway road embankment was delineated based on computed water surface elevation upstream of the drainage structures as ponding would occur beyond the effective flow boundaries used to model flow transitioning into the drainage structures. The floodplain

downstream of the Sun Valley Parkway road embankment was also delineated at several washes based on computed water surface elevation downstream of the drainage structure as ponding would occur beyond the effective flow boundaries used to model flow transitioning out of the drainage structures.

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map, (Exhibit 3). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones AE). Small areas within the floodplain 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 of floodplains, 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 floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment 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 floodways in this study are 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 floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the floodplain. 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 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Floodways were computed for all the study streams including these areas of shallow flooding discussed in Section 3.1. The floodways delineated in those

areas of shallow flooding will provide a basis for planning adequate drainage corridors for future development based on floodway alignments along the most dominate and direct flowpath to the stream outlet.

The floodway upstream of Sun Valley Parkway road embankment was delineated based on computed water surface elevation upstream of the drainage structures as the detention and collection channel capacity along the upstream side of the road requires preservation.

The area between the floodway and 100-year floodplain boundaries termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation on the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
A	.080	100.	462.	5.9	1505.1	1504.1	1.0
B	.216	87.	459.	6.0	1507.9	1507.0	.9
C	.359	121.	568.	3.8	1510.2	1509.5	.7
D	.503	100.	281.	7.7	1513.3	1513.1	.2
E	.636	145.	586.	3.7	1518.2	1517.5	.7
F	.778	65.	259.	8.3	1520.5	1520.0	.5
G	.964	138.	596.	3.6	1525.3	1524.4	.9
H	1.112	141.	344.	6.3	1528.0	1527.4	.6
I	1.220	147.	544.	4.0	1531.9	1530.9	1.0
J	1.377	89.	276.	3.3	1534.4	1533.6	.8
K	1.490	111.	312.	2.9	1536.1	1535.3	.8
L	1.636	168.	337.	2.7	1538.4	1537.9	.5
M	1.778	99.	250.	3.7	1541.2	1540.8	.4
N	1.893	217.	333.	2.7	1544.1	1543.5	.6
O	2.004	124.	90.	3.9	1547.9	1547.8	.1
P	2.126	74.	108.	3.2	1554.9	1553.9	1.0
Q	2.244	111.	100.	3.5	1560.7	1560.2	.5
R	2.379	150.	139.	2.5	1567.2	1566.4	.8
S	2.501	71.	50.	3.6	1573.0	1572.7	.3
T	2.630	59.	68.	2.7	1579.6	1578.7	.9
U	2.758	155.	57.	3.1	1587.0	1586.3	.7
V	2.892	65.	71.	2.5	1594.0	1593.1	.9
W	3.017	53.	38.	3.7	1599.8	1599.7	.1
X	3.151	41.	44.	3.2	1608.9	1608.3	.6
Y	3.281	87.	33.	4.3	1616.4	1615.8	.6
Z	3.408	111.	51.	2.8	1625.7	1624.7	1.0

1) MILES ABOVE CONFLUENCE WITH 5 WEST

2) N.G.V.D. 1929

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS OF MARICOPA
COUNTY.

FLOODWAY DATA

WASH NO. 1 AND TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
A A	3.547	128.	46.	2.2	1634.9	1634.0	.9
A B	3.631	76.	41.	2.5	1640.7	1640.3	.4
A C	3.761	96.	35.	2.9	1650.0	1649.2	.8
A D	3.887	67.	38.	2.7	1657.9	1657.7	.2
A E	4.055	33.	30.	3.4	1667.7	1667.7	.0
A F	4.066	16.	17.	5.9	1669.0	1669.0	.0
A G	4.094	16.	39.	2.6	1671.5	1671.5	.0
A H	4.101	46.	52.	1.9	1671.6	1671.6	.0
TRIBUTARY	-2.379	150.	138.	2.5	1567.2	1566.4	.8
A I	12.510	39.	30.	4.4	1573.1	1573.1	.0
A J	12.639	116.	71.	1.9	1579.6	1578.8	.8
A K	12.761	26.	24.	5.4	1585.8	1585.7	.1
A L	12.904	68.	62.	2.1	1594.2	1593.3	.9
A M	13.023	67.	32.	3.3	1600.1	1599.6	.5
A N	13.170	50.	42.	2.5	1610.0	1609.0	1.0
A O	13.277	49.	27.	3.9	1617.4	1616.9	.5
A P	13.408	15.	26.	4.1	1627.0	1626.6	.4
A Q	13.536	18.	17.	4.6	1635.4	1634.9	.5
A R	13.616	12.	23.	4.2	1640.9	1640.1	.8
A S	13.743	12.	19.	4.8	1648.6	1648.1	.5
A T	13.875	21.	27.	3.5	1657.1	1656.9	.2
A U	14.000	12.	15.	6.2	1667.5	1667.5	.0
A V	14.009	11.	19.	5.0	1668.4	1668.1	.3
A W	14.034	11.	21.	4.4	1669.6	1669.6	.0
A X	14.042	16.	16.	5.7	1670.7	1670.7	.0

1) DISTANCE CONTINUES ALONG TRIBUTARY BASELINE FROM REPEATED CROSS-SECTION BUT WITH 10 ADDED TO TRIBUTARY SECTION I.D.

2) N.G.V.D. 1929

TABLE 2	DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Federal Insurance Administration	FLOODWAY DATA
	SUN VALLEY PARKWAY NORTH TOWN OF SURPRISE AND PORTIONS OF MARICOPA COUNTY.	WASH NO. 1 AND TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
A	.107	77.	242.	5.3	1537.5	1536.5	1.0
B	.220	95.	217.	6.0	1542.5	1541.6	.9
C	.352	133.	279.	4.6	1549.4	1548.7	.7
D	.481	210.	306.	4.2	1556.2	1555.2	1.0
E	.611	250.	367.	3.5	1562.4	1561.5	.9
F	.738	230.	321.	4.0	1568.2	1567.4	.8
G	.873	333.	381.	3.4	1575.0	1574.2	.8
H	1.013	236.	305.	4.2	1582.1	1581.3	.8
I	1.151	277.	337.	3.8	1589.8	1588.9	.9
J	1.288	352.	341.	3.7	1597.7	1597.0	.7
K	1.425	241.	329.	3.8	1605.5	1604.7	.8
L	1.555	370.	321.	3.9	1612.8	1612.0	.8
M	1.719	107.	134.	3.1	1621.9	1621.1	.8
N	1.831	31.	63.	6.6	1627.9	1627.8	.1
O	1.993	27.	67.	6.2	1637.9	1637.3	.6
P	2.123	85.	90.	4.5	1648.4	1647.7	.7
Q	2.254	116.	96.	4.2	1656.6	1656.3	.3
R	2.281	174.	127.	3.1	1658.1	1658.0	.1
S	2.287	81.	74.	5.4	1658.6	1658.6	.0
T	2.313	81.	101.	4.0	1659.6	1659.6	.0
U	2.321	366.	100.	4.0	1660.3	1660.3	.0
TRIBUTARY	-1.555	370.	321.	3.9	1612.8	1612.0	.8
V	11.711	114.	208.	4.1	1622.0	1621.3	.7
W	11.855	101.	148.	5.8	1631.4	1630.5	.9
X	11.967	46.	149.	5.8	1638.0	1637.3	.7
Y	11.975	64.	114.	7.6	1638.2	1638.2	.0
Z	12.002	64.	162.	5.3	1640.3	1640.3	.0
A A	12.013	116.	138.	6.2	1640.5	1640.5	.0

- 1) MILES ABOVE CONFLUENCE WITH WASH NO. 1. DISTANCE CONTINUES ALONG TRIB. BASELINE FROM REPEATED CROSS-SECTION BUT WITH 10 ADDED TRIB. A SECTION I.D.
- 2) N.G.V.D. 1929

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

FLOODWAY DATA

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS OF MARICOPA
COUNTY.

WASH NO. 2 AND TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
A	.086	27.	115.	6.6	1512.6	1511.8	.8
B	.209	21.	93.	8.3	1517.9	1517.1	.8
C	.355	78.	177.	4.3	1524.9	1523.9	1.0
D	.499	61.	112.	6.9	1533.2	1532.6	.6
E	.645	78.	153.	4.3	1541.9	1540.9	1.0
F	.790	47.	88.	7.3	1550.4	1549.8	.6
G	.938	62.	146.	4.4	1559.5	1558.5	1.0
H	1.084	35.	85.	7.6	1566.9	1566.3	.6
I	1.221	60.	128.	4.2	1575.2	1574.2	1.0
J	1.347	39.	74.	7.2	1581.8	1581.3	.5
K	1.484	50.	126.	4.2	1589.5	1588.6	.9
L	1.622	41.	76.	7.0	1598.4	1598.0	.4
M	1.768	139.	171.	3.1	1607.0	1606.1	.9
N	1.888	9.	13.	6.9	1613.8	1613.6	.2
O	2.007	13.	24.	3.5	1622.9	1622.0	.9
P	2.076	10.	14.	6.2	1627.0	1626.7	.3
Q	2.128	16.	25.	3.4	1631.1	1630.7	.4
R	2.142	43.	59.	1.5	1631.4	1631.1	.3
S	2.171	43.	42.	2.0	1632.0	1631.9	.1
T	2.186	46.	22.	3.9	1633.5	1633.5	.0
TRIBUTARY A	-1.768	139.	170.	3.1	1607.0	1606.1	.9
U	11.884	12.	22.	7.8	1614.1	1613.9	.2
V	12.000	24.	46.	3.7	1622.1	1621.2	.9
W	12.063	22.	28.	6.1	1626.2	1625.5	.7
X	12.089	10.	21.	8.3	1629.5	1629.5	.0
Y	12.115	10.	25.	7.5	1630.3	1630.3	.0
Z	12.128	24.	30.	6.3	1630.9	1630.9	.0

1) MILES ABOVE CONFLUENCE WITH WASH NO. 1 ALONG BASELINE. DISTANCE CONTINUES ALONG TRIB. BASELINE FROM REPEATED CROSS-SECTION BUT WITH 10 ADDED TO TRIB. A SECTION I.D.

2) N.G.V.D. 1929

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH

TOWN OF SURPRISE AND PORTIONS OF MARICOPA COUNTY

FLOODWAY DATA

WASH NO. 3 AND TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
TRIBUTARY B	-1.768	139.	170.	3.1	1607.0	1606.1	.9
AA	21.890	27.	41.	6.9	1614.3	1614.2	.1
AB	22.016	38.	64.	4.4	1622.9	1622.0	.9
AC	22.037	43.	47.	6.0	1624.7	1624.7	.0
AD	22.067	43.	69.	4.1	1625.8	1625.8	.0
AE	22.076	76.	58.	4.9	1626.9	1626.9	.0

1) DISTANCE CONTINUES ALONG TRIB. BASELINE FROM REPEATED CROSS SECTION BUT WITH 20 ADDED TO TRIB. B SECTION I.D.

2) N.G.V.D. 1929

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS OF MARICOPA COUNTY.

FLOODWAY DATA

WASH NO. 3 AND TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
A	.159	353.	500.	3.9	1477.5	1476.5	1.0
B	.273	530.	739.	3.1	1481.9	1481.2	.7
C	.417	280.	423.	5.4	1488.4	1487.4	1.0
D	.564	175.	332.	6.9	1494.2	1493.4	.8
E	.689	289.	478.	4.8	1501.1	1500.2	.9
F	.795	299.	482.	4.7	1506.9	1506.1	.8
G	.917	417.	592.	3.8	1513.2	1512.2	1.0
H	1.038	277.	461.	4.9	1520.0	1519.0	1.0
I	1.167	179.	437.	5.2	1525.8	1524.8	1.0
J	1.292	96.	287.	7.9	1531.5	1530.7	.8
K	1.413	109.	380.	5.9	1537.8	1536.8	1.0
L	1.553	102.	243.	8.0	1546.0	1545.5	.5
M	1.678	120.	335.	5.8	1554.2	1553.2	1.0
N	1.818	113.	282.	6.6	1561.1	1560.4	.7
O	1.939	105.	285.	6.5	1568.5	1567.6	.9
P	2.057	135.	357.	5.1	1574.2	1573.4	.8
Q	2.148	79.	216.	8.5	1579.0	1578.6	.4
R	2.204	140.	335.	5.4	1582.1	1581.1	1.0
S	2.242	64.	213.	8.6	1585.1	1584.6	.5
T	2.322	100.	345.	5.3	1589.6	1588.8	.8
U	2.439	39.	157.	10.8	1596.2	1595.6	.6
V	2.523	129.	338.	5.0	1601.5	1600.8	.7
W	2.621	44.	112.	8.0	1607.9	1607.4	.5
X	2.750	36.	79.	1.9	1615.2	1614.2	1.0
Y	2.759	10.	19.	7.9	1616.9	1616.9	.0
Z	2.784	10.	25.	6.0	1617.9	1617.9	.0
A A	2.798	28.	31.	4.9	1618.4	1618.4	.0

1) MILES ABOVE CONFLUENCE WITH 5 WEST ALONG BASELINE.

2) N.G.V.D. 1929

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS OF MARICOPA
COUNTY.

FLOODWAY DATA

WASH NO. 4 AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
TRIBUTARY A.	-2.621	42.	108.	8.3	1607.9	1607.4	.5
AB	12.725	99.	207.	3.7	1613.9	1613.4	.5
AC	12.734	77.	138.	5.6	1614.1	1613.9	.2
AD	12.760	77.	159.	4.8	1614.9	1614.9	.0
AE	12.775	99.	121.	6.3	1617.0	1617.0	.0
TRIBUTARY B	-2.439	39.	157.	10.8	1596.2	1595.6	.6
AF	22.523	129.	355.	4.8	1601.7	1600.9	.8
AG	22.617	70.	122.	6.7	1608.4	1608.2	.2
AH	22.657	55.	146.	5.6	1611.1	1610.4	.7
AI	22.669	77.	134.	6.1	1611.6	1611.4	.2
AJ	22.697	77.	166.	4.9	1612.7	1612.7	.0
TRIBUTARY C	-2.322	100.	345.	5.3	1589.6	1588.8	.8
AK	32.418	18.	21.	6.2	1592.6	1593.4	-.8
AL	32.492	29.	35.	3.8	1598.6	1598.3	.3
AM	32.558	29.	25.	5.4	1603.4	1603.5	-.1
AN	32.575	30.	30.	4.5	1605.6	1605.4	.2
AO	32.584	64.	33.	4.1	1606.8	1606.8	.0
AP	32.610	64.	47.	2.8	1607.7	1607.7	.0
TRIBUTARY D	-1.939	105.	285.	6.5	1568.5	1567.6	.9
AQ	42.070	37.	71.	.9	1574.3	1573.8	.5
AR	42.130	21.	13.	4.8	1576.7	1576.7	.0
AS	42.200	24.	23.	2.7	1581.4	1580.9	.5
AT	42.299	16.	14.	4.3	1586.5	1586.4	.1
AU	42.401	8.	11.	5.9	1597.9	1597.6	.3
AV	42.406	7.	9.	6.6	1600.7	1600.7	.0
AW	42.432	7.	17.	3.6	1602.5	1602.5	.0
AX	42.436	57.	42.	1.5	1602.7	1602.7	.0

1) DISTANCE CONTINUES ALONG TRIB. BASELINE FROM REPEATED CROSS-SECTION BUT WITH 10, 20, 30 AND 40 ADDED, RESPECTIVELY TO TRIB. A, B, C, AND D. SECTION I.D.

2) N.G.V.D. 1929

TABLE 2	DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Federal Insurance Administration	FLOODWAY DATA
	SUN VALLEY PARKWAY NORTH TOWN OF SURPRISE AND PORTIONS OF MARICOPA COUNTY.	WASH NO. 4 AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
TRIBUTARY E	-1.678	120.	335.	5.8	1554.2	1553.2	1.0
AY	51.836	36.	20.	4.0	1561.2	1561.3	-.1
AZ	51.980	126.	69.	1.2	1569.9	1569.5	.4
BA	52.080	27.	18.	4.7	1577.2	1577.1	.1
BB	52.175	24.	27.	3.0	1584.3	1583.4	.9
BC	52.248	32.	19.	4.2	1588.9	1589.0	-.1
BD	52.259	11.	13.	6.2	1591.9	1591.9	.0
BE	52.285	11.	27.	3.0	1593.5	1593.5	.0
BF	52.289	19.	19.	4.4	1593.5	1593.5	.0
TRIBUTARY F	-1.413	109.	380.	5.9	1537.8	1536.8	1.0
BG	61.538	39.	52.	6.7	1542.9	1542.8	.1
BH	61.690	63.	95.	3.7	1553.5	1553.0	.5
BI	61.811	30.	49.	7.1	1561.6	1561.1	.5
BJ	61.936	26.	62.	5.6	1570.5	1569.9	.6
BK	62.027	20.	44.	8.0	1576.2	1575.3	.9
BL	62.074	43.	67.	5.3	1580.9	1580.6	.3
BM	62.087	39.	73.	4.8	1581.6	1581.4	.2
BN	62.114	39.	111.	3.2	1583.2	1583.2	.0
BO	62.127	41.	52.	6.7	1584.4	1584.4	.0

1) DISTANCE CONTINUES ALONG TRIB. BASELINE FROM REPEATED CROSS-SECTION BUT WITH 50 AND 60 ADDED RESPECTIVELY TO TRIB. E AND F SECTION I.D.
2) N.G.V.D. 1929

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
A	.059	469.	670.	3.7	1468.9	1467.9	1.0
B	.153	656.	733.	3.4	1473.4	1472.4	1.0
C	.265	509.	678.	3.6	1479.2	1478.2	1.0
D	.418	378.	566.	4.4	1485.6	1484.6	1.0
E	.518	267.	555.	4.4	1490.7	1489.7	1.0
F	.642	245.	495.	5.0	1495.9	1494.9	1.0
G	.775	202.	519.	4.6	1501.6	1500.6	1.0
H	.866	233.	459.	5.2	1505.4	1504.5	.9
I	.920	387.	711.	3.4	1507.8	1507.0	.8
J	.998	296.	457.	5.2	1511.1	1510.8	.3
K	1.110	145.	305.	6.3	1518.8	1518.1	.7
L	1.204	139.	324.	5.9	1523.9	1523.2	.7
M	1.263	64.	207.	9.2	1529.3	1528.4	.9
N	1.331	105.	356.	5.4	1533.2	1532.2	1.0
O	1.361	77.	417.	4.6	1533.9	1533.4	.5
P	1.387	77.	436.	4.4	1534.6	1534.1	.5
Q	1.396	147.	463.	4.1	1534.7	1534.1	.6
TRIBUTARY A	-.920	387.	710.	3.4	1507.8	1507.0	.8
R	11.007	296.	453.	5.3	1511.1	1510.8	.3
S	11.117	145.	304.	2.5	1516.3	1515.7	.6
T	11.210	100.	127.	5.9	1519.6	1519.2	.4
U	11.244	77.	191.	3.9	1521.3	1521.0	.3
V	11.274	77.	170.	4.4	1521.5	1521.4	.1
W	11.283	127.	129.	5.8	1522.1	1522.1	.0

1) MILES ABOVE CONFLUENCE WITH 5 WEST ALONG BASELINE. DISTANCE CONTINUES ALONG TRIB. BASELINE FROM REPEATED CROSS-SECTION BUT WITH 10 ADDED TO TRIB. A SECTION I.D.
2) N.G.V.D. 1929

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH

TOWN OF SURPRISE AND PORTIONS OF MARICOPA COUNTY.

FLOODWAY DATA

WASH NO. 5 AND TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
A	.254	258.	398.	3.5	1436.3	1435.3	1.0
B	.366	210.	329.	4.3	1441.1	1440.3	.8
C	.498	111.	260.	5.4	1447.9	1447.0	.9
D	.617	170.	339.	4.2	1453.3	1452.4	.9
E	.737	120.	253.	5.6	1458.6	1458.4	.2
F	.849	212.	343.	4.1	1464.6	1463.8	.8
G	.950	128.	275.	5.1	1469.6	1468.6	1.0
H	1.042	99.	219.	6.4	1475.1	1474.4	.7
I	1.097	58.	179.	7.8	1479.1	1478.2	.9
J	1.134	105.	294.	3.1	1481.2	1480.4	.8
K	1.178	55.	120.	7.7	1483.6	1482.6	1.0
L	1.225	105.	221.	4.2	1486.9	1486.1	.8
M	1.237	43.	104.	8.9	1488.4	1488.4	.0
N	1.269	43.	127.	8.6	1489.6	1489.6	.0
O	1.282	72.	138.	7.9	1490.2	1490.2	.0
TRIBUTARY A	-1.097	58.	179.	7.8	1479.1	1478.2	.9
P	11.139	80.	325.	1.3	1480.6	1479.7	.9
Q	11.148	77.	167.	2.5	1480.6	1479.6	1.0
R	11.175	77.	129.	3.2	1480.7	1480.4	.3
S	11.180	96.	79.	5.2	1480.9	1480.9	.0

1) MILES ABOVE CONFLUENCE WITH TRILBY WASH ALONG BASELINE. DISTANCE CONTINUES ALONG TRIB. BASELINE FROM REPEATED CROSS-SECTION BUT WITH 10' ADDED TO TRIB. A SECTION I.D.

2) N.G.V.D. 1929

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

FLOODWAY DATA

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS OF MARICOPA

WASH NO. 6 AND TRIBUTARY

COUNTY.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
A	.254	258.	408.	3.1	1393.3	1392.5	.8
B	.398	225.	297.	4.2	1398.5	1397.9	.6
C	.495	212.	346.	3.6	1403.7	1402.8	.9
D	.650	353.	424.	2.9	1409.4	1408.7	.7
E	.779	626.	497.	2.5	1414.1	1413.1	1.0
F	.851	553.	387.	3.2	1417.5	1416.5	1.0
G	1.005	546.	449.	2.8	1425.3	1424.5	.8
H	1.144	316.	276.	3.6	1432.8	1432.0	.8
I	1.206	279.	289.	3.5	1436.3	1435.5	.8
J	1.282	266.	289.	3.5	1440.3	1439.5	.8
K	1.377	210.	267.	3.8	1445.0	1444.2	.8
L	1.445	178.	254.	4.0	1448.6	1447.6	1.0
M	1.509	100.	207.	4.9	1451.5	1450.6	.9
N	1.555	157.	298.	3.4	1453.3	1452.4	.9
O	1.591	117.	187.	5.4	1454.6	1453.9	.7
P	1.630	124.	235.	4.3	1457.0	1456.0	1.0
Q	1.672	88.	189.	5.3	1459.0	1458.0	1.0
R	1.718	43.	149.	6.8	1461.4	1460.5	.9
S	1.727	43.	111.	9.1	1462.2	1462.2	.0
T	1.755	43.	159.	6.3	1463.9	1463.9	.0
U	1.761	128.	365.	2.8	1464.6	1464.6	.0

1) MILES ABOVE CONFLUENCE WITH TRILBY WASH ALONG BASELINE
2) N.G.V.D. 1929

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS OF MARICOPA COUNTY.

FLOODWAY DATA

WASH NO. 7

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
A	.114	332.	449.	3.2	1356.8	1355.8	1.0
B	.265	321.	442.	3.3	1364.1	1363.1	1.0
C	.362	316.	383.	3.8	1369.0	1368.1	.9
D	.474	534.	538.	2.7	1372.9	1371.9	1.0
E	.623	325.	347.	4.2	1376.5	1375.8	.7
F	.773	323.	409.	3.5	1382.3	1381.4	.9
G	.893	334.	329.	4.4	1385.9	1385.2	.7
H	1.016	278.	367.	3.9	1390.9	1390.1	.8
I	1.094	649.	509.	2.8	1395.0	1394.2	.8
J	1.177	643.	438.	3.3	1400.2	1399.7	.5
K	1.285	371.	409.	3.5	1407.1	1406.6	.5
L	1.375	249.	342.	4.2	1413.5	1412.5	1.0
M	1.495	220.	302.	4.2	1420.8	1420.3	.5
N	1.601	90.	179.	6.1	1427.3	1426.4	.9
O	1.668	126.	190.	5.8	1433.3	1432.6	.7
P	1.730	140.	228.	4.8	1437.1	1436.1	1.0
Q	1.808	124.	183.	6.0	1442.6	1441.9	.7
R	1.860	60.	152.	7.2	1446.8	1446.0	.8
S	1.917	101.	177.	6.2	1451.3	1450.5	.8
T	1.975	97.	177.	6.2	1456.0	1455.6	.4
U	2.027	100.	181.	6.1	1459.8	1459.1	.7
V	2.072	46.	117.	8.4	1463.1	1462.7	.4
W	2.112	123.	190.	5.2	1466.8	1466.2	.6
X	2.157	30.	90.	9.9	1471.1	1470.6	.5
Y	2.172	32.	92.	9.7	1473.5	1473.5	.0
Z	2.204	32.	174.	5.1	1476.7	1476.7	.0
AA	2.216	62.	244.	4.5	1476.8	1476.8	.0

1) MILES ABOVE CONFLUENCE WITH MCMICKEN DAM 100-YEAR FLOODPOOL ELEV. ALONG BASELINE

2) N.G.V.D. 1929

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS OF MARICOPA COUNTY.

FLOODWAY DATA

WASH NO. 8 AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION ²		
CROSS SECTION	DISTANCE ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE (FT.)
TRIBUTARY A.	-2.112	123.	190.	5.2	1466.8	1466.2	.6
AB	12.152	7.	12.	7.5	1469.5	1470.3	-.8
AC	12.181	7.	22.	4.2	1474.1	1474.7	-.6
AD	12.189	105.	63.	3.4	1475.5	1475.5	.0
AE	12.197	60.	44.	4.9	1476.4	1476.4	.0
AF	12.209	61.	46.	4.7	1477.0	1477.0	.0
TRIBUTARY B	-2.027	100.	180.	6.1	1459.8	1459.1	.7
AG	22.080	45.	81.	1.4	1462.2	1461.6	.6
AH	22.097	9.	15.	7.6	1463.7	1463.7	.0
AI	22.129	9.	28.	4.2	1468.3	1468.3	.0
AJ	22.140	31.	25.	5.1	1471.8	1471.8	.0
AK	22.182	83.	41.	3.1	1474.5	1474.5	.0

1) MILES ABOVE CONFLUENCE WITH MCMICKEN DAM 100-YEAR FLOODPOOL EL. ALONG BASELINE. DISTANCE CONTINUES ALONG TRIB. BASELINE FROM REPEATED SECTION BUT WITH 10 AND 20 ADDED RESPECTIVELY TO TRIB. A SECTION I.D.

2) N.G.V.D. 1929

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS OF MARICOPA COUNTY.

FLOODWAY DATA

WASH NO. 8 AND TRIBUTARIES

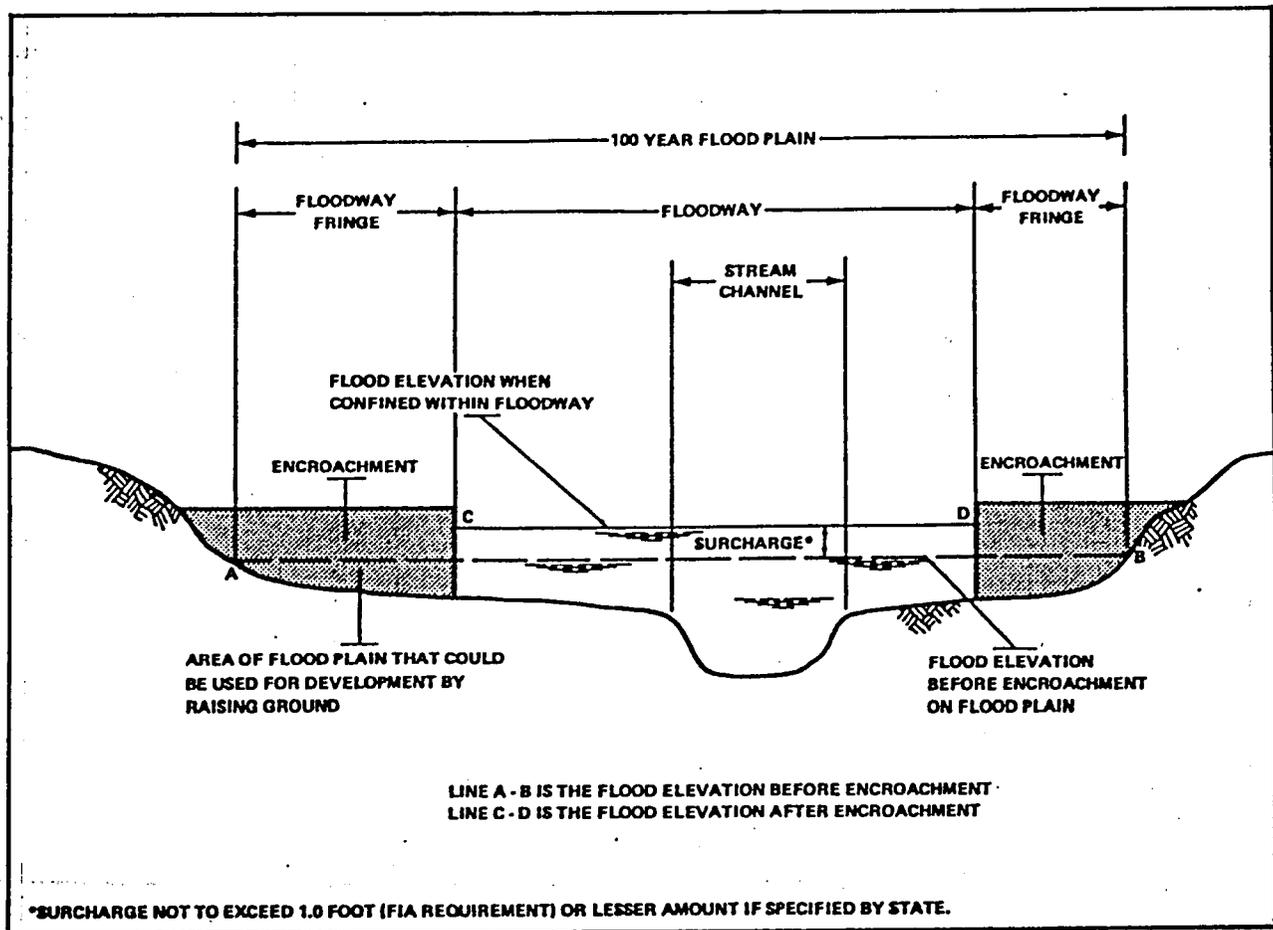


Figure 2. Floodway Schematic

5.0 INSURANCE APPLICATIONS

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

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AO

Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depth are between 1.0 and 3.0 feet; depths are shown, but no FHF's are determined.

Zone AH

Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; base flood elevations are shown, but no FHF's are determined.

Zone AE

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

Zone X

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

6.0 OTHER STUDIES

The Wittman Area Drainage Master Study (ADMS) (Reference 3) was performed for the Flood Control District of Maricopa County in March 1989. The Wittman ADMS study delineated floodplains for Trilby Wash and Tributaries, adjacent to and north of this FIS study area. The Wittman ADMS drainage area included the drainage area of this FIS study. The more detailed hydrology for this FIS study area (Reference 4) was inserted into the Wittman ADMS study hydrology for comparison of peak discharges along Trilby Wash. Peak discharges from this study's hydrology (Reference 4) were found to be within 5 percent of the Wittman ADMS results (Reference 3) which was considered acceptable. Several washes from this FIS flow into the Trilby Wash and Tributaries floodplains. Therefore, floodplain elevations from the Wittman ADMS were utilized in the starting water surface profiles for this FIS floodplain analysis.

The drainage report prepared for the Sun Valley Parkway in March 1987 (Reference 11) computed peak discharges along the Parkway for design of

culvert crossings. The report did not delineate floodplains. Peak discharges from The Sun Valley Parkway report (Referenced 11) were generally higher than this FIS study (Reference 4). This is attributed to the Sun Valley Parkway reports assumption of developed conditions (i.e. higher runoff coefficient) for a portion of the drainage area as well as the use of a higher intensity rainfall distribution.

A report by the U.S. Army Corps of Engineers (Reference 1) for the design of Trilby Wash Detention Basin (A.K.A., McMicken Dam) was utilized by the Wittman ADMS report (Reference 3) in calibrating the HEC-1 model for the Reference 3 study. The C.O.E. study computed Standard Project Flood (SPF) and Probable Maximum Flood (PMF) storm inflows to Trilby Wash Detention (A.K.A. McMicken Dam) of 35,000 cfs and 120,000 cfs, respectively. The Wittman ADMS study computed SPF and PMF storm inflows of 37,500 cfs and 110,370 cfs, respectively. The C.O.E. study computed SPF inflow volume was 32,800 Ac-Ft compared to the Wittman ADMS computed SPF inflows volume of 24,013 Ac-Ft. These storm event discharges and volumes compared quite well. The C.O.E. study did not compute values for the 100-year event, therefore no comparison could be made for this event.

This Sun Valley Parkway North FIS Study (Reference 4) hydrology incorporated the same basic methodology utilized by the Wittman ADMS (Reference 3). Peak discharges from this study (Reference 4) were found to be within 5 percent of the Wittman ADMS results (Reference 3).

A hydrology report by the U.S. Army Corps of Engineers (Reference 2) for the Gila River Basin, New River and Phoenix City Streams provided data on stream gages in the area and include a frequency discharge curve for a gage station of limited years record (7 years and small area (0.13 sq. mi.)) near Youngtown, Arizona. The 100-year peak discharge estimated from this gage compared well to the SVPN study (Reference 4) results.

7.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Presidio of San Francisco, Building 105, San Francisco, California 94129.

8.0 BIBLIOGRAPHY AND REFERENCES

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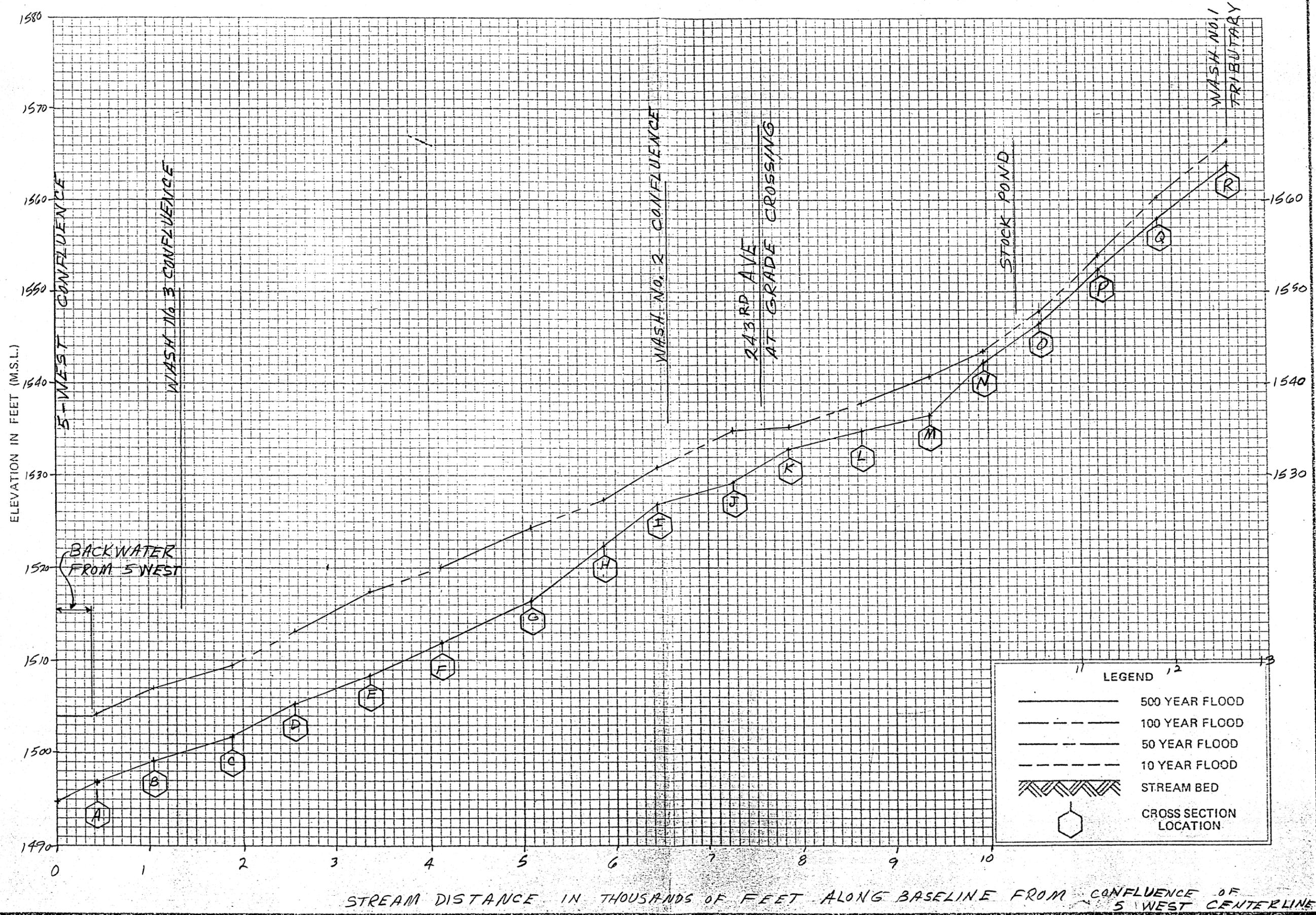
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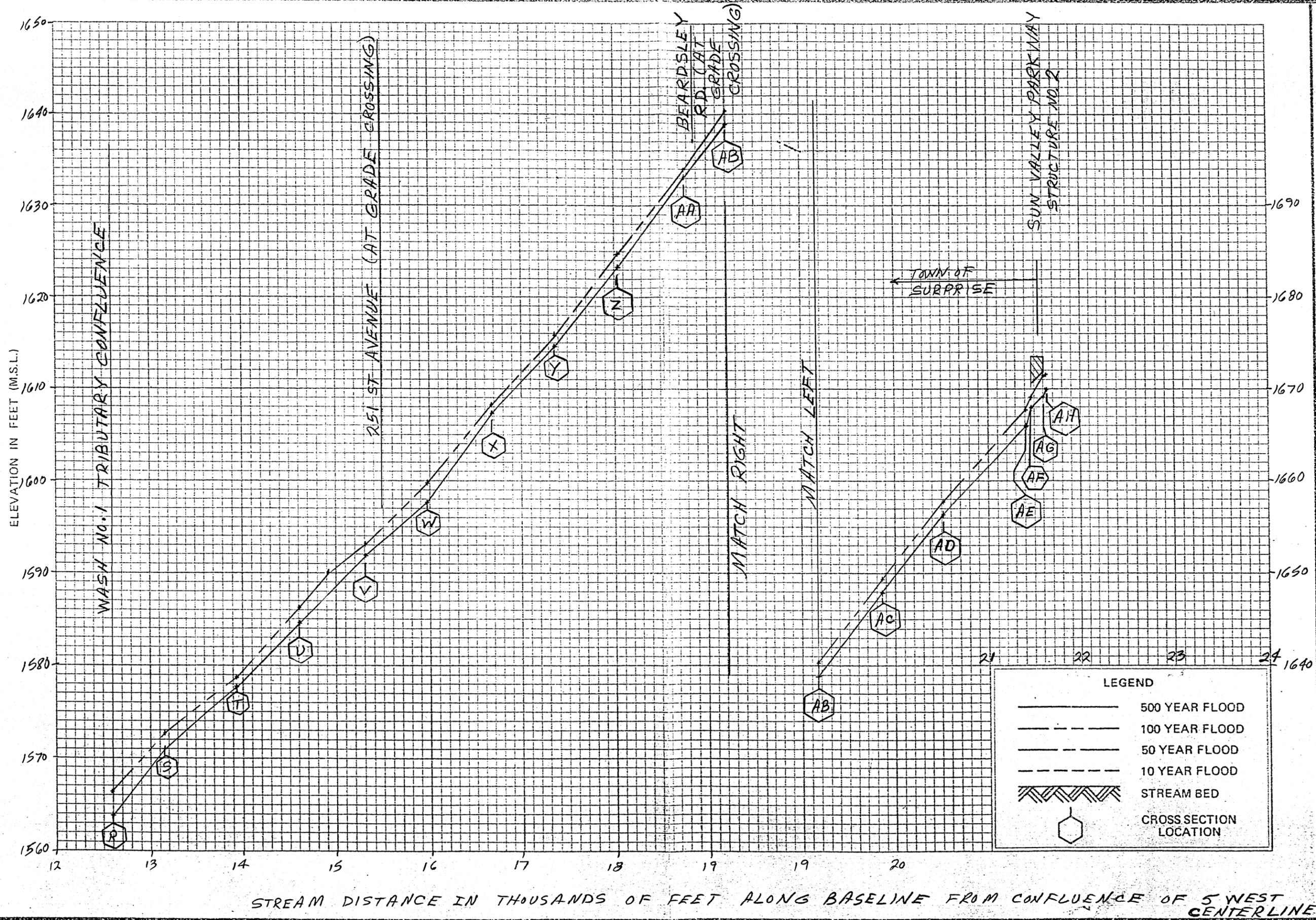
LEGEND	
	500 YEAR FLOOD
	100 YEAR FLOOD
	50 YEAR FLOOD
	10 YEAR FLOOD
	STREAM BED
	CROSS SECTION LOCATION

FLOOD PROFILES

WASH No. 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
 Federal Insurance Administration
 SUN VALLEY PARKWAY NORTH
 TOWN OF SURPRISE AND
 PORTIONS OF UNINCORP MARICOPA Co

OIP



LEGEND

	500 YEAR FLOOD
	100 YEAR FLOOD
	50 YEAR FLOOD
	10 YEAR FLOOD
	STREAM BED
	CROSS SECTION LOCATION

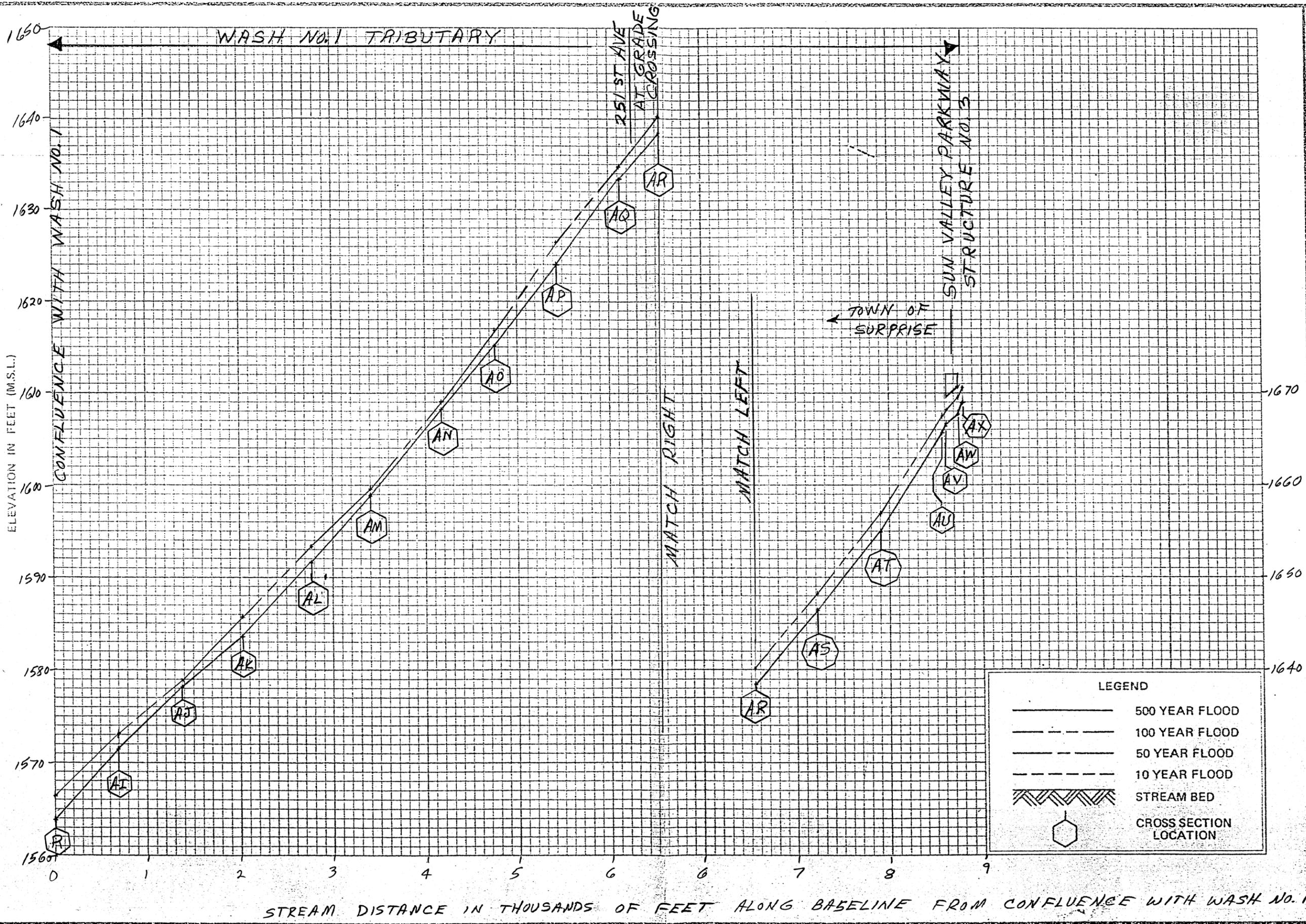
FLOOD PROFILES

WASH No. 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS
OF UNINCORP. MARICOPA CO.

02P



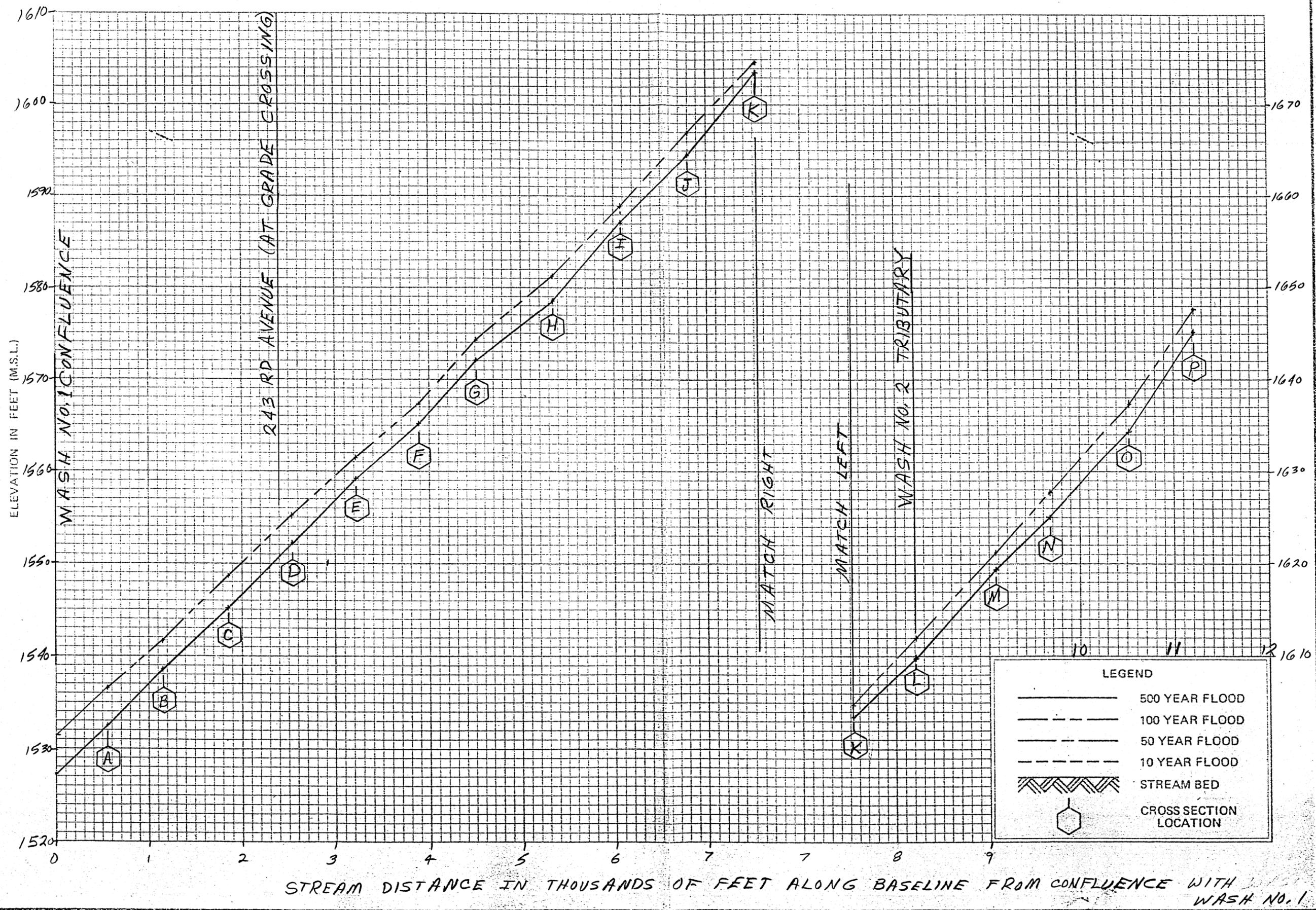
FLOOD PROFILES

WASH NO. 1 TRIBUTARY

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS
OF UNINCORP. MARICOPA CO.

03P

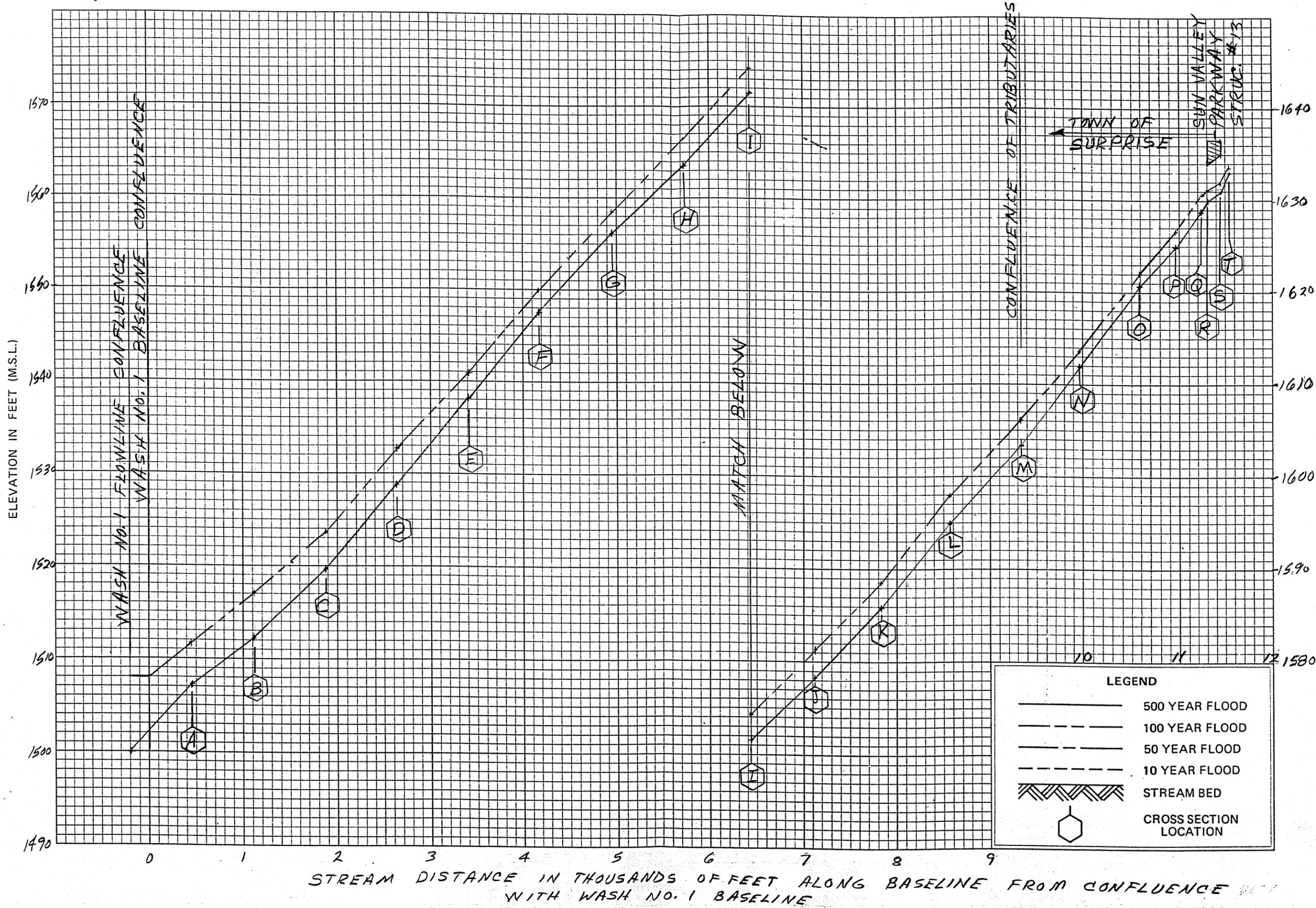


LEGEND	
	500 YEAR FLOOD
	100 YEAR FLOOD
	50 YEAR FLOOD
	10 YEAR FLOOD
	STREAM BED
	CROSS SECTION LOCATION

FLOOD PROFILES

WASH NO. 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
 Federal Insurance Administration
 SUN VALLEY PARKWAY NORTH
 TOWN OF SURPRISE AND PORTIONS
 OF UNINCORP. MARICOPA CO.

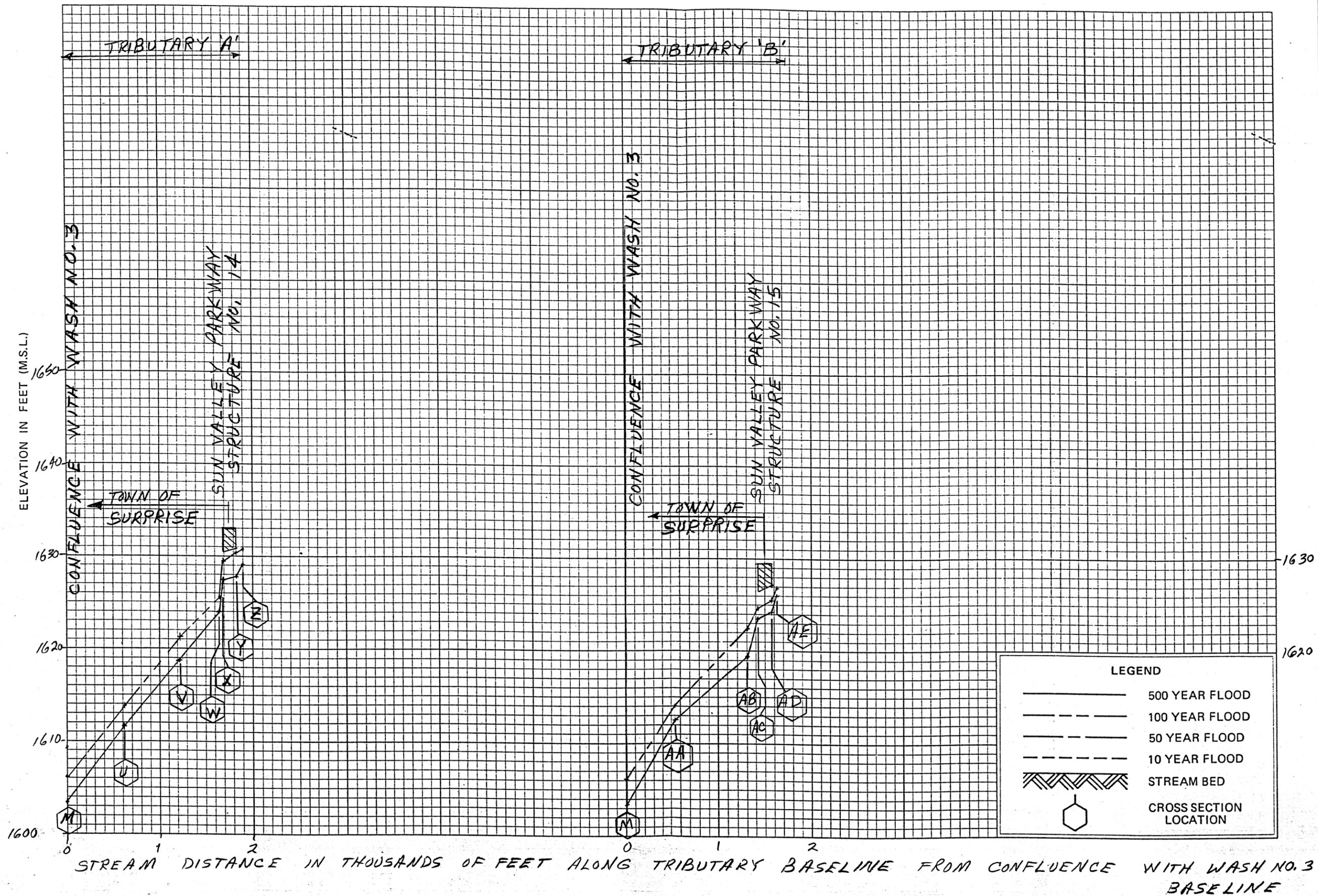


FLOOD PROFILES

WASH NO. 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
 Federal Insurance Administration
 SUN VALLEY PARKWAY NORTH
 TOWN OF SURPRISE AND PORTIONS
 OF UNINCORP. MARICOPA CO.

06P

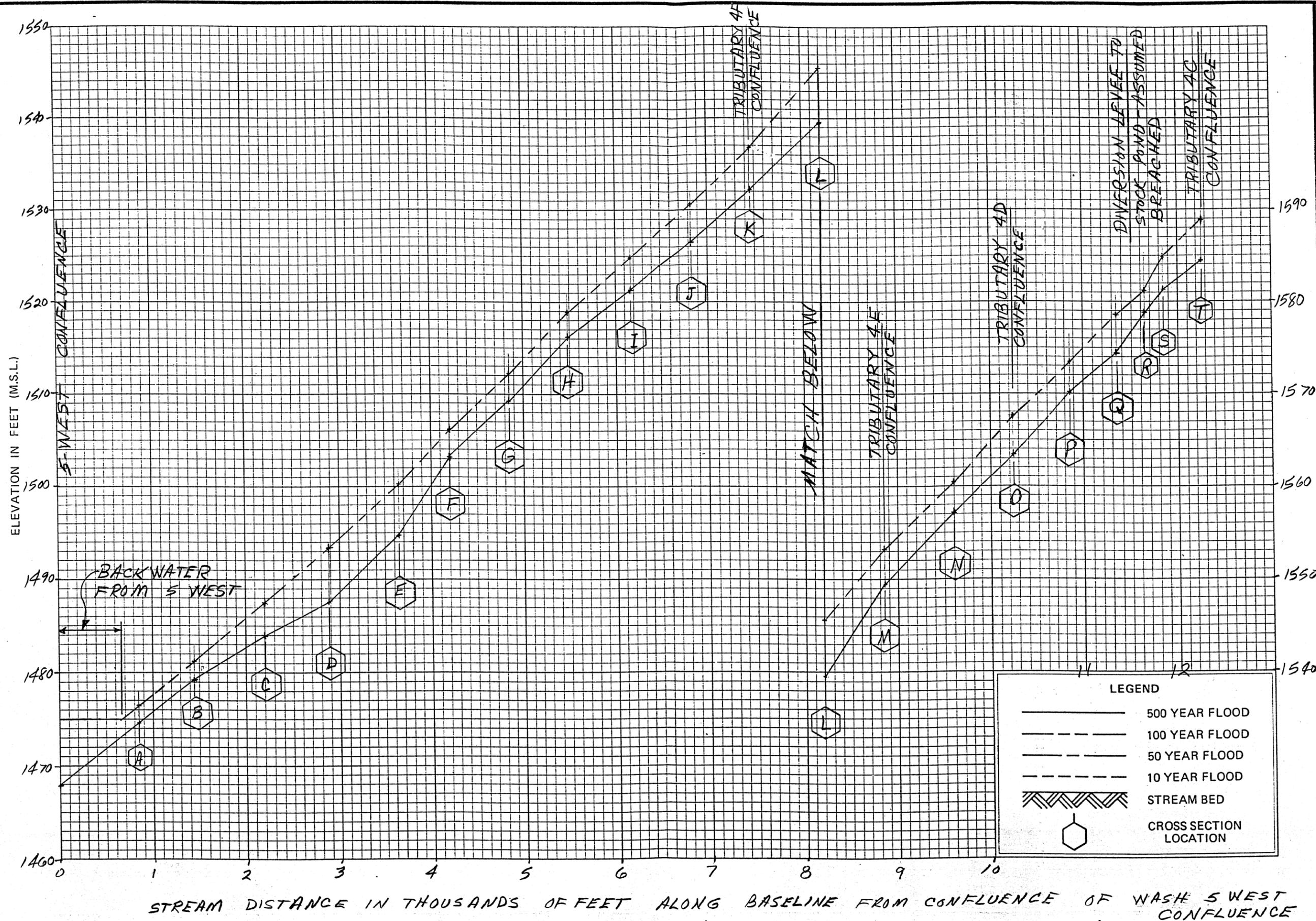


FLOOD PROFILES

WASH NO. 3 TRIBUTARIES 'A' AND 'B'

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
 Federal Insurance Administration
 SUN VALLEY PARKWAY NORTH
 TOWN OF SURPRISE AND PORTIONS
 OF UNINCORP. MARICOPA CO.

07P

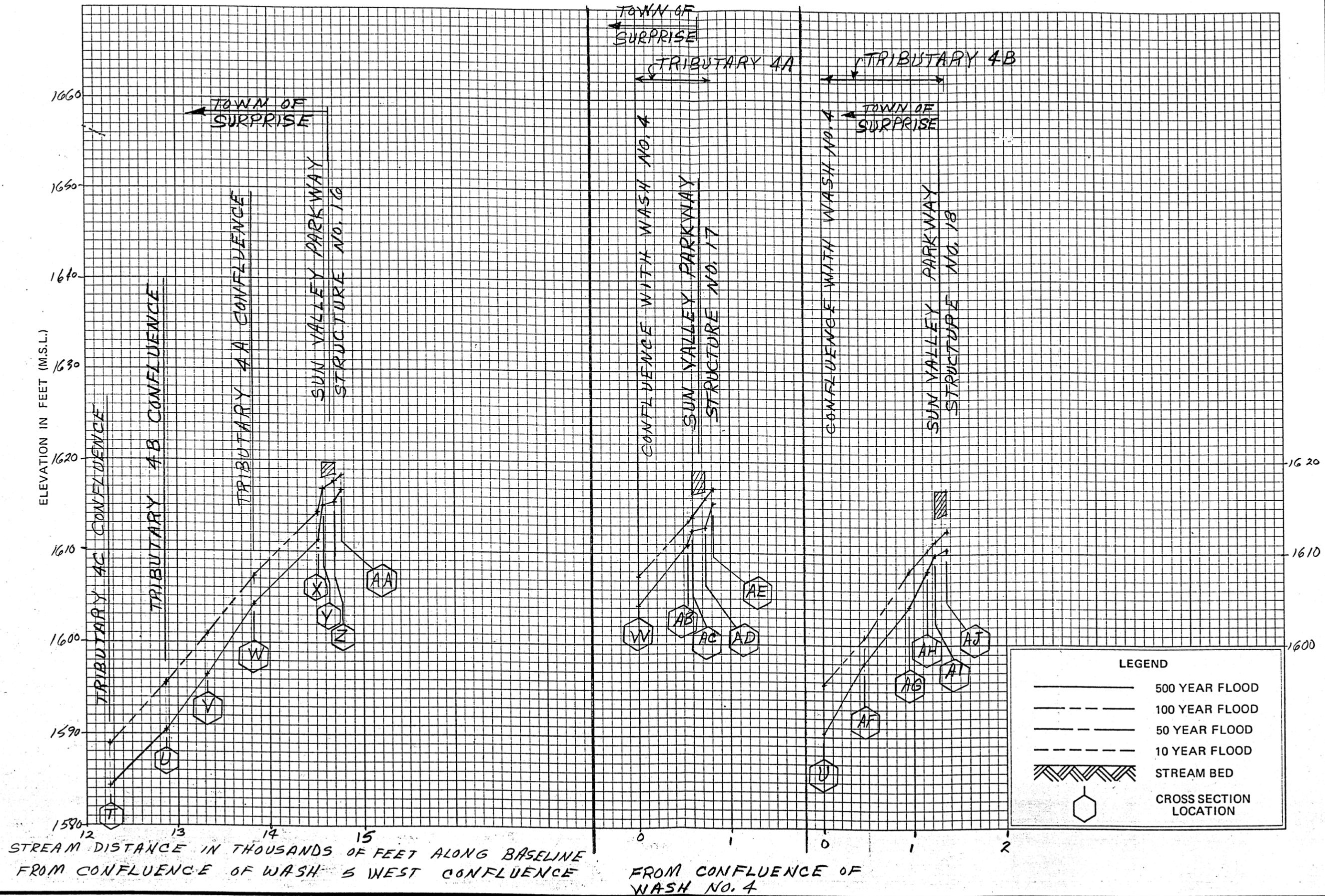


FLOOD PROFILES

WASH NO. 4

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 SUN VALLEY PARKWAY NORTH
 TOWN OF SURPRISE AND PORTIONS
 OF WINCORP, MARICOPA CO.

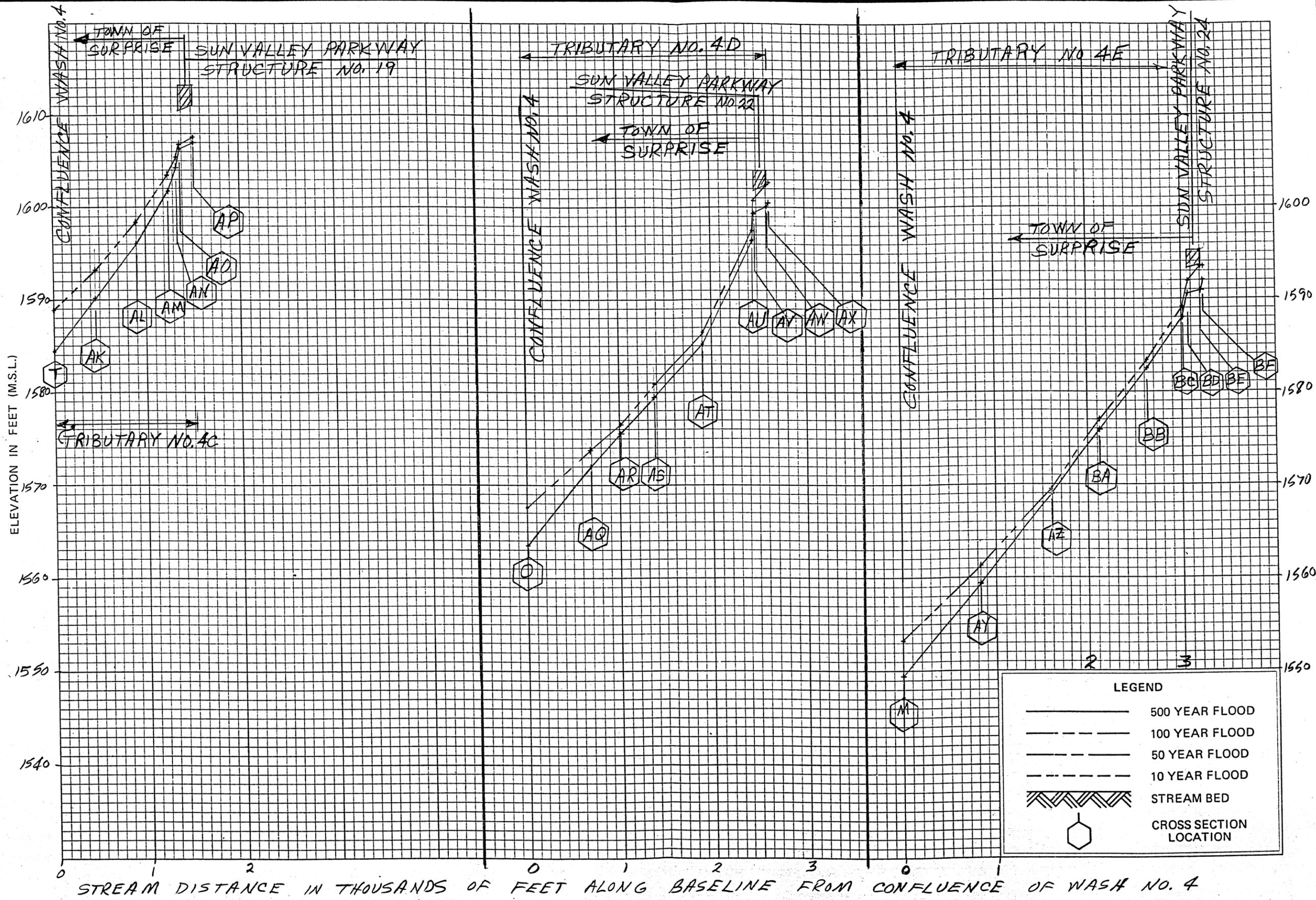
08P



FLOOD PROFILES

WASH No. 4 AND TRIBUTARY 4A AND 4B

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
 Federal Insurance Administration
 SUN VALLEY PARKWAY NORTH
 TOWN OF SURPRISE AND PORTIONS
 OF UNINCORP. MARICOPA CO.

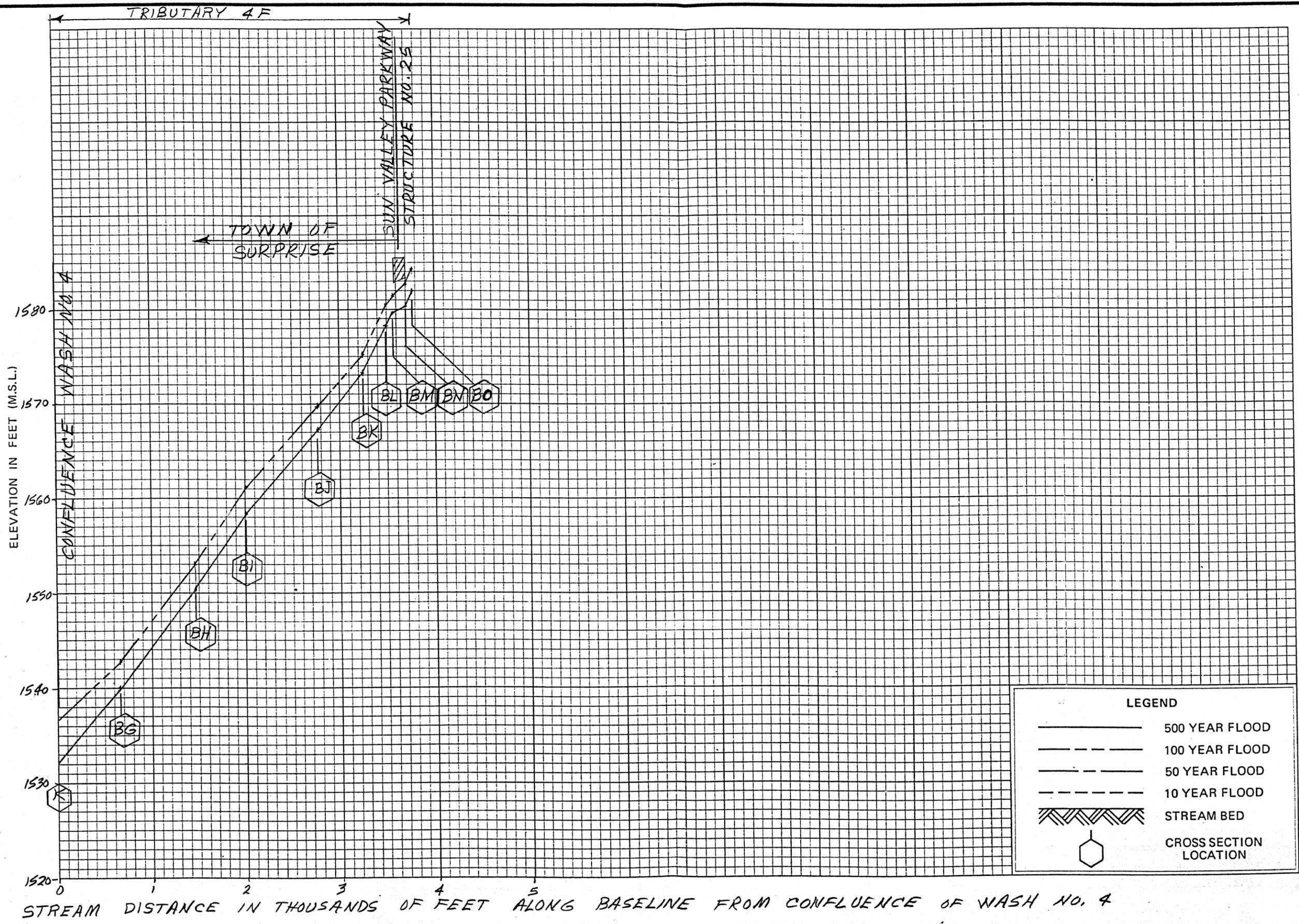


FLOOD PROFILES

TRIBUTARIES 4C, 4D, 4E

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
 Federal Insurance Administration
 SUN VALLEY PARKWAY NORTH
 TOWN OF SURPRISE AND PORTIONS
 OF UNINCORP. MARICOPA CO.

10P

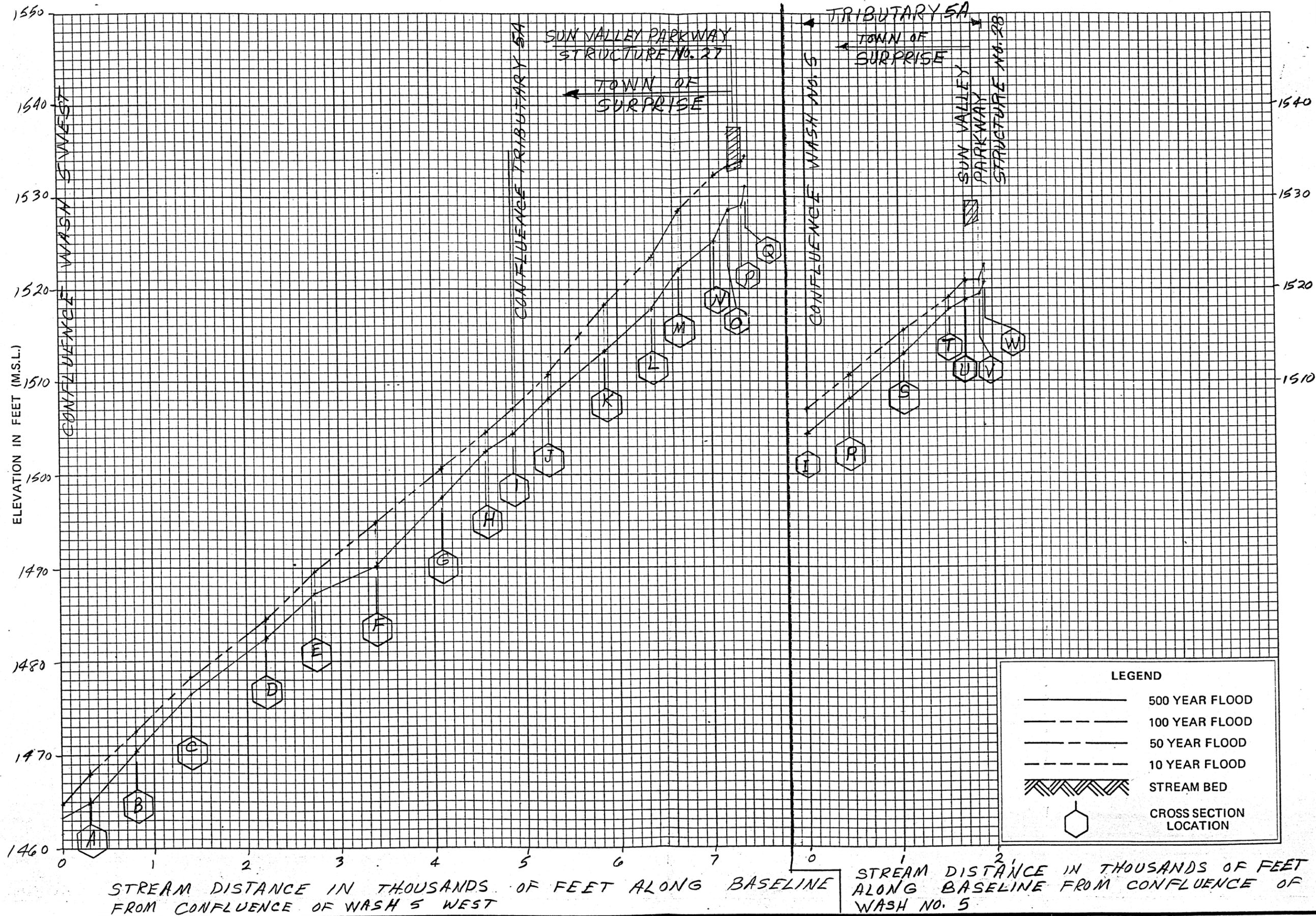


FLOOD PROFILES

TRIBUTARY 4F

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
 Federal Insurance Administration
 SUN VALLEY PARKWAY NORTH
 TOWN OF SURPRISE AND PORTIONS
 OF UNICORP, MARICOPA CO.

110



FLOOD PROFILES

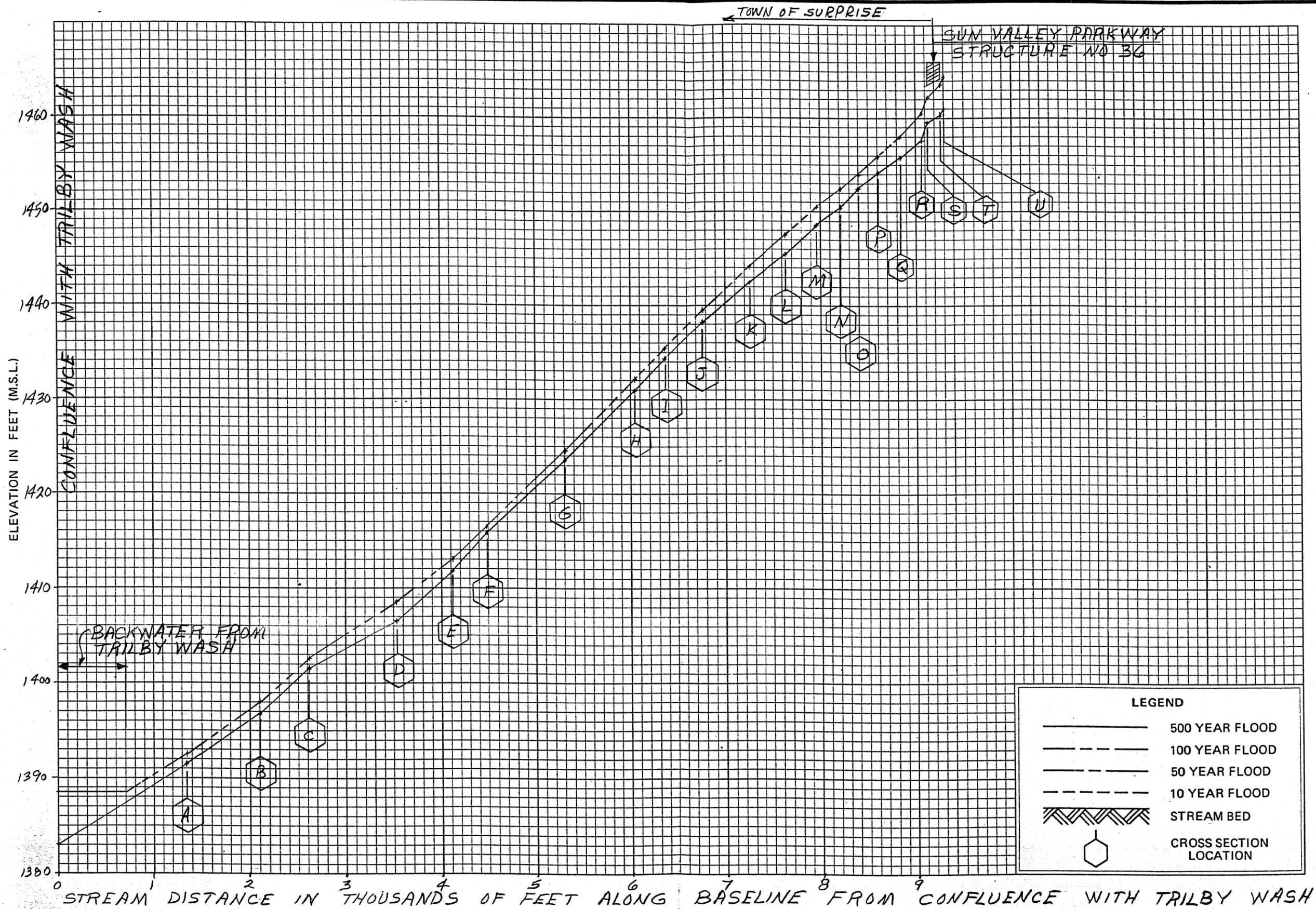
WASH NO. 5 AND TRIBUTARY 5A

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTION S
OF UNINCORP. MARICOPA CO.

12 P

EXHIBIT 1



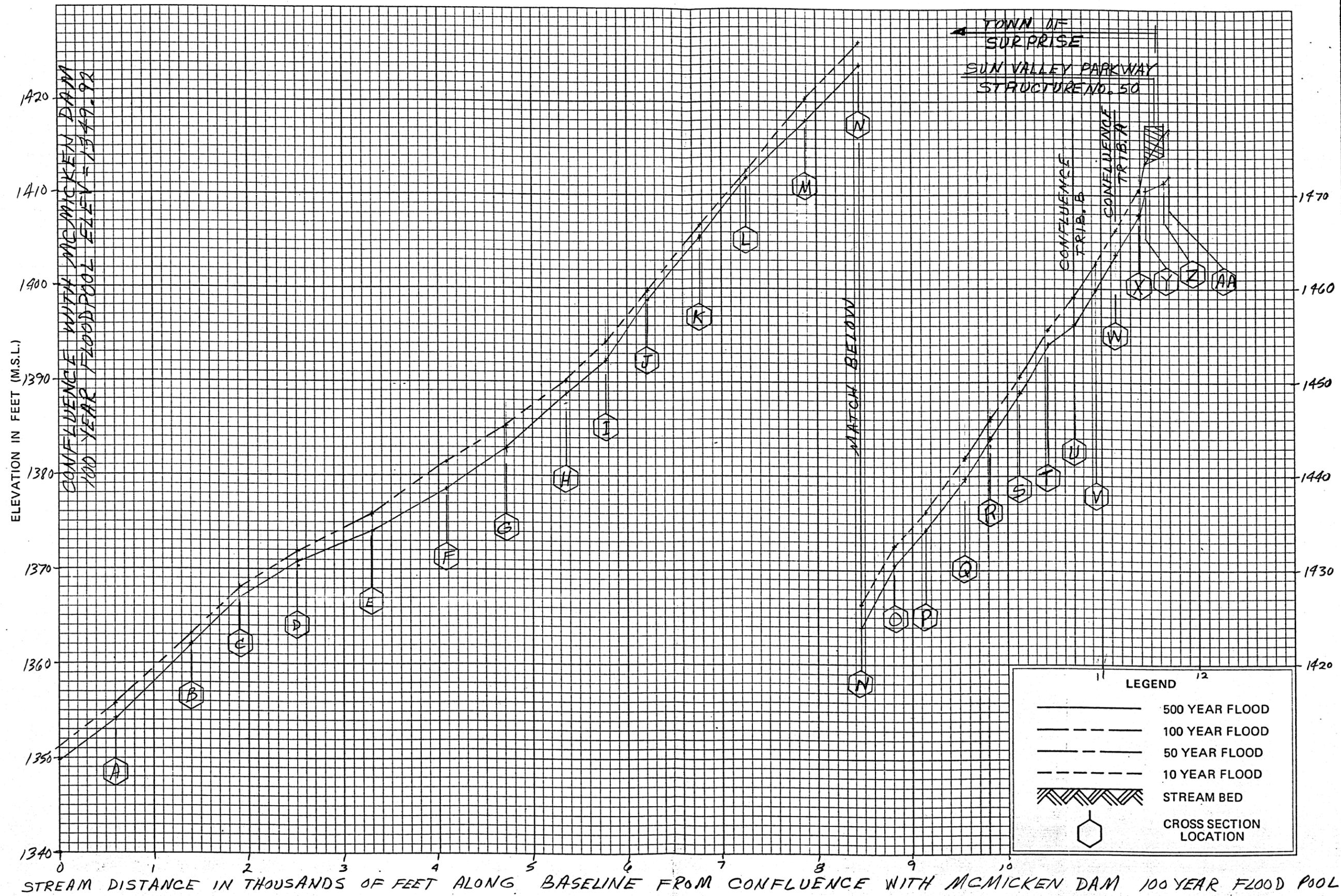
FLOOD PROFILES

WASH NO. 7

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS
OF WINCORP. MARICOPA CO.

14P

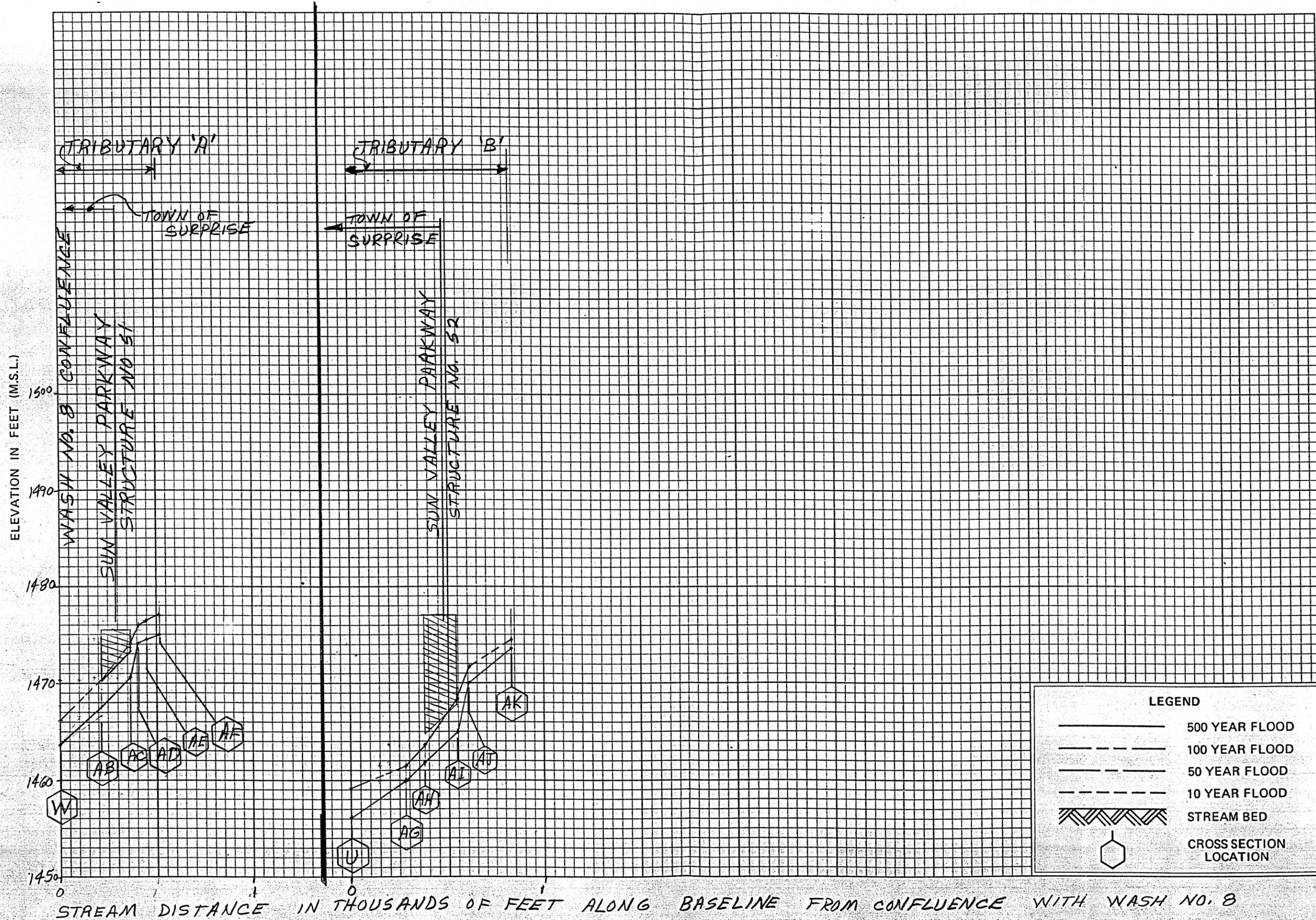


FLOOD PROFILES

WASH NO. 8

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE AND PORTIONS
OF UNINCORP. MARICOPA CO.

15 P



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

SUN VALLEY PARKWAY NORTH
TOWN OF SURPRISE, AND PORTION'S
OF UNINCORP. MARICOPA CO.

FLOOD PROFILES

WASH NO. 8 - TRIBUTARIES A AND B

16P

EXHIBIT 2
REFERENCE MARK DESCRIPTIONS

Reference Mark #	Description	Sheet No.	Elevation (N.G.V.D.) (1929)	STATE PLANE COORDINATES (1983)	
				Northerly	Easterly
RM-1	Aluminum Cap Near E1/4 Corner, Section 17 T4N-R3W	1	1543.22	979085.945	497574.669
RM-2	Brass Cap @ NE Corner Section 20 T4N-R3W	1	1552.49	976454.501	497527.043
RM-3	Rebar 50' NE of E1/4 Corner Section 20 T4N-R3W	1	1574.29	973847.101	497538.573
RM-4	Brass Cap @ SE Corner Section 20 T4N-R3W	1	1602.77	971173.912	497477.453
RM-5	Brass Cap @ SW Corner Section 20 T4N-R3W	1	1634.88	971199.995	492193.323
RM-6	Brass Cap @ W1/4 Corner Section 20 T4N-R3W	1	1600.04	973848.714	492214.847
RM-7	Rebar Near NW Corner Section 20 T4N-R3W	1	1579.81	976408.301	492216.416
RM-8	Aluminum Cap Near Center Section 17 T4N-R3W	1	1547.39	979135.406	49050.496

EXHIBIT 2 (continued)

Reference Mark #	Description	Sheet No.	Elevation (N.G.V.D.) (1929)	STATE PLANE COORDINATES (1983)	
				Northerly	Easterly
RM-9	Aluminum Cap Near Center Section 23 T4N-R3W	2	1487.03	973755.707	510684.247
RM-10	Brass Cap @ W1/4 Corner Section 23 T4N-R3W	2	1509.42	973760.108	508051.747
RM-11	Brass Cap @ S1/4 Corner Section 22 T4N-R3W	2	1544.73	971135.884	505396.755
RM-12	Rebar near NW Corner S1/2 SE1/4 Section 21 T4N-R3W	2	1572.62	972319.376	500145.254
RM-13	Rebar North of Center Section 21 T4N-R3W	2	1557.33	974419.730	500025.394
RM-14	Brass Cap @ NW Corner Section 22 T4N-R3W	2	1519.13	976428.329	502796.833
RM-15	Aluminum Cap near Center Section 16 T4N-R3W	2	1538.76	979264.946	500466.070
RM-16	Aluminum Cap near SW Corner Section 19 T4N-R2W	3	1438.66	971181.383	518573.678
RM-17	Aluminum Cap 1200' North of SW Corner Section 24 T4N-R3W	3	1474.99	972331.613	513242.203

EXHIBIT 2 (continued)

Reference Mark #	Description	Sheet No.	Elevation (N.G.V.D.) (1929)	STATE PLANE COORDINATES (1983)	
				Northerly	Easterly
RM-18	Brass Cap at N.E. Corner, Section 23 T4N, R3W Stamped H4 1474, 1471	3	1473.81	976384.981	513366.875
RM-19	Brass Cap @ S1/4 Corner Section 21 T4N-R3W	4	1587.42	971160.498	500120.082
RM-20	Brass Cap in H.H. @ Center Section 28 T4N-R3W	4	1616.87	968519.539	500094.686
RM-21	Brass Cap in H.H. @ Center Section 29 T4N-R3W	4	1647.32	968547.059	494816.889
RM-22	Brass Cap in H.H. @ W1/4 Corner Section 30 T4N-R3W	4	1674.12	968571.336	489515.449
RM-23	Brass Cap @ S1/4 Corner Section 23 T4N-R3W	5	1502.58	971106.211	510673.424
RM-24	Brass Cap in H.H. @ Center Section 26 T4N-R3W	5	1525.77	968477.785	510641.548
RM-25	Brass Cap in H.H. @ Center Section 27 T4N-R3W	5	1571.33	968494.205	505372.068
RM-26	Brass Cap @ SW Corner Section 22 T4N-R3W	5	1571.61	971147.256	502758.099

EXHIBIT 2 (Cont'd)

Reference Mark #	Description	Sheet No.	Elevation (N.G.V.D.) (1929)	STATE PLANE COORDINATES (1983)	
				Northerly	Easterly
RM-27	Aluminum Cap 1650' East of W1/4 Corner Section 30 T4N,R2W	6	1445.34	968311.647	520226.557
RM-28	Brass Cap in H.H. @ Sun Valley Parkway & West Line Section 30 T4N,R2W	6	1468.31	967220.081	518541.730
RM-29	Aluminum Cap 1400' North of Bell Road & 1750' West of Section 25 T4N,R3W	6	1464.83	969295.692	516815.500
RM-30	1/2" Pipe @ S1/4 Corner, Section 28 T4N,R2W	7	1367.00	965655.454	531644.274
RM-31	1" Pipe @ Center Section 33, T4N, R2W	7	1363.59	962926.207	531484.511
RM-32	Aluminum Cap Near W1/4 Corner Section 32 T4N,R2W	7	1388.31	963194.443	528989.333
RM-33	Aluminum Cap 1750' West of NE Corner Section 32 T4N, R2W	7	1400.01	965753.115	527235.554
RM-34	Aluminum Cap 800' North of Center Section 32 T4N, R2W	7	1411.95	963673.362	526807.708

EXHIBIT 2 (continued)

Reference Mark #	Description	Sheet No.	Elevation (N.G.V.D.) (1929)	STATE PLANE COORDINATES (1983)	
				Northerly	Easterly
RM-35	Aluminum Cap in Bell Road Median @ East Line Section 31 T4N-R2W	7	1461.03	962910.788	523996.700
RM-36	USGS BM Near West Line NW1/4 Section 29 T4N-R2W	7	1411.78	969311.556	523972.087
RM-37	Aluminum Cap Northside of Bell Road Near N1/4 Corner Section 4 T3N-R2W	9	1365.67	960360.586	531499.234

APPENDIX B
HYDRAULIC ANALYSIS
DISCUSSION AND SUPPORTIVE DATA
FLOOD INSURANCE STUDY
SUN VALLEY PARKWAY NORTH
MARICOPA COUNTY, ARIZONA

Prepared for:

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September, 1991

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APPENDIX B
Table of Contents

DISCUSSION

1.0	Overview	B-1
2.0	Manning's "n" Value Estimation	B-1
3.0	Inspection and Evaluation of Levees	B-1
4.0	Measurement and HEC-2 Modeling of Drainage Structures	B-2
5.0	Split Flow Estimations	B-3

SUPPORTIVE DATA

Manning's "n" Value Estimation Forms	B-6 - B-14
Manning's "n" Value Field Photos	B-15 - B-25
Stock Pond Levee Capacity Analysis - Wash No. 4	
Location Map	B-26
Field Photos	B-27 - B-28
Cross-Section Plots	B-29 - B-30
HEC-2 Input/output Analysis for Several Discharges	B-31 - B-36
As-Built Plan at Study Wash Culverts	B-37 - B-60
Bridge Data Sheets, HEC-2 Input Parameters (SB and SC Cards)	B-61 - B-82
Table 5 (From Reference 4), Summary of Existing Culvert Flow Capacities and Flow Distribution.	B-83 - B-84



1.0 OVERVIEW

This Appendix section contains supportive data for the hydraulic analysis conducted for the Sun Valley Parkway North FIS study.

2.0 MANNING'S "N" VALUE ESTIMATION

In order to perform the hydraulic backwater analysis utilizing the HEC-2 model, Manning's "n" values needed to be estimated. Field visits to document and estimate Manning's "n" values were made with the study mapping in hand and after preliminary study wash alignments were established.

Photos were taken along the study washes to document representative cover, channel depth and width relationships which follow in the Appendix. A procedure from Chow's Open-Channel Hydraulics was utilized to estimate Manning's "n" values for similar segments of each wash. This procedure involved adding incremental "n" value increases associated with six factors affecting "n" value to arrive at a total "n" value. This procedure was performed for channel and left and right overbank of each wash and forms follow in the appendix.

Initial "n" values developed for the washes by this chow procedure and forms seemed high when compared to other reference material including,

- a) Chow's, Handbook of Hydraulics, Table 5-6 and Figure 5-5.
- b) U.S.G.S. open File Report, Roughness Coefficients for Stream Channels in Arizona By B.N. Aldridge and J.M. Garrett.
- c) U.S.G.S. Water Supply Piper 1849, Roughness characteristics of Natural Channels by Harry H. Barnes, Jr.

As a result, the "n" values developed in the chow procedure forms, which follow, were adjusted based on a comparison of "n" value estimates for similar stream sections from the above references.

3.0 INSPECTION AND EVALUATION OF LEVEES

Along the study washes, man made levee exist on Wash No. 1 between Section N and O and Wash No. 4 between Section Q and S. Both of these levees are privately owned (i.e., no government operation or maintenance) and were

privately constructed to develop stock ponds. The levee on Wash No. 1 was determined to be overtopped at the south end based on a comparison of computed 100-year water surface elevations and levee elevations from the study mapping. It was therefore assumed non-effective and breached for the floodplain analysis.

The levee on Wash No. 4 was likewise found to be overtopped by the 100-year discharge. Additional field surveyed cross-sections on mapping datum were obtained and a HEC-2 hydraulic rating curve analysis was performed at this location to more accurately determine location and magnitude of discharge of overtopping. The location map for field surveyed cross-sections, cross-section plots, photos of the levee and HEC-2 analysis follow in the appendix for this analysis.

Other levees evaluated along the study washes occur upstream and along the Sun Valley Parkway. These structures are armored with concrete grouted rip-rap and are designed with anticipation of weir flow occurring over the levees. The levees were designed to provide some detention along the road way. The levees are within the Sun Valley Parkway right-of-way and would thus be maintained by the Maricopa County Highway Department.

These levees along the Sun Valley Parkway were therefore considered effective and in place for the hydraulic analysis.

4.0 MEASUREMENT AND HEC-2 MODELLING OF DRAINAGE STRUCTURES

The only drainage structures affecting the study washes occur along the Sun Valley Parkway. A set of detailed as-built plans for Sun Valley Parkway (Reference 9) were obtained for this study which detail culvert sizes, invert elevations, roadway profiles, headwall types and dimensions and weir levee elevations, and parallel channel elevations and dimensions. The elevation benchmarks for the Sun Valley Parkway are common to the study mapping survey control (i.e. N.G.V.D. - 1983). Copies of these as-built plans showing the culverts in plan view are included in the following appendix data. The profile points (BT Points) for determining weir flow in the HEC-2 special bridge and culvert routines are also shown on the plans.

The bridge data sheets which follow in the appendix include input parameters for the HEC-2 model special bridge (SB card) and special culvert (SC Card)

analysis. The special bridge (SB card) analysis was used to model the corrugated steel pipe arch culvert crossings which are not addressed by the HEC-2 special culvert charts. An equivalent area rectangular opening was estimated for these arch culverts using the Special Bridge option (SB Card). The special bridge method was also used to model two culverts of different sizes, structure No. 6 and 7, which were analyzed as a combined structure.

The special culvert method (SC card) was used to model other box culvert crossings.

The top of road and levee and channel invert data determining when weir flow occurs in the special bridge and culvert analysis was also obtained from the Sun Valley Parkway as-built plans. This data was entered on the BT cards in the HEC-2 model.

5.0 SPLIT FLOW ESTIMATIONS

Splits in flow at the Sun Valley Parkway for the study washes were initially identified in the hydrology report (Reference 4). As part of the hydrology study, detention storage and culvert discharge vs. elevation were modeled for the drainage structures to determine attention of 100-year storm peak discharges at the Parkway.

Where flow could split at a drainage structure and flow along the Parkway to another drainage structure an evaluation was made in the hydrology study using the diversion - card option (DT, DI, DQ cards) to compute flow split.

Rating curves of discharge versus elevation were developed for drainage structures (using FHWA, HEC-5 charts) and for weir flow (using weir equation) over armored weir levees or into channels. This data was entered into the HEC-1 model to determine flow splits at drainage structures along the Parkway.

The split flow analysis in the hydrologic analysis was summarized in Table 5 of the Report (Reference 4) which is included in the following appendix.

As shown on this Table 5, split flow was estimated to occur at the following study washes and associated drainage structures;

Wash No.	100-year Inflow	To Struc. No.	Outflow		Breakout or Split Flow to other Struc.	Other Struc No.
			Same Struc. After Attenuation	E.G. Elev. Fam. HEC-1		
	(cfs)		(cfs)		(cfs)	
3	191	#14	171	1630.96	17	#15
6	1094	#31	925	1490.24	170	#32
8	1107	#50	891	1476.86	217	#51
8	217	#51	91	1474.41	128	#52
8	128	#52	117	1467.91	2	#53

The culvert capacity and weir flow analysis calculations used in the HEC-1 model were based on ponded water surface elevations or energy grade elevations (i.e. velocity = 0 fps) at the culvert or weir entrance.

The HEC-2 analysis utilized the split flow discharges summarized above and in Table 5 of Reference 4. The resulting elevations and discharges through culvert and weir computed by the HEC-2 special bridge or culvert routine are summarized below.

Wash No.	100-year Inflow	To Sect. No.	To Struc. No.	Energy Grade at Sect.	Culvert Discharge Computed	Weir Flow Computed	Weir Flow to Struc. No.
3	191	12.115	#14	1631.18	177	14	#15
6	1094	1.269	#31	1490.70	932	167	#32
8	1107	2.204	#50	1477.24	895	217	#51
8	217	12.181	#51	1475.46	89	129	#52
8	117	22.129	#52	1468.57	117	0	#53

Because the HEC-2 model computes culvert and weir water surface elevations by the backwater procedure there is some difference from the elevations and discharges computed from the HEC-1 model. However, the resulting split flow estimates from the two procedures compare quite well.

In addition to the flow splits along the Sun Valley Parkway discussed above, a flow split was identified on the Tributary of Wash No. 1, below structure No. 3 at section 13.616. A portion of the tributary flow at this section split to join the main channel of Wash No. 1. The flow distribution option of HEC-2 was utilized at this section to estimate that approximately 14.7 cfs splits from the tributary and joins the main channel of Wash No. 1.

TABLE 5-5. VALUES FOR THE COMPUTATION OF THE ROUGHNESS COEFFICIENT BY Eq. (5-12)

Channel conditions		Values	
① Material involved	Earth	n_0	0.020
	Rock cut		0.025
	Fine gravel		0.024
	Coarse gravel		0.028
② Degree of irregularity	Smooth	n_1	0.000
	Minor		0.005
	Moderate		0.010
	Severe		0.020
③ Variations of channel cross section	Gradual	n_2	0.000
	Alternating occasionally		0.005
	Alternating frequently		0.010-0.015
④ Relative effect of obstructions	Negligible	n_3	0.000
	Minor		0.010-0.015
	Appreciable		0.020-0.030
	Severe		0.040-0.060
⑤ Vegetation	Low	n_4	0.005-0.010
	Medium		0.010-0.025
	High		0.025-0.050
	Very high		0.050-0.100
⑥ Degree of meandering	Minor	m_5	1.000
	Appreciable		1.150
	Severe		1.300

Source: Chow's
Open channel
Hydraulics

ROUGHNESS COEFFICIENT "n"

STREAM Wash #1 DATE 5/15/91 BY GAS

SECTION		①	②	③	④	⑤	⑥	COMPOSITE "n"
0.0805 to 1.3768	LOB	0.024	.005	.005	.005	.015	1.0	0.054
	CH	0.024	.005	.005	.000	0.008	1.0	0.042
	ROB	0.024	.005	.005	.005	.015	1.0	0.054
1.3768 to 10.8929	LOB	0.024	0.005	.001	.005	0.015	1.0	0.050
	CH	0.024	same	—	—	—	—	→
	ROB	0.024	same	—	—	—	—	→
2.0037 to 4.0548 and 12.510 to 14.000	LOB	0.024	0.005	.005	.005	.01	1.0	0.049
	CH	0.024	0.005	.005	0.001	0.01	1.0	0.045
	ROB							0.049
4.0548 to 4.066 and 14.000 to 14.009	LOB	same	—	—	—	—	—	→
	CH	0.024	0.001	0.00	0.00	0.005		0.030
	ROB	same	—	—	—	—	—	→
4.066 to 4.0939 and 14.009 to 14.034	LOB	N/A	—	—	—	—	—	→
	CH	0.012	—	—	—	—	—	0.012
	ROB	N/A	—	—	—	—	—	→
4.0938 to 4.1013 and 14.034 to 14.042	LOB	same	—	—	—	—	—	→
	CH	0.024	.001	0.0	0.0	0.005		0.030
	ROB	same	—	—	—	—	—	→
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							

ROUGHNESS COEFFICIENT "n"

STREAM Wash #2 DATE 5/15/91 BY GAS

SECTION		①	②	③	④	⑤	⑥	COMPOSITE "n"
0.107 to 2.2812 and 11.711 to 11.967	LOB	.024	.005	.005	.005	.01	1.0	.049
	CH	.024	.005	.005	.001	.01	1.0	.0045
	ROB	Same						.049
2.2812 + 2.2869 and 2.3134 to 2.3210	LOB	Same						
	CH	.024	.001	.00	.00	.005	1.0	.030
	ROB	Same						
2.2869 to 2.3134 and 11.975 to 12.002	LOB	N/A	—	—	—	—	—	—
	CH	.012	—	—	—	—	—	.012
	ROB	N/A	—	—	—	—	—	—
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							

ROUGHNESS COEFFICIENT "n"

STREAM Wash No. 3 DATE 5/24/91 BY GAS

SECTION		①	②	③	④	⑤	⑥	COMPOSITE "n"
0.0862 to 0.2093	LOB	.024	.005	.005	.005	.01	1.0	0.049
	CH	.024	.005	.005	.00	.008	1.0	0.042
	ROB	same						0.049
0.3551 to 2.1279 and 2.1712 to 2.1863	LOB	0.024	.005	.005	.005	.01	1.0	0.049
	CH	0.024	.005	.005	.001	.01	1.0	0.045
	ROB	same						
2.1279 to 2.1421 12.063 to 12.089 12.115 to 12.128	LOB	same						
	CH	0.024	0.001	—	—	0.005	1.0	.03
	ROB	same						
2.1421 to 2.1782 12.089 to 12.115	LOB	same						
	CH	0.012	—	—	—	—	—	0.012
	ROB	same						
11.884 to 12.063 21.890 to 22.016	LOB	0.024	.005	.005	.005	.01	1.0	0.049
	CH	.024	.005	.005	.001	.01	1.0	0.045
	ROB	same						
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							

ROUGHNESS COEFFICIENT "n"

Sun Valley Parkway North FIS

STREAM Wash # 4

DATE 6/13/91

BY GAS

SECTION		①	②	③	④	⑤	⑥	COMPOSITE "n"
0.159 to 2.75	LOB	0.024	0.005	0.005	0.005	0.01	1.0	0.049
	CH	0.024	.005	.005	-	0.008	1.0	0.042
	ROB	dito						0.049
2.750 to 2.759 # 2.784 to 2.798	LOB	0.024	-	-	0.005	0.006	1.0	0.035
	CH	0.024	-	-	0.005	0.006	1.0	0.035
	ROB	dito						0.035
-2.621 to 12.725 to -2.439 to 22.657 to -2.322 to	LOB	0.024	0.005	0.005	0.005	0.01	1.0	0.049
	CH	0.024	0.005	0.005	-	0.008	1.0	0.042
	ROB	dito						0.049
32.575) -1.939 to 42.401 to -1.678 to 52.248 and -1.413 to 62.074	LOB							
	CH							
	ROB							
12.725 to 12.734) 12.760 to 12.775) 22.657 to	LOB	0.024	-	-	0.005	0.006	1.0	0.035
	CH	0.024	-	-	0.005	0.006	1.0	0.035
	ROB	dito						0.035
22.669) 32.575 to 32.584) 42.401 to 42.406)	LOB							
	CH							
	ROB							
42.432 to 42.436) 52.248 to 52.259) 52.285 to	LOB							
	CH							
	ROB							
52.289) 62.074 to 62.087) 62.114 to 62.127	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							

ROUGHNESS COEFFICIENT "n"
 Sun Valley Parkway North FIS
 STREAM Wash #5 DATE 6/25/91 BY GAS

SECTION		①	②	③	④	⑤	⑥	COMPOSITE "n"
0.059 to 1.331 to 11.007 to 11.210	LOB	0.024	0.005	0.005	0.005	0.01	1.0	0.049
	CH	0.024	0.005	0.005	—	0.008	1.0	0.042
	ROB	* ditto						0.049
1.331 to 1.361 and 1.387 to 1.397	LOB	0.024	—	—	0.005	0.006	1.0	0.035
	CH	0.024	—	—	0.005	0.006	1.0	0.035
	ROB	ditto						0.035
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							

ROUGHNESS COEFFICIENT "n"
 Sun Valley Parkway North FIS
 STREAM Wash #6 DATE 6/27/91 BY GAS

SECTION		①	②	③	④	⑤	⑥	COMPOSITE "n"
0.0254 to 1.2254 11.139	LOB	0.024	0.005	0.005	0.005	0.01	1.0	0.049
	CH	0.024	0.005	0.005	-	0.008	1.0	0.042
	ROB	dillo						0.049
1.225 to 1.237 and 1.269 to 1.282	LOB	0.024	-	-	0.005	0.006	1.0	0.035
	CH	0.024	-	-	0.005	0.006	1.0	0.035
	ROB	dillo						0.035
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							

ROUGHNESS COEFFICIENT "n"

STREAM Wash No 7 DATE 7/25/91 BY GAS

SECTION		①	②	③	④	⑤	⑥	COMPOSITE "n"
0.2538 to 1.4450	LOB	.024	.005	.005	.005	.01	1.0	0.049
	CH	.024	.005	.005	.003	.008	1.0	0.045
	ROB	* ditto						
1.4456 to 1.7178	LOB	.024	.005	.005	.005	.01	1.0	0.049
	CH	.024	.005	.005	-	.008	1.0	0.042
	ROB	ditto						
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							
	LOB							
	CH							
	ROB							

ROUGHNESS COEFFICIENT "n"

STREAM Wash No. 8 DATE 7/26/91 BY GAS

SECTION		①	②	③	④	⑤	⑥	COMPOSITE "n"	
0.114 to 1.495	LOB	.024	.005	.005	.005	.01	1.0	0.049	
	CH	.024	.005	.005	.003	.008	1.0	0.045	
	ROB	ditto							
1.601 to 2.157, -2.112 to 2.152, -2.027 to 2.275	LOB	.024	.005	.005	.005	.01	1.0	0.049	
	CH	.024	.005	.005	-	.008	1.0	0.042	
	ROB	ditto							
2.172 to 2.204, 2.204 to 2.216 12.189 to 12.209	LOB	.024	-	-	.005	.006	1.0	0.035	
	CH	ditto						0.035	
	ROB	ditto						0.035	
12.189 to 12.209 22.317 to 22.300	LOB		Road Pavement						0.016
	CH	.024	-	-	0.005	.006	1.0	0.035	
	ROB	.024	.005	.005	.005	.01	1.0	0.049	
	LOB								
	CH								
	ROB								
	LOB								
	CH								
	ROB								
	LOB								
	CH								
	ROB								
	LOB								
	CH								
	ROB								
	LOB								
	CH								
	ROB								



WASH NO. 1 RIVER MILE 0.30



WASH NO. 1 RIVER MILE 1.50 D/S OF 243RD AVE.



WASH NO. 1 RIVER MILE 1.90 D/S OF STOCK POND



WASH NO. 1 RIVER M. 1.95 STOCK POND
OUTLET

B-15

P1



WASH NO. 1 RIVER M. 1.95 LOOKING NORTH AT
LEVEE TO STOCK POND



WASH NO. 1 RIVER M. 2.00

B-16



9 - 37

WASH NO. 1 RIVER M. 3.02 MAIN CHANNEL



9 - 45

WASH NO. 1 RIVER M. 3.02 E. TRIB. CHANN.

P2



WASH NO. 1 RIVER M. 4.06 FROM PARKWAY
STRUC. NO. 3



WASH NO. 1 RIVER M. 4.06 MAIN CHANNEL
FROM PARKWAY STRUC. NO. 2



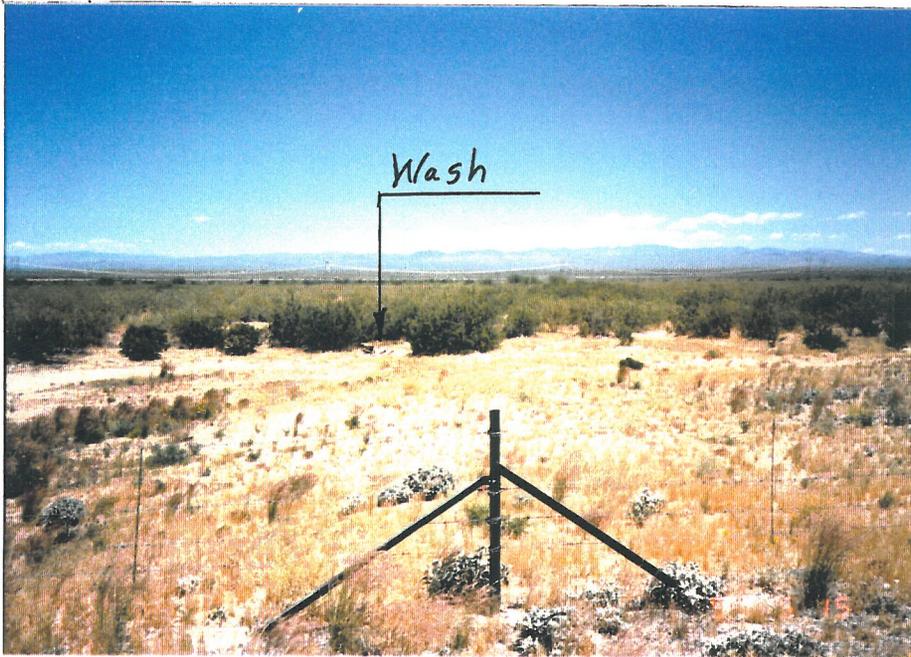
WASH NO. 2 RIVER M. 1.01



WASH NO. 2 RIVER M. 0.92 AT POWERLINES

B-17

P3



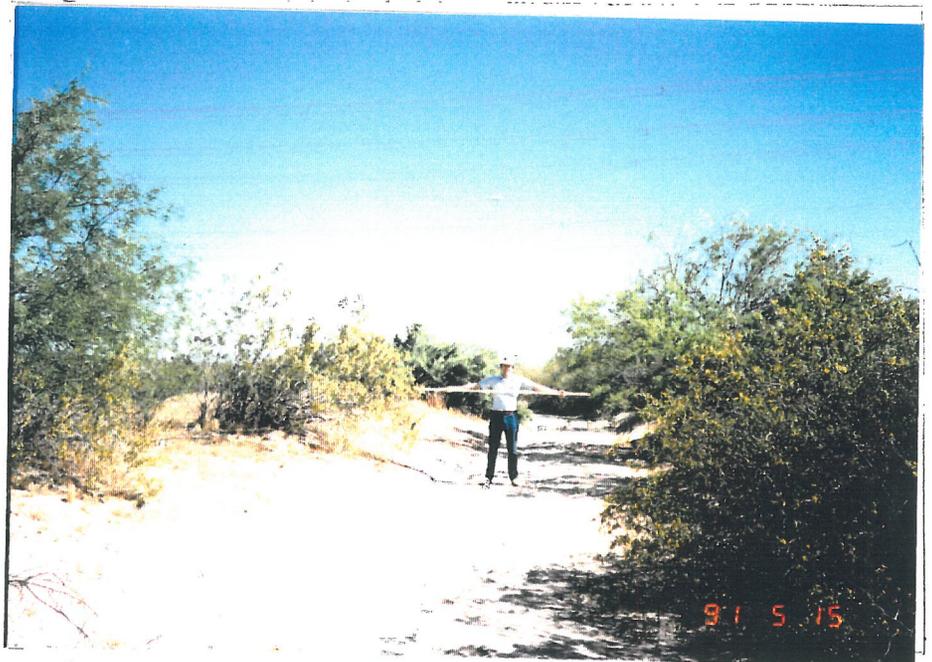
WASH NO. 2 RIVER M. 11.98 (TRIB) FROM PARKWAY
STRUC. NO. 11



WASH NO. 2 RIVER M. 2.25 (MAIN CHANN.)



WASH NO. 3 RIVER M. 0.05



WASH NO. 3 RIVER M. 0.94

B-18

P4



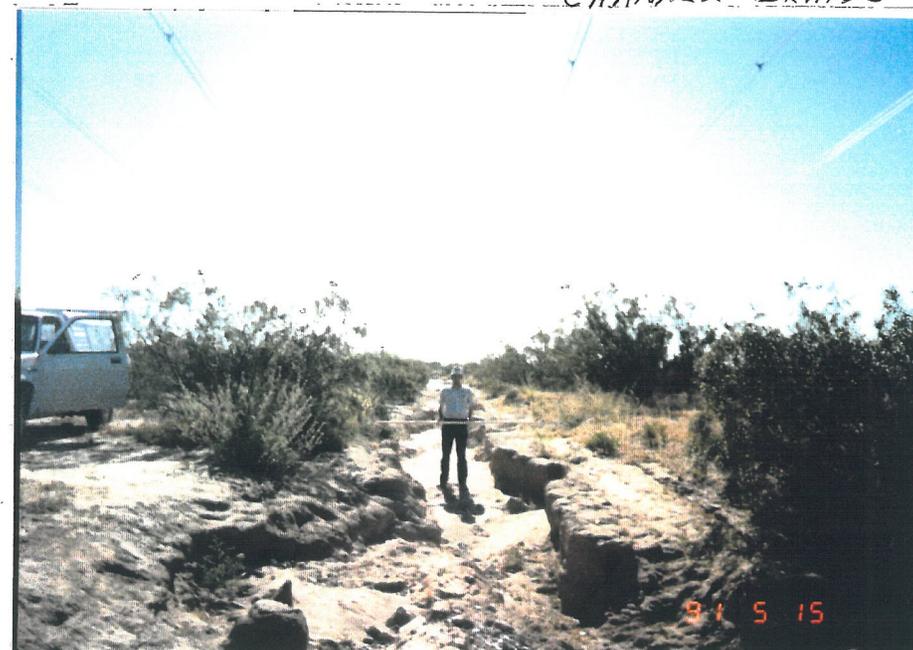
WASH NO. 3 RIVER M. 1.08 1 OF 2 CHANNEL BRAIDS



WASH NO. 3 RIVER M. 1.08 2 OF 2 CHANNEL BRAIDS



WASH NO. 4 RIVER M. 2.08 DIS OF STRUC. #13 AT PARKWAY



WASH NO. 4 RIVER M. 0.15

B-19

P5



WASH NO. 4 RIVER M. 0.27



WASH NO. 4 RIVER M. 0.40 S. OF POWERLINE
E. OF TOWER



WASH NO. 4 RIVER M. 0.48 S. OF POWERLINE
W. OF TOWER



WASH NO. 4 RIVER M. 0.35 N. OF POWERLINE
E. OF TOWER

B-20

P6



WASH NO. 4 RIVER M. 2.08 DOWNSTREAM OF
PARKWAY STRUC. NO. 21



WASH NO. 4 RIVER M. 2.75 FROM STRUC
NO 16 AT PARKWAY



WASH NO. 5 RIVER M. 0.06 EAST OF 219TH AVE.



WASH NO. 5 RIVER M. 0.70 BEARDSLEY
OR ALIGNMENT

B-21

P7



WASH NO. 5 RIVER M. 0.68 N. FROM
BEARDSLEY RD ALIGNMENT



WASH NO. 5 RIVER M. 1.26 DIS FROM
PARKWAY STRUC. #27



WASH NO. 6 RIVER M. 1.04



WASH NO. 7 RIVER M. 1.72 DIS OF PARKWAY
STRUC. #27

B-22

P8



WASH NO. 7 RIVER M. 1.63



WASH NO. 7 RIVER M. 0.78



WASH NO. 8 RIVER M. 2.07

B-23

P9



WASH NO. 8 RIVER M. 1.18



WASH NO. 8 RIVER M. 1.18 LOOKING U/S



WASH NO. 8 RIVER M. 1.12 LOOKING S.E.



WASH NO. 8 RIVER M. 1.00 LOOKING W.

B-24

P10



WASH NO. 8 RIVER M. 1.00 LOOKING S.E.



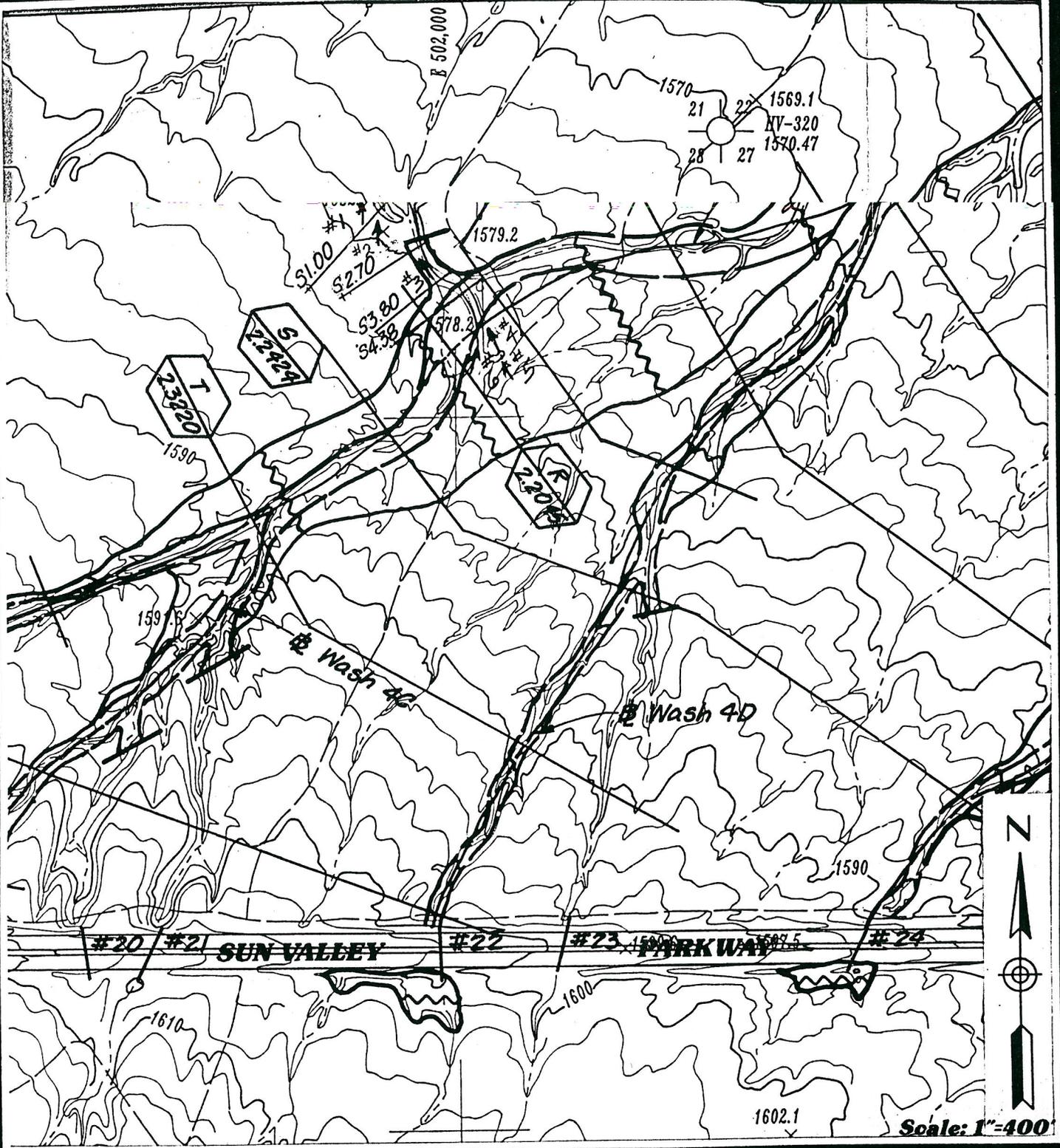
WASH NO. 8 RIVER M. 0.45 LOOKING S.E.



WASH NO. 8 RIVER M. 0.36 LOOKING E.

B-25

P11



Explanation

- #1 Photo Location/I.D.
- S0.00 Field Surveyed
- Cross-Section

- Sun Valley Parkway North FIS
- Stock Pond Diversion
- Levee Capacity Analysis

A-N WEST INC.
Consulting Engineers

B-26

A-N WEST INC.
Consulting Engineers

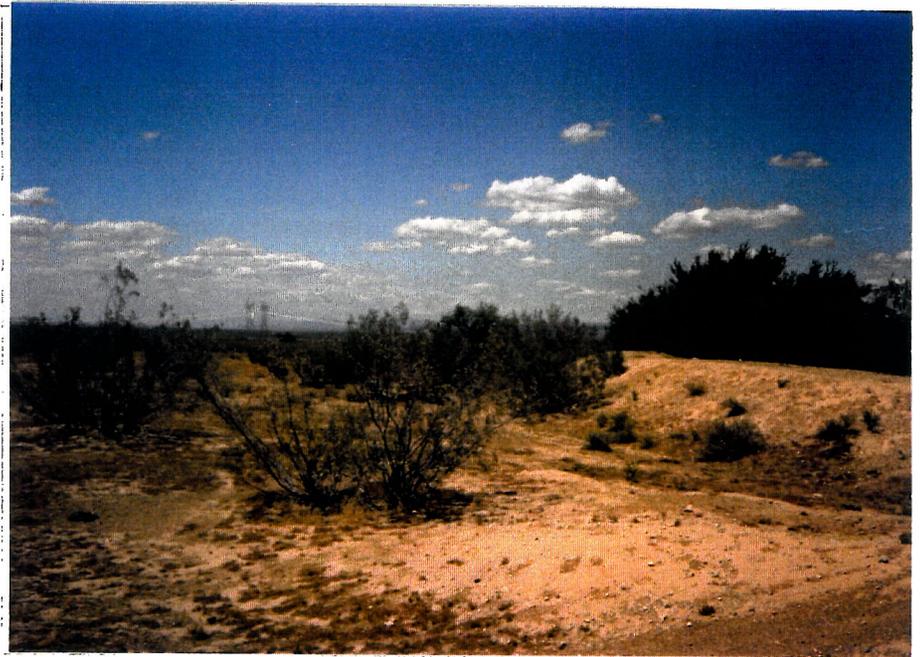
Cross-Section

Levee Capacity Analysis

B-26



WASH NO. 4 STOCK POND PHOTO #1



WASH NO. 4 STOCK POND PHOTO #2



WASH NO. 4 STOCK POND PHOTO #3



WASH NO. 4 STOCK POND PHOTO #4

B-27

P12



WASH NO. 4 STOCK POND PHOTO #5

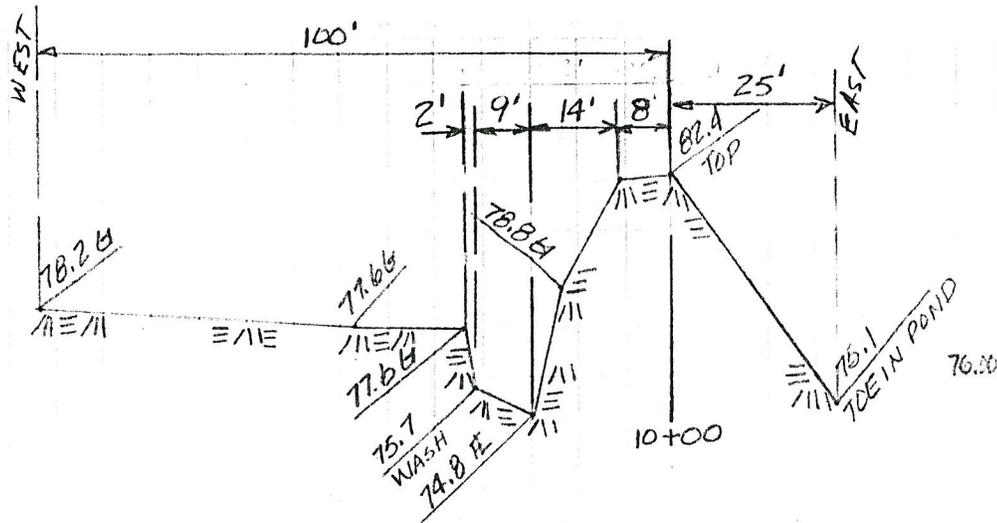


WASH NO 4 STOCK POND PHOTO #6

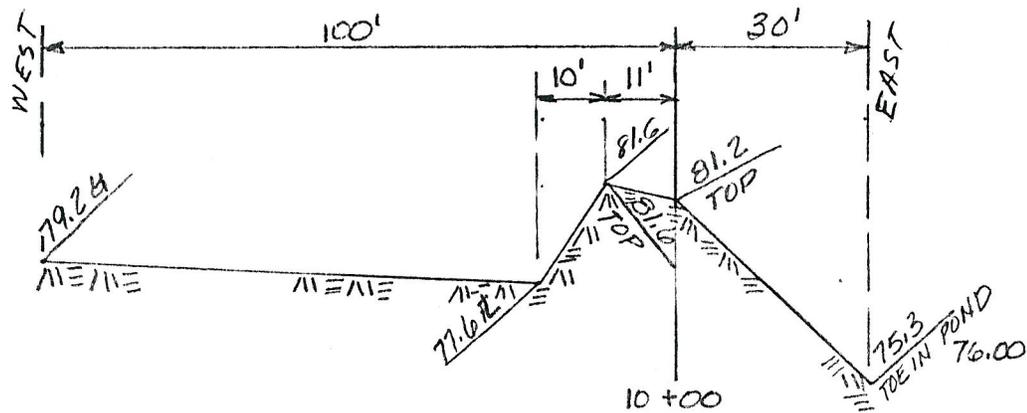
B-28

P13

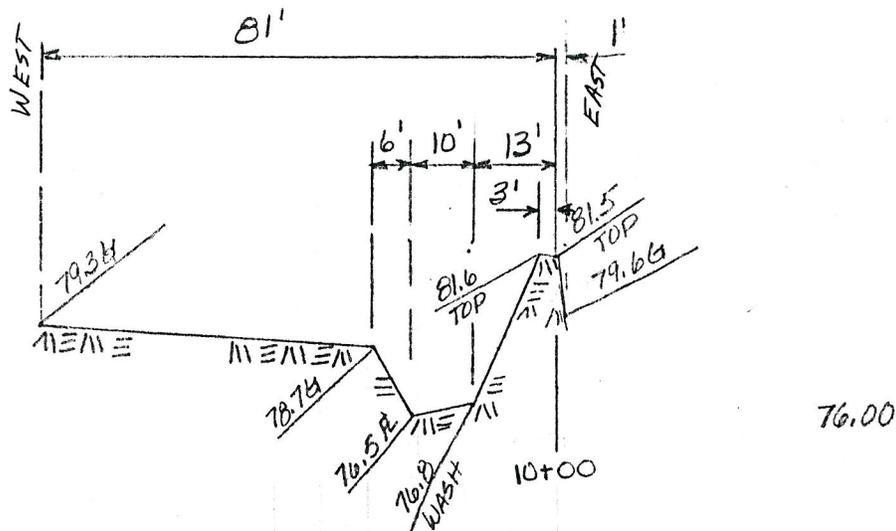
SECTION 0.00



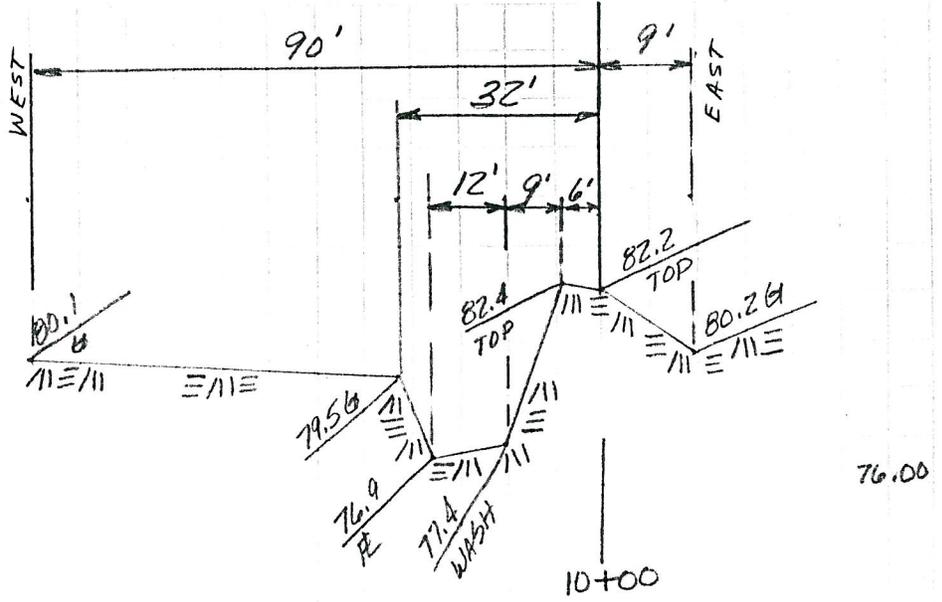
SECTION 1.00



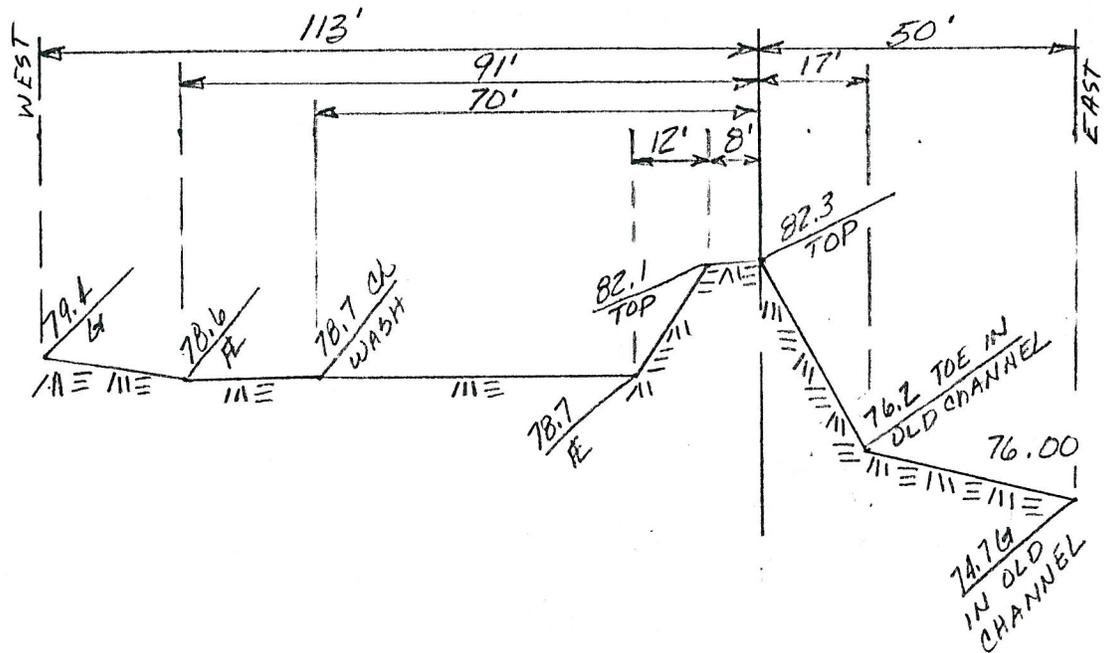
SECTION 2.70



SECTION 3.80



SECTION 4.36



THIS RUN EXECUTED 7/10/91 17:21: 4

HEC2 RELEASE DATED SEPT 88

T1 SUN VALLEY PARKWAY NORTH FIS. CONTRACT:FCDMC NO. 90-04 FILE:WASH4-7
T2 DIVERSION LEVEE\CHANNEL CAPACITY MODEL A-N WEST INC. PHX.AZ
T3 WASH NO. 4 DIVERSION CHANNEL ANALYSIS(SEC.2.14 TO 2.20,LEFT SIDE)

J1	ICHECK	IND	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FO
	0	2		0	-1				1576	
J2	NPROF	IPL0T	PRFVS	XSECV	XSECH	FN	ALLDC	ISW	CHNIM	ITRACE
	1		-1							

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

38	43	1	2	26	39	21	22	27	28
53	54	0	38	13	14	15	55	26	56
63	1	51	4	42	57	0	38	39	33
3	10	11	12	5	7	8	16	17	18
0									

J5 LPRNT NUMSEC *****REQUESTED SECTION NUMBERS*****
-10 -10

NC	.049	.049	.042	.1	.3		
QT	4	500	1000	1250	1500		
ET		9.1	9.1	9.1		600	992

THIS HEC2 MODEL ANALIZES THE CAPACITY AND DISCHARGE AT OVERTOPPING FOR A DIVERSION LEVEE TO A STOCK POND ON THE LEFT SIDE OF WASH #4 BETWEEN SECTIONS 2.1477 AND 2.2045.

FIELD SURVEYED CROSS-SECTIONS OF THE LEVEE AND UPSTREAM CHANNEL WERE TAKEN AT THE MAPPING DATUM FOR INPUT TO HEC2 MODEL. THE LEVEE IS NOT ARMORED TO RESIST SCOUR AND WAS PRIVATELY CONSTRUCTED.

NO PUBLIC AGENCY MAINTAINS THE LEVEE.
 STARTING WATER SURFACE ELEVATION BASED ON CRITICAL DEPTH
 CROSS-SECTION I.D. NUMBERS ARE IN STATIONING INCREASING UPSTREAM FROM
 DOWNSTREAM SECTION (I.E., 1.00 = STA. 1+00.).
 CROSS SECTIONS ARE CODED FROM LEFT TO RIGHT LOOKING DOWNSTREAM WITH
 STATION 1000 AT APPROX. TOP OF LEVEE.

X1	0.0000	10	967	992	0	0	0			
GR	1582.3	600	1578.2	900	1577.6	949	1577.6	967	1575.7	969
GR	1574.8	978	1578.8	982	1582.3	992	1582.4	1000	1575.1	10025
ET		9.1	9.1	9.1					900	989
X1	1.00	6	900	989	150.0	100.0	100.0			
GR	1581.6	800	1579.2	900	1577.6	979	1581.6	989	1581.2	1000
GR	1575.3	1030								
ET		9.1	9.1	9.1					797	997
X1	2.70	8	971	997	100.0	170.0	170.0			
GR	1581.6	797	1579.3	919	1578.7	971	1576.5	977	1576.8	987
GR	1581.6	997	1581.5	1000	1579.6	1001				
ET		9.1	9.1	9.1					750	994
X1	3.80	8	968	994	150.0	110.0	110.0			
GR	1582.4	750	1580.1	910	1579.5	968	1576.9	973	1577.4	985
GR	1582.4	994	1582.2	1000	1580.2	1009				
ET		9.1	9.1	9.1					750	992
X1	4.36	9	909	992	100.0	56.0	56.0			
GR	1582.1	750	1579.4	887	1578.6	909	1578.7	930	1578.7	980
GR	1582.1	992	1582.3	1000	1576.2	1017	1574.7	1050		

THIS RUN EXECUTED 7/10/91 17:21:11

 HEC2 RELEASE DATED SEPT 88

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

WASH NO. 4 DIVERSION CH

SUMMARY PRINTOUT

SECNO	Q	CWSEL	CRWS	VCH	XLCH	STCHL	STCHR	STENCL	STENCR	SSTA	ENDST
* .000	500.00	1578.74	1578.74	6.86	.00	967.00	992.00	600.00	992.00	860.51	981.94
* .000	1000.00	1579.29	1579.29	8.29	.00	967.00	992.00	600.00	992.00	820.28	983.40
* .000	1250.00	1579.49	1579.49	8.74	.00	967.00	992.00	600.00	992.00	805.32	983.98
* .000	1500.00	1575.91	1575.91	5.55	.00	967.00	992.00	.00	.00	968.78	10025.00
1.000	500.00	1579.96	.00	3.74	100.00	900.00	989.00	800.00	989.00	868.55	984.89
* 1.000	1000.00	1580.67	.00	4.79	100.00	900.00	989.00	800.00	989.00	839.08	986.65
* 1.000	1250.00	1580.92	.00	5.22	100.00	900.00	989.00	800.00	989.00	828.35	987.30
* 1.000	1500.00	1580.05	1580.05	7.52	100.00	900.00	989.00	.00	.00	864.48	1030.00
* 2.700	500.00	1580.63	.00	3.64	170.00	971.00	997.00	797.00	997.00	848.61	994.97
* 2.700	1000.00	1581.45	.00	4.37	170.00	971.00	997.00	797.00	997.00	804.89	996.69
* 2.700	1250.00	1581.76	.00	4.59	170.00	971.00	997.00	797.00	997.00	797.00	997.00
* 2.700	1500.00	1581.85	.00	5.27	170.00	971.00	997.00	.00	.00	797.00	1001.00
3.800	500.00	1580.96	.00	4.57	110.00	968.00	994.00	750.00	994.00	849.68	991.42
3.800	1000.00	1581.85	.00	4.96	110.00	968.00	994.00	750.00	994.00	787.93	993.02
3.800	1250.00	1582.18	.00	5.11	110.00	968.00	994.00	750.00	994.00	765.65	993.59
3.800	1500.00	1582.37	.00	5.41	110.00	968.00	994.00	.00	.00	751.69	1009.00
* 4.360	500.00	1581.29	.00	1.80	56.00	909.00	992.00	750.00	992.00	791.69	989.10
* 4.360	1000.00	1582.15	.00	2.37	56.00	909.00	992.00	750.00	992.00	750.00	992.00
* 4.360	1250.00	1582.47	.00	2.58	56.00	909.00	992.00	750.00	992.00	750.00	992.00
* 4.360	1500.00	1582.66	.00	1.78	56.00	909.00	992.00	.00	.00	750.00	1050.00

WASH NO. 4 DIVERSION CH

SUMMARY PRINTOUT

SECNO	QLOB	QCH	QROB	VLOB	VCH	VROB	TELMX	CWSEL	DIFWSX	TOPWID	ELMIN	ALPHA
.000	202.74	297.26	.00	2.80	6.86	.00	1575.10	1578.74	.00	121.43	1574.80	1.67
.000	569.30	430.70	.00	4.01	8.29	.00	1575.10	1579.29	.00	163.12	1574.80	1.46
.000	766.19	483.81	.00	4.42	8.74	.00	1575.10	1579.49	.00	178.66	1574.80	1.39
.000	.00	36.26	1463.74	.00	5.55	3.65	1575.10	1575.91	.00	1006.06	1574.80	1.01
1.000	15.02	484.98	.00	1.27	3.74	.00	1575.30	1579.96	1.22	116.34	1577.60	1.09
1.000	88.14	911.85	.00	1.98	4.79	.00	1575.30	1580.67	1.38	147.57	1577.60	1.17
1.000	138.35	1111.65	.00	2.25	5.22	.00	1575.30	1580.92	1.43	158.95	1577.60	1.20
1.000	40.20	1038.81	420.99	2.66	7.52	7.33	1575.30	1580.05	4.15	144.81	1575.30	1.07
2.700	233.85	266.15	.00	1.78	3.64	.00	1579.60	1580.63	.67	146.36	1576.50	1.43
2.700	591.03	408.97	.00	2.36	4.37	.00	1579.60	1581.45	.78	191.80	1576.50	1.31
2.700	782.99	467.01	.00	2.58	4.59	.00	1579.60	1581.76	.84	200.00	1576.50	1.27
2.700	950.32	547.87	1.82	2.98	5.27	.83	1579.60	1581.85	1.79	204.00	1576.50	1.27
3.800	175.44	324.56	.00	1.87	4.57	.00	1580.20	1580.96	.34	141.74	1576.90	1.61
3.800	540.93	459.07	.00	2.39	4.96	.00	1580.20	1581.85	.40	205.09	1576.90	1.46
3.800	735.12	514.88	.00	2.56	5.11	.00	1580.20	1582.18	.42	227.94	1576.90	1.41
3.800	908.34	572.31	19.35	2.76	5.41	1.75	1580.20	1582.37	.52	256.54	1576.90	1.40
4.360	147.25	352.75	.00	1.05	1.90	.00	1574.70	1581.28	.31	197.41	1578.60	1.18
4.360	365.57	634.43	.00	1.40	2.37	.00	1574.70	1582.15	.30	242.00	1578.60	1.20
4.360	492.38	757.62	.00	1.57	2.58	.00	1574.70	1582.47	.30	242.00	1578.60	1.18
4.360	377.91	550.74	571.35	1.10	1.78	1.91	1574.70	1582.66	.30	300.00	1574.70	1.15

WASH NO. 4 DIVERSION CH

SUMMARY PRINTOUT

SECNO	XLCH	K*CHSL	EG	HV	HL	OLOSS	10*KG	VOL	DEPTH	K*XNL	K*XNCH	K*XNR
* .000	.00	.00	1579.22	.48	.00	.00	111.03	.00	3.94	49.00	42.00	.00
* .000	.00	.00	1579.89	.60	.00	.00	143.15	.00	4.49	49.00	42.00	.00
* .000	.00	.00	1580.14	.64	.00	.00	152.52	.00	4.69	49.00	42.00	.00
* .000	.00	.00	1576.12	.21	.00	.00	487.73	.00	1.11	.00	42.00	49.00
1.000	100.00	28.00	1580.17	.21	.92	.03	63.83	.34	2.36	49.00	42.00	.00
* 1.000	100.00	28.00	1581.00	.33	1.08	.03	64.72	.60	3.07	49.00	42.00	.00
* 1.000	100.00	28.00	1581.31	.39	1.15	.03	67.08	.71	3.32	49.00	42.00	.00
* 1.000	100.00	5.00	1580.90	.85	3.33	.19	239.19	.72	4.75	49.00	42.00	49.00
* 2.700	170.00	-6.47	1580.76	.13	.58	.01	25.54	.90	4.13	49.00	42.00	.00
* 2.700	170.00	-6.47	1581.62	.17	.61	.02	29.21	1.49	4.95	49.00	42.00	.00
* 2.700	170.00	-6.47	1581.95	.19	.62	.02	29.68	1.75	5.26	49.00	42.00	.00
* 2.700	170.00	7.06	1582.09	.24	1.13	.06	37.64	1.69	5.35	49.00	42.00	49.00
3.800	110.00	3.64	1581.19	.23	.40	.03	41.31	1.47	4.06	49.00	42.00	.00
3.800	110.00	3.64	1582.08	.22	.44	.02	37.63	2.55	4.95	49.00	42.00	.00
3.800	110.00	3.64	1582.40	.23	.44	.01	36.96	3.02	5.28	49.00	42.00	.00
3.800	110.00	3.64	1582.61	.25	.52	.00	39.42	3.09	5.47	49.00	42.00	49.00
* 4.360	56.00	30.36	1581.32	.04	.11	.02	7.91	1.91	2.68	49.00	42.00	.00
* 4.360	56.00	30.36	1582.22	.07	.13	.02	9.53	3.34	3.55	49.00	42.00	.00
* 4.360	56.00	30.36	1582.55	.08	.13	.01	9.97	3.96	3.87	49.00	42.00	.00
* 4.360	56.00	-39.29	1582.71	.04	.07	.02	4.41	4.33	7.96	49.00	42.00	49.00

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO=	.000	PROFILE= 1	CRITICAL DEPTH ASSUMED
CAUTION SECNO=	.000	PROFILE= 2	CRITICAL DEPTH ASSUMED
CAUTION SECNO=	.000	PROFILE= 3	CRITICAL DEPTH ASSUMED
CAUTION SECNO=	.000	PROFILE= 4	CRITICAL DEPTH ASSUMED
WARNING SECNO=	1.000	PROFILE= 2	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	1.000	PROFILE= 3	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=	1.000	PROFILE= 4	CRITICAL DEPTH ASSUMED
CAUTION SECNO=	1.000	PROFILE= 4	MINIMUM SPECIFIC ENERGY
WARNING SECNO=	2.700	PROFILE= 1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	2.700	PROFILE= 2	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	2.700	PROFILE= 3	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	2.700	PROFILE= 4	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	4.360	PROFILE= 1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	4.360	PROFILE= 2	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	4.360	PROFILE= 3	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	4.360	PROFILE= 4	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

BRIDGE DATA SHT. HEC-2 SC CARD

Project Sun Valley Parkway N. F.F.S.
Feature Wash No 1 Struct. No. 3
Designed GA3 Date 12/91 Sht. of
Checked Date Job No.
Rev. 8/14/91

struct. No. 3

BRIDGE:

SPAN: _____
HEIGHT: _____
WIDTH: _____

CULVERT:

PIPE OR BOX SIZE: 10'x3'
NUMBER OF BARRELS: 1
LENGTH: 134ft
skew 2°-22'

ELEVATIONS:

ROAD ELEVATION: 16741 / 1672 ← use in
Road Median T/c over culvert. *Low Chann. Invert 5 ft.*
x 2 Cord
LOW CHORD ELEVATION: 1670.7
U/S INVERT: 1667.70
D/S INVERT: 1666.70

BLOCKAGE:

PER CENT: 0
TYPE: Head wall
LOW CHORD: Chann p Level
PIER: None
PIER SHAPE: N/A
PIER SIZE: N/A

COMPUTER INPUT: (SC CARD)

FIELD
1 CUNO.CUNV = 1.012
2 ENTLC = 0.2 *Table 3.1 - HEC-2 Manual*
3 COFQ = 3.0
4 RDLEN = 0
5 RISE = 3
6 SPAN = 10
7 CULVLN = 134
8 CHRT.SCL = 12.1 *Chart 12, Scale 1*
9 ELCHU = 1667.70
10 ELCHD = 1666.70

MISC. DATA:

N = 0.012
A = 30
WP = 26
R = 1.15
ENTRANCE TYPE =

REMARKS:

BRIDGE DATA SHT. HEC-2 SB CARD

Project Sun Valley Parkway N. FIS
Feature Wash #2
Designed CRS Date 5/13/81 of _____
Checked _____ Date _____ Job No. _____

BRIDGE:

SPAN: _____
HEIGHT: _____
WIDTH: _____

CULVERT:

struct #6 struct #7
PIPE OR BOX SIZE: 10'x4' and 10'x3'
NUMBER OF BARRELS: 6 and 2
LENGTH: 141 and 136

ELEVATIONS:

ROAD ELEVATION: 1666.4 / 1661.5 ^{use} _{in}
LOW CHORD ELEVATION: 1662.4 _{x2 card}
U/S INVERT: 1658.40
D/S INVERT: 1657.70

BLOCKAGE:

PER CENT: 0
TYPE: Head walls
LOW CHORD: Chamfered
PIER: Wall
PIER SHAPE: Round Inlet
PIER SIZE: 1' wide Ea.

COMPUTER INPUT:

XK = 0.95
XKOR = 0.59 0.2 + 0.45 + 1
COFQ = 2.63
RDLEN = 0
BWC = 81
BWP = 6
BAREA = 300
S. S. = 0.0
ELCHU = 1658.40
ELCHD = 1657.70

MISC. DATA:

N = 0.012
A = 300
WP = 220
R 4/3 = 1.51
K_F = 0.39 = $\frac{29 \text{ (m)}^2 L}{R^{1.33}}$

REMARKS:

BRIDGE DATA SHT. HEC-2 SC CARD

Project Sun Valley Parkway North FIS
Feature Wash No 3 Struc. No 13
Designed GAS Date 5/16/91 Sht. of
Checked Date Job No.
Rev. 8/14/91

BRIDGE:

SPAN: _____
HEIGHT: _____
WIDTH: _____

CULVERT:

Struc. No 13

PIPE OR BOX SIZE: 10' x 4'
NUMBER OF BARRELS: 4
LENGTH: 154 ft
Skew 29°-56'

ELEVATIONS:

ROAD ELEVATION: 1637.9 *Road Median T/C over culvert*
LOW CHORD ELEVATION: 1635.0 *Top Weir Lavee to Rt use in x2 Card*
U/S INVERT: 1631.0
D/S INVERT: 1630.0

BLOCKAGE:

PER CENT: 0
TYPE: Headwall
LOW CHORD: Chamfered
PIER: Wall
PIER SHAPE: Roundal
PIER SIZE: 1' Wide Each

COMPUTER INPUT: (SC CARD)

FIELD

1 CUNO.CUNV = 4.012
2 ENTLC = 0.2 *table 3.4 HEC-2 Manual*
3 COFQ = 2.7 *10' wide Broad Crested Weir*
4 RDLEN = 0
5 RISE = 4
6 SPAN = 10
7 CULVLN = 154
8 CHRT.SCL = 12.3 *Chart 12, Scale 3*
9 ELCHU = 1631.0
10 ELCHD = 1630.0

MISC. DATA:

N = 0.012
A = 160
WP = 112
R = 1.43
ENTRANCE TYPE = _____

REMARKS:

BRIDGE DATA SHT. HEC-2 SC CARD

Project Sun Valley Parkway North FIS
Feature Wash No. 3 (Struc. #14)
Designed GAS Date 5/16/91 Sht. of
Checked Date Job No.
Rev. 8/17/91

BRIDGE:

SPAN:

HEIGHT:

WIDTH:

ELEVATIONS:

ROAD ELEVATION: 1634.2 / 1631.0 ← *Use in x2 card*

LOW CHORD ELEVATION: 1630.80

U/S INVERT: 1627.80

D/S INVERT: 1627.40

COMPUTER INPUT: (SC CARD)

FIELD

- 1 CUNO.CUNV = 1.012
- 2 ENTLC = 0.2 *Table 3.4 HEC-2 Manual*
- 3 COFQ = 2.7 *10' wide Broad Crested Weir*
- 4 RDLEN = 0
- 5 RISE = 3
- 6 SPAN = 10
- 7 CULVLN = 138
- 8 CHRT.SCL = 12.1 *Chart 12, Scale 1*
- 9 ELCHU = 1627.80
- 10 ELCHD = 1627.40

CULVERT:

Struc. #14

PIPE OR BOX SIZE: 10' X 3'

NUMBER OF BARRELS: 1

LENGTH: 138 ft

Skew 13° - 0

BLOCKAGE:

PER CENT: 0

TYPE: Headwall

LOW CHORD: Chamfered

PIER: None

PIER SHAPE: N/A

PIER SIZE: N/A

MISC. DATA:

N = 0.012

A = 30

WP = 26

R = 1.15

ENTRANCE TYPE =

REMARKS:

BRIDGE DATA SHT. HEC-2 SC CARD

Project San Valley Parkway North FIS
Feature Wash No. 3 Struc. #15
Designed OAS Date 5/16/91 Sht. of
Checked Date Job No.
Rev. 8/14/91

Struc. #15

BRIDGE:

SPAN: _____

HEIGHT: _____

WIDTH: _____

CULVERT:

PIPE OR BOX SIZE: 10' x 3'

NUMBER OF BARRELS: 4

LENGTH: 158 ft

Skew 32° 28'

ELEVATIONS:

ROAD ELEVATION: 1630.5 / 1626.8 ^{Use} _{In X2} _{Card}

LOW CHORD ELEVATION: 1627.20

U/S INVERT: 1624.20

D/S INVERT: 1623.60

BLOCKAGE:

PER CENT: 0

TYPE: Headwall

LOW CHORD: Chamfered

PIER: Wall

PIER SHAPE: Rounded Inlet

PIER SIZE: 1 Ft wide Ea.

COMPUTER INPUT: (SC CARD)

FIELD

1 CUNO.CUNV = 4.012

2 ENTLCL = 0.2 - Table 3.4 - HEC-2 Manual

3 COFQ = 2.9

4 RDLEN = 0

5 RISE = 3

6 SPAN = 10

7 CULVLN = 158

8 CHRT.SCL = 12.3 Chart 12, Scale 3

9 ELCHU = 1624.20

10 ELCHD = 1623.60

MISC. DATA:

N = 0.012

A = 120

WP = 104

R = .115

ENTRANCE TYPE = _____

REMARKS:

BRIDGE DATA SHT. HEC-2 SC CARD

Project Sun Valley Parkway N. F.I.S
 Feature Wash # 4 Side # 16
 Designed CAS Date 6/21/91 Sht. of
 Checked Date Job No.
 Rev. 8/12/91

BRIDGE:

SPAN: _____
 HEIGHT: _____
 WIDTH: _____

CULVERT:

Struct. # 16
 PIPE OR BOX SIZE: 10' X 3'
 NUMBER OF BARRELS: 1
 LENGTH: 133 ft
 Skew 0°-32'

ELEVATIONS:

ROAD ELEVATION: 1621.4 / 1618.5 ^{Use In X 3 card}
 LOW CHORD ELEVATION: 1618.4
 U/S INVERT: 1615.4
 D/S INVERT: 1615.0

Road Median T/c over culvert
Weir Level 1' smart RT

BLOCKAGE:

PER CENT: 0
 TYPE: Headwall
 LOW CHORD: Chamfered
 PIER: N/A
 PIER SHAPE: N/A
 PIER SIZE: N/A

COMPUTER INPUT: (SC CARD)

FIELD

1 CUNO.CUNV = 0.012
 2 ENTLCL = 0.2 *table 3.4 HEC-2 Manual*
 3 COFQ = 2.7
 4 RDLEN = 0
 5 RISE = 3
 6 SPAN = 10
 7 CULVLN = 133
 8 CHRT.SCL = 12.1 *chart 12, scale 1*
 9 ELCHU = 1615.4
 10 ELCHD = 1615.0

MISC. DATA:

N = 0.012
 A = 30
 WP = 26
 R = 1.15
 ENTRANCE TYPE = _____

Assume No Skew

REMARKS:

BRIDGE DATA SHT. HEC-2 SC CARD

Project S.V.P.N. FIS
Feature Wash #4 Struc. #18
Designed CHS Date 6/2/91 Sht. of
Checked Date Job No.

Rev. 8/12/91

BRIDGE:

SPAN:

HEIGHT:

WIDTH:

ELEVATIONS:

ROAD ELEVATION: 1618.30 / 1615.0 ← Use In
Road Median T/C over culvert (Werr Levee Invert RT)

LOW CHORD ELEVATION: 1614.50

U/S INVERT: 1610.50

D/S INVERT: 1609.90

COMPUTER INPUT: (SC CARD)

FIELD

- 1 CUNO.CUNV = 6.012
- 2 ENTLCL = 0.2 *Table 3.4 HEC-2 Manual*
- 3 COFQ = 2.7 *10' Lined Broad Crested werr*
- 4 RDLEN = 0
- 5 RISE = 6
- 6 SPAN = 12
- 7 CULVLN = 148
- 8 CHRT.SCL = 12.3 *Chart 12, Scale 3*
- 9 ELCHU = 1610.50
- 10 ELCHD = 1609.90

CULVERT:

Struc. #18

PIPE OR BOX SIZE: 12'x4'

NUMBER OF BARRELS: 6

LENGTH: 148 ft

Skew 25° - 30'

BLOCKAGE:

PER CENT: 0

TYPE: Headwall

LOW CHORD: Chumpiered

PIER: Wall - Rounded Inlet

PIER SHAPE: Wall Rounded

PIER SIZE: 1' Wide Ea.

MISC. DATA:

N = 0.012

A = 288

WP = 192

R = 1.68

ENTRANCE TYPE =

REMARKS:

BRIDGE DATA SHT. HEC-2 SC CARD

Project S.V.P.N. FIS
 Feature Wash # 4 Struc. # 19
 Designed _____ Date _____ Sht. _____ of _____
 Checked _____ Date _____ Job No. _____

Rev. 8/12/91

Struc. # 19

BRIDGE:

SPAN: _____

HEIGHT: _____

WIDTH: _____

CULVERT:

PIPE OR BOX SIZE: 12'x4'

NUMBER OF BARRELS: 5

LENGTH: 135 ft

Skew 6°-54'

ELEVATIONS:

ROAD ELEVATION: 1614.9 / 1610.9

LOW CHORD ELEVATION: 1611.0

U/S INVERT: 1607.0

D/S INVERT: 1606.3

*Road Median Tie
over Culvert*

*Chann. Invert
Rt.*

*Use In
x2 Card*

BLOCKAGE:

PER CENT: 0

TYPE: Head wall

LOW CHORD: Chamfered

PIER: wall

PIER SHAPE: Wall-Rounded

PIER SIZE: 1' wide each

COMPUTER INPUT: (SC CARD)

FIELD

1 CUNO.CUNV = 15,012

2 ENTLCL = 0.2

3 COFQ = 2.7

4 RDLEN = 0

5 RISE = 4

6 SPAN = 12

7 CULVLN = 135

8 CHRT.SCL = 12.1 - Chart 12, Scale 1

9 ELCHU = 1607.0

10 ELCHD = 1606.3

*Table 3.4, HEC-2 Manual
wing walls
156 to 450*

*Assume
skew
Insight Account*

MISC. DATA:

N = 0.012

A = 240

WP = 160

R = 1.5

ENTRANCE TYPE = _____

REMARKS:

BRIDGE DATA SHT. HEC-2 SB CARD

Project SUPN FIS.
 Feature Wash #4 Struc. #22
 Designed _____ Date _____ Sht. _____ of _____
 Checked _____ Date _____ Job No. _____

BRIDGE:

SPAN: _____

HEIGHT: _____

WIDTH: _____

CULVERT:

Struc. #22

PIPE OR BOX SIZE: 42" x 29" C.S.P.A.

NUMBER OF BARRELS: 2

LENGTH: 135

ELEVATIONS:

ROAD ELEVATION: 1604

LOW CHORD ELEVATION: 1602.42

U/S INVERT: 1600.0

D/S INVERT: 1599.4

BLOCKAGE:

PER CENT: 0

TYPE: Head wall

LOW CHORD: Square

PIER: _____

PIER SHAPE: Square inlet Edge

PIER SIZE: Assume Ave. 1.7' wide
 Each

COMPUTER INPUT:

XK = 1.25

XKOR = 5.29 $K_e + K_s + 1$
 $0.5 + 3.78 + 1$

COFQ = 2.63

RDLEN = 0

BWC = 7.0

BWP = 1.7

BARLA = 12.8

S. S. = 0

ELCHU = 1600

ELCHD = 1599.4

MISC. DATA:

N = 0.024

A = 6.4' / Barrel $R = 0.679 = A/WP$

WP = 9.43' / Barrel $WP = \frac{6.4}{0.679} = 9.43'$
 Barrel

$R^{4/3} = (0.679)^{4/3} = 0.577$

$K_F = \frac{3.78 \cdot 29 \cdot (1)^{2L}}{R^{4/3}}$

REMARKS:

BRIDGE DATA SHT. HEC-2 SB CARD

Project S.V.P.N. FIS.
 Feature Wash # 4 Struc # 24
 Designed _____ Date _____ Sht. _____ of _____
 Checked _____ Date _____ Job No. _____

BRIDGE:

SPAN: _____

HEIGHT: _____

WIDTH: _____

ELEVATIONS:

ROAD ELEVATION: 1596.4

LOW CHORD ELEVATION: 1593.72

U/S INVERT: 1591.30

D/S INVERT: 1590.9

COMPUTER INPUT:

XK = 1.25

XKOR = 6.29 $K_e + K_f + 1$
 $0.5 + 3.78 + 1$

COFQ = 2.63

RDLEN = 0

BWC = 11.0'

BWP = 3.0

BARLA = 19.2

S. S. = 0

ELCHU = 1591.3

ELCHD = 1590.9

REMARKS:

CULVERT:

PIPE OR BOX SIZE: Struc # 24
42" X 29" C.S.P.A.

NUMBER OF BARRELS: 3

LENGTH: 137

BLOCKAGE:

PER CENT: 0

TYPE: Headwall

LOW CHORD: Square

PIER: _____

PIER SHAPE: Square Inlet Edge

PIER SIZE: Assume Ave. 1.5'
wide Each

MISC. DATA:

N = 0.024

A = 6.4² / Barrel $R = 0.679 = A/WP$

WP = 9.43' / Barrel $WP = \frac{6.4}{0.679} = 9.43'$

R $4/3 = \frac{(0.679)^{4/3}}{1} = 0.597$

$K_F = \frac{3.78}{\frac{29(n)^2 L}{12^{4/3}}}$

BRIDGE DATA SHT. HEC-2 SC CARD

Project S.V.P. N. FIS
 Feature Wash No. 5 Struc. #27
 Designed GAS Date 6/28/91 Sht. of
 Checked Date Job No.
 Rev. 8/6/91

Struc. #27

BRIDGE:

CULVERT:

SPAN: _____

PIPE OR BOX SIZE: 12'x4'

HEIGHT: _____

NUMBER OF BARRELS: 6

WIDTH: _____

LENGTH: 137 ft

skew 12°-23'

ELEVATIONS:

BLOCKAGE:

ROAD ELEVATION: 1538.8 / 1535.0

PER CENT: 0

LOW CHORD ELEVATION: 1533.0

TYPE: RCB with Headwalls

U/S INVERT: 1529.0

LOW CHORD: _____

D/S INVERT: 1528.50

PIER: Wall

PIER SHAPE: Wall - Rounded Inlet

PIER SIZE: 1 Ft. wide
Ru

COMPUTER INPUT: (SC CARD)

FIELD

1 CUNO.CUNV = 6.012

2 ENTLC = 0.2

3 COFQ = 2.7 - 10' wide Level

4 RDLEN = 0

5 RISE = 4

6 SPAN = 12

7 CULVLN = 137

8 CHRT.SCL = 12.1 Chart 12, Scale 1

9 ELCHU = 1529.0

10 ELCHD = 1528.50

MISC. DATA:

N = 0.012

A = 288

WP = 192

R = 1.5

ENTRANCE TYPE = _____

Road Median over Culvert & Weir Invert to Rt. Use in X2 card

From Table 3.4 HEC-2 Manual using walls 15° to 45° Top Corner Rounded Broad Crested Weir

Assume skew Insignificant

REMARKS:

BRIDGE DATA SHT. HEC-2 SC CARD

Project S.V.P.N. FIS
 Feature Wash No. 5 Struc. #28
 Designed SAS Date 6/28/91 Sht. of
 Checked Date Job No.
 Rev. 8/6/91

Struc. #28

BRIDGE:

SPAN: _____

HEIGHT: _____

WIDTH: _____

CULVERT:

PIPE OR BOX SIZE: 12' X 8'

NUMBER OF BARRELS: 6

LENGTH: 159'
 skewed 32° - 47'

ELEVATIONS:

ROAD ELEVATION: 1530.9 / 1526.8

LOW CHORD ELEVATION: 1527.3

U/S INVERT: 1519.30

D/S INVERT: 1518.80

Road Median over Culvert + Low channel Invert at Rt. Use in X2 card

BLOCKAGE:

PER CENT: 0

TYPE: RCB with Headwall

LOW CHORD: _____

PIER: Wall

PIER SHAPE: Wall Rounded Inlet

PIER SIZE: 1' wide Each

COMPUTER INPUT: (SC CARD)

FIELD

1 CUNO.CUNV = 6.012

2 ENTLC = 0.2 *From Table 3.4 HEC-2 Manual wing walls 15° to 45° top corner rounded*

3 COFQ = 3.0

4 RDLEN = 0

5 RISE = 6

6 SPAN = 12

7 CULVLN = 159

8 CHRT.SCL = 12.3 *Chart 12, Scale 3*

9 ELCHU = 1519.30

10 ELCHD = 1518.80

MISC. DATA:

N = 0.012

A = 576

WP = 240

R = 2.4

ENTRANCE TYPE = _____

REMARKS:

BRIDGE DATA SHT. HEC-2 SC CARD

Project S.V.P.N FIS
Feature Wash No 6 Struc. No 3 2
Designed GAS Date 7/21/81 Sht. of
Checked Date Job No.

Struc. #32

BRIDGE:

SPAN: _____
HEIGHT: _____
WIDTH: _____

CULVERT:

PIPE OR BOX SIZE: 12'x6'
NUMBER OF BARRELS: 6
LENGTH: 144 ft
SKEW = 21° 52'

ELEVATIONS:

ROAD ELEVATION: 1988.8 / 1484
LOW CHORD ELEVATION: 1485
U/S INVERT: 1479.0
D/S INVERT: 1478.40

Road Med over Culvert
Weir flow to channel at right use in x 2 card

BLOCKAGE:

PER CENT: 0
TYPE: Head wall
LOW CHORD: SKEW = 21° 52'
PIER: Wall
PIER SHAPE: Wall Pier
PIER SIZE: Rounded Inlet 1 Ft wide Rac

COMPUTER INPUT: (SC CARD)

FIELD

1 CUNO.CUNV = 6.012
2 ENTLCL = 0.2 *Form Table 3, 4 HEC-2 Manual*
3 COFQ = 2.9
4 RDLEN = 0
5 RISE = 6
6 SPAN = 12'
7 CULVLN = 144
8 CHRT.SCL = 12.3 *Chart 12, Scale 3*
9 ELCHU = 1479.0
10 ELCHD = 1478.4

MISC. DATA:

Wing walls 15° to 45° Top corner rounded
N = 0.012
A = 432
WP = 216
R = 2
ENTRANCE TYPE = _____

REMARKS:

BRIDGE DATA SHT. HEC-2 SC CARD

Project Sun Valley Parkway North
 Feature Wish #8 Struct. No 50
 Designed GAS Date 7/29/74 Sht. of
 Checked Date Job No.

Struct. No 50

BRIDGE:

SPAN:
 HEIGHT:
 WIDTH:

CULVERT:

PIPE OR BOX SIZE: 10' x 3'
 NUMBER OF BARRELS: 3
 LENGTH: 169'

ELEVATIONS:

ROAD ELEVATION:	ϕ Rd. over culvert	Low water
	<u>1477.5</u>	Elev. <u>1475.0</u>
LOW CHORD ELEVATION:	<u>1474.30</u>	
U/S INVERT:	<u>1471.30</u>	
D/S INVERT:	<u>1470.60</u>	

BLOCKAGE:

PER CENT: 0
 TYPE: Headwall
 LOW CHORD: 6" Rad
 PIER: Wall 
 PIER SHAPE: Wall Pier - Rounded
 Inlet
 PIER SIZE: 1 Foot wide

COMPUTER INPUT: (SC CARD)

FIELD

1 CUNO.CUNV = 3.012
 2 ENTLC = 0.2 from Table 3.4 HEC-2 Manual
 3 COFQ = 2.9
 4 RDLEN = 0
 5 RISE = 3
 6 SPAN = 10'
 7 CULVLN = 169
 8 CHRT.SCL = 12.3 Chart 12, Scale 3
 9 ELCHU = 1471.30
 10 ELCHD = 1470.60

MISC. DATA:

*wingwalls 15 to 45°
top corner Rounded*
 N = .012
 A = 90 ft²
 WP = 78 ft
 R = 1.15
 ENTRANCE TYPE =

REMARKS:

BRIDGE DATA SHT. HEC-2 SB CARD

Project San Valley Parkway North
Feature Wash No. 8 Struct. No. 52
Designed CHS Date 7/30/81 Sht. of
Checked Date Job No. 7158-01

BRIDGE:

CULVERT:

Struct. #52

SPAN: _____

PIPE OR BOX SIZE: 49" x 33" CSPA

HEIGHT: _____

NUMBER OF BARRELS: 2

WIDTH: _____

LENGTH: 169 ft

ELEVATIONS:

to Rd over
culvert 1477.1 / *weir flow*
channel 1468.8 *RT.*

BLOCKAGE:

ROAD ELEVATION: 1477.1

PER CENT: _____

LOW CHORD ELEVATION: 1467.75

TYPE: _____

U/S INVERT: 1465.0

LOW CHORD: _____

D/S INVERT: 1461.90

PIER: _____

PIER SHAPE: _____

PIER SIZE: _____

COMPUTER INPUT:

XK = 1.25

- square edge - Headwall

XKOR = 5.36

*$k_e + k_c + 1$
 $0.5 + 3.85 + 1$*

COFQ = 2.9

RDLEN = 0

BWC = 8.5

BWP = 2.17

BARLA = 17.4

S. S. = 0

ELCHU = 1465.0

ELCHD = 1461.90

MISC. DATA:

N = 0.024

A = 8.7' / Barrel

WP = 11.0' / Barrel

R 4/3 = (6.791)^{4/3} = 0.732

K_F = 3.85 ²⁹

REMARKS:

Install 3 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

@ Sta. 16+19.50 Struct. #2
Install 146 L.F. - Triple 44" x 33" C.S.P.A.
Bottom Coated 2 1/2 x 1/2 Corr. (12 Ga.)
e S = 0.62% Skew 20° 19'
Q100 = 189 cfs, H.W. = 4.5'

@ Sta. 20+00
Construct Median
Catch Basin
w/ Conc. Apron
per A.D.O.T. Det. C-15.80
Grate EL = 73.79 A.B. = 70.36
15" R.G.R.C.P. - E = 70.30
@ Sta. 20+00, 76' Lt.

Construct Headwall
M.A.G. Det. 501-2
"U Type"

@ Sta. 15+96, 68' Lt.
E = 68.19
A.B. = 67.94

@ Sta. 17+32, 60' Lt.
E = 72.7

@ Sta. 18+00, 63' Lt.
E = 72.30

@ Sta. 20+00, 63' Lt.
E = 71.70

Install 12.5 C.Y.
Grouted Rip-Rap
Per Det. 4 Sht. 2

@ Sta. 16+04, 67' Rt.
E = 71.95

@ Sta. 16+34, 77' Rt., E = 69.2

@ Sta. 16+46, 67' Rt.
E = 69.90

@ Sta. 15+33, 89' Rt. A.B. = 69.07

@ Sta. 14+83, 81' Rt.

Construct Headwall
per M.A.G. Det. 501-2
"U Type"

@ Sta. 16+55, 77' Rt.
E = 69.2

@ Sta. 17+26, 103' Rt.

@ Sta. 16+75, 89' Rt.

Install 3 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

@ Sta. 18+00, 72' Rt.
E = 69.0

Install 67 L.F.
15" R.G.R.C.P. CLIV
e S = 0.32%
(Miter End)

Install 1 C.Y.
Grouted Rip-Rap
Per Det. 4, Sht. 2

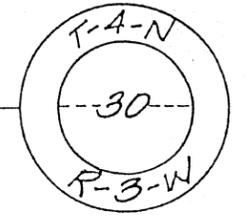
@ Sta. 20+00, 64' Rt.
15" Inv = 70.10

@ Sta. 20+00, 67' Rt.
E = 70.1

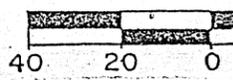
A.B. = 70.06

@ Sta. 20+00, 90' Rt.

MATCH SHEET 5 STA. 20+00.00

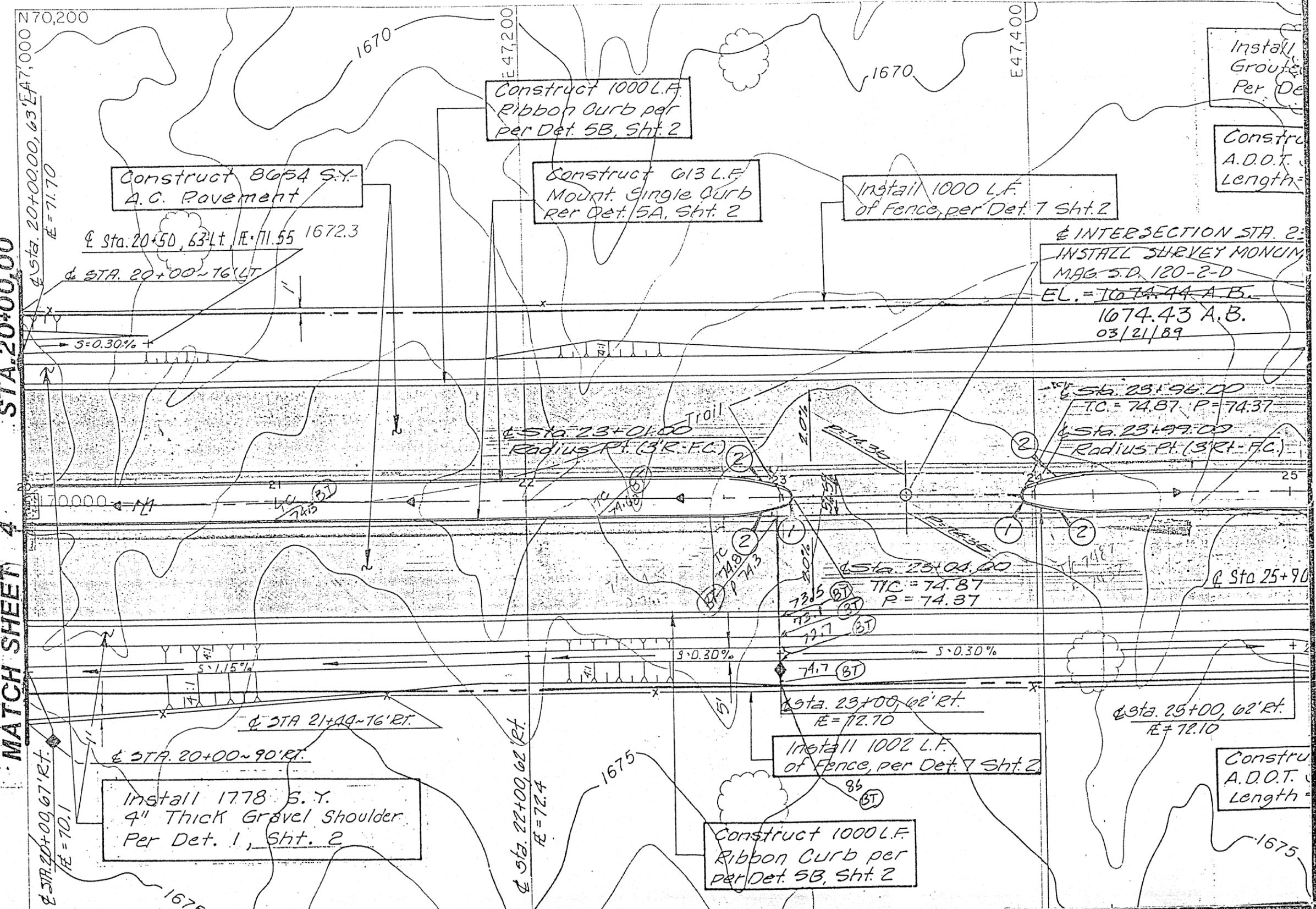


Modify for 15"



SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 1 Struc. No. 2

MATCH SHEET 4

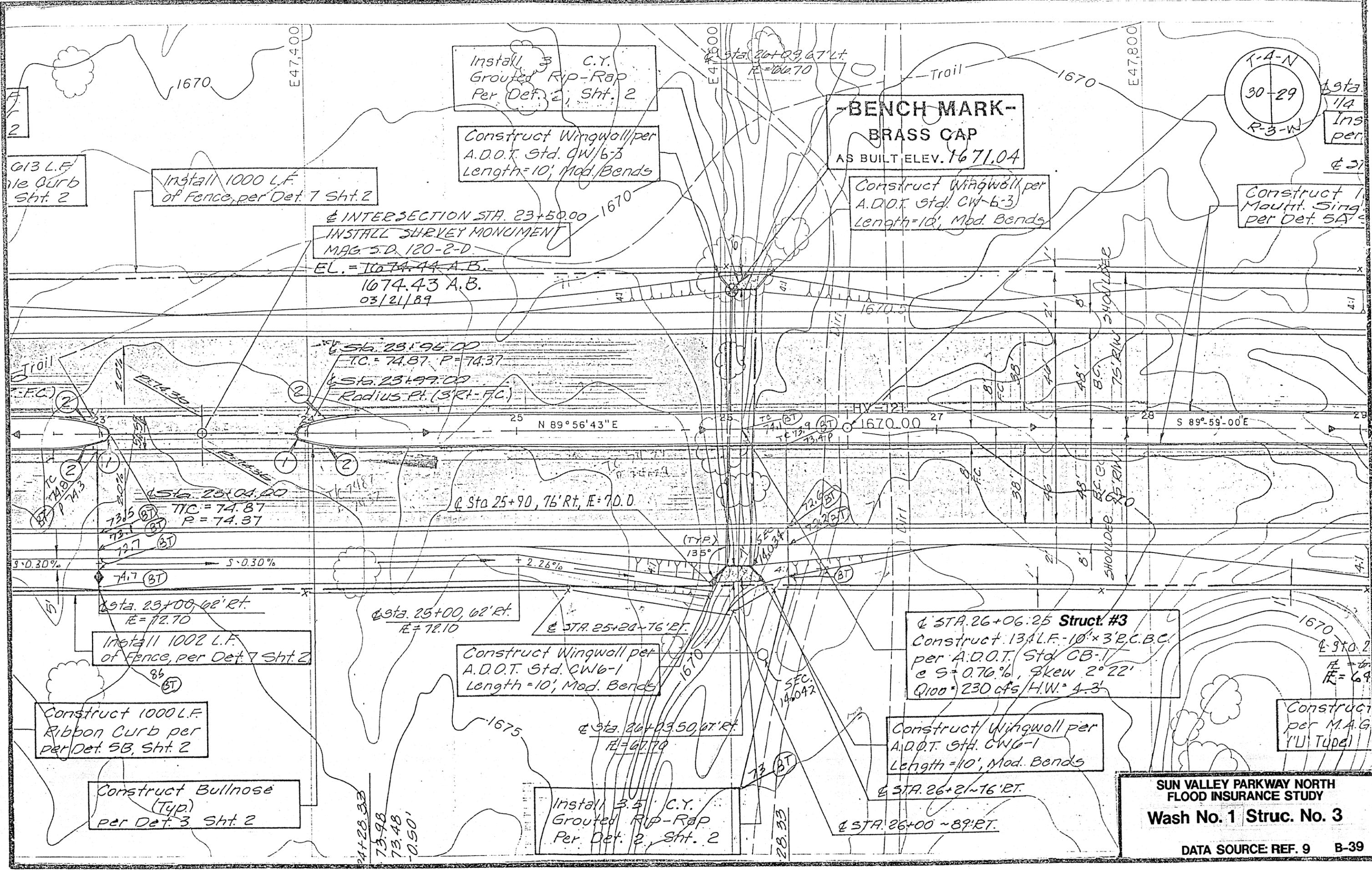


FC CURVE DATA

RADIUS	DELTA	LENGTH	TANGENT
3.00'	131° 38' 44"	0.89'	6.68'

**SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 1 Struc. No. 2**

DATA SOURCE: REF. 9 B-38

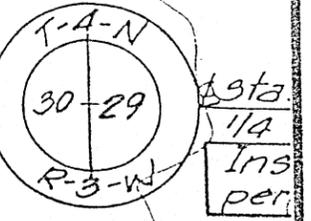


Install 3 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

Construct Wingwall per
A.D.O.T. Std. CW/6-3
Length=10', Mod. Bends

-BENCH MARK-
BRASS CAP
AS BUILT ELEV. 1671.04

Construct Wingwall per
A.D.O.T. Std. CW-6-3
Length=10', Mod. Bends



Install 1000 L.F.
of Fence, per Det. 7 Sht. 2

Install 1000 L.F.
of Curb
Sht. 2

INTERSECTION STA. 23+50.00
INSTALL SURVEY MONUMENT
MAG. S.D. 120-2-D
EL. = 1074.44 A.B.
1074.43 A.B.
03/21/89

Sta. 23+96.00
TC = 74.87 P = 74.37
Sta. 23+99.00
Radius Pt. (3 RT - F.C.)

Sta. 23+04.00
TIC = 74.87
P = 74.37

Sta 25+90, 76' RT, E = 70.0

Sta. 26+06.25 **Struct. #3**
Construct 134 L.F. - 10' x 3' R.C.B.C.
per A.D.O.T. Std. CB-1
e S = 0.70%, Skew 2° 22'
Q100 = 230 cfs / H.W. = 4.3'

Construct Wingwall per
A.D.O.T. Std. CW6-1
Length = 10', Mod. Bends

Install 1002 L.F.
of Fence, per Det. 7 Sht. 2

Construct 1000 L.F.
Ribbon Curb per
per Det. 5B, Sht. 2

Construct Bullnose
(Typ.)
per Det. 3, Sht. 2

Construct Wingwall per
A.D.O.T. Std. CW6-1
Length = 10', Mod. Bends

Sta. 26+03.50, 67' RT.
E = 67.70

Install 3.5 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

**SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY**
Wash No. 1 Struct. No. 3

Install 1778 S.Y.
4" Thick Gravel Shoulder
Per Det. 1, Sht. 2

Construct 1000 L.F.
Ribbon Curb
per Det. 5B, Sht. 2

Construct 2000 L.F.
Mount. Single Curb
per Det. 5A, Sht. 2

Sta. 58+20
Construct Median Catch Basin
A.DOT. Std. C-15.80, (1" Conc. Apron)
Grate = 40.43, R=15" pipe = 42.00 R=41.94 A.B.

Install 72 L.F. 15" Class III
R.G.R.C.P. @ S=1.07%

Install 1000 L.F.
fence, per
Det. 7, Sht. 2

3 Lt.

1645

E51.00

E50.80

Sta. 60+00, 76' Lt.

STA. 60+00.00

GRADE TO
SLOPE

GRADE TO
SLOPE

Mod. for 15" Pipe.

AGE ENHANCEMENT
NOVEMBER 29, 1988 FOR
CONSTRUCTION SOUTH OF

Sta. 58+33.5
Construct Berm
Top Elev. = 46.7

MATCH SHEET 9

30%

S=2.0%
S=2.0%
S=0.30%

Sta. 58+20, 72' Rt.
R=40.30 R=40.34 A.B.
Mit. End

40.0
DETENTION

Sta. 56+00, 62' Rt.
R=45.4

Construct 1000 L.F.
Ribbon Curb
per Det. 5B, Sht. 2

Install 1170 L.F. of fence
per Det. 7, Sht. 2

Sta. 58+00, 62' Rt.
R=44.8

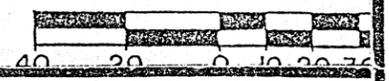
Install 8 C.Y.
Grouted Rip-Rap
Per Det. 4, Sht. 2

Sta. 57+96, 78' Rt.

Sta. 57+92, 148' Rt.

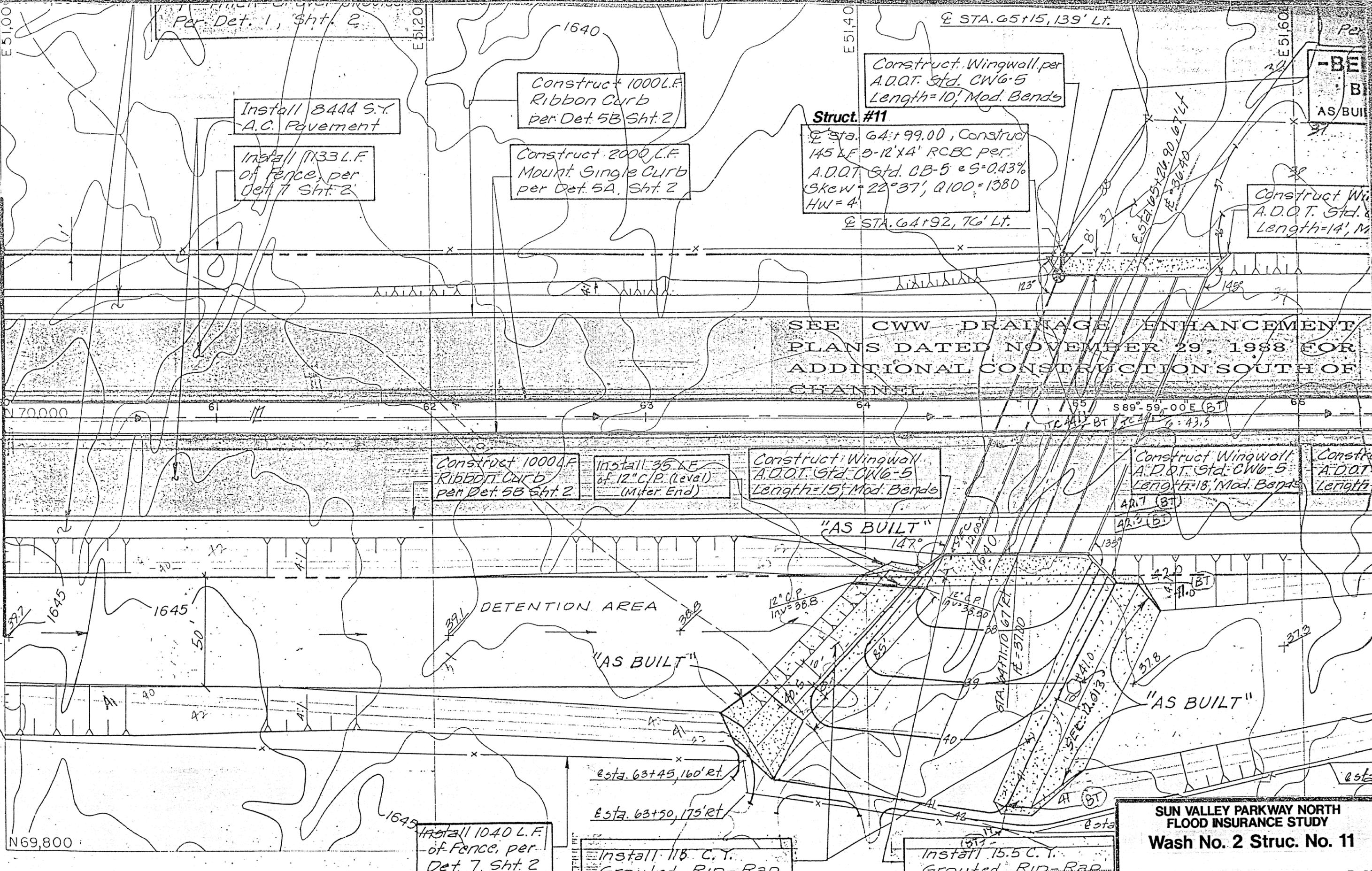
Sta. 58+15
Detention Bott.

Sta. 00+00, 150' Rt.



SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 2 Struc. No. 11

STA 60+00
MATCH SHEET



Per Det. 1, Sht. 2

Install 8444 S.Y.
A.C. Pavement

Install 1133 L.F.
of Fence, per
Det. 7 Sht. 2

Construct 1000 L.F.
Ribbon Curb
per Det. 5B Sht. 2

Construct 2000 L.F.
Mount. Single Curb
per Det. 5A, Sht. 2

Construct Wingwall per
A.D.O.T. Std. CW6-5
Length=10', Mod. Bends

Struct. #11
E Sta. 64+99.00, Construct
145 L.F. 9-12'x4' RCBC per
A.D.O.T. Std. CB-5 e S=0.43%
Skew=22°37', Q100=1380
HW=4'
E STA. 64+92, 76' Lt.

Construct Wingwall
A.D.O.T. Std.
Length=14', M

SEE CWW DRAINAGE ENHANCEMENT
PLANS DATED NOVEMBER 29, 1988 FOR
ADDITIONAL CONSTRUCTION SOUTH OF
CHANNEL

Construct 1000 L.F.
Ribbon Curb
per Det. 5B Sht. 2

Install 35 L.F.
of 12" C.P. (Level)
(Miter End)

Construct Wingwall
A.D.O.T. Std. CW6-5
Length=15', Mod. Bends

Construct Wingwall
A.D.O.T. Std. CW6-5
Length=18', Mod. Bends

Construct
A.D.O.T.
Length

DETECTION AREA

"AS BUILT"

"AS BUILT"

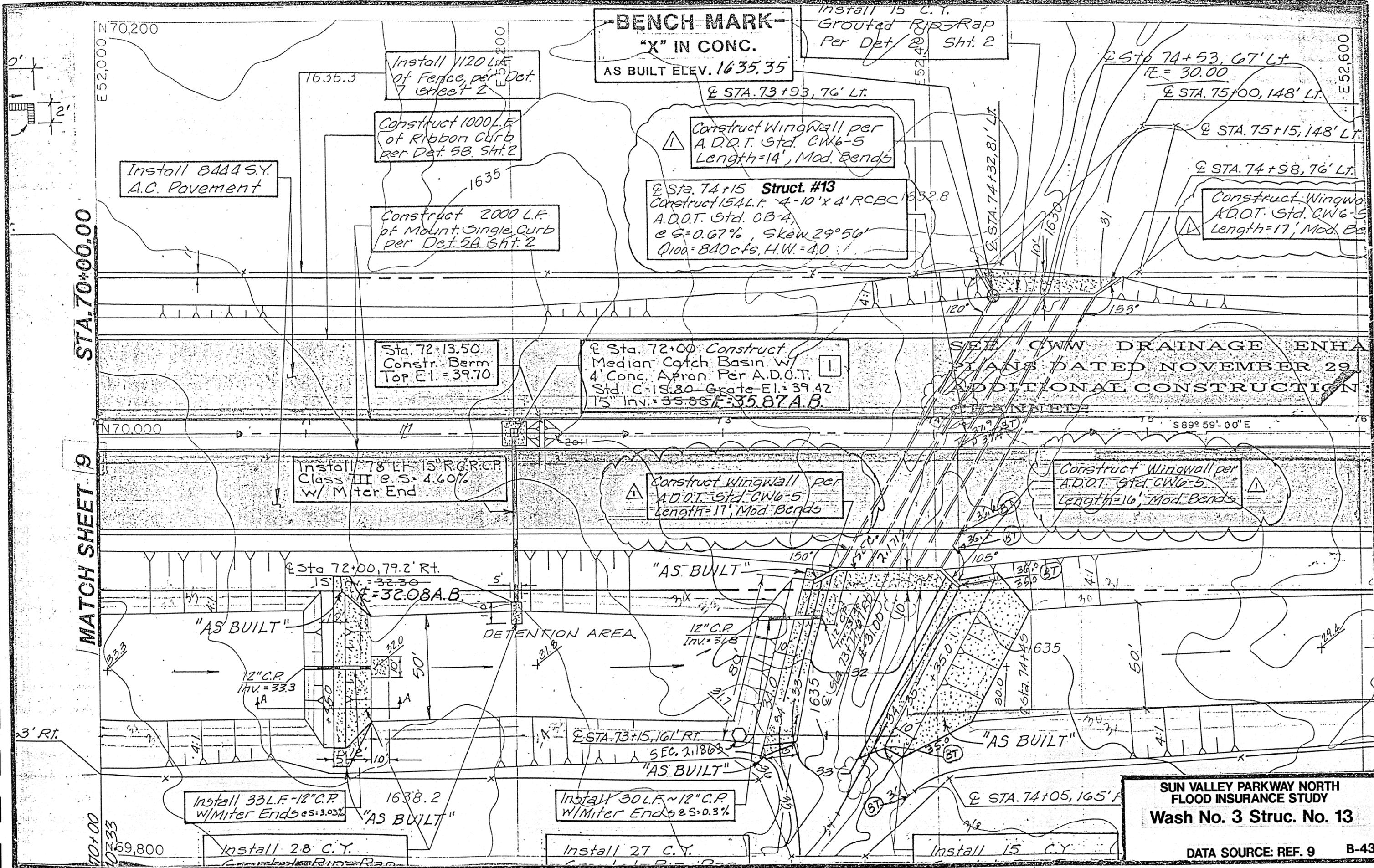
Install 1040 L.F.
of Fence, per
Det. 7, Sht. 2

Install 115 C.Y.
Grouted Rip-Rap

Install 15.5 C.Y.
Grouted Rip-Rap

SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 2 Struct. No. 11

DATA SOURCE: REF. 9 B-42



BENCH-MARK
 "X" IN CONC.
 AS BUILT ELEV. 1635.35

Install 15 C.Y.
 Grouted Rip-Rap
 Per Det. 20 Sht. 2

Install 1120 L.F.
 of Fence, per Det.
 7 Sheet 2

Construct 1000 L.F.
 of Ribbon Curb
 per Det. 5B Sht. 2

Construct 2000 L.F.
 of Mount. Single Curb
 per Det. 5A Sht. 2

Construct Wingwall per
 A.D.O.T. Std. CW6-5
 Length=14', Mod. Bends

Sta. 74+15 **Struct. #13**
 Construct 154 L.F. 4-10' x 4' RCBC
 A.D.O.T. Std. CB-4,
 eS=0.67%, Skew 29°56'
 Q100=840 cfs, H.W.=4.0

Construct Wingwall
 A.D.O.T. Std. CW6-5
 Length=17', Mod. Bends

Sta. 72+13.50
 Constr. Berm
 Top El. = 39.70

Sta. 72+00 Construct
 Median Catch Basin w/
 4' Conc. Apron Per A.D.O.T.
 Std. C-15.80 Grate El. = 39.42
 15" Inv. = 35.88 E=35.87 A.B.

SEE CWN DRAINAGE ENHA
 PLANS DATED NOVEMBER 29
 ADDITIONAL CONSTRUCTION
 REQUIRED

Install 78 L.F. 15" RGRCP
 Class III e S. 4.60%
 w/ Miter End

Construct Wingwall per
 A.D.O.T. Std. CW6-5
 Length=17', Mod. Bends

Construct Wingwall per
 A.D.O.T. Std. CW6-5
 Length=16', Mod. Bends

Sta. 72+00, 79.2' RT.
 15" Inv. = 32.30
 E=32.08 A.B.

"AS BUILT"

"AS BUILT"

DETECTION AREA

12" C.P.
 Inv. = 31.8

"AS BUILT"

Install 33 L.F. 12" C.P.
 w/ Miter Ends eS=3.03%

"AS BUILT"

Install 30 L.F. 12" C.P.
 w/ Miter Ends eS=0.3%

Install 28 C.Y.
 Grouted Rip-Rap

Install 27 C.Y.
 Grouted Rip-Rap

Install 15 C.Y.
 Grouted Rip-Rap

SUN VALLEY PARKWAY NORTH
 FLOOD INSURANCE STUDY
 Wash No. 3 Struc. No. 13

E53200
Install 1778 S.Y.
4" Thick Gravel Shoulder
Per Det. 1, Sht. 2

Install 20 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

BRASS CAP
AS BUILT ELEV. 1627.90
@ Sta. 84+81, 85' Lt.

@ Sta. 86+80
Construct Berm
Top El. = 28.97

Construct Wingwall per
A.D.O.T. Std. CW 6-5
Length = 15' Mod. Bends

@ Sta. 84+67 Struct. #15
Construct 158 L.F. 4-10' x 3' R.C.B.C.
A.D.O.T. Std. CB-4, @ S = 0.38%
Skew = 32° 28', Q100 = 800
HW = 3.8'
@ Sta. 84+37.76' Lt.

@ Sta. 85+55, 82' Lt.

@ Sta. 85+80, 76' Lt.

Construct Wingwall per
A.D.O.T. Std. CW 6-5
Length = 23' Mod. Bends

Install Bullnose (Typ.)
per Det. 3, Sht. 2

Install 1 C.Y. Grouted
Rip-Rap per Det. 4, Sht. 2

SEE CWV DRAINAGE ENHANCEMENT
PLANS DATED NOVEMBER 29, 1988 FOR
ADDITIONAL CONSTRUCTION SOUTH OF
CHANNEL

@ Sta. 86+52, 65' Lt.

@ Sta. 87+01,
Rad. Pt.
(3'R-F.C.)

@ Sta. 87+96.00
TIC = 28.01
TC = 27.51
P = 27.60 51'

Install 65 L.F. ~
15" Ø R.G.R.C.P. CL. IV
(Miter-End)

@ Sta. 86+10, 62' Rt.
E = 26.8

@ Sta. 87+04.00
TIC = 28.79
P = 28.29

ATTENTION AREA

"AS-BUILT"

"AS BUILT"

Install 16.5 C.Y.
Grouted Rip-Rap
Per Det. 4, Sht. 2

Construct Wingwall per
A.D.O.T. Std. CW 6-5
Length = 16' Mod. Bends

Construct 1412 L.F.
Mount. Single Curb
per Det. 5A, Sht. 2

Construct Wingwall per
A.D.O.T. Std. CW 6-5
Length = 17' Mod. Bends

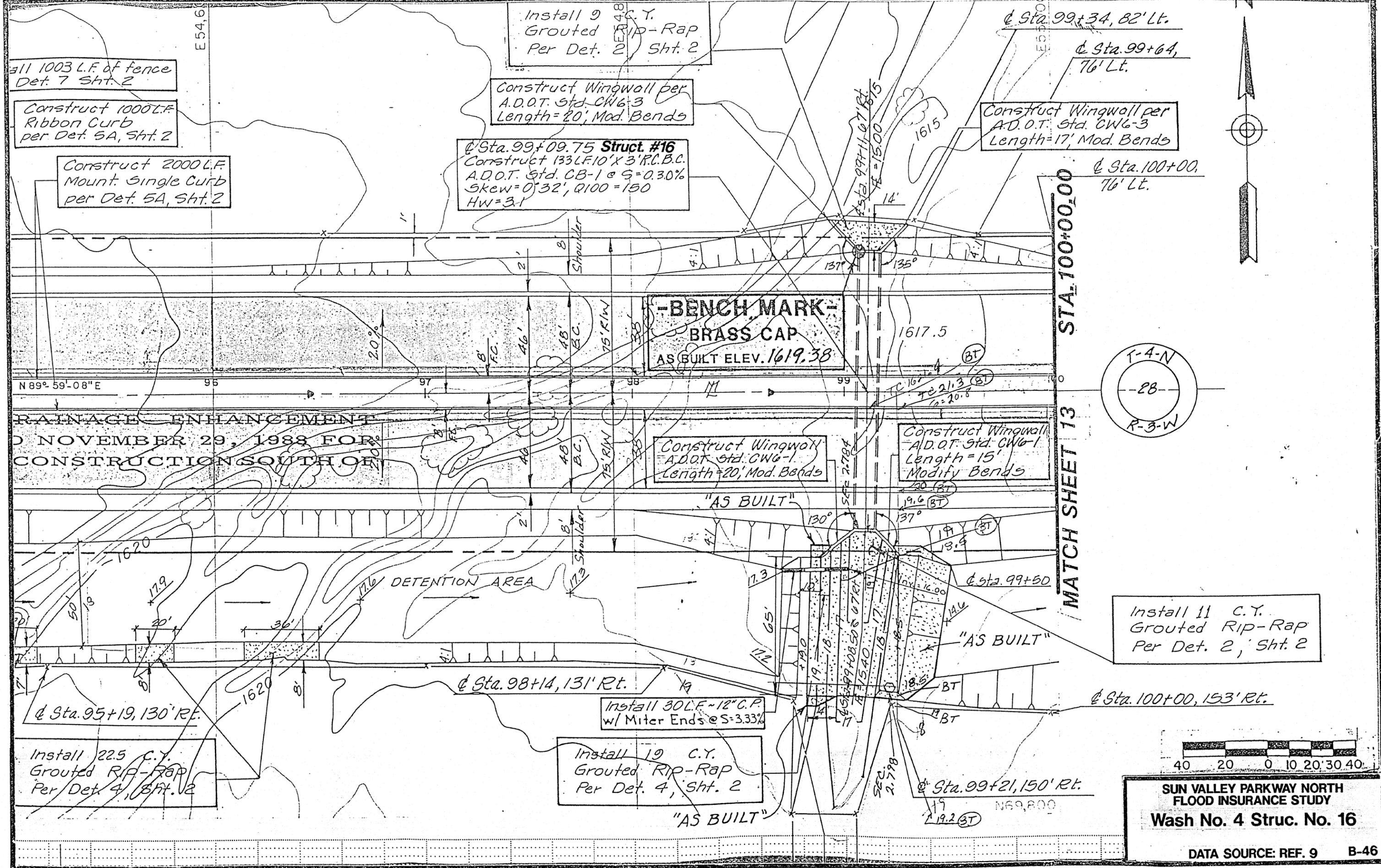
EL. = 1627.91 A.B.
@ Inter. Sta. 87+50
P = 27.90 EL. = 1627.93 A.B.
Install Survey Mon. per
M.A.B. Det. 120-2-D 03/21/89

@ Sta. 86+70
Construct Median
Catch Basin per A.D.O.T.
Std. C-15.80 w/ Conc.
Apron, Grate El. = 28.63
15' x 15' @ E = 25.14 A.B.

Install 18 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

Install 34 L.F. 12" C.P.
w/ Miter Ends

SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 3 Struct. No. 15



Install 1003 L.F. of fence
Det. 7 Sht. 2

Construct 1000 L.F.
Ribbon Curb
per Det. 5A, Sht. 2

Construct 2000 L.F.
Mount. Single Curb
per Det. 5A, Sht. 2

Install 9
Grouted Rip-Rap
Per Det. 2 Sht. 2

Construct Wingwall per
A.D.O.T. Std. CW6-3
Length=20', Mod. Bends

@ Sta. 99+09.75 **Struct. #16**
Construct 133 L.F. 10' X 3' R.C.B.C.
A.D.O.T. Std. CB-1 @ S=0.30%
Skew=0° 32', R100=150
HW=3.1

@ Sta. 99+34, 82' Lt.

@ Sta. 99+64,
76' Lt.

Construct Wingwall per
A.D.O.T. Std. CW6-3
Length=17', Mod. Bends

@ Sta. 100+00,
76' Lt.

-BENCH MARK-
BRASS CAP
AS BUILT ELEV. 1619.38

RAINAGE ENHANCEMENT
NOVEMBER 29, 1988 FOR
CONSTRUCTION SOUTH OF

Construct Wingwall
A.D.O.T. Std. CW6-1
Length=20', Mod. Bends

Construct Wingwall
A.D.O.T. Std. CW6-1
Length=15'
Modify Bends

DETENTION AREA

"AS BUILT"

"AS BUILT"

@ Sta. 98+14, 131' Rt.

Install 30 L.F. 12" C.P.
w/ Miter Ends @ S=3.33%

Install 10 C.Y.
Grouted Rip-Rap
Per Det. 4, Sht. 2

"AS BUILT"

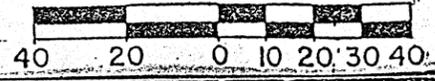
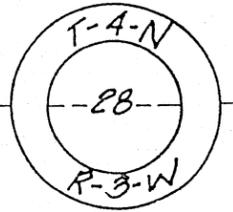
@ Sta. 100+00, 153' Rt.

@ Sta. 95+19, 130' Rt.

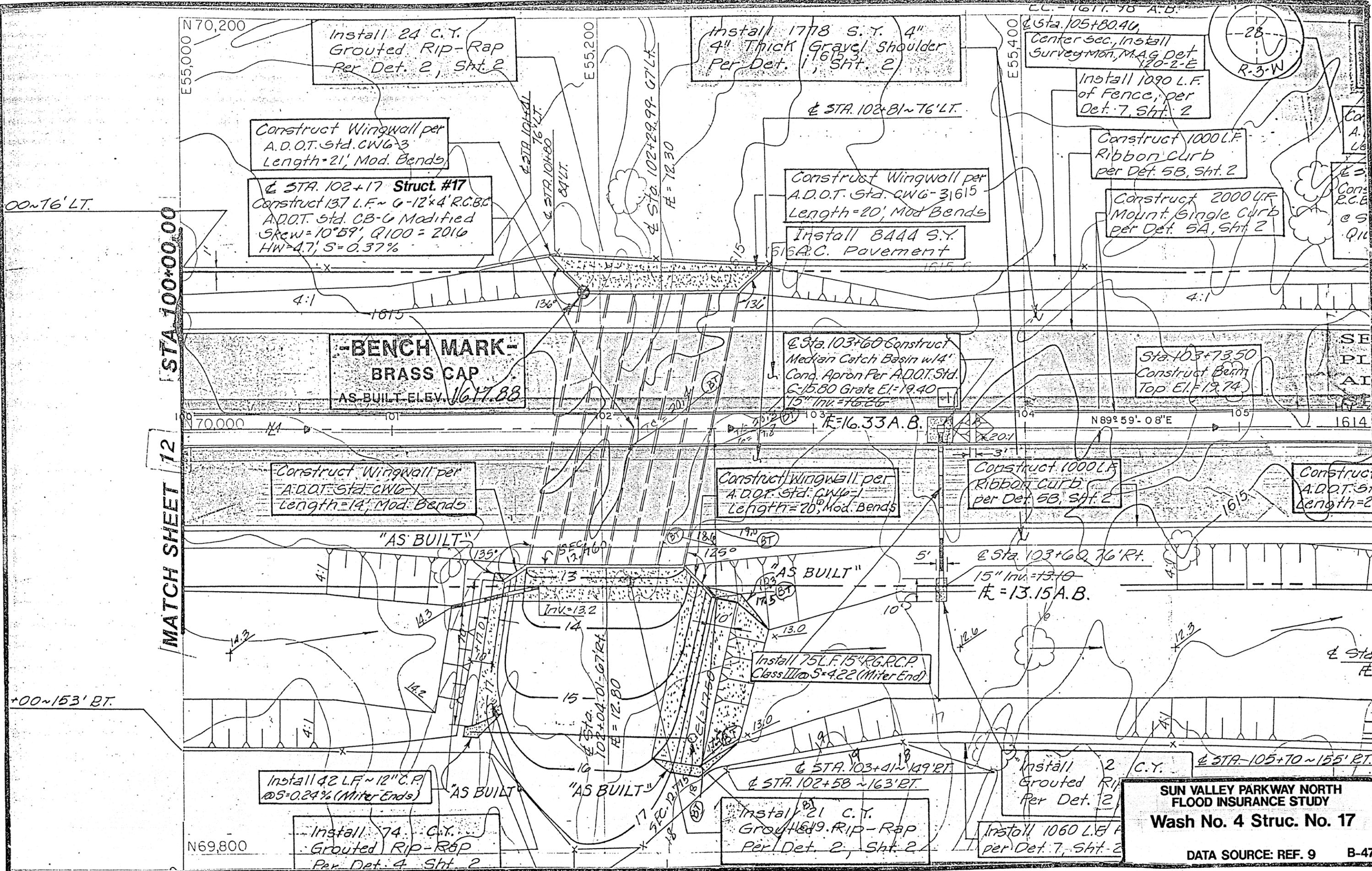
Install 22.5 C.Y.
Grouted Rip-Rap
Per Det. 4, Sht. 2

@ Sta. 99+21, 150' Rt.

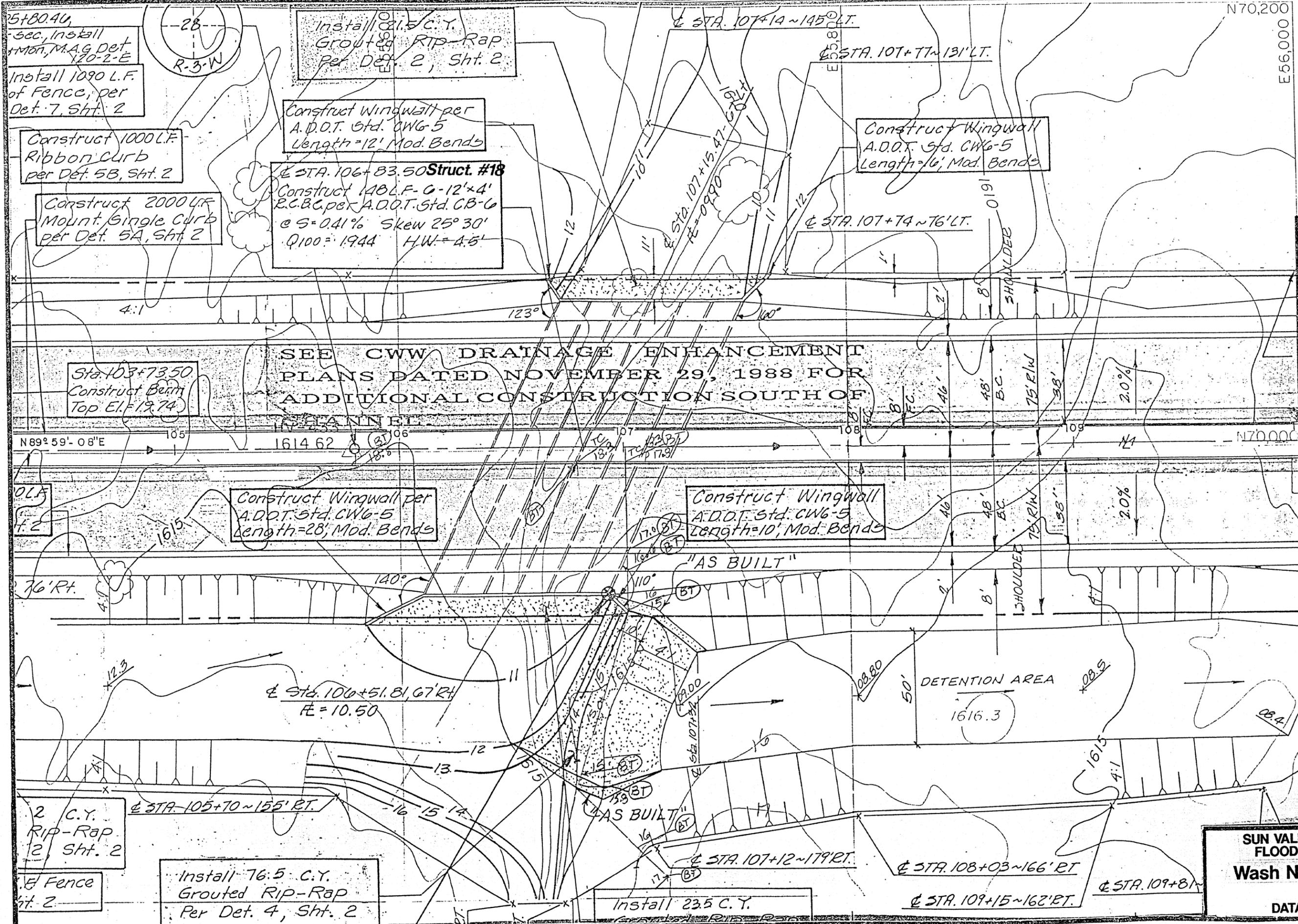
Install 11 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2



SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 4 Struct. No. 16



**SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 4 Struc. No. 17**



15+80.40
 -sec, install
 +Mon, M.A.G Det
 120-2-E
 Install 1090 L.F.
 of Fence, per
 Det. 7, Sht. 2

Construct 1000 L.F.
 Ribbon Curb
 per Det. 5B, Sht. 2

Construct 2000 L.F.
 Mount. Single Curb
 per Det. 5A, Sht. 2

Install 21.5 C.Y.
 Grouted Rip-Rap
 Per Det. 2, Sht. 2

Construct Wingwall per
 A.D.O.T. Std. CW6-5
 Length=12', Mod. Bends

Sta. 106+83.50 **Struct. #18**
 Construct 148 L.F. of 12'x4'
 R.C.B.C. per A.D.O.T. Std. CB-6
 @ S=0.41% Skew 25° 30'
 Q100=1944 H.W.=4.5'

Construct Wingwall
 A.D.O.T. Std. CW6-5
 Length=16', Mod. Bends

Sta. 103+73.50
 Construct Berm
 Top El. 19.74

SEE CWW DRAINAGE ENHANCEMENT
 PLANS DATED NOVEMBER 29, 1988 FOR
 ADDITIONAL CONSTRUCTION SOUTH OF
 CHANNEL

Construct Wingwall per
 A.D.O.T. Std. CW6-5
 Length=28', Mod. Bends

Construct Wingwall
 A.D.O.T. Std. CW6-5
 Length=10', Mod. Bends

"AS BUILT"

Sta. 106+51.81, 67' RT
 E=10.50

50' DETENTION AREA
 1616.3

2 C.Y.
 Rip-Rap
 2, Sht. 2

Sta. 105+70 ~ 155' RT.

Install 76.5 C.Y.
 Grouted Rip-Rap
 Per Det. 4, Sht. 2

Install 23.5 C.Y.
 Grouted Rip-Rap

Sta. 107+12 ~ 179' RT.

Sta. 108+03 ~ 166' RT.

Sta. 109+15 ~ 162' RT.

Sta. 109+81

SUN VALLEY PARKWAY NORTH
 FLOOD INSURANCE STUDY
 Wash No. 4 Struc. No. 18

DATA SOURCE: REF. 9 B-48

MATCH SHEET 14 STA. 110+00.00

Modify

Install 1778 S
4" Thick Gravel
Per Det. 1, Sh

Install 1000 L.F.
of Fence, per
Det. 7 Sht. 2

Construct 1000 L.F.
Ribbon Curb
per Det. 5B, Sht. 2

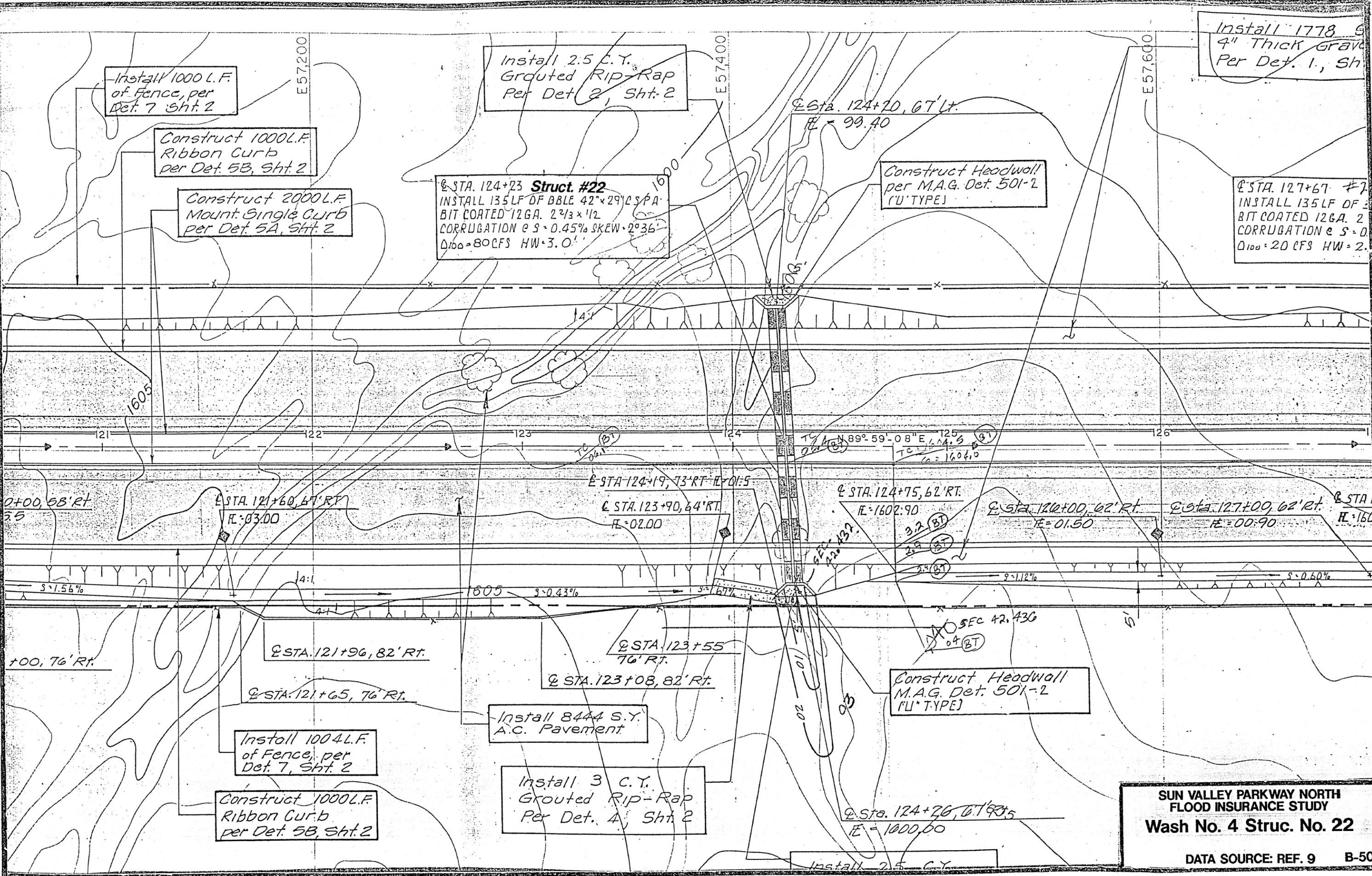
Construct 2000 L.F.
Mount. Single Curb
per Det. 5A, Sht. 2

Install 2.5 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

Sta. 124+23 **Struct. #22**
INSTALL 135 LF OF DBLE 42"x29" C.S.P.A.
BIT COATED 12GA. 2 2/3 x 1/2
CORRUGATION e S = 0.45% SKEW = 2°36'
D₁₀₀ = 80 CFS HW = 3.0'

Construct Headwall
per M.A.G. Det. 501-2
(U TYPE)

Sta. 127+67 #7
INSTALL 135 LF OF
BIT COATED 12GA. 2
CORRUGATION e S = 0.
D₁₀₀ = 20 CFS HW = 2.



Sta. 120+00, 58' Rt.
E=03.00

Sta. 121+60, 67' Rt.
E=03.00

Sta. 124+19, 73' Rt. E=01.5

Sta. 123+90, 64' Rt.
E=02.00

Sta. 124+75, 62' Rt.
E=1602.90

Sta. 126+00, 62' Rt.
E=01.50

Sta. 127+00, 62' Rt.
E=00.90

Sta. 127+00, 62' Rt.
E=160

Sta. 120+00, 76' Rt.

Sta. 121+96, 82' Rt.

Sta. 121+65, 76' Rt.

Sta. 123+55, 76' Rt.

Sta. 123+08, 82' Rt.

Construct Headwall
M.A.G. Det. 501-2
(U TYPE)

Install 8444 S.Y.
A.C. Pavement

Install 1004 L.F.
of Fence, per
Det. 7, Sht. 2

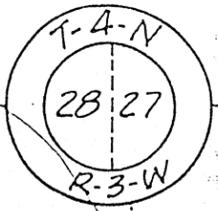
Construct 1000 L.F.
Ribbon Curb
per Det. 5B, Sht. 2

Install 3 C.Y.
Grouted Rip-Rap
Per Det. 4, Sht. 2

Sta. 124+26, 67' Rt.
E=1000.00

Install 2.5 C.Y.

SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 4 Struc. No. 22



Center of Intersection
 @ Sta. 132+18.58 4 Cor
 Install Survey Mon.
 M.A.G. Det. 120-2-E
 EL. = 1599.53 A.B. 1599.43 A.B.
 03/21/89

@ Sta. 131+4
 Construct Median Catch
 Basin w/Cond. Apron per
 A.O.T. Std. C-15.80, Grate
 EL. = 00.32, 15' E = 88.14

@ Sta. 131+5
 Const Berm
 Top EL. = 00.75 E = 96.97 A.B.

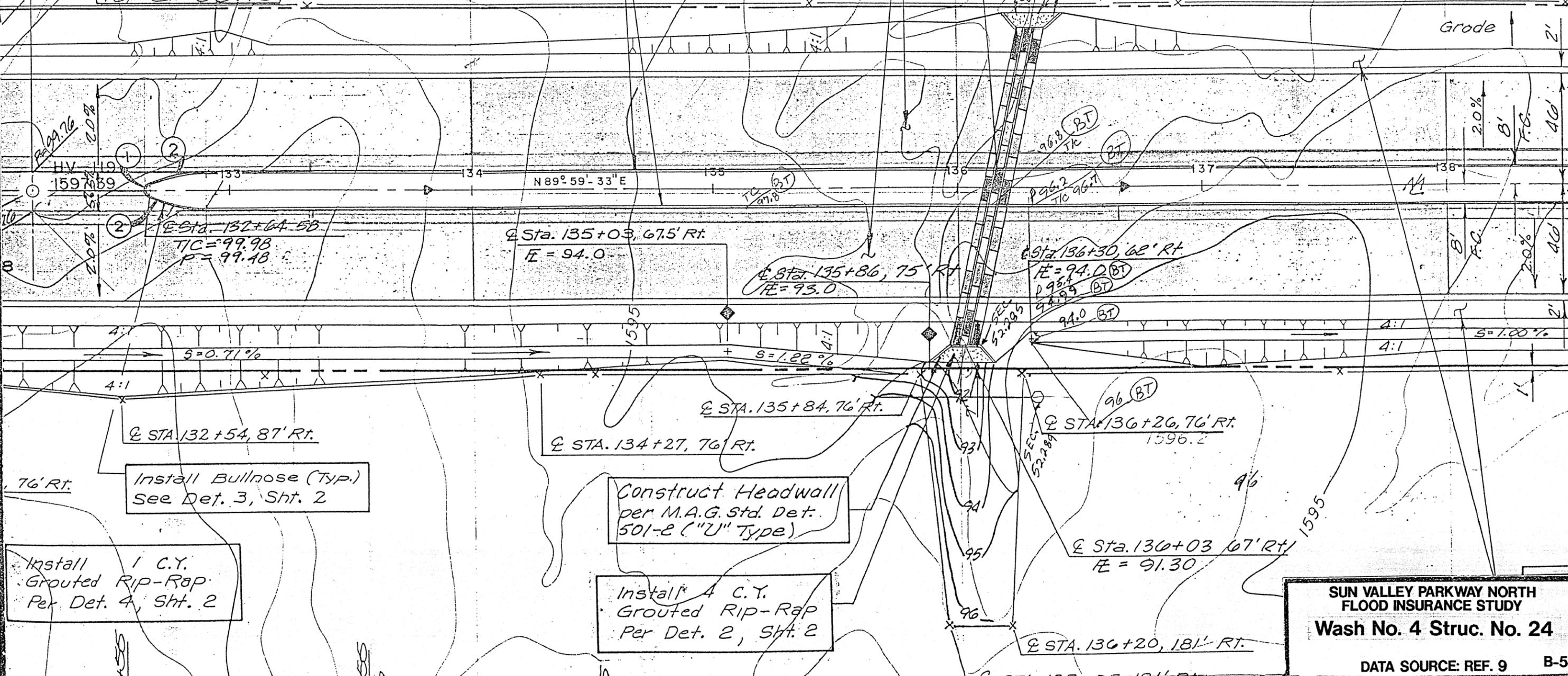
@ Sta. 136+16.50 **Struct. #24**
 Install 137 L.F. Trip. 42" x 29" C.S.P.A.
 Bit Coated 12(Ga) - 2 2/3 x 1/2 Corr.
 C.S. = 0.30% , Skew 11°33'
 Q100 = 90 cfs, H.W. = 2.5'

Install 8054 S.Y.
 A.C. Pavement

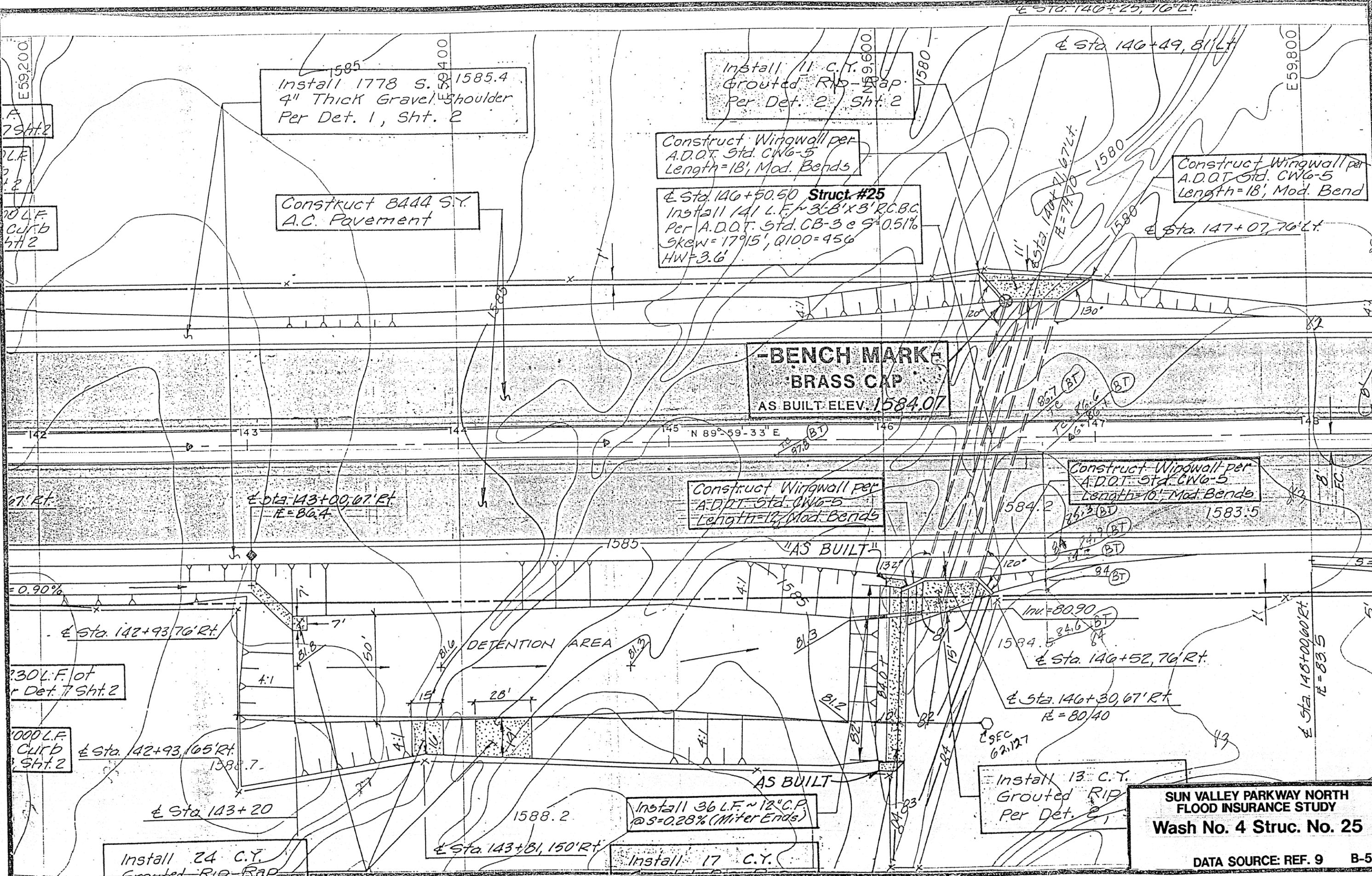
Construct 1475 L.F.
 Mount. Single Curb
 per Det. 5A, Sht. 2

Construct Headwall
 per M.A.G. Det. 501-2
 ("U" Type)

Install 3.5 C.Y.
 Grouted Rip-Rap
 Per Det. 2, Sht. 2



**SUN VALLEY PARKWAY NORTH
 FLOOD INSURANCE STUDY**
Wash No. 4 Struc. No. 24
 DATA SOURCE: REF. 9 B-51



Install 1778 S.Y. 1585.4
 4" Thick Gravel Shoulder
 Per Det. 1, Sht. 2

Install 11 C.Y.
 Grouted Rip-Rap
 Per Det. 2 Sht. 2

Construct Wingwall per
 A.D.O.T. Std. CW6-5
 Length=18', Mod. Bends

Sta. 140+50.50 Struct. #25
 Install 141 L.F. 36" B' x 3' RC.B.C.
 Per A.D.O.T. Std. CB-3 e S=0.51%
 Skew=17°15', Q100=456
 HW=3.6'

Construct Wingwall per
 A.D.O.T. Std. CW6-5
 Length=18', Mod. Bend

Construct 8444 S.Y.
 A.C. Pavement

-BENCH MARK-
BRASS CAP
 AS BUILT ELEV. 1584.07

Construct Wingwall per
 A.D.O.T. Std. CW6-5
 Length=12', Mod. Bends

Construct Wingwall per
 A.D.O.T. Std. CW6-5
 Length=10', Mod. Bends

Sta. 143+00.07 Rt.
 E=86.4

"AS BUILT"

Inu=80.90
 Sta. 140+52.76 Rt.
 E=83.5

Sta. 140+30.67 Rt.
 E=80.40

30 L.F. of
 Curb
 Det. 7 Sht. 2

1000 L.F.
 Curb
 Sht. 2

Sta. 142+93.65 Rt.
 1588.7

Sta. 143+20

Install 36 L.F. 12" C.P.
 @ S=0.28% (Miter Ends)

Install 17 C.Y.

Install 13 C.Y.
 Grouted Rip-Rap
 Per Det. 2

Install 24 C.Y.
 Grouted Rip-Rap

**SUN VALLEY PARKWAY NORTH
 FLOOD INSURANCE STUDY
 Wash No. 4 Struc. No. 25**

Construct 1000 L.F.
Ribbon Curb
per Det. 5B, Sht. 2

Construct 2000 L.F.
Mount. Single Curb
per Det. 5A, Sht. 2

Struct. #27
E Sta. 197+74.50 @ S=0.52%
Construct 137 L.F. 12" R.C.B.C. 4" A.B.
A.D.O.T. Std. CB-6 Mod.
SKEN=12°23', Q100=
HW = 1535

Construct Wingwall
A.D.O.T. Std. CW6-3
Length = 18', Mod Bends.

Construct Wingwall
A.D.O.T. Std. CW6-3
Length = 22', Mod Bends.

SEE CWW DRAINAGE ENHANCEMENT
PLANS DATED NOVEMBER 29, 1988 FOR
ADDITIONAL CONSTRUCTION SOUTH OF
CHANNEL

46-39 E 194 195 196 197 198 199

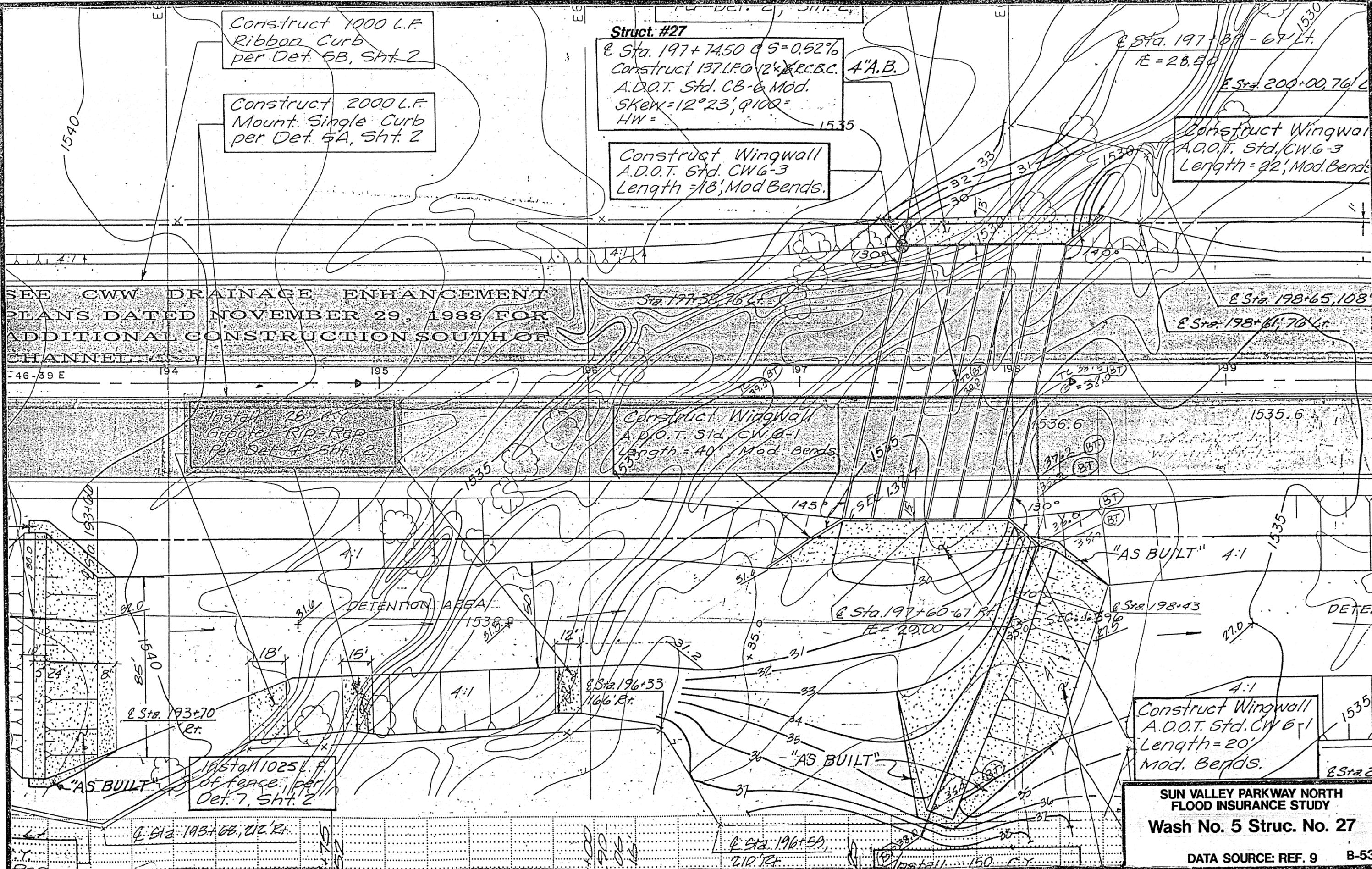
Install 28 C.Y.
Grouted Rip-Rap
Per Det. 4, Sht. 2

Construct Wingwall
A.D.O.T. Std. CW6-1
Length = 40', Mod. Bends.

Construct Wingwall
A.D.O.T. Std. CW6-1
Length = 20'
Mod. Bends.

**SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 5 Struct. No. 27**

DATA SOURCE: REF. 9 B-53



-BENCH MARK-
BRASS CAP
AS BUILT ELEV. 1528.37

Sta. 208+00 - 67' Lt.
E = 18.55

Sta. 207+57.50 **Struct. #28**
Construct 159 L.F. of Cattle
Crossing, 6-12 x 8' R.C.B.C.
per A.D.O.T. Std. CB-6
Skew = 32° 47', Q100 = 3960
HW = 7.0', Grate El. = 30.54
W/ Grate Opening per
Detail 8, Sheet 2. S = 32%

Install 41 c.y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

Construct Wingwall
A.D.O.T. Std. CW6-6
Length = 20', Mod. Bends.
Sta. 207+41, 84' Lt.
Sta. 207+24, 76' Lt.

Construct Wingwall
A.D.O.T. Std. CW6-6
Length = 34', Mod. Bends

SEWER DRAINAGE ENHANCEMENT
DATED NOVEMBER 29, 1988 FOR
REGIONAL CONSTRUCTION SOUTH OF
MEL

N 89° 46' - 39" E

Construct Wingwall A.D.O.T.
Std. CW6-6 Length = 46'
Mod. Bends

Install 80 L.F.
12" CP W/
Miter Ends

Sta. 207+32, 67' Rt.
Sta. 207+91, 110' Rt.

Install 17 c.y.
Grouted Rip-Rap
Per Det. 4, Sht. 2

Construct Wingwall
A.D.O.T. Std. CW6-6
Length = 30', Mod. Bends

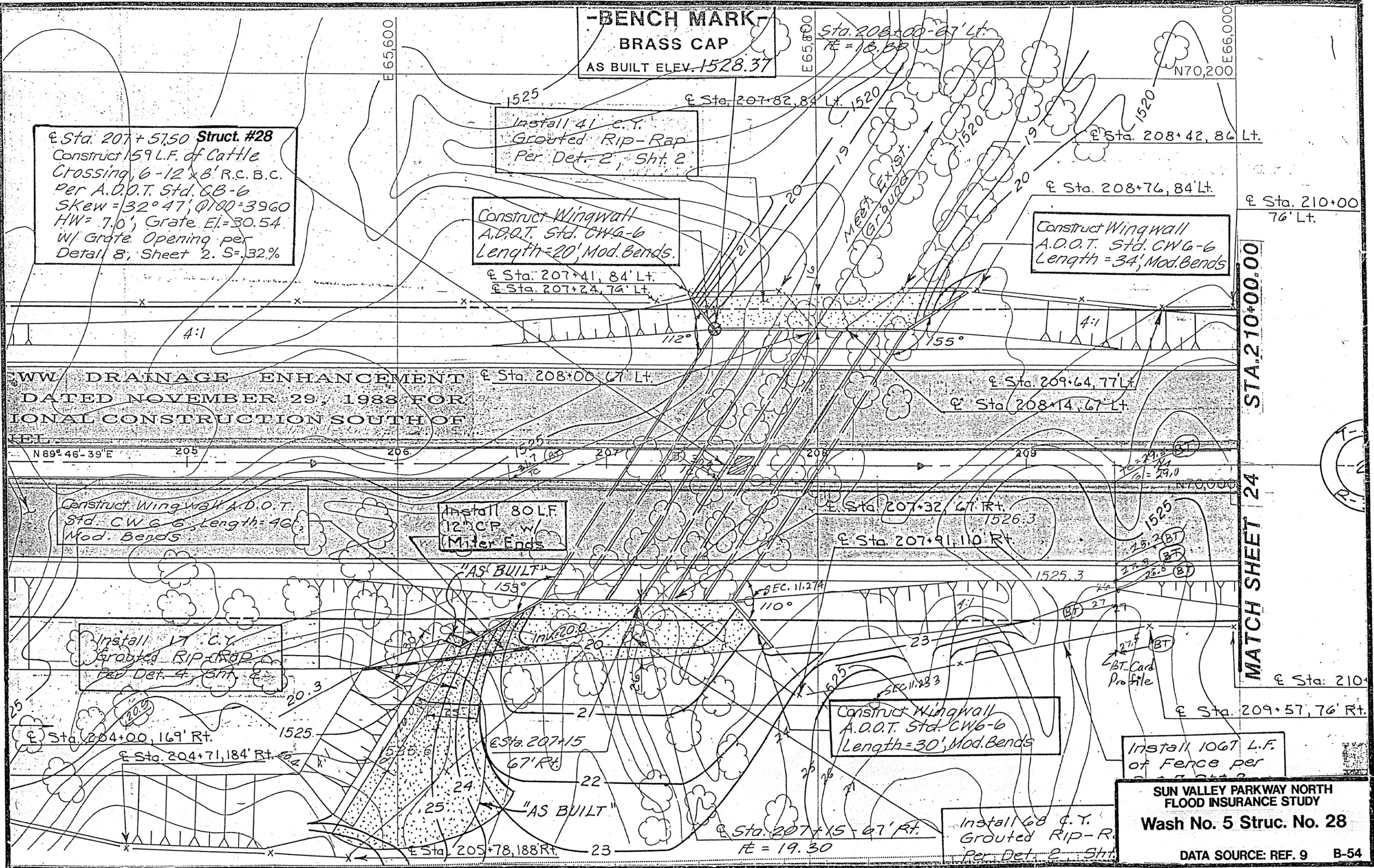
Install 1067 L.F.
of Fence per

Install 68 c.y.
Grouted Rip-R.
Per Det. 2, Sht.

**SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY**
Wash No. 5 Struct. No. 28

DATA SOURCE: REF. 9 B-54

STA. 210+00.00
MATCH SHEET 24



-BENCH MARK-
BRASS CAP
AS BUILT ELEV. 1485.76

Install 40.5 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

Install 5 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

Construct wingwall per
A.D.T. Std. CW6-5
Length=26', Mod. Bends

E Sta. 260+98.50
Construct 144 L.F. ~ 6-12" x 6' R.C.B.C.
A.D.T. Std. CB-6 (Modified)
Skew=21°52' Q100=2376
HW=5', V=5' fps. S=0.42%

Construct Wingwall per
A.D.T. Std. CW6-5
Length=30' Mod. Bends

Struct. #32
E Sta. 264+99.50, Install 135
LF of DBI. 42" x 29" C.S.P.A. Bit.
Coated 12 Ga. - 2 2/3 x 1/2 Corr. @
S=1.56%, Skew=4°46', Q100=76 cfs
H.W.=12.9

Construct wingwall per
A.D.T. Std. CW6-5
Length=27' Mod. Bends

Construct Wingwall per
A.D.T. Std. CW6-5
Length=30' Mod. Bends

Install 2.5 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht.

Install 44 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

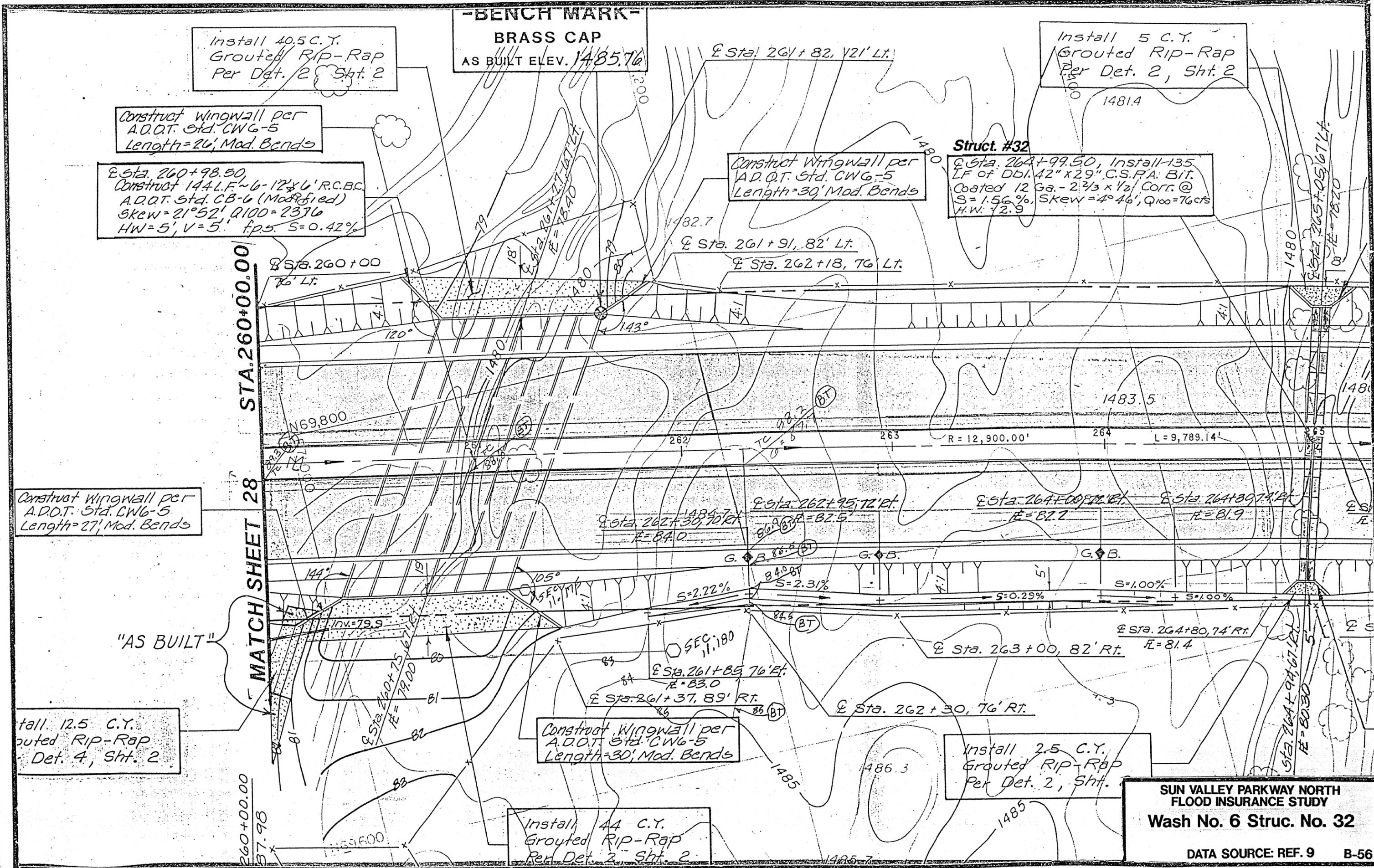
**SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 6 Struct. No. 32**

STA. 260+00.00

MATCH SHEET 28

"AS BUILT"

Install 12.5 C.Y.
Grouted Rip-Rap
Per Det. 4, Sht. 2

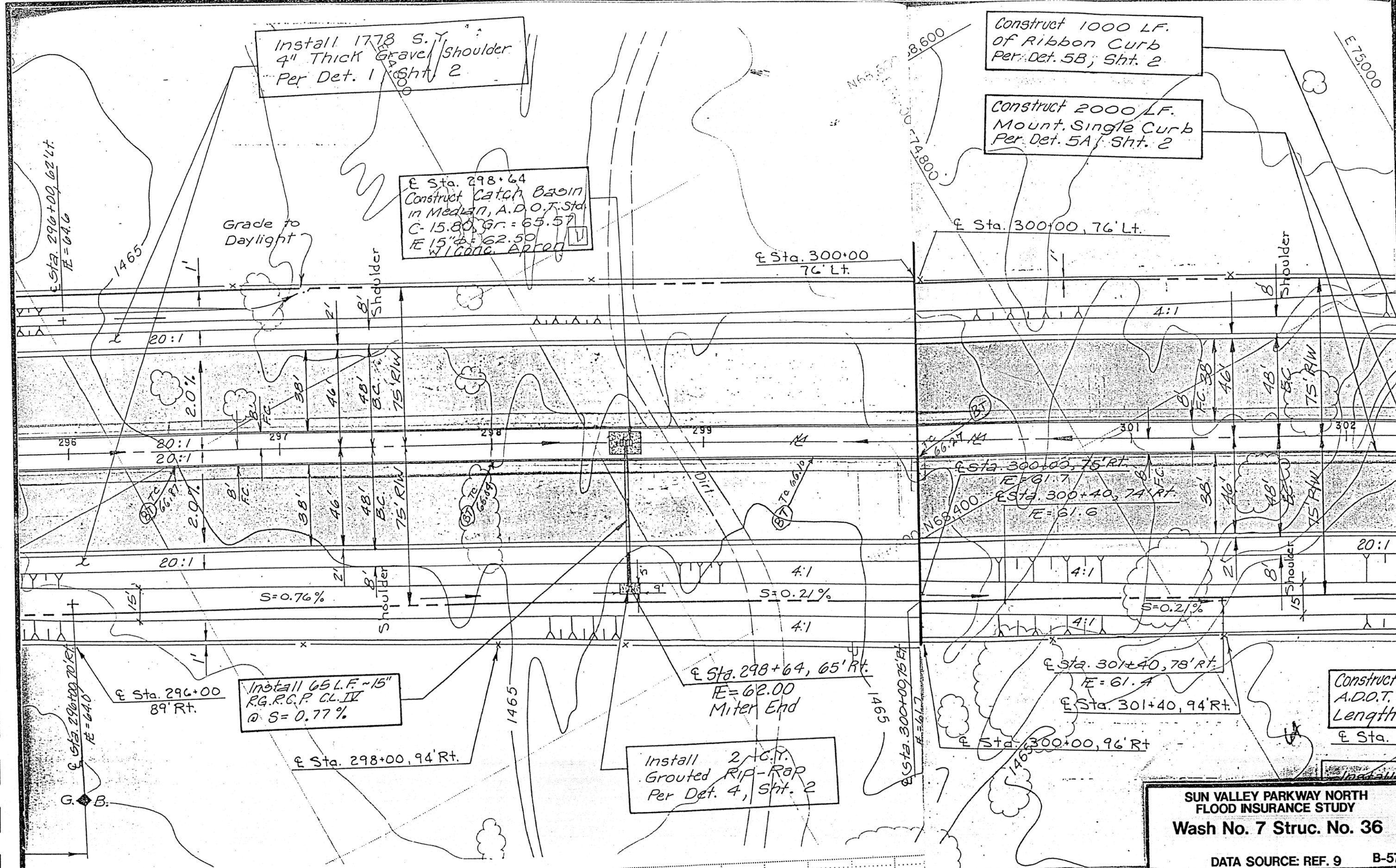


Install 1778 S.Y.
4" Thick Gravel Shoulder
Per Det. 1 Sht. 2

E Sta. 298+64
Construct Catch Basin
in Median, A.D.O.T. Sta.
C-15.80, Gr. = 65.57
E 15" = 62.50
W/Code, Appen

Construct 1000 LF.
of Ribbon Curb
Per Det. 5B; Sht. 2

Construct 2000 LF.
Mount. Single Curb
Per Det. 5A; Sht. 2



Grade to Daylight

E Sta. 300+00
76' Lt.

E Sta. 300+00, 76' Lt.

S=0.76%

S=0.21%

S=0.21%

Install 65 L.F. ~15"
R.G.R.C.P. CL IV
@ S=0.77%

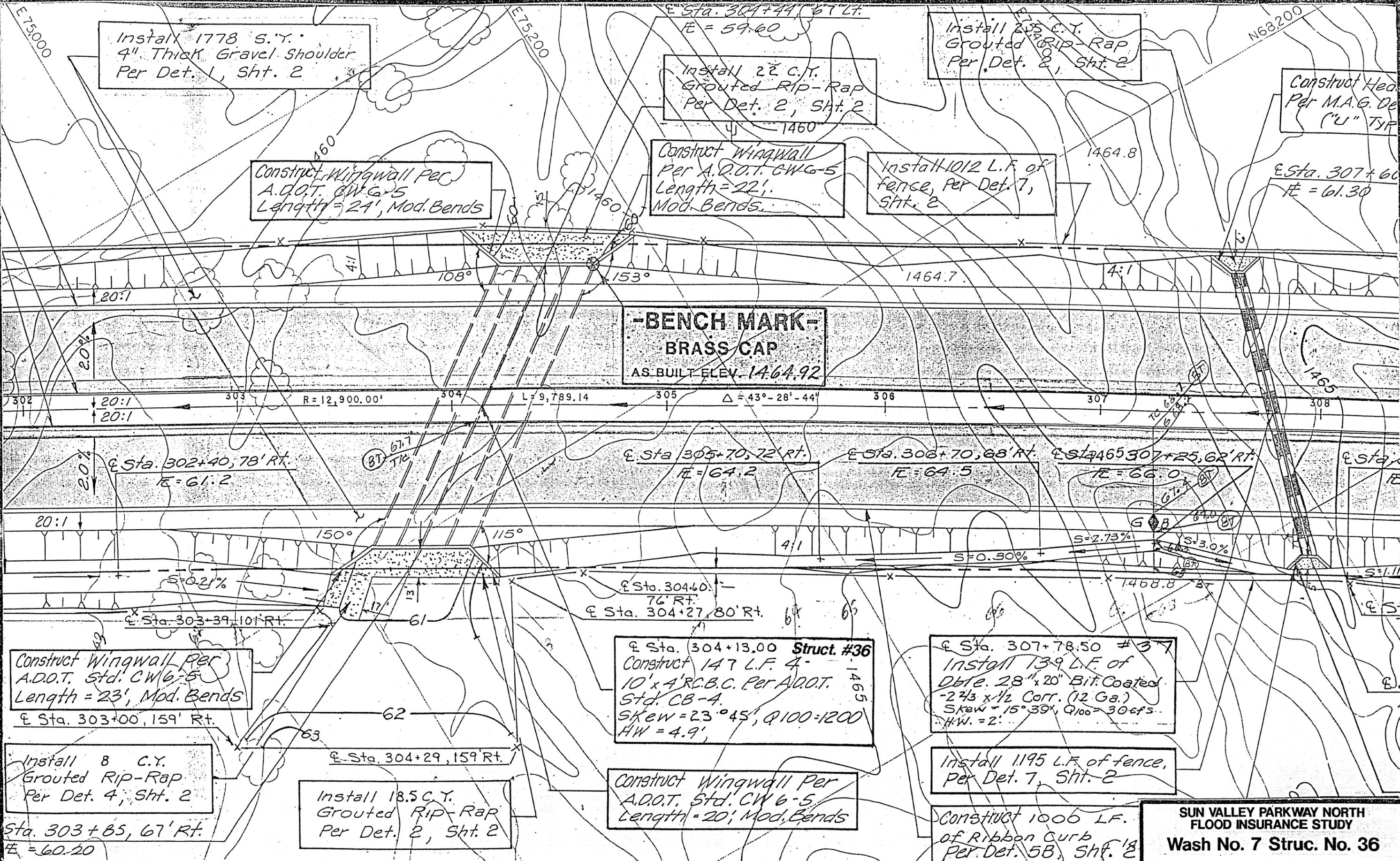
E Sta. 298+64, 65' Rt.
E=62.00
Miter End

Install 2 C.T.
Grouted Rip-Rap
Per Det. 4, Sht. 2

E Sta. 301+40, 78' Rt.
E=61.4
E Sta. 301+40, 94' Rt.

Construct
A.D.O.T.
Length
E Sta. 3

SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 7 Struc. No. 36



Install 1778 S.Y.
4" Thick Gravel Shoulder
Per Det. 1, Sht. 2

Install 22 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

Install 235 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

Construct Head
Per M.A.G. De
("U" TYP

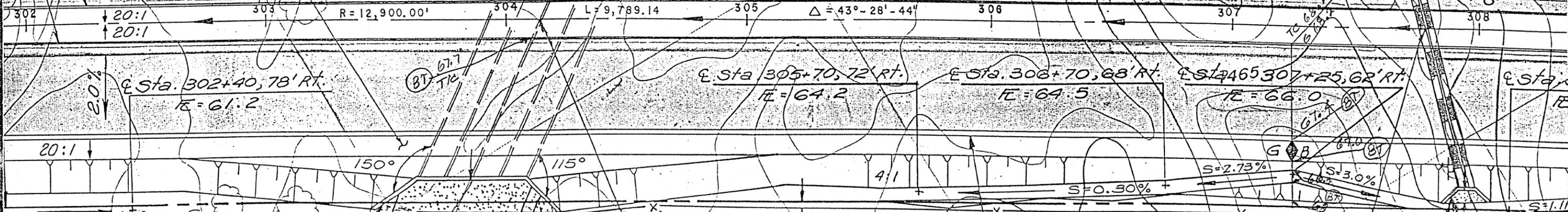
Construct Wingwall Per
A.D.O.T. CW 6-5
Length = 24', Mod. Bends

Construct Wingwall
Per A.D.O.T. CW 6-5
Length = 22',
Mod. Bends.

Install 1012 L.F. of
fence, Per Det. 7,
Sht. 2

E Sta. 307+60
E = 61.30

-BENCH MARK-
BRASS CAP
AS BUILT ELEV. 1464.92



Construct Wingwall Per
A.D.O.T. Std. CW 6-5
Length = 23', Mod. Bends

E Sta. 304+13.00 **Struct. #36**
Construct 147 L.F. 4"
10' x 4' R.C.B.C. Per A.D.O.T.
Std. CB-4.
Skew = 23° 45', Q100 = 1200
HW = 4.9'

E Sta. 307+78.50 #37
Install 139 L.F. of
Dble. 28" x 20" Bit. Coated
-2 2/3 x 1/2 Corr. (12 Ga.)
Skew = 15° 39', Q100 = 30 cfs
HW = 2'

Install 8 C.Y.
Grouted Rip-Rap
Per Det. 4, Sht. 2

Install 18.5 C.Y.
Grouted Rip-Rap
Per Det. 2, Sht. 2

Construct Wingwall Per
A.D.O.T. Std. CW 6-5
Length = 20', Mod. Bends

Install 1195 L.F. of fence,
per Det. 7, Sht. 2

Construct 1006 L.F.
of Ribbon Curb
Per Det. 5B, Sht. 2

**SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 7 Struct. No. 36**

1778 S.Y.
Gravel Shoulder
1, Sht. 2

Install 8654 s.y.
A.C. Pavement

Install 1 c.y.
Grouted Rip-Rap
Per Det. 4, Sht. 2

Install 76 L.F. C.I. III (Miter End)
15" R.G.R.C.P. @ S=1.0%

Install 1006 L.F.
of Fence,
Per Det. 7, Sht. 2

Construct Headwall
Per M.A.G. Detail
501-2 "U" Type

E Sta. 353+64.00
Construct Catch Basin in Median
A.D.O.T. Std. C-15-80
Gr=70.97, E=15" Ø=64.46

03/21
EL.=1469.
Install S.
Monume
per MAG
120-2-D
E Inter
P=6

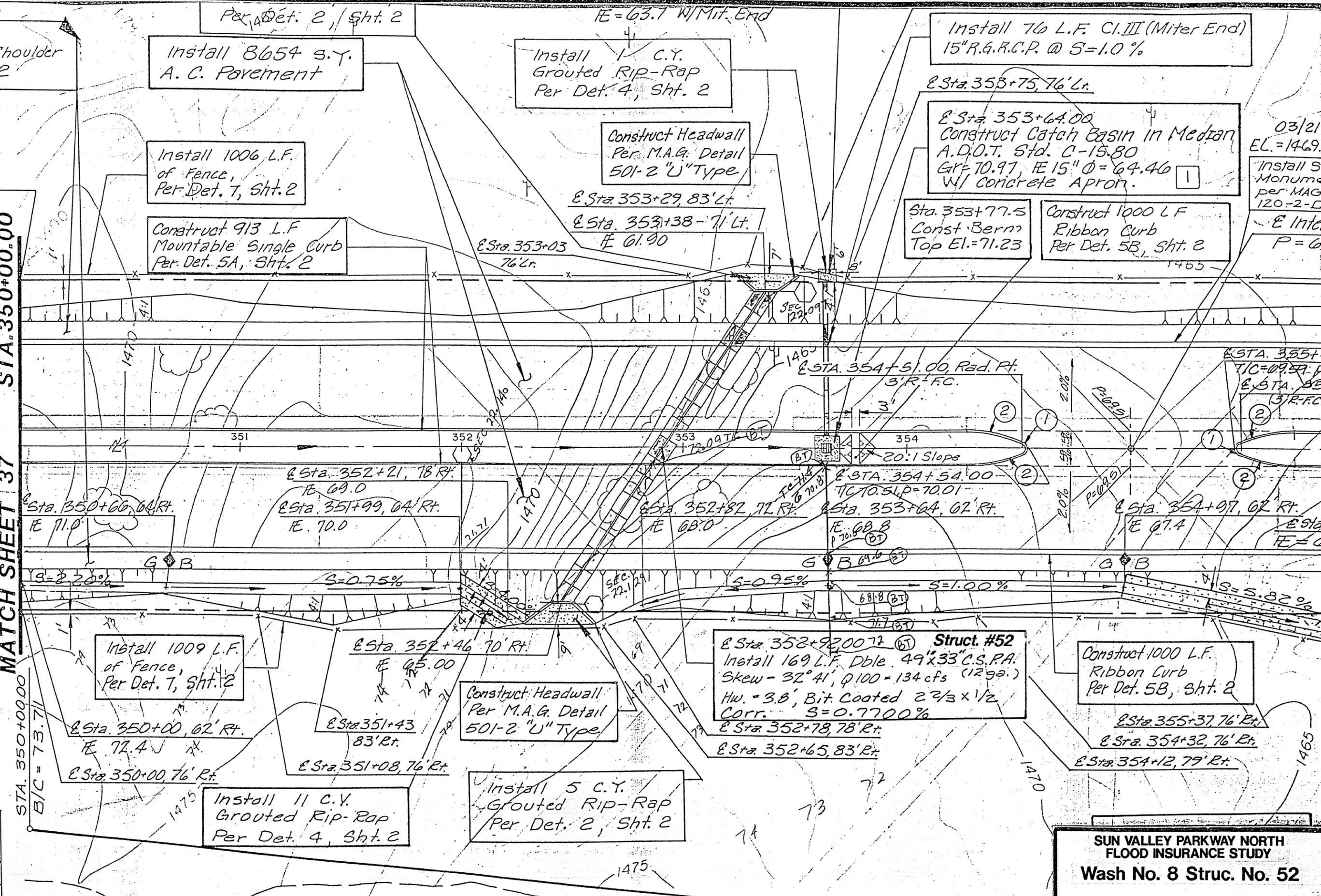
Construct 913 L.F.
Mountable Single Curb
Per Det. 5A, Sht. 2

E Sta. 353+29, 83' Lt.
E Sta. 353+38-71' Lt.
E=61.90

Sta. 353+77.5
Const. Berm
Top El.=71.23

Construct 1000 L.F.
Ribbon Curb
Per Det. 5B, Sht. 2

MATCH SHEET 37 STA. 350+00.00



LENGTH	TANG.
2.89'	6.68
1.32'	12.85

SUN VALLEY PARKWAY NORTH
FLOOD INSURANCE STUDY
Wash No. 8 Struct. No. 52

TABLE 5 (FROM HYDROLOGY REPORT REF. 4)
SUN VALLEY PARKWAY
SUMMARY OF EXISTING CULVERT FLOW CAPACITIES AND DISTRIBUTION

STRUCTURE I.D.	STATION	DESCRIPTION	CAPACITY AT BREAKOUT (CFS)	PEAK 100-YEAR DISCHARGE (CFS)	PEAK CULVERT FLOW (CFS)	BREAKOUT FLOW (CFS)	TO CULVERT I.D.	STUDY WASH NO.
1	4+30.50	10'x3" R.C.B.C.	200	102	102	--	--	
2	16+19.50	THREE 49"x33" C.S.P.A.	150	113	102	--	--	WASH #1
3	26+06.25	10'x3" R.C.B.C.	205	94	94	--	--	WASH #1
4	30+35.50	TWO 49"x33" C.S.P.A.	106	17	17	--	--	
5	33+07.50	28"x20" C.S.P.A.	13	35	17	18	#6-7	
6	36+92.50	SIX 10'x4' R.C.B.C.	2,070	401 (C)	401 (C)	--	--	WASH #2
7	38+84.50	TWO 10'x3' R.C.B.C.	312			--	--	WASH #2
8	45+39	10'x8' R.C.B.C.	600	N/A	--	--	--	
9	47+60.25	35"x24" C.S.P.A.	26.5	30	27	3	#10	
10	51+76.50	35"x24" C.S.P.A.	24	24	22	--	--	
11	64+99.00	FIVE 12'x4' R.C.B.C.	1,410	859	859	--	--	WASH #2
12	67+33	FIVE 12'x3' R.C.B.C.	1,120	--	--	--	--	
13	74+15	FOUR 10'x4' R.C.B.C.	920	86	86	--	--	WASH #3
14	79+21.50	10'x3' R.C.B.C.	165	191	171	17	#15	WASH #3
15	84+67	FOUR 10'x3' R.C.B.C.	492	283	282	--	--	WASH #3
16	99+09.75	10'x3' R.C.B.C.	160	158	151	--	--	WASH #4
17	102+17	SIX 12'x4' R.C.B.C.	2,052	766	766	--	--	WASH #4
18	106+83.50	SIX 12'x4' R.C.B.C.	2,016	815	816	--	--	WASH #4
19	110+99	FIVE 12'x4' R.C.B.C.	1,360	134	134	--	--	WASH #4
20	114+09	35"x24" C.S.P.A.	25	32 (C)	32 (C)	--	--	
21	116+05.50	10'x8' R.C.B.C.	740			--	--	
22	124+23	TWO 42"x29" C.S.P.A.	58	62 (C)	62 (C)	--	--	WASH #4
23	127+67	35"x24" C.S.P.A.	15.5			--	--	
24	136+16.50	42"x29" C.S.P.A.	80	82	82	--	--	WASH #4
25	146+50.50	THREE 8'x3' R.C.B.C.	456	352	350	--	--	WASH #4
26	154+43.50	FOUR 35"x24" C.S.P.A.	72	54	--	--	--	
27	197+74.50	SIX 12'x4' R.C.B.C.	2,664	1,911	1,905	--	--	WASH #5
28	207+57.50	SIX 12'x8' R.C.B.C.	3,600	754	748	--	--	WASH #5
29	210+68.50	TWO 42"x29" C.S.P.A.	14	25	15	10	#30	
30	236+91	THREE 8'x3' R.C.B.C.	312	684	522	154	#31	
31	254+82.50	10'x4' R.C.B.C.	740	1,094	925	170	#32	WASH #6
32	260+98.50	SIX 12'x6' R.C.B.C.	2,376	413	412	--	--	WASH #6

B-83

TABLE 5 (CONT'D.)

B-84

STRUCTURE I.D.	STATION	DESCRIPTION	CAPACITY AT BREAKOUT (CFS)	PEAK 100-YEAR DISCHARGE (CFS)	PEAK CULVERT FLOW (CFS)	BREAKOUT FLOW (CFS)	TO CULVERT I.D.	STUDY WASH NO.
33	264+9950	TWO 42"x29" C.S.P.A.	72	426	79	253 84	#32 #34	
34	279+17	FOUR 8'x3' R.C.B.C.	496	[163 (c)]	[163 (c)]	---	---	
35	282+90	TWO 28"x20" C.S.P.A.	16			---	---	
36	304+13.00	FOUR 10'x4' R.C.B.C.	1,400	1,009	1,009	---	---	WASH #7
37	307+78.50	TWO 28"x20" C.S.P.A.	26	[245 (c)]	[245 (c)]	---	---	
38	310+12.50	TWO 28"x20" C.S.P.A.	10			---	---	
39	312+27	28"x20" C.S.P.A.	24			---	---	
40	315+02.50	28"x20" C.S.P.A.	12			---	---	
41	316+36.50	10'x8' R.C.B.C.	670			---	---	
42	318+88	28"x20" C.S.P.A.	10			---	---	
43	320+57.50	42"x29" C.S.P.A.	52			---	---	
44	322+99	42"x29" C.S.P.A.	38			---	---	
45	324+95.5	28"x20" C.S.P.A.	11			---	---	
46	327.30	42"x29" C.S.P.A.	62			---	---	
47	328.91	42"x29" C.S.P.A.	54			---	---	
48	336+58.50	49"x33" C.S.P.A.	26	[137 (c)]	[137 (c)]	---	---	
49	341+76.50	TWO 10'x8' R.C.B.C.	1,220			---	---	
50	347+26	THREE 10'x3' R.C.B.C.	570	1,107	891	217	#51	WASH #8
51	349.18	TWO 42"x29" C.S.P.A.	70	217	91	128	#52	WASH #8
52	352+92	TWO 49"x33" C.S.P.A.	116	128	117	2	#53	WASH #8
53	357+26	48" C.S.P.	110	2	1	---	---	
54	369+17.50	72" C.S.P.	240	328	267	61	#55-60	
55	370+82	60" C.S.P.	150	[186 (c)]	[186 (c)]			
56	373+07	C.S.P.A.	12					
57	374+90	28"x20" C.S.P.A.	7.5					
58	378+96	36" C.S.P.	59					
59	379+85	24" C.S.P.	24					
60	384+06	42"x29" C.S.P.A.	34					
61	473+08	TWO 10'x10' C.B.C.	4,600	N/C	N/C			

NOTES:

- 1.) STRUCTURE I.D. SHOWN ON DRAINAGE AREA MAP.
- 2.) STATION NUMBER FROM SUN VALLEY PARKWAY DESIGN PLANS.
- 3.) (c) INDICATES COMBINED FLOWS WITHIN BRACKETED STRUCTURES.

EXPLANATION:

R.C.B.C. = REINFORCED CONCRETE BOX CULVERT
 C.S.P.A. = CORRUGATED STEEL PIPE ARCH
 C.S.P. = CORRUGATED STEEL PIPE
 N/C = NOT COMPUTED