

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 5 OF 5



MONTEREY COUNTY, CALIFORNIA AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
CARMEL-BY-THE-SEA, CITY OF	060196
DEL REY OAKS, CITY OF	060197
GONZALES, CITY OF	060198
GREENFIELD, CITY OF	060446
KING CITY, CITY OF	060199
MARINA, CITY OF	060727
MONTEREY, CITY OF	060200
MONTEREY COUNTY, UNINCORPORATED AREAS	060195
PACIFIC GROVE, CITY OF	060201
SALINAS, CITY OF	060202
SAND CITY, CITY OF	060435
SEASIDE, CITY OF	060203
SOLEDAD, CITY OF	060204



FEMA

REVISED:

June 21, 2017

FLOOD INSURANCE STUDY NUMBER

06053C'V005B

Version Number: 2 3 2 1

TABLE OF CONTENTS

Volume 1

	<u>Page</u>
SECTION 1.0 – INTRODUCTION	1
1.1 The National Flood Insurance Program	1
1.2 Purpose of this Flood Insurance Study Report	2
1.3 Jurisdictions Included in the Flood Insurance Study Project	2
1.4 Considerations for using this Flood Insurance Study Report	10
SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS	23
2.1 Floodplain Boundaries	23
2.2 Floodways	31
2.3 Base Flood Elevations	32
2.4 Non-Encroachment Zones	32
2.5 Coastal Flood Hazard Areas	33
2.5.1 Water Elevations and the Effects of Waves	33
2.5.2 Floodplain Boundaries and BFEs for Coastal Areas	34
2.5.3 Coastal High Hazard Areas	35
2.5.4 Limit of Moderate Wave Action	36
SECTION 3.0 – INSURANCE APPLICATIONS	36
3.1 National Flood Insurance Program Insurance Zones	36
3.2 Coastal Barrier Resources System	37
SECTION 4.0 – AREA STUDIED	37
4.1 Basin Description	37
4.2 Principal Flood Problems	38
4.3 Non-Levee Flood Protection Measures	56
4.4 Levees	60
SECTION 5.0 – ENGINEERING METHODS	63
5.1 Hydrologic Analyses	63

Figures

	<u>Page</u>
Figure 1: FIRM Panel Index	13
Figure 2: FIRM Notes to Users	16
Figure 3: Map Legend for FIRM	19
Figure 4: Floodway Schematic	31
Figure 5: Wave Runup Transect Schematic	34
Figure 6: Coastal Transect Schematic	36
Figure 7: Frequency Discharge-Drainage Area Curves	70

Volume 1, Continued

Tables

	<u>Page</u>
Table 1: Listing of NFIP Jurisdictions	2
Table 2: Flooding Sources Included in this FIS Report	24
Table 3: Flood Zone Designations by Community	37
Table 4: Coastal Barrier Resources System Information	37
Table 5: Basin Characteristics	38
Table 6: Principal Flood Problems	38
Table 7: Historic Flooding Elevations	56
Table 8: Non-Levee Flood Protection Measures	56
Table 9: Levees	61
Table 10: Summary of Discharges	64
Table 11: Summary of Non-Coastal Stillwater Elevations	71
Table 12: Stream Gage Information used to Determine Discharges	72

Volume 2

	<u>Page</u>
5.2 Hydraulic Analyses	73
5.3 Coastal Analysis	105
5.3.1 Total Stillwater Elevations	105
5.3.2 Waves	107
5.3.3 Coastal Erosion	107
5.3.4 Wave Hazard Analyses	107
5.4 Alluvial Fan Analyses	124
SECTION 6.0 – MAPPING METHODS	125
6.1 Vertical and Horizontal Control	125
6.2 Base Map	127
6.3 Floodplain and Floodway Delineation	127

Figures

	<u>Page</u>
Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas	106
Figure 9: Transect Location Map	121

Tables

	<u>Page</u>
Table 13: Summary of Hydrologic and Hydraulic Analyses	74
Table 14: Roughness Coefficients	105
Table 15: Summary of Coastal Analyses	105
Table 16: Tide Gage Analysis Specifics	107
Table 17: Coastal Transect Parameters	109

Volume 2, Continued

Tables

	<u>Page</u>
Table 18: Summary of Alluvial Fan Analyses	124
Table 19: Results of Alluvial Fan Analyses	124
Table 20: Countywide Vertical Datum Conversion	125
Table 21: Stream-Based Vertical Datum Conversion	126
Table 22: Base Map Data	127
Table 23: Summary of Topographic Elevation Data used in Mapping	128

Volume 3

	<u>Page</u>
6.4 Coastal Flood Hazard Mapping	170
6.5 FIRM Revisions	174
6.5.1 Letters of Map Amendment	174
6.5.2 Letters of Map Revision Based on Fill	175
6.5.3 Letters of Map Revision	175
6.5.4 Physical Map Revisions	175
6.5.5 Contracted Restudies	176
6.5.6 Community Map History	176
SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION	178
7.1 Contracted Studies	178
7.2 Community Meetings	179
SECTION 8.0 – ADDITIONAL INFORMATION	182
SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES	183

Tables

	<u>Page</u>
Table 24: Floodway Data	130
Table 25: Flood Hazard and Non-Encroachment Data for Selected Streams	170
Table 26: Summary of Coastal Transect Mapping Considerations	171
Table 27: Incorporated Letters of Map Change	175
Table 28: Community Map History	177
Table 29: Summary of Contracted Studies Included in this FIS Report	178
Table 30: Community Meetings	180
Table 31: Map Repositories	182
Table 32: Additional Information	183
Table 33: Bibliography and References	184

Volume 3, Continued

Exhibits

Flood Profiles	<u>Panel</u>
Arroyo Seco	01-08 P
Calera Creek	09-12 P
Canyon Del Rey	13-18 P
Carmel River	19-34 P
Carmel River Garland Ranch Overbank	35 P
Carmel River Hacienda Carmel Overbank	36 P

Volume 4

Exhibits

Flood Profiles	<u>Panel</u>
Carmel River North Highway 1 Overbank	37-38 P
Carmel River Schulte Overbank	39 P
Carmel River South Highway 1 Overbank	40-41 P
Castroville Boulevard Wash	42-44 P
Corncob Canyon Creek	45 P
East Branch Gonzales Slough	46 P
El Toro Creek	47-50 P
Elkhorn Slough	51-54 P
Gabilan Creek	55-60 P
Gonzales Slough	61-64 P
Harper Creek	65-69 P
Josselyn Canyon Creek	70 P
Natividad Creek	71-72 P
Pajaro River	73-85 P
Pajaro River – Without Consideration of Levee	86-94 P
Pine Canyon Creek	95-98 P
Reclamation Ditch	99-109 P
Salinas River	110-122 P
Salinas River Overbank	123-124 P

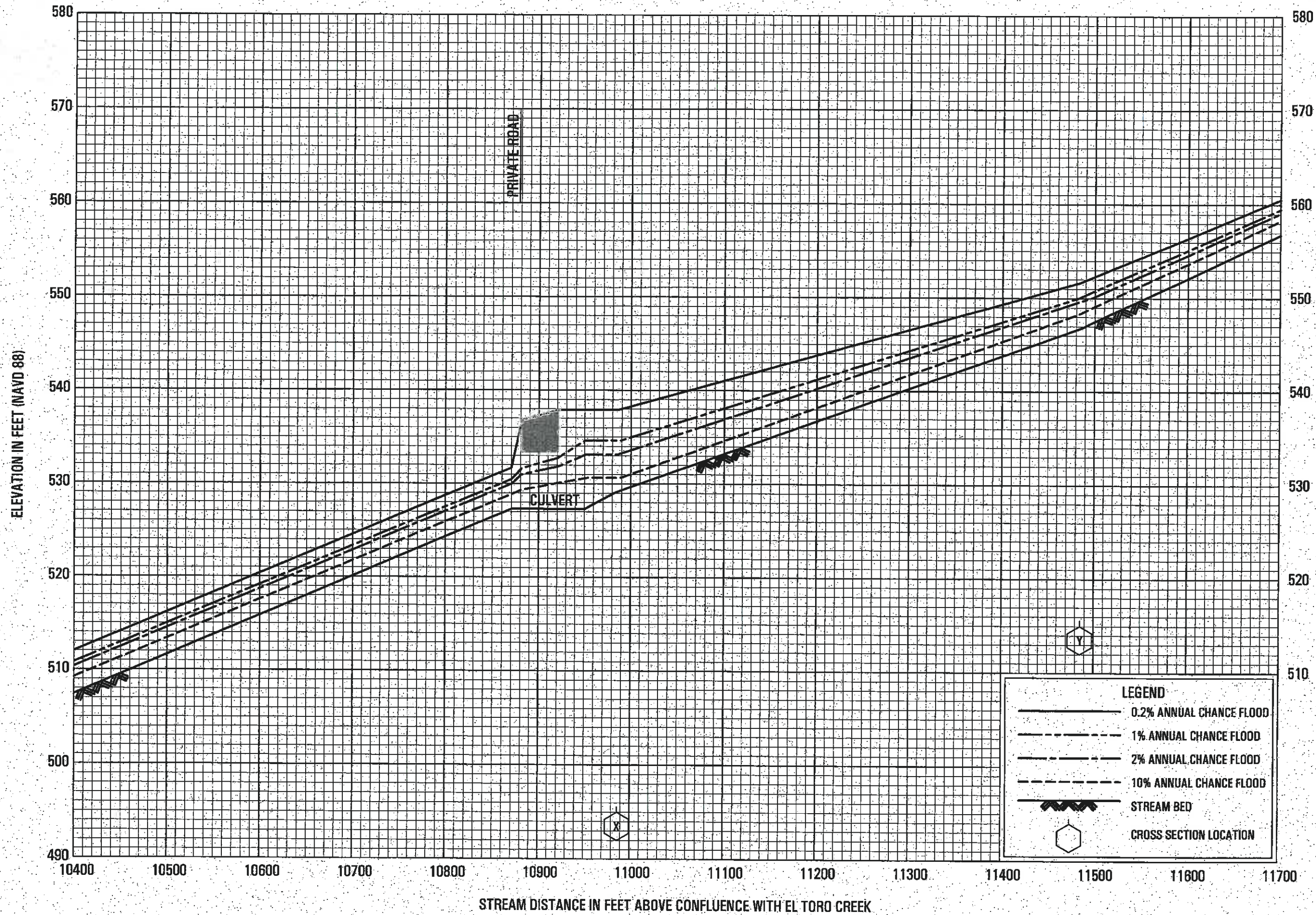
Volume 5

Exhibits

Flood Profiles	<u>Panel</u>
San Benancio Gulch	125-139 P
San Lorenzo Creek	140-142 P
San Miguel Canyon Creek	143-146 P
Santa Rita Creek	147-150 P
Tembladero Slough	151-152 P
Thomasello Creek	153 P
Watson Creek	154-162 P

Published Separately

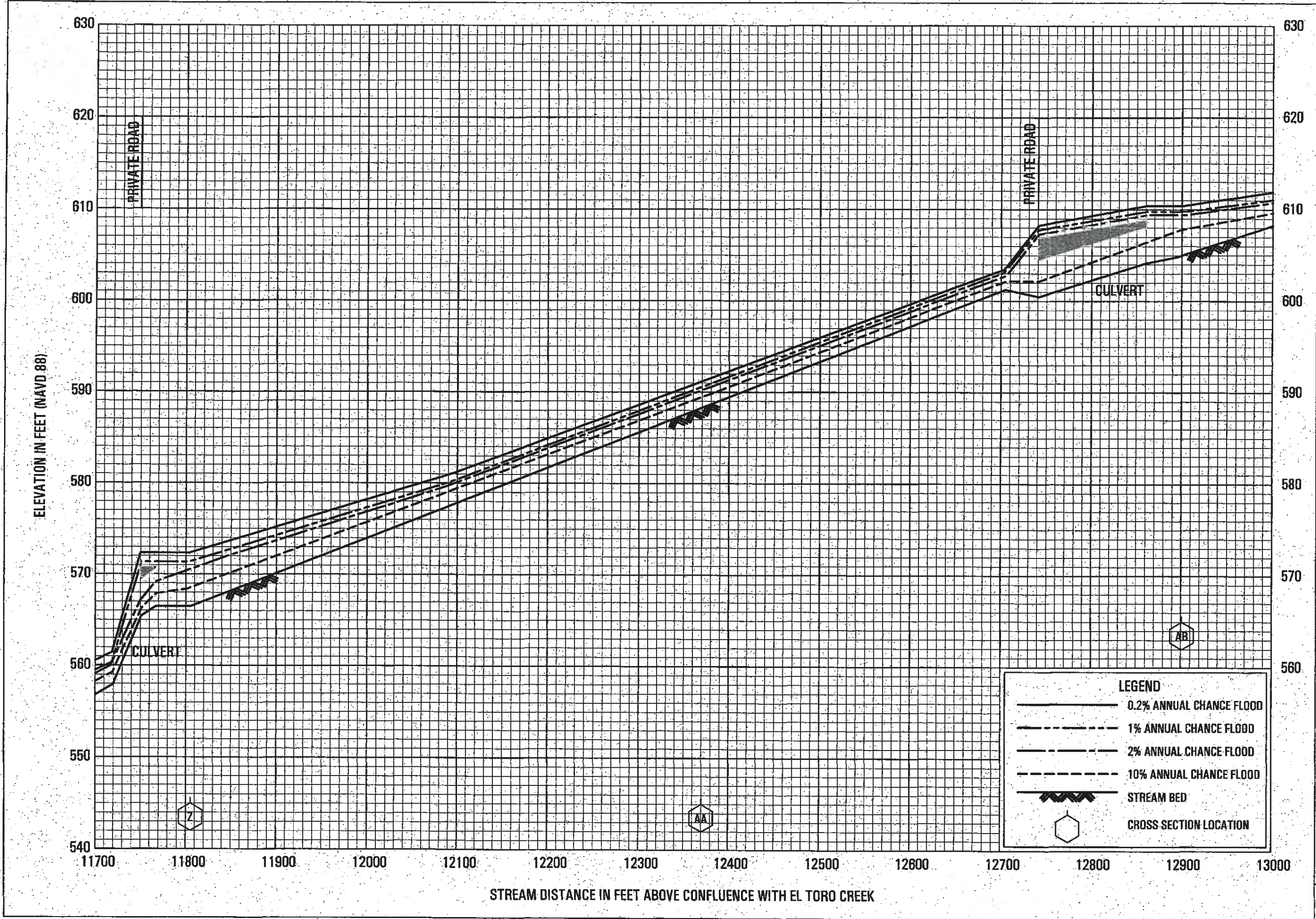
Flood Insurance Rate Map (FIRM)



FLOOD PROFILES
SAN BENANCIO GULCH

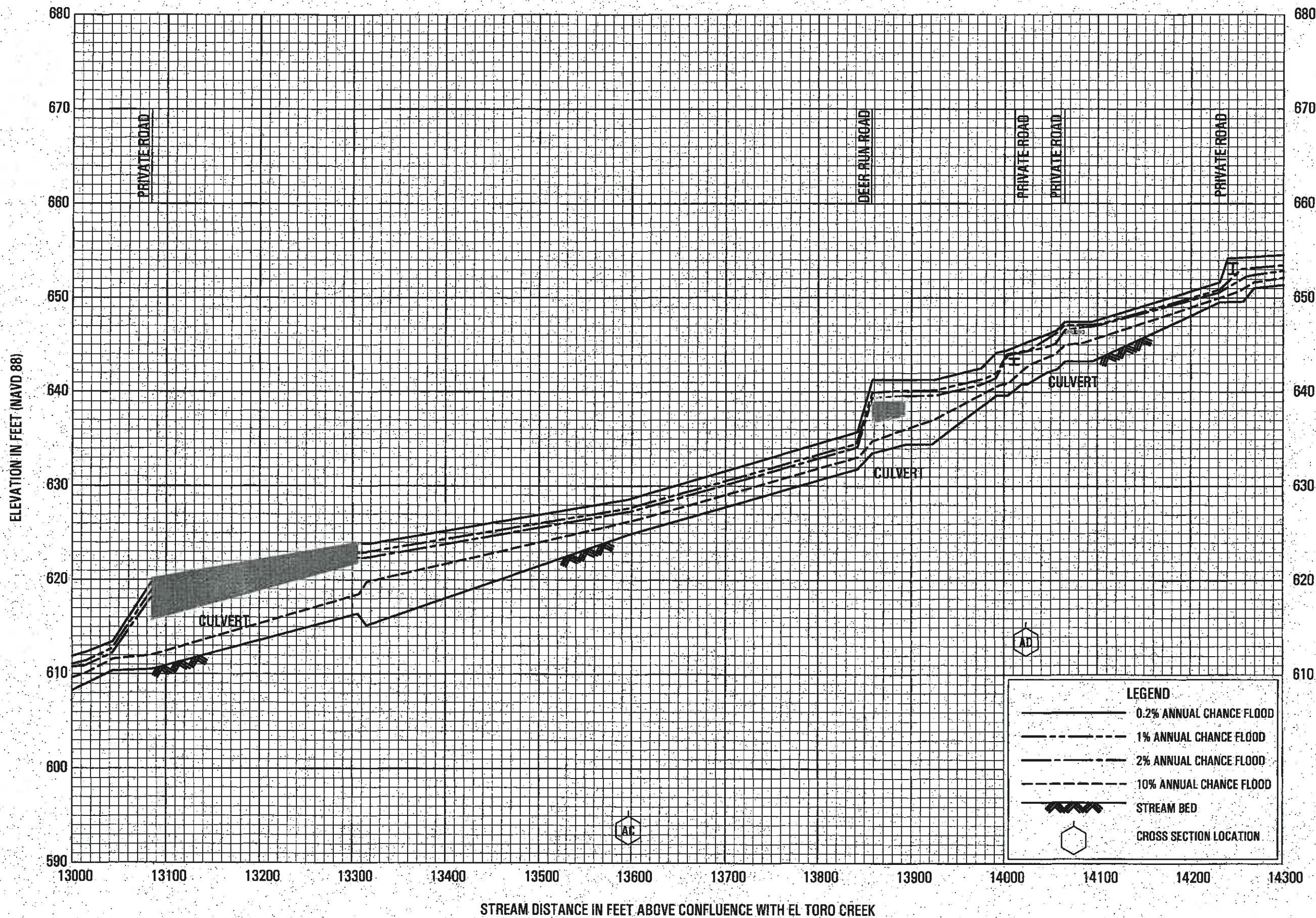
FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
AND INCORPORATED AREAS

LEGEND	
	0.2% ANNUAL CHANCE FLOOD
	1% ANNUAL CHANCE FLOOD
	2% ANNUAL CHANCE FLOOD
	10% ANNUAL CHANCE FLOOD
	STREAM BED
	CROSS SECTION LOCATION



FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
 AND INCORPORATED AREAS

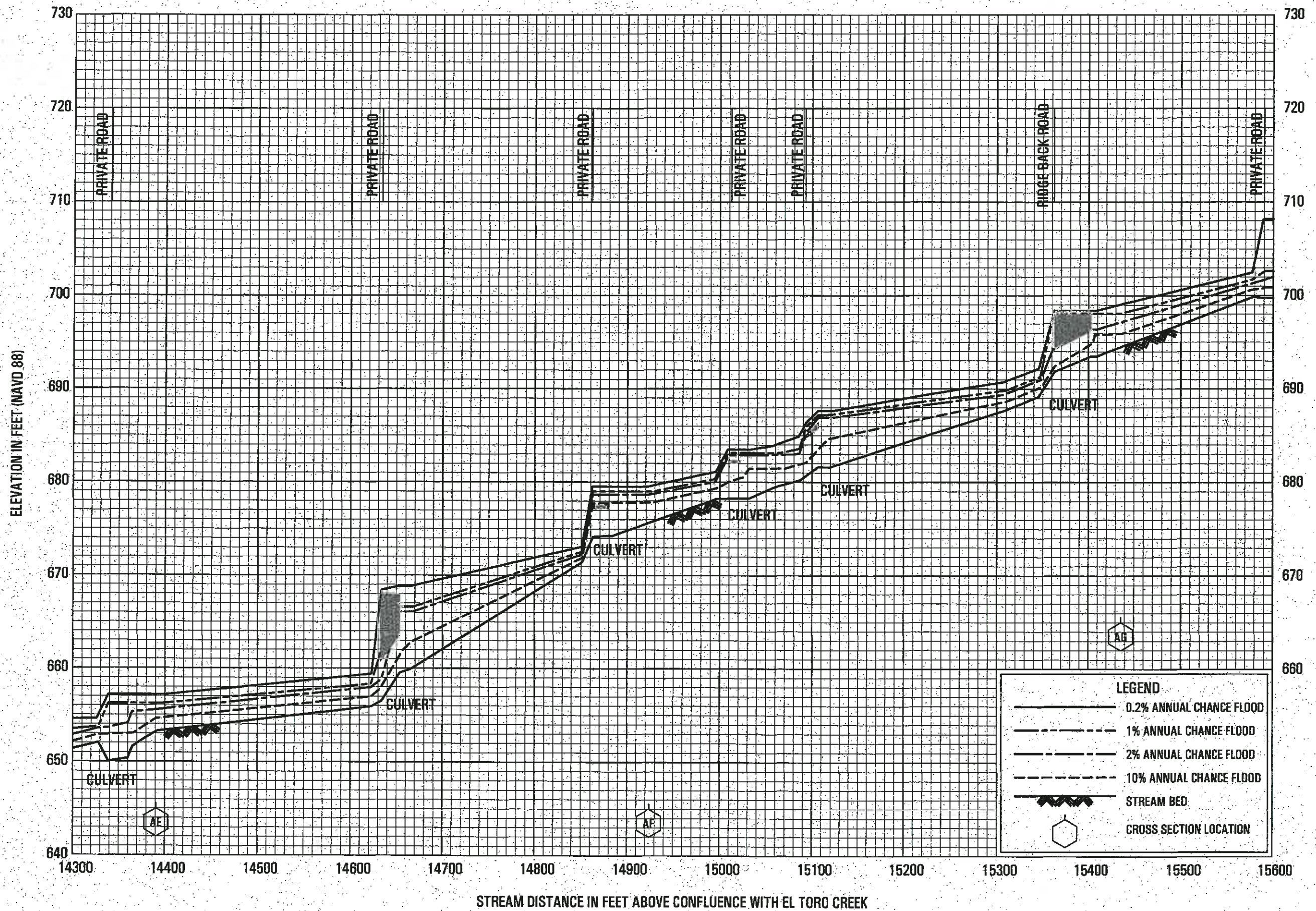
FLOOD PROFILES
 SAN BENANCIO GULCH



LEGEND	
	0.2% ANNUAL CHANCE FLOOD
	1% ANNUAL CHANCE FLOOD
	2% ANNUAL CHANCE FLOOD
	10% ANNUAL CHANCE FLOOD
	STREAM BED
	CROSS SECTION LOCATION

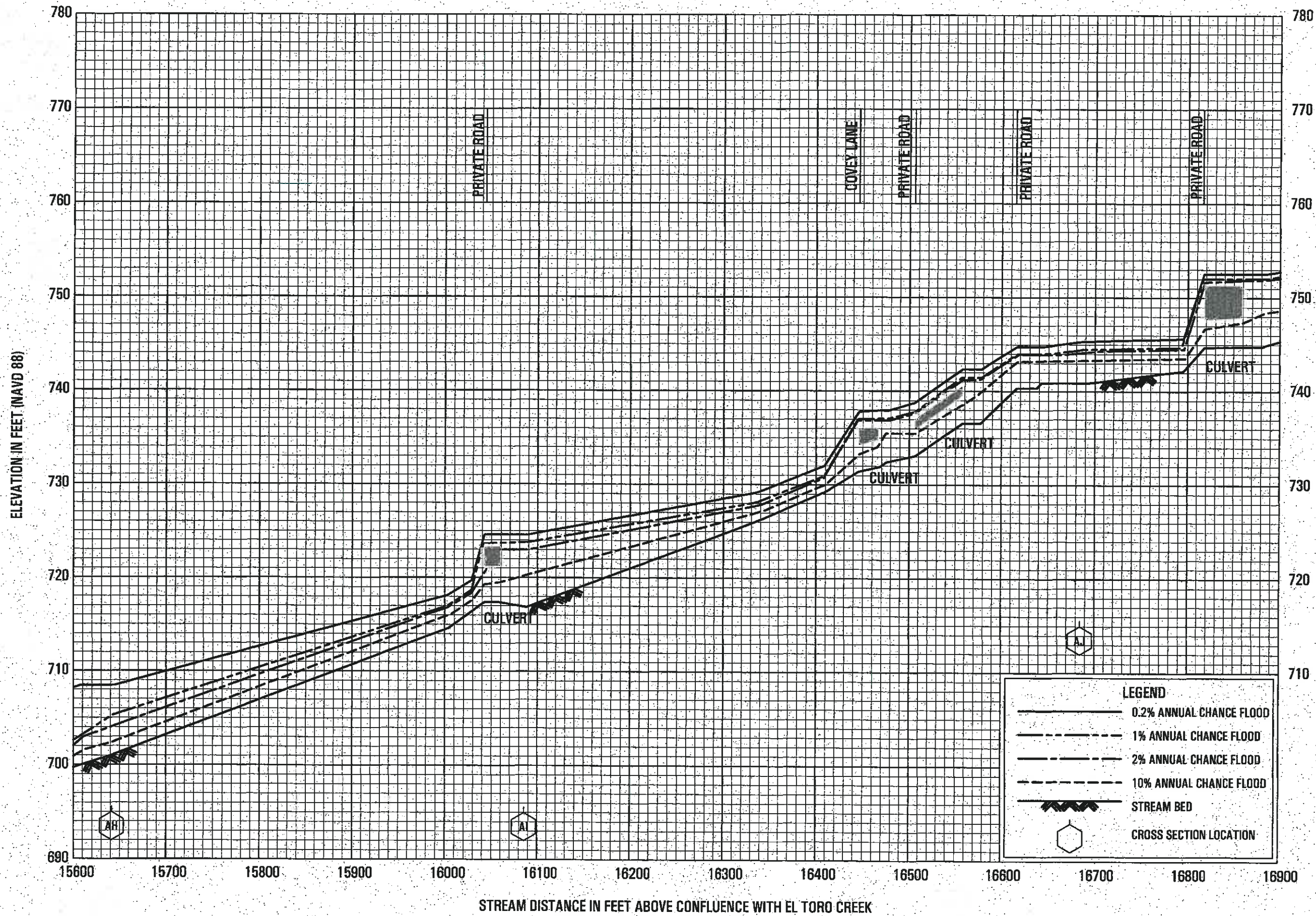
FLOOD PROFILES
SAN BENANCIO GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
AND INCORPORATED AREAS



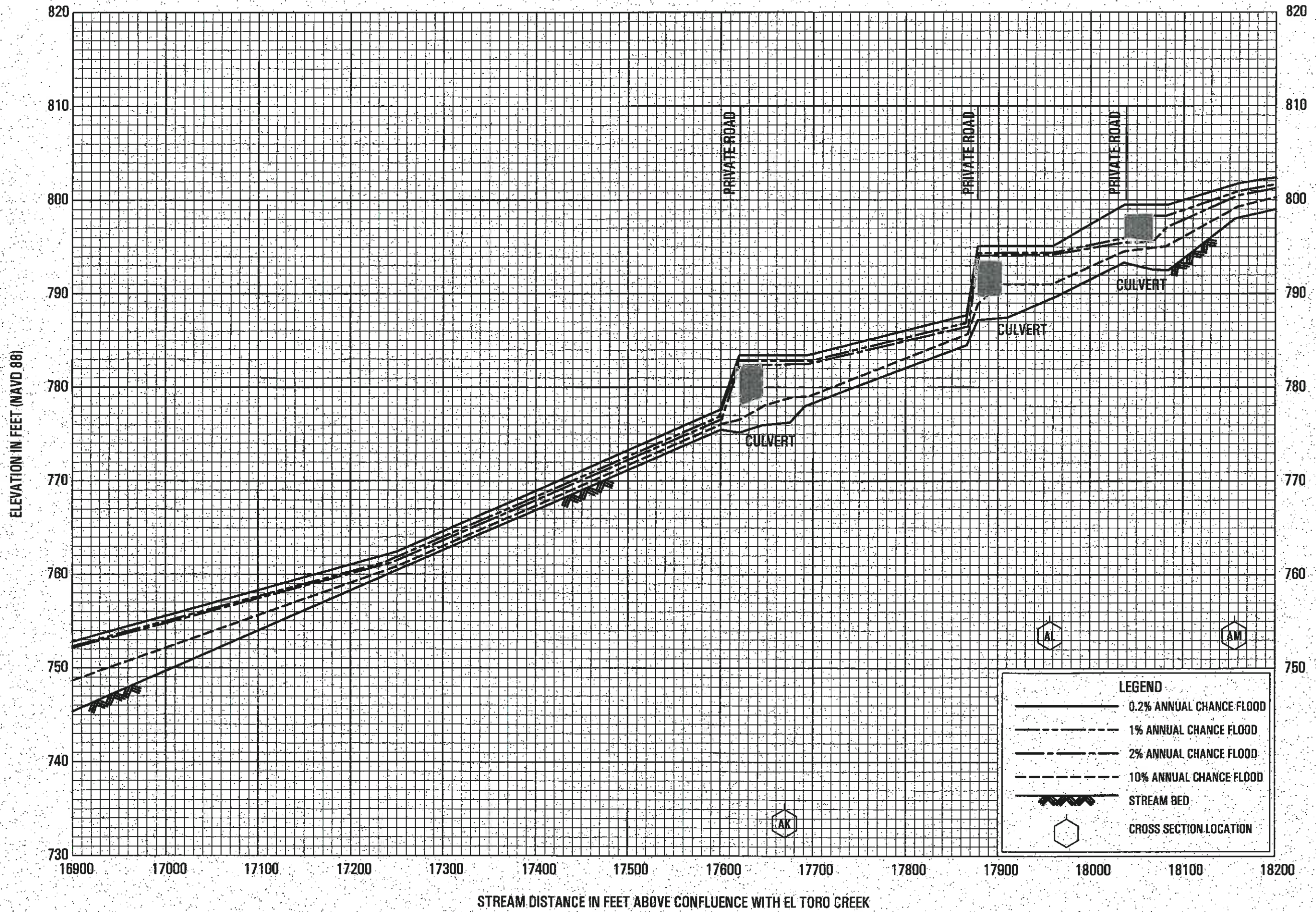
FLOOD PROFILES
SAN BENANCIO GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
AND INCORPORATED AREAS



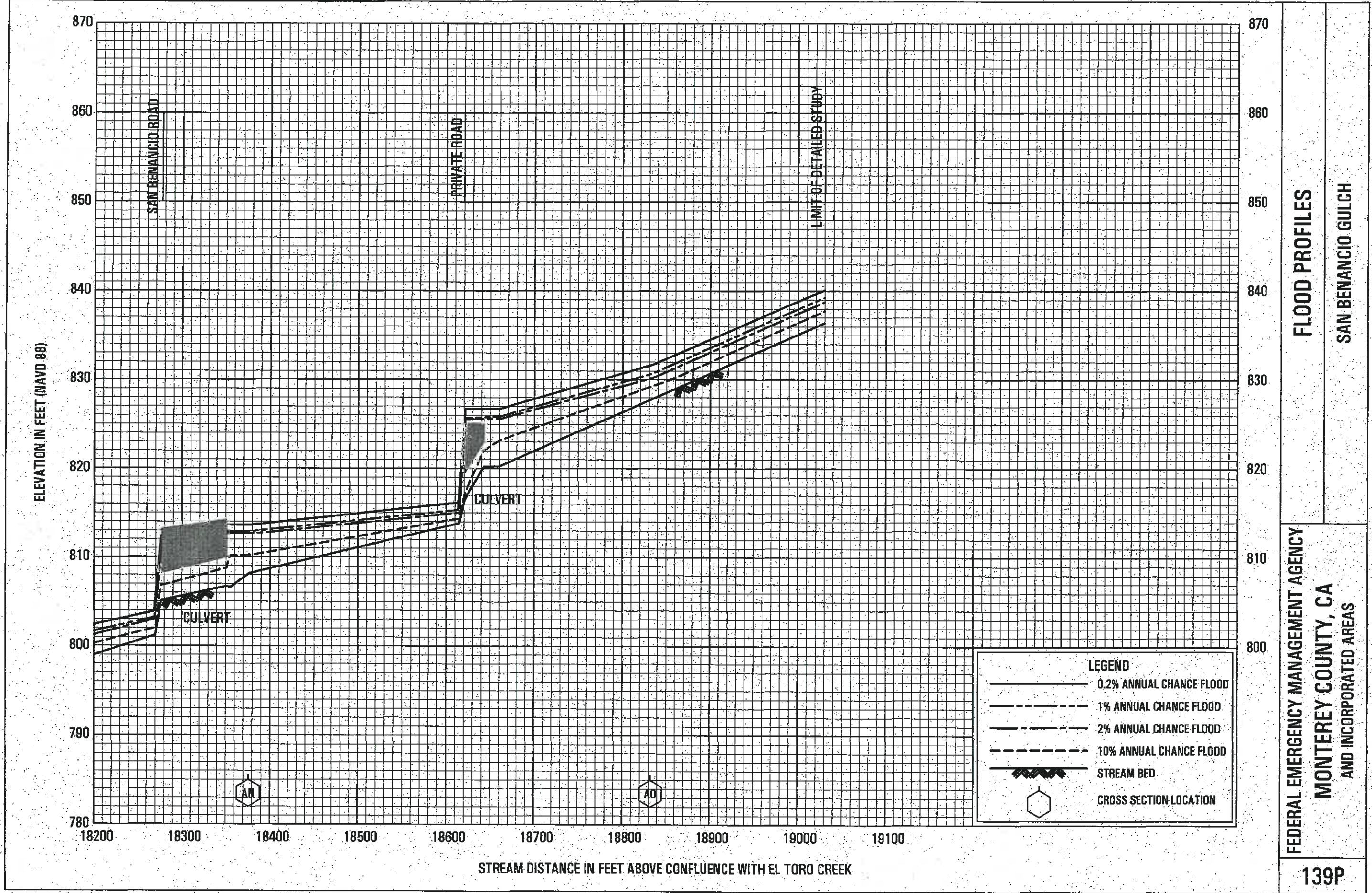
FLOOD PROFILES
SAN BENANCIO GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
AND INCORPORATED AREAS



FLOOD PROFILES
SAN BENANCIO GULCH

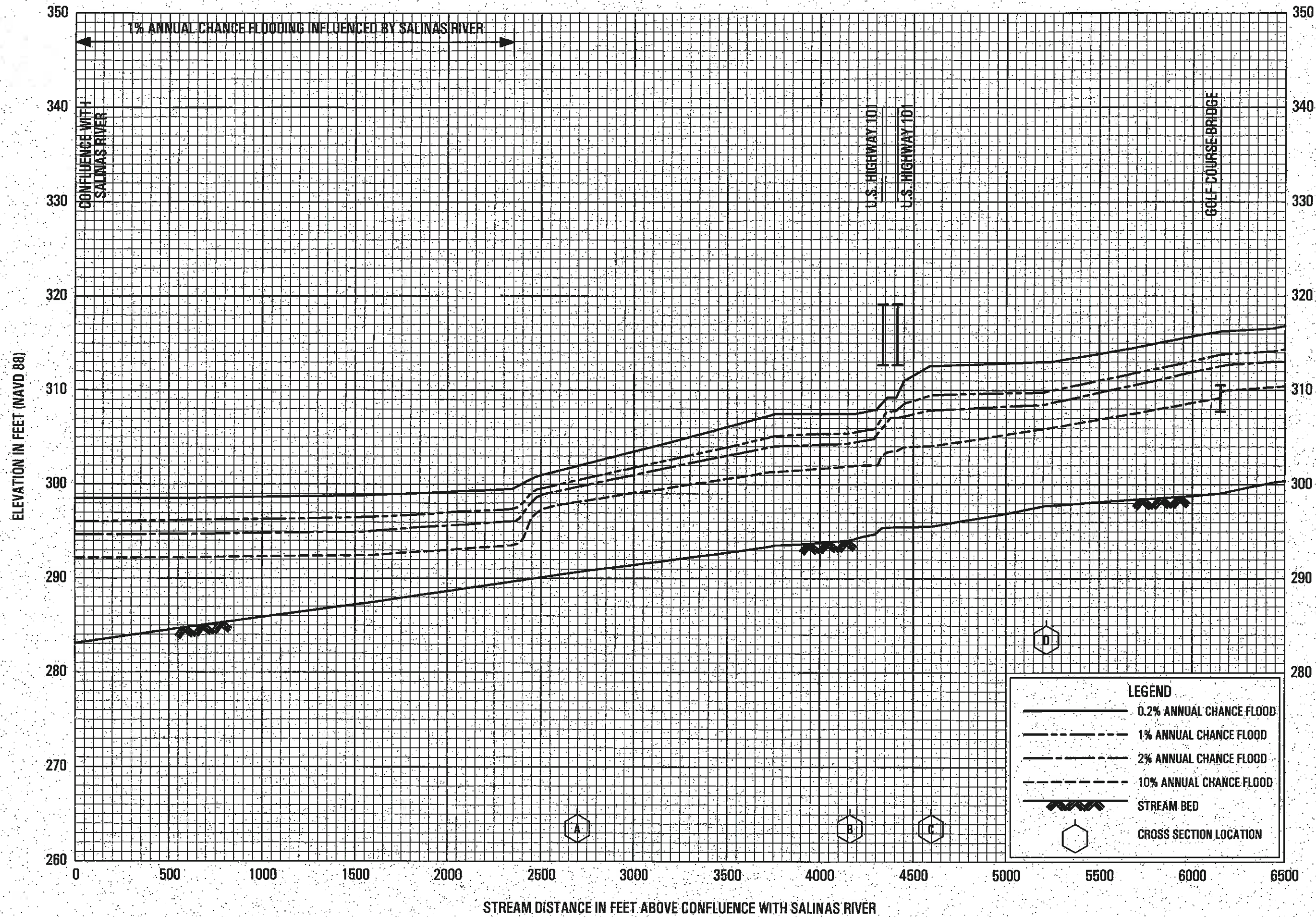
FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
AND INCORPORATED AREAS



LEGEND

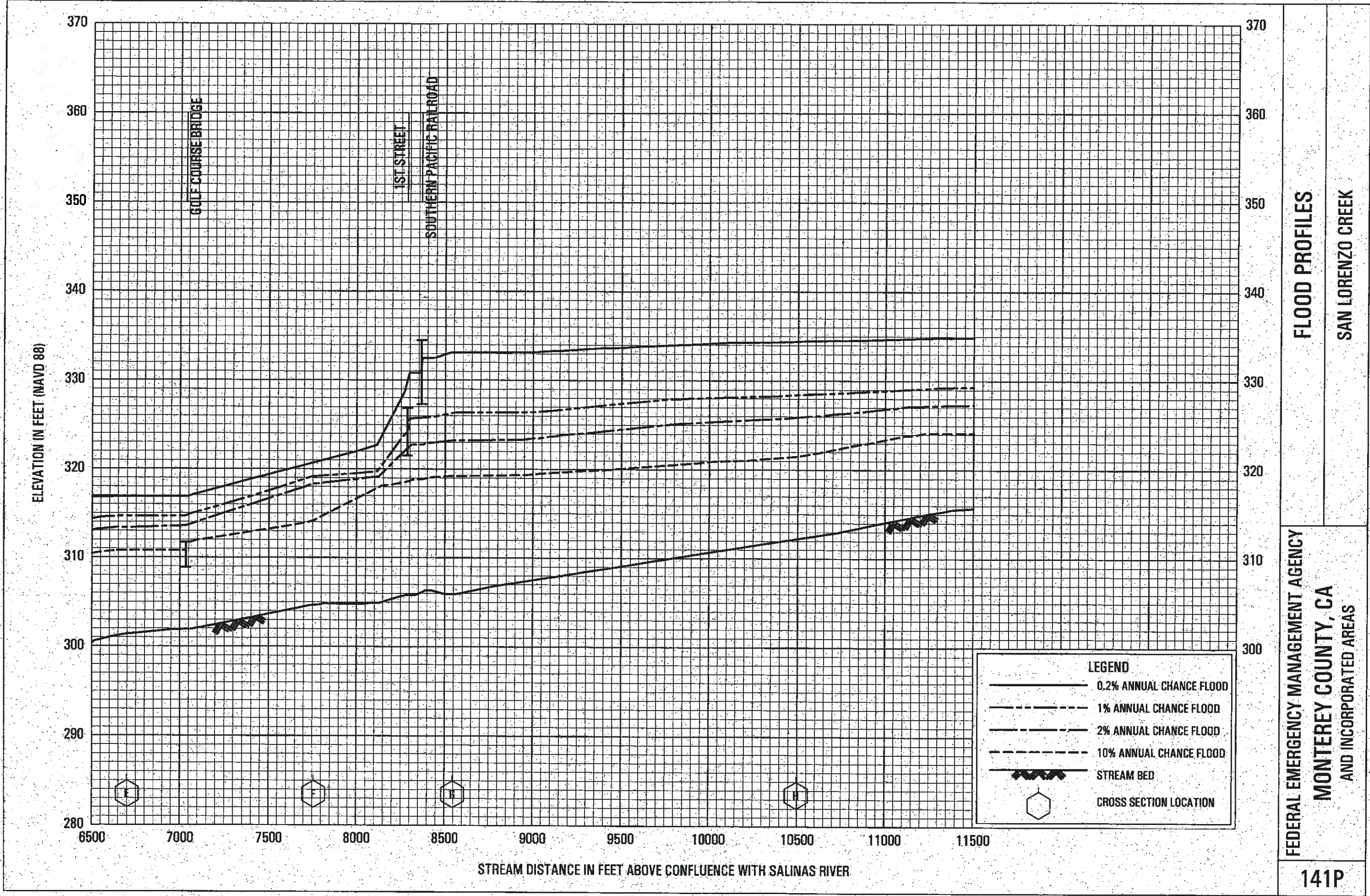
- 0.2% ANNUAL CHANCE FLOOD
- - - 1% ANNUAL CHANCE FLOOD
- · - · 2% ANNUAL CHANCE FLOOD
- - - - 10% ANNUAL CHANCE FLOOD
- ~~~~~ STREAM BED
- ⬡ CROSS SECTION LOCATION

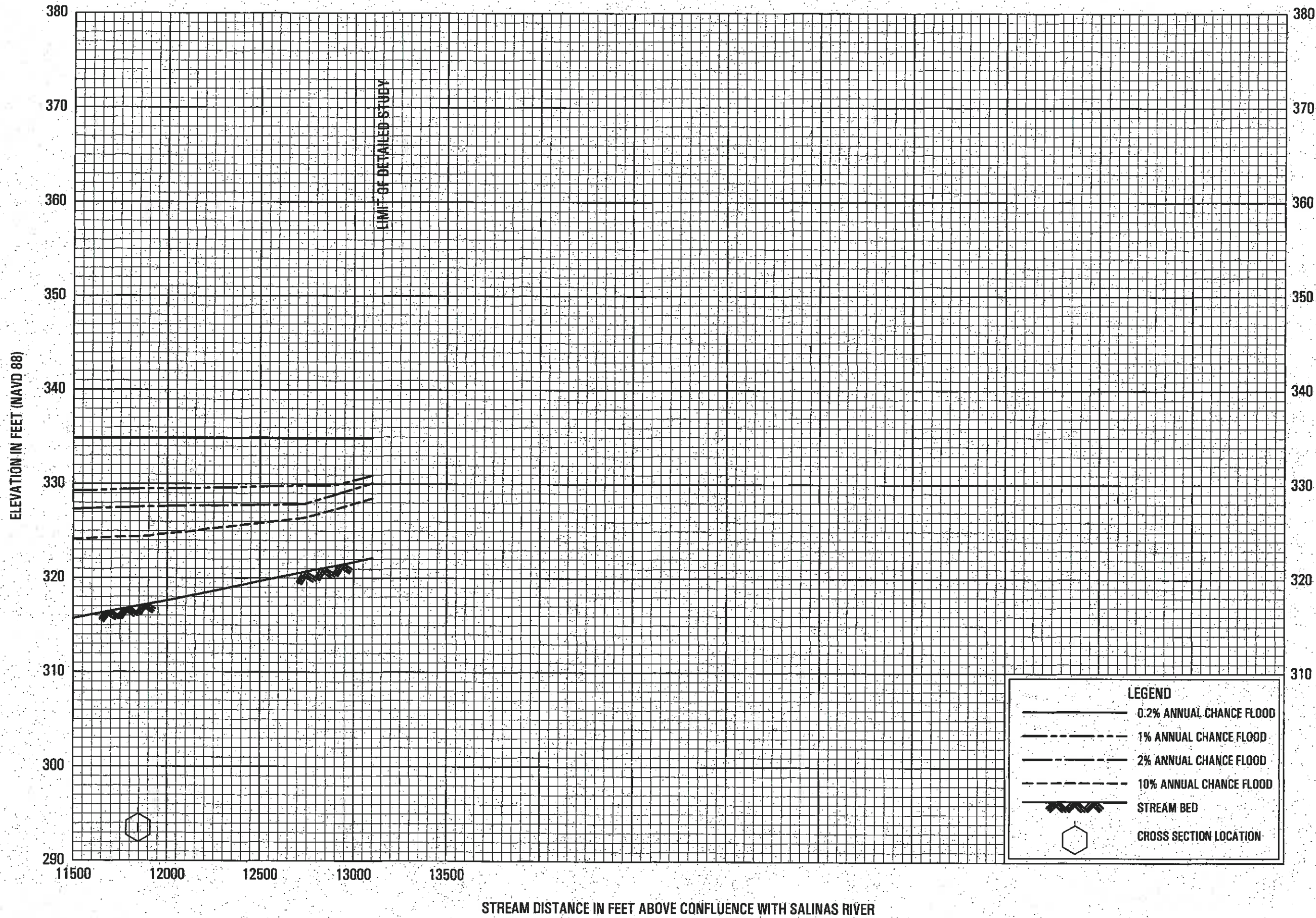
FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
 AND INCORPORATED AREAS



FLOOD PROFILES
 SAN LORENZO CREEK

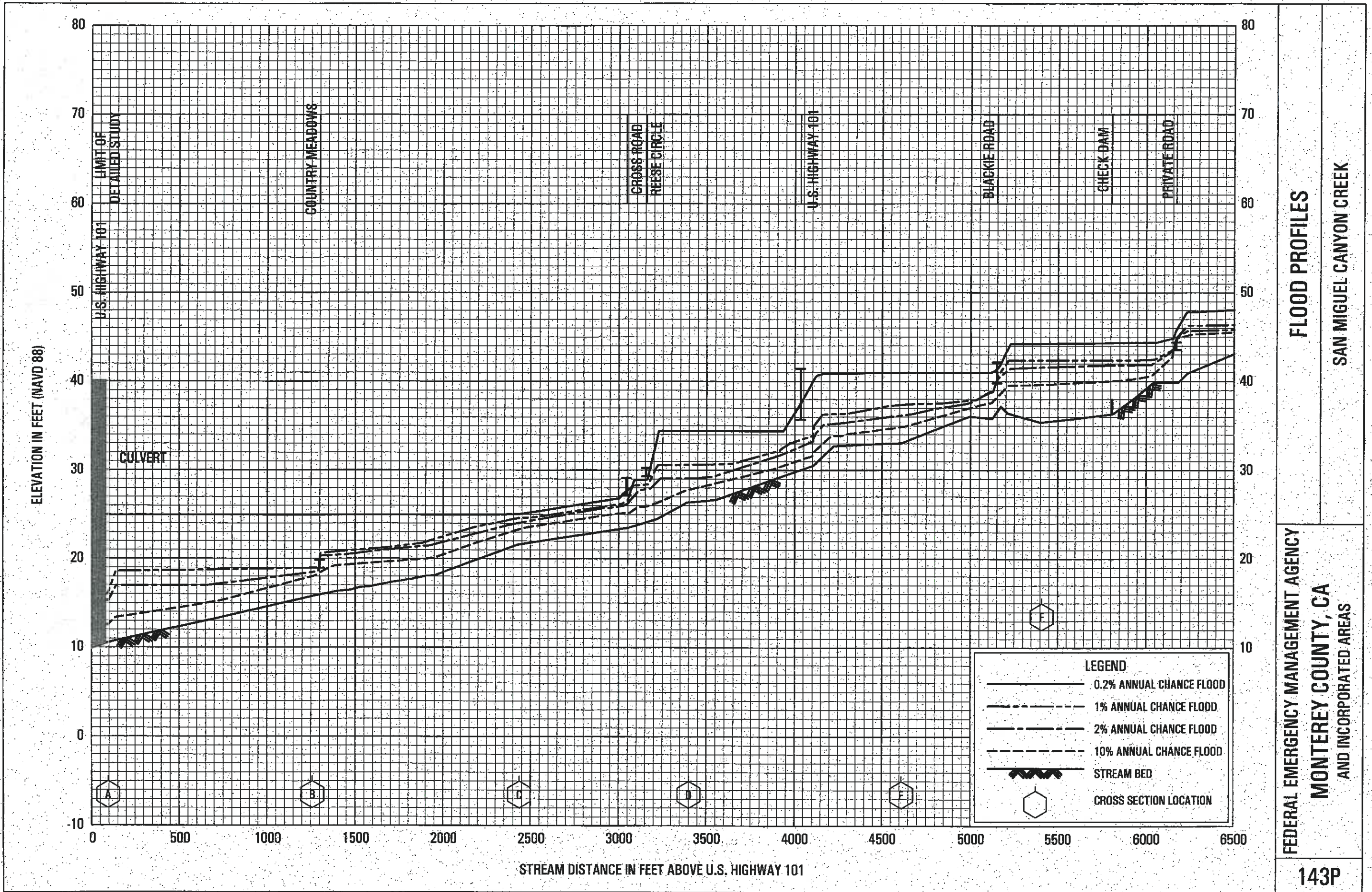
FEDERAL EMERGENCY MANAGEMENT AGENCY
 MONTEREY COUNTY, CA
 AND INCORPORATED AREAS

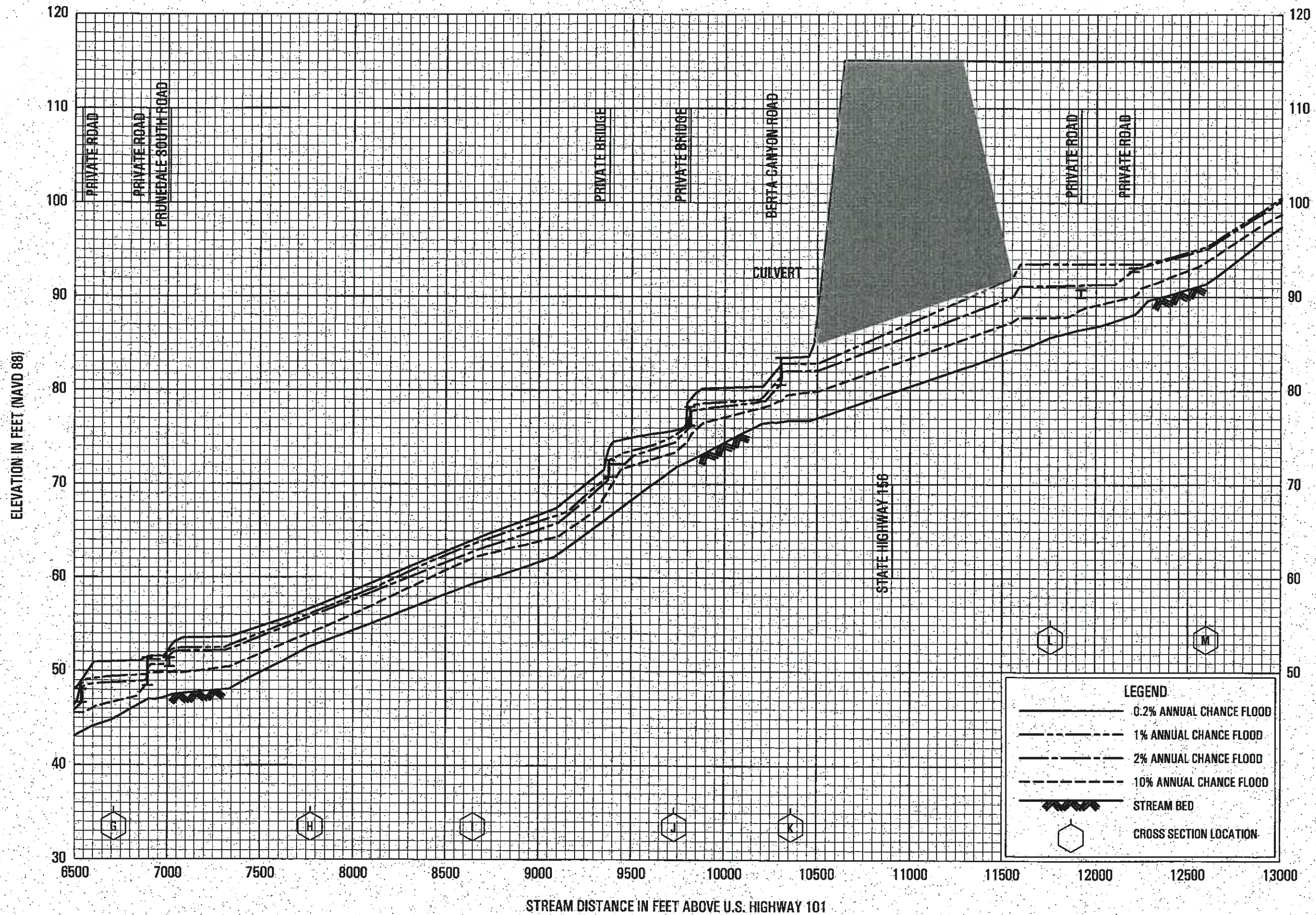




FLOOD PROFILES
SAN LORENZO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
AND INCORPORATED AREAS

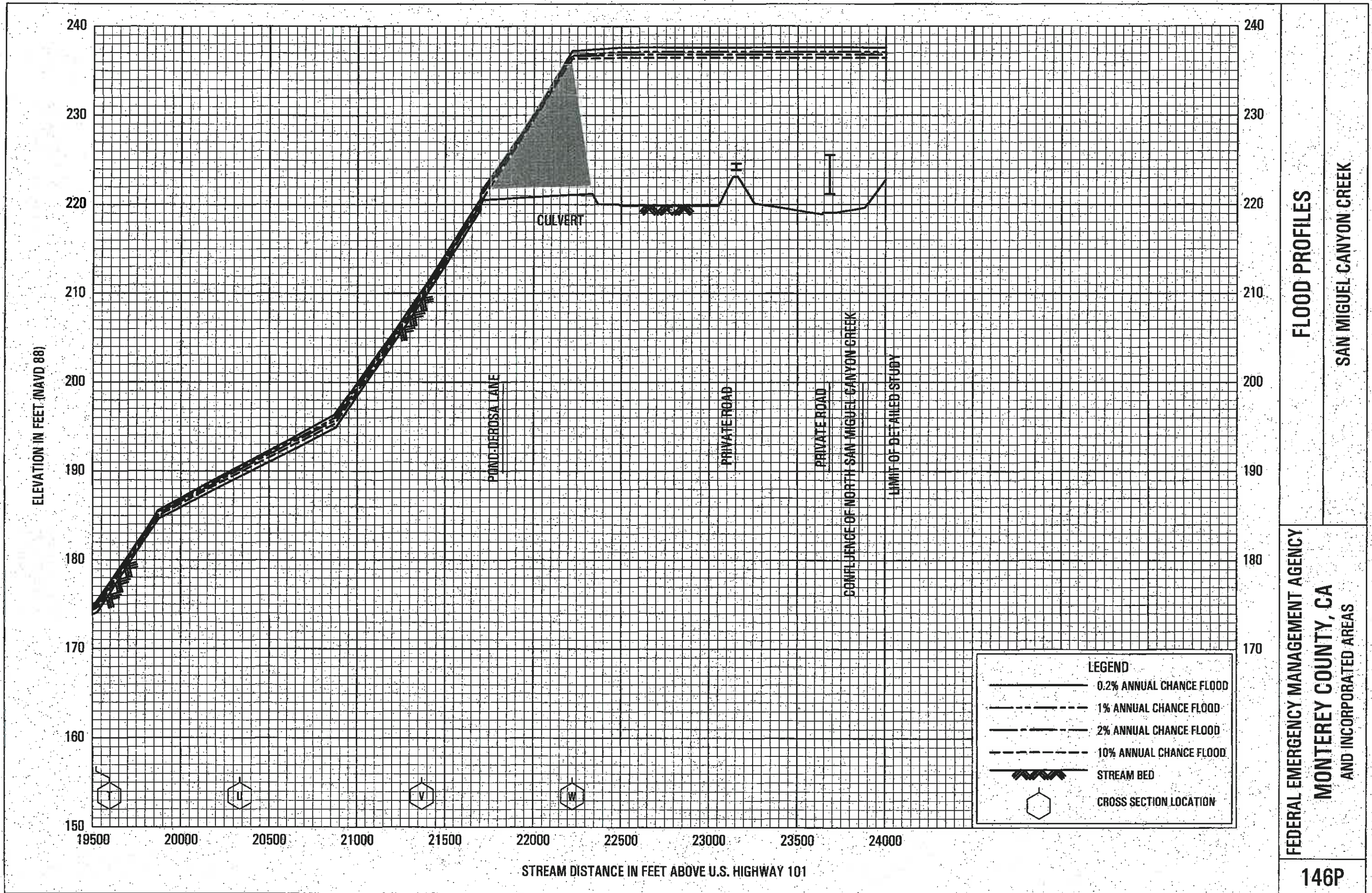


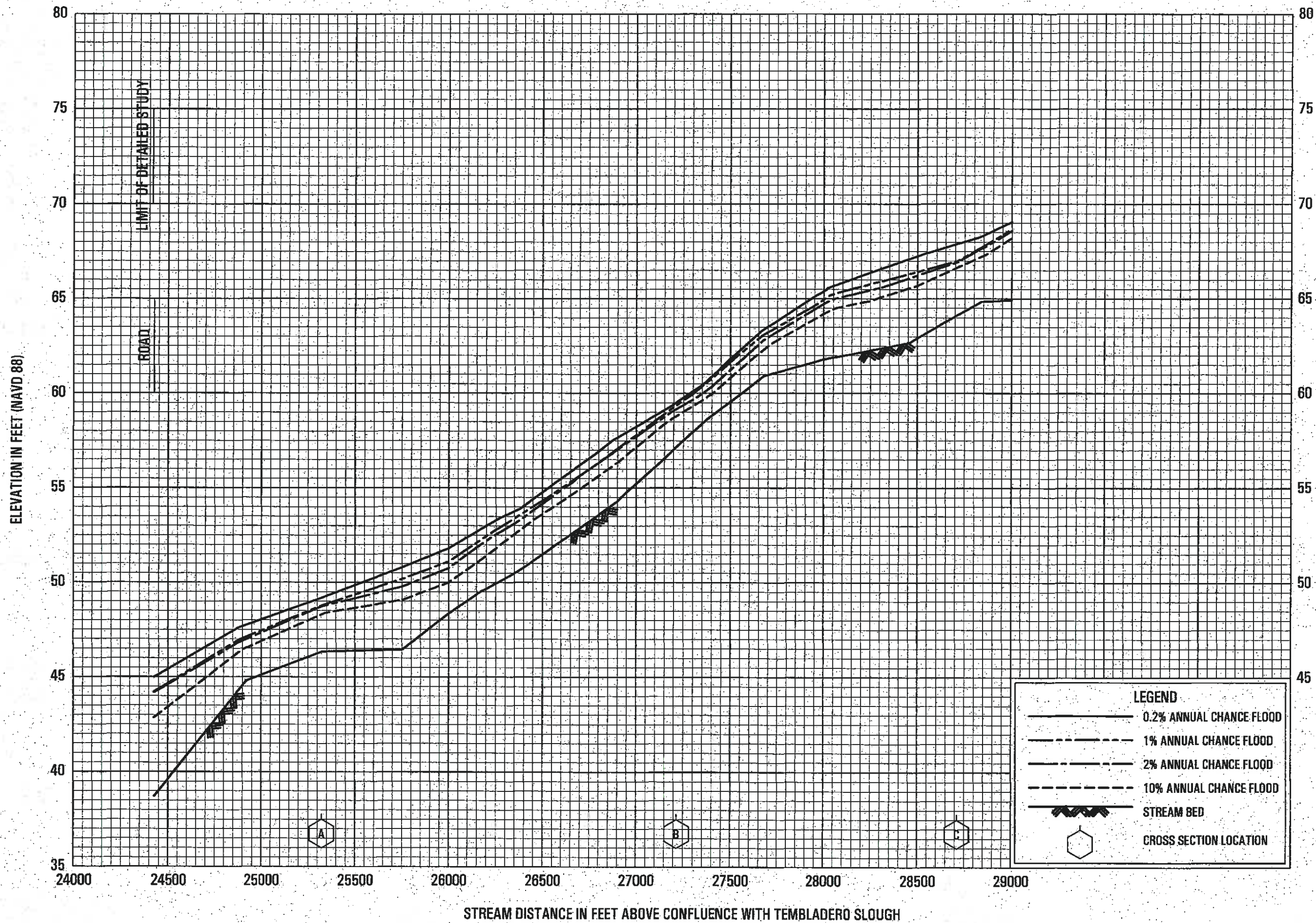


FLOOD PROFILES

SAN MIGUEL CANYON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
 AND INCORPORATED AREAS

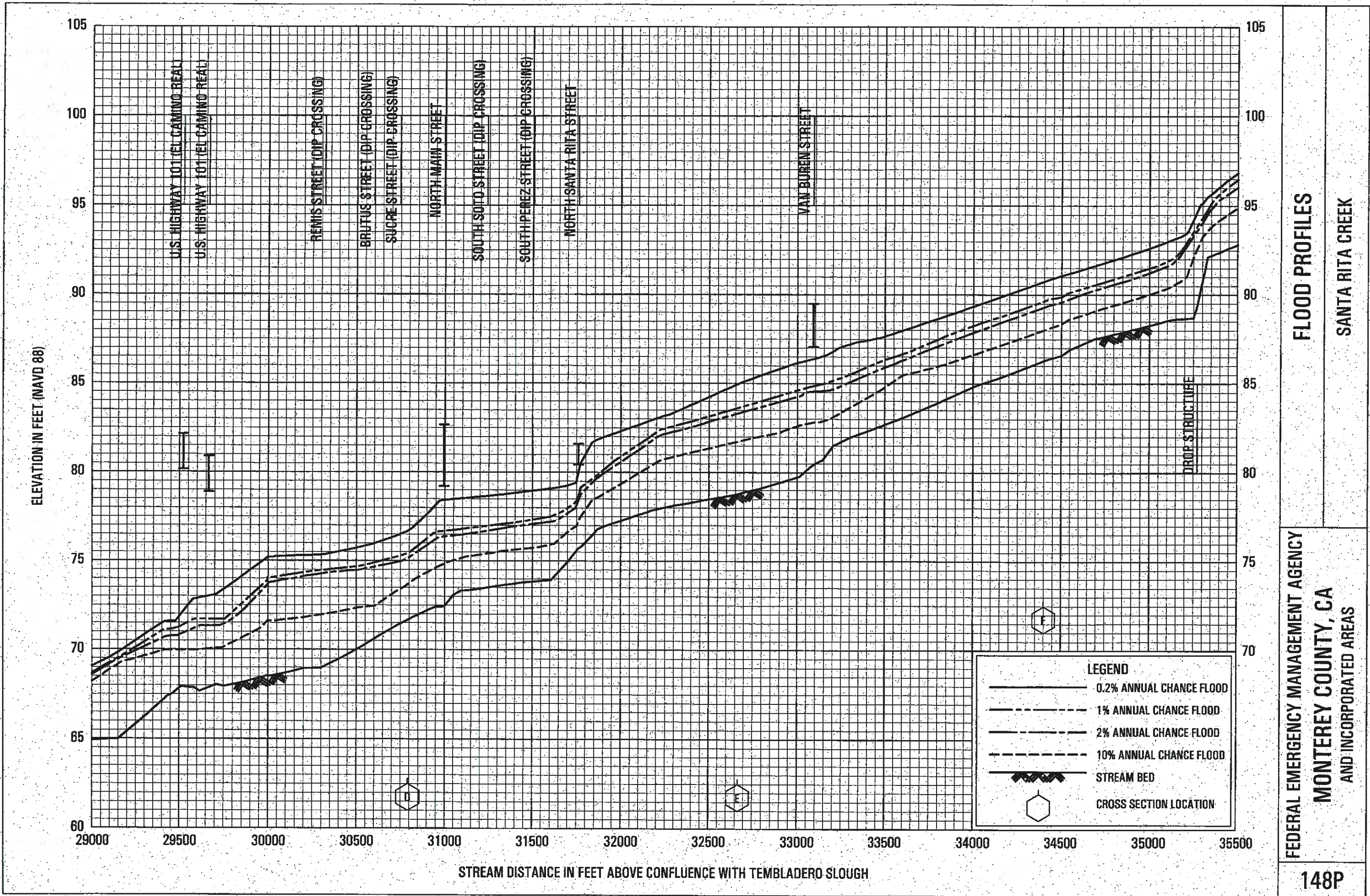


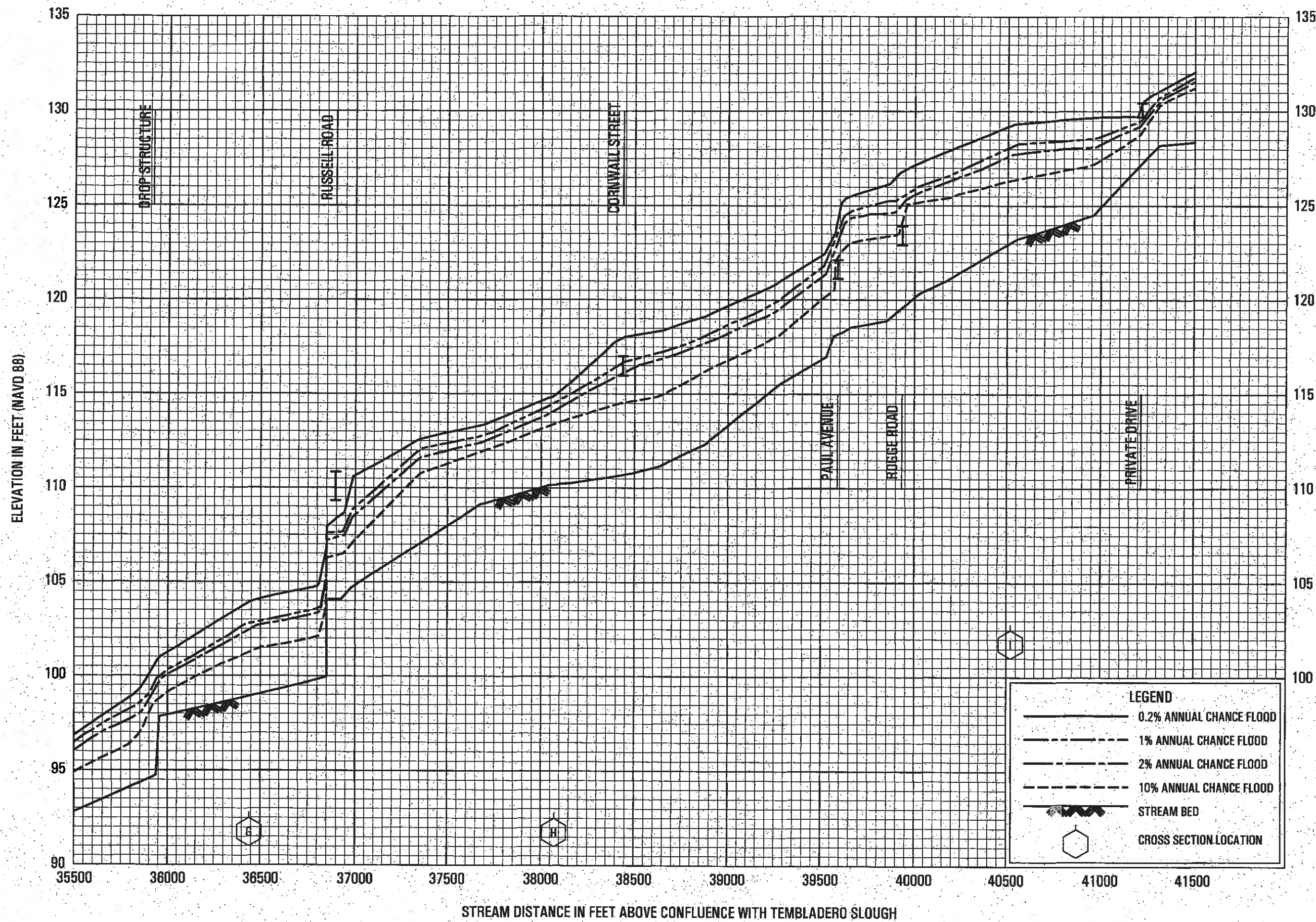


FLOOD PROFILES

SANTA RITA CREEK

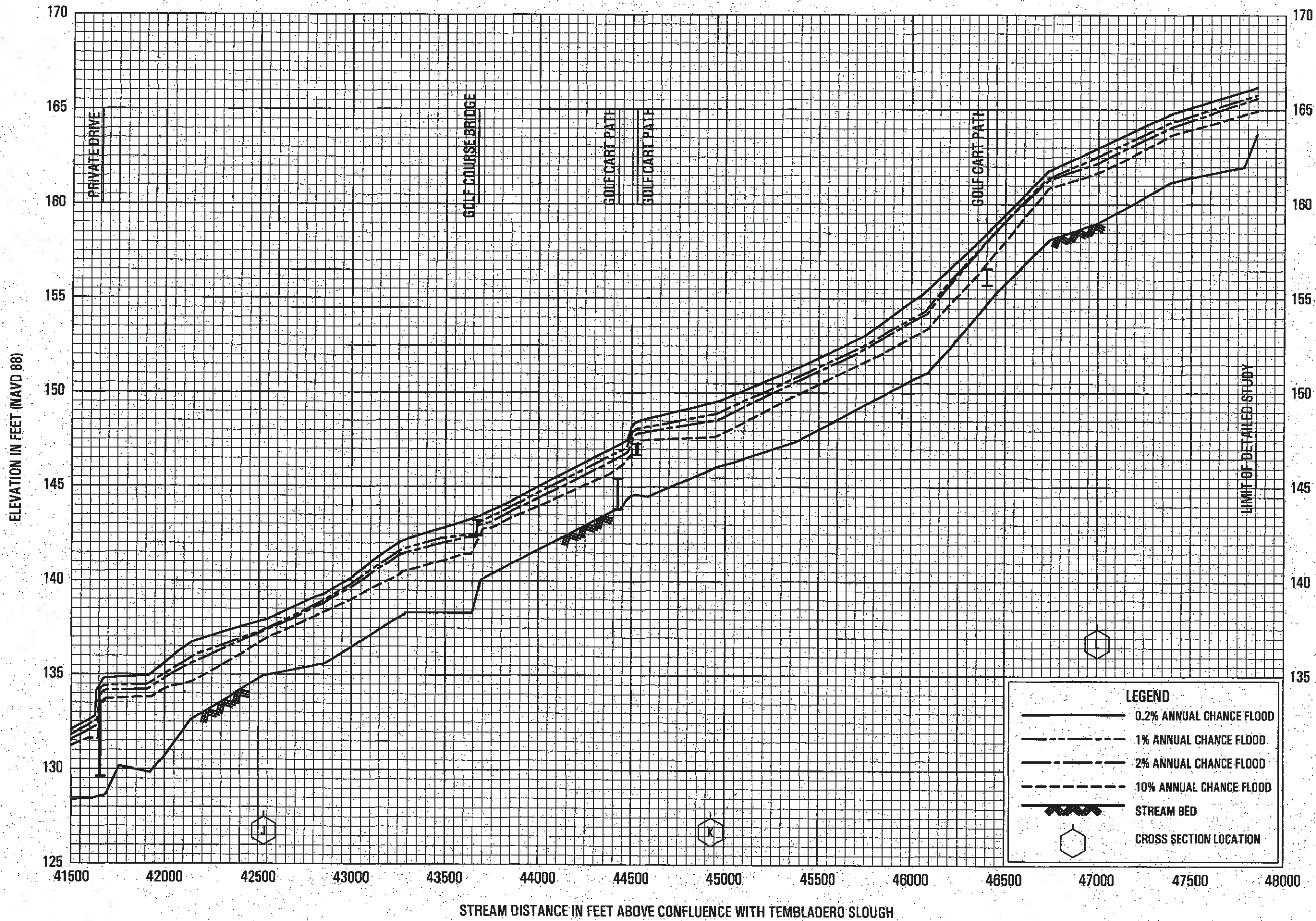
FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
 AND INCORPORATED AREAS





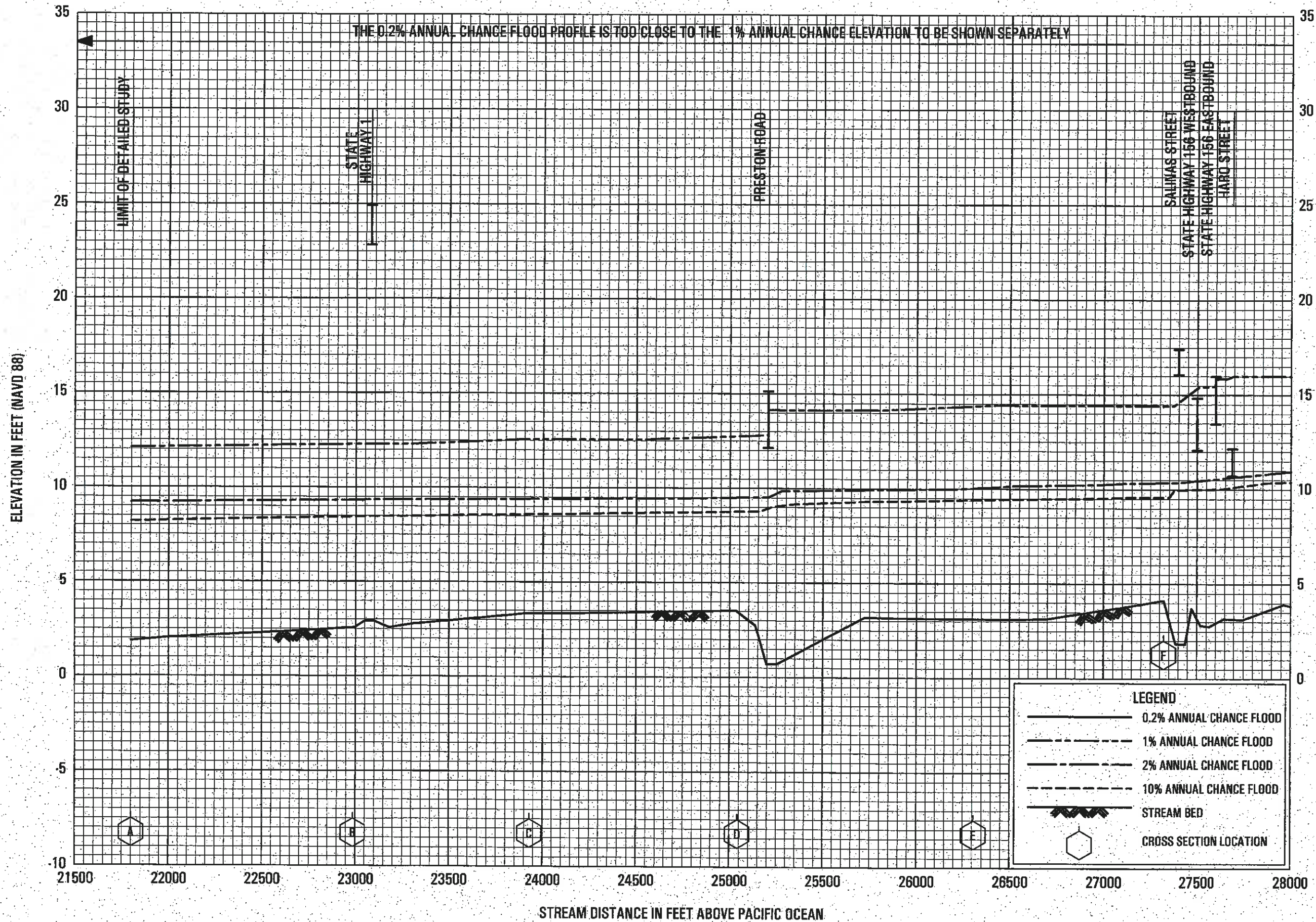
FLOOD PROFILES
SANTA RITA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
AND INCORPORATED AREAS



FLOOD PROFILES
SANTA RITA CREEK

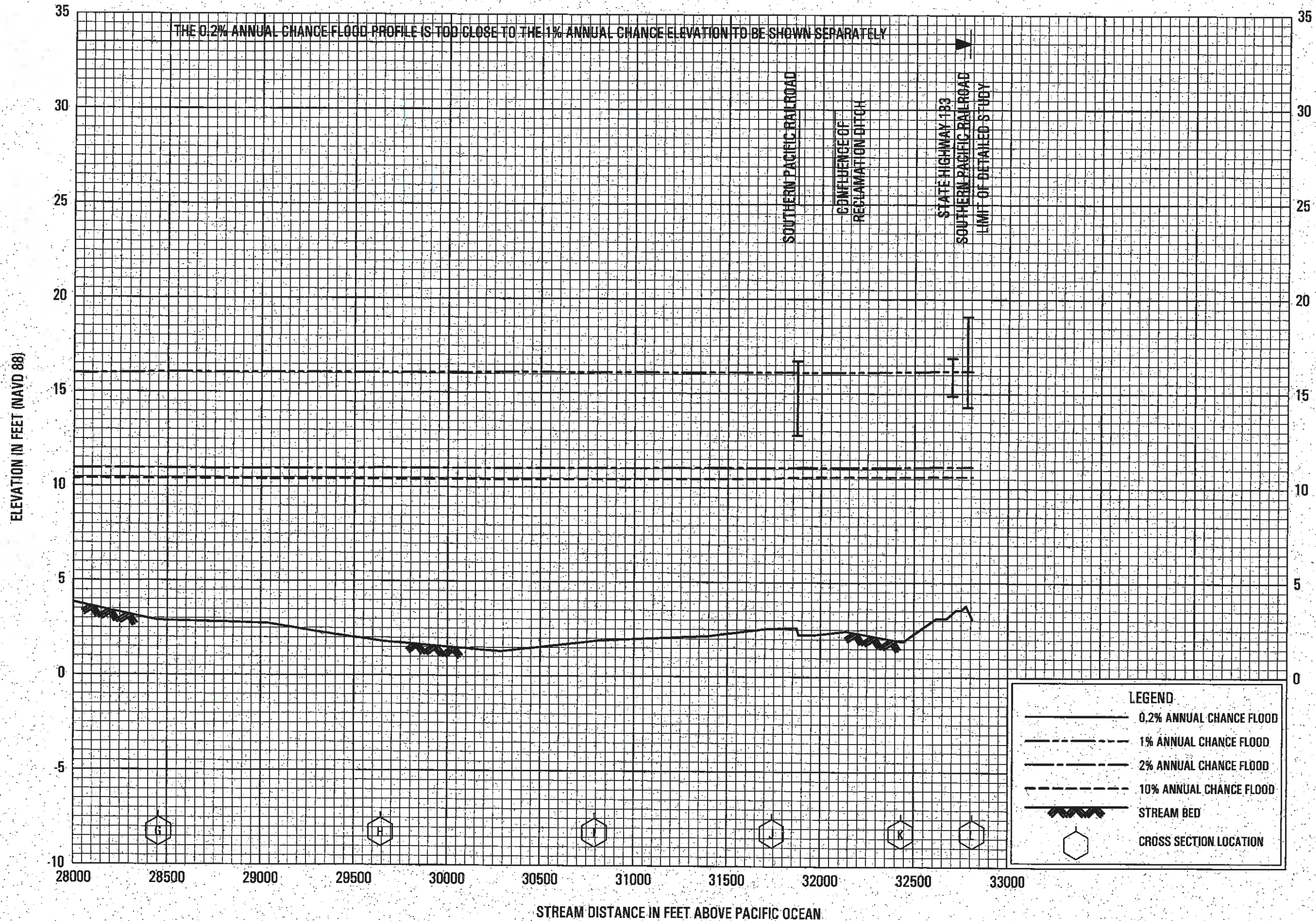
FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
AND INCORPORATED AREAS



FLOOD PROFILES

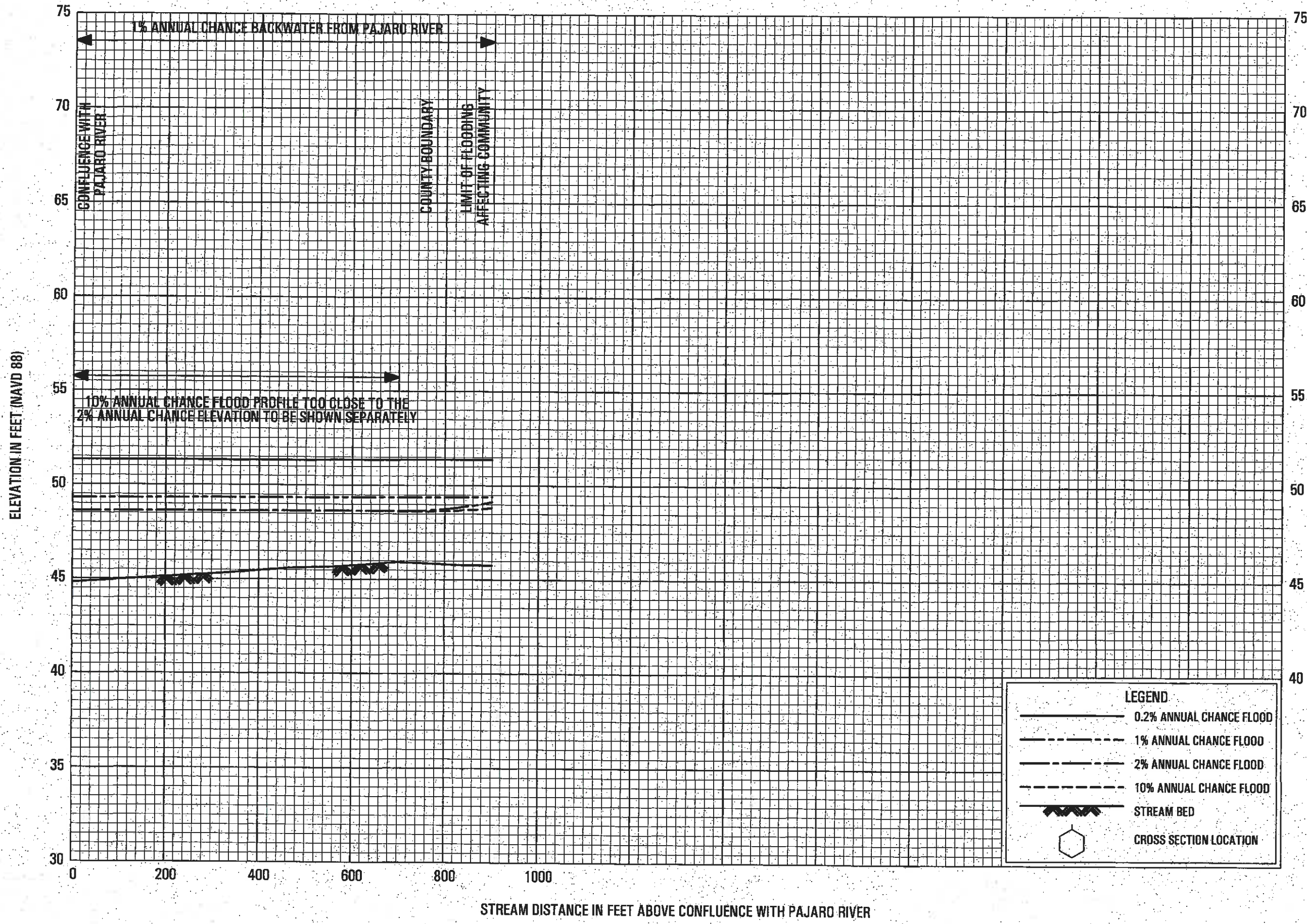
TEMLADERO SLOUGH

FEDERAL EMERGENCY MANAGEMENT AGENCY
 MONTEREY COUNTY, CA
 AND INCORPORATED AREAS



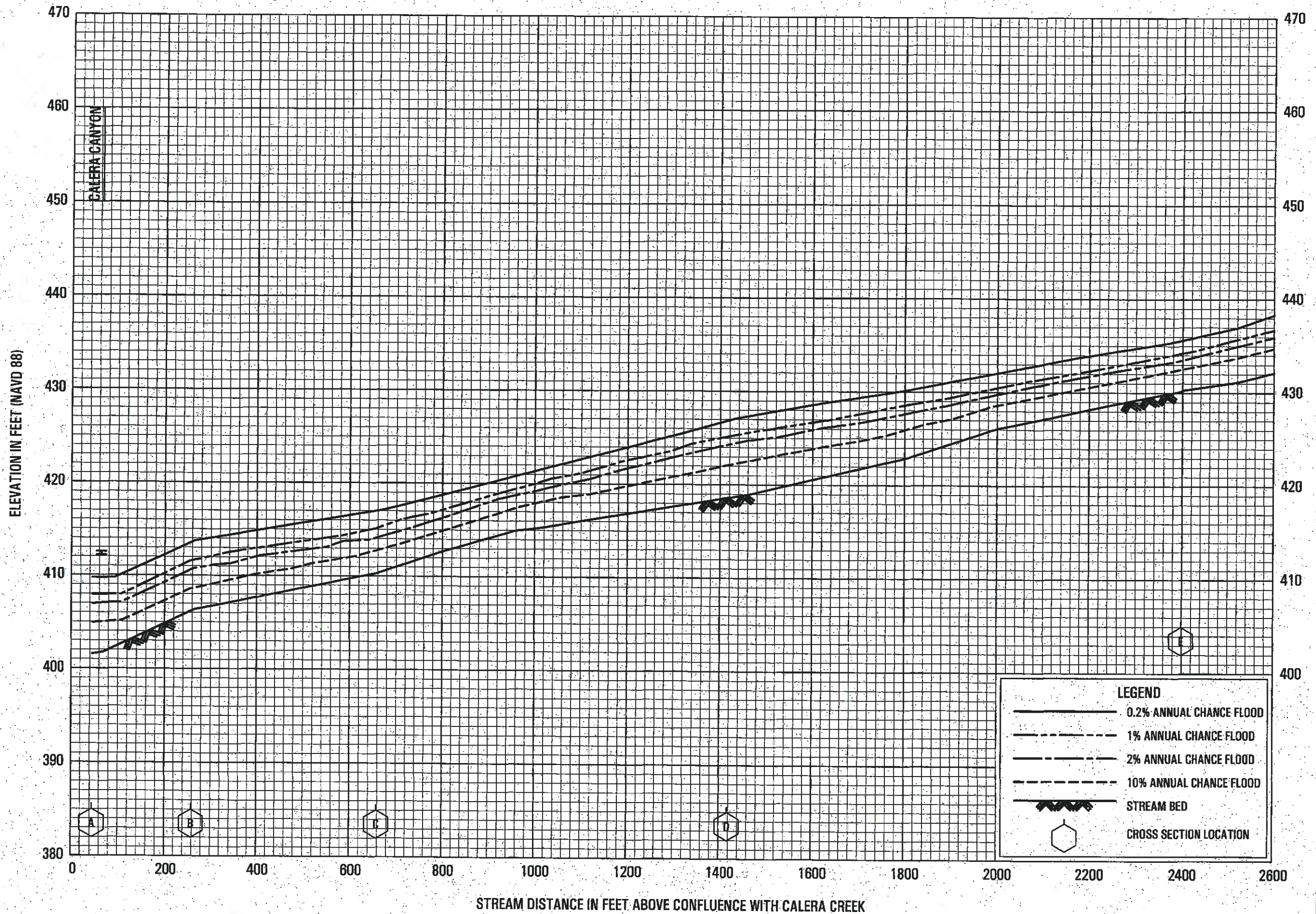
FLOOD PROFILES
TEMLADERO SLOUGH

FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
AND INCORPORATED AREAS



FLOOD PROFILES
THOMASELLO CREEK

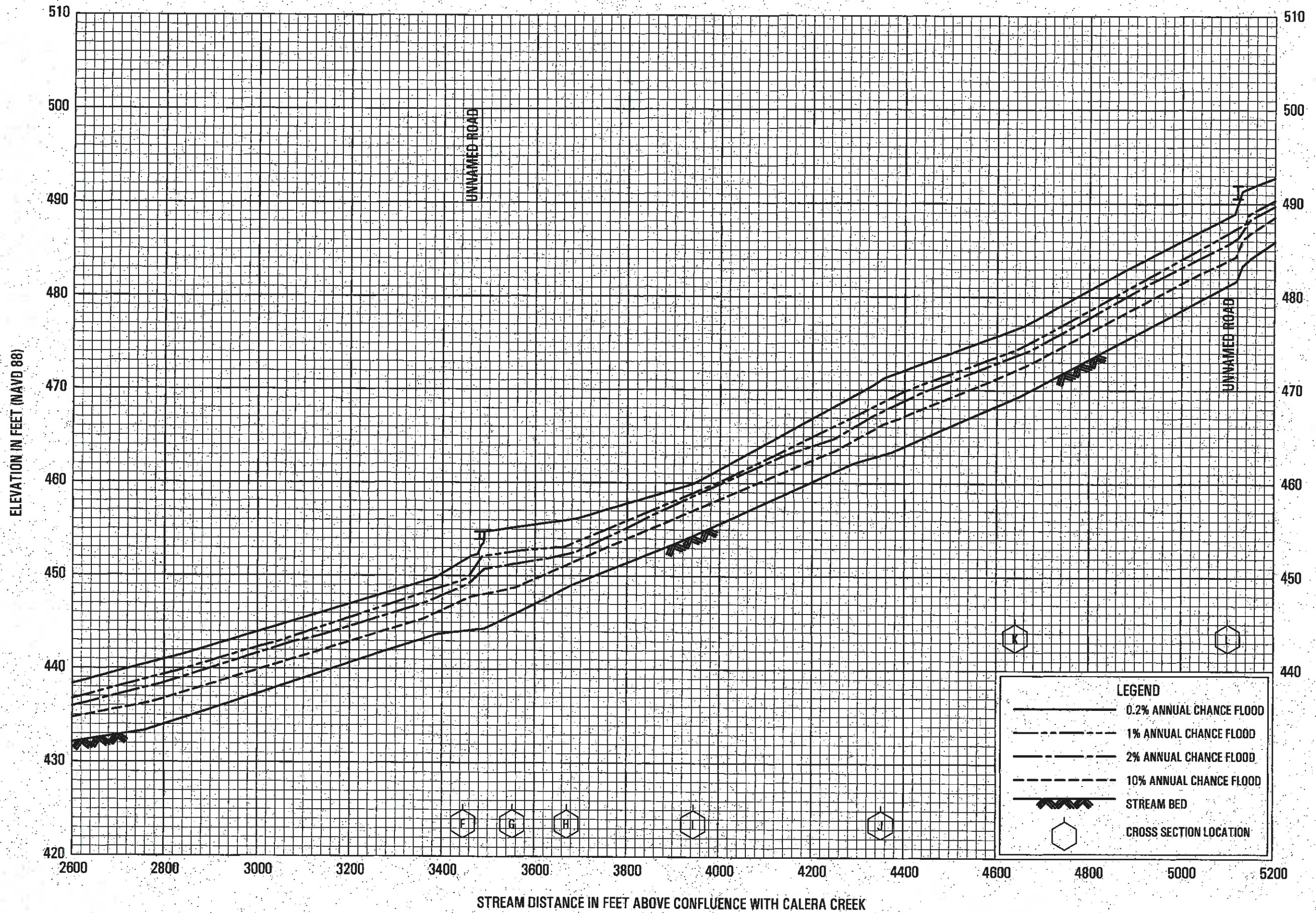
FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
AND INCORPORATED AREAS



FLOOD PROFILES

WATSON CREEK

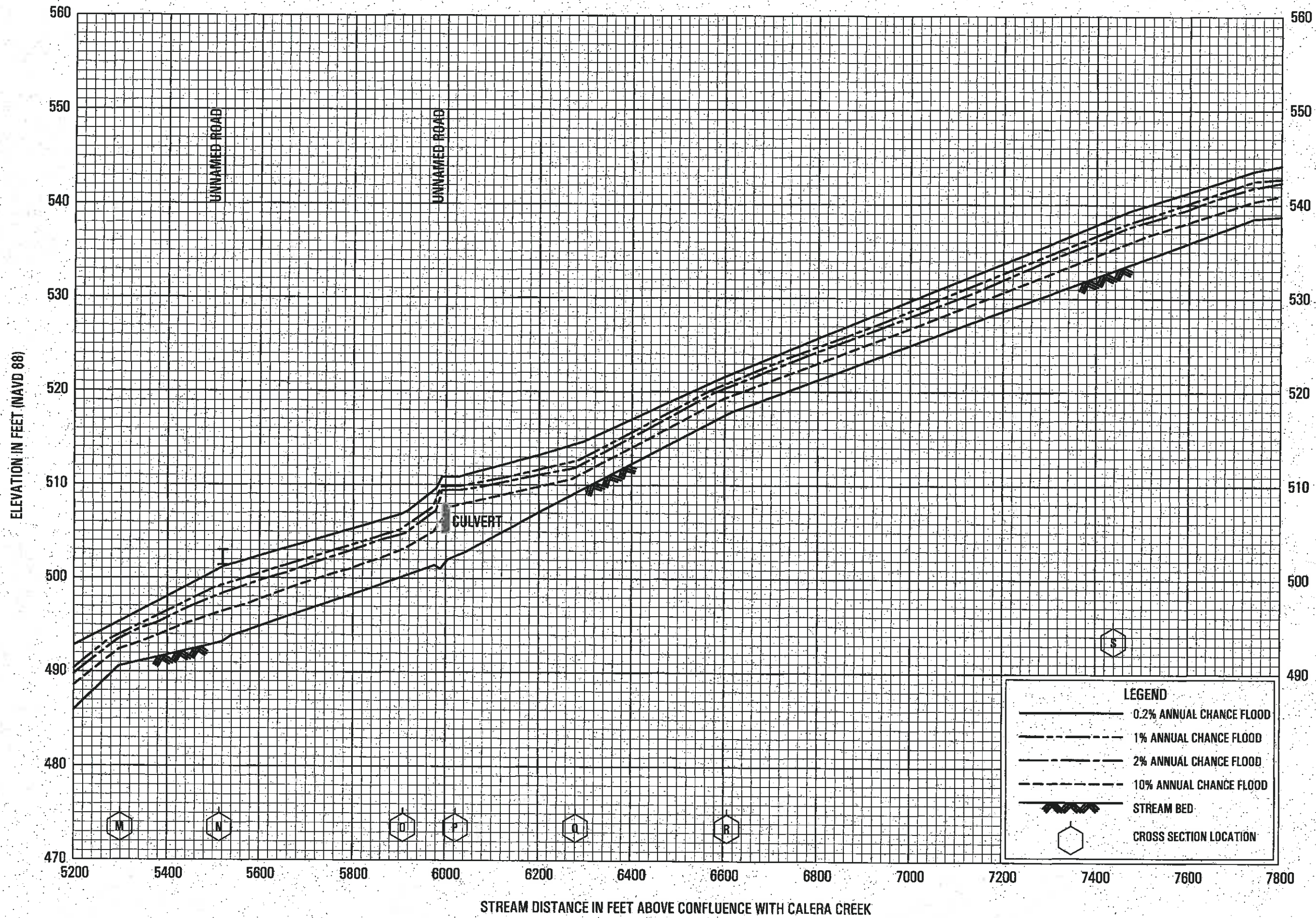
FEDERAL EMERGENCY MANAGEMENT AGENCY
 MONTEREY COUNTY, CA
 AND INCORPORATED AREAS



FLOOD PROFILES

WATSON CREEK

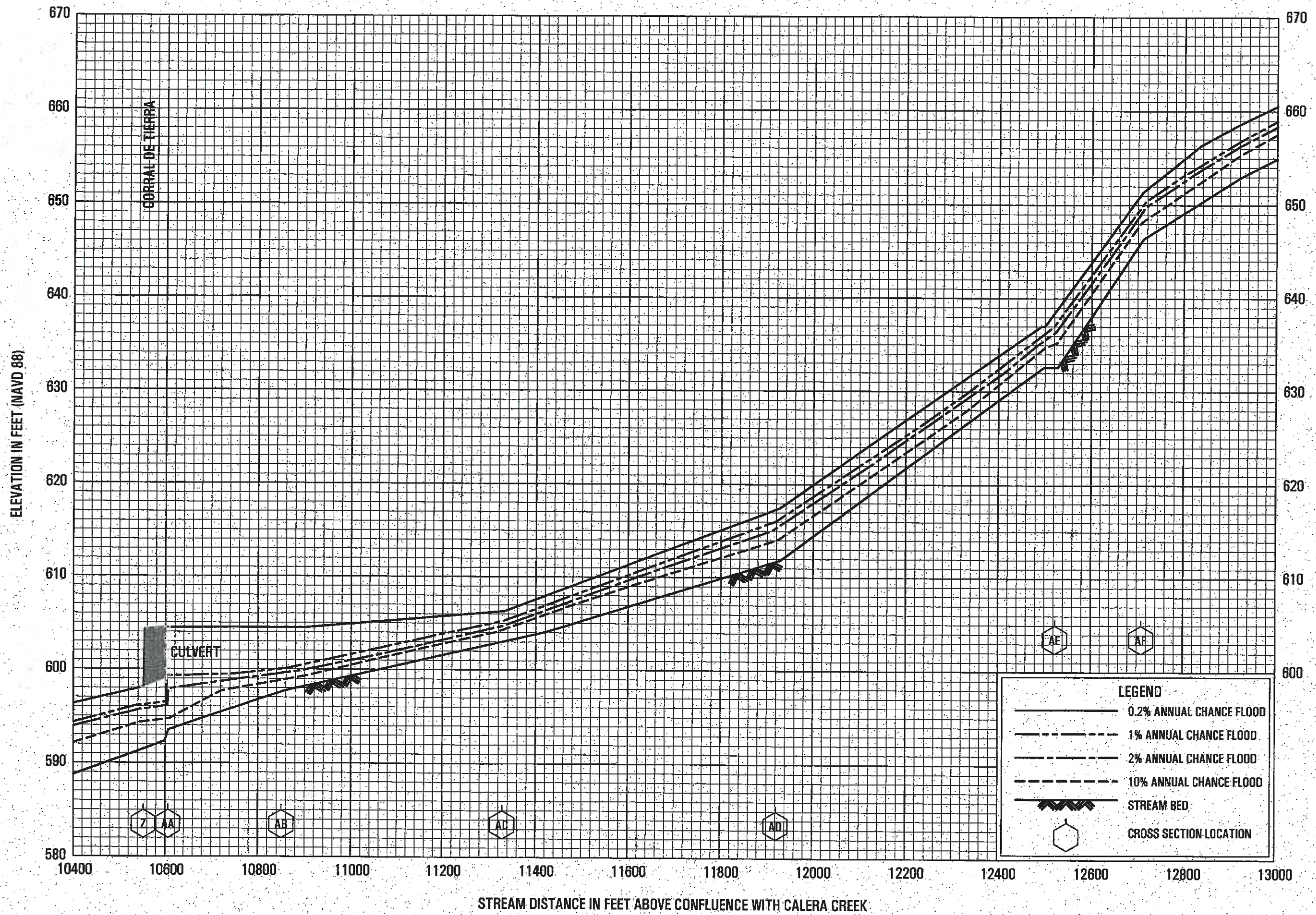
FEDERAL EMERGENCY MANAGEMENT AGENCY
 MONTEREY COUNTY, CA
 AND INCORPORATED AREAS



FLOOD PROFILES

WATSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
 MONTEREY COUNTY, CA
 AND INCORPORATED AREAS

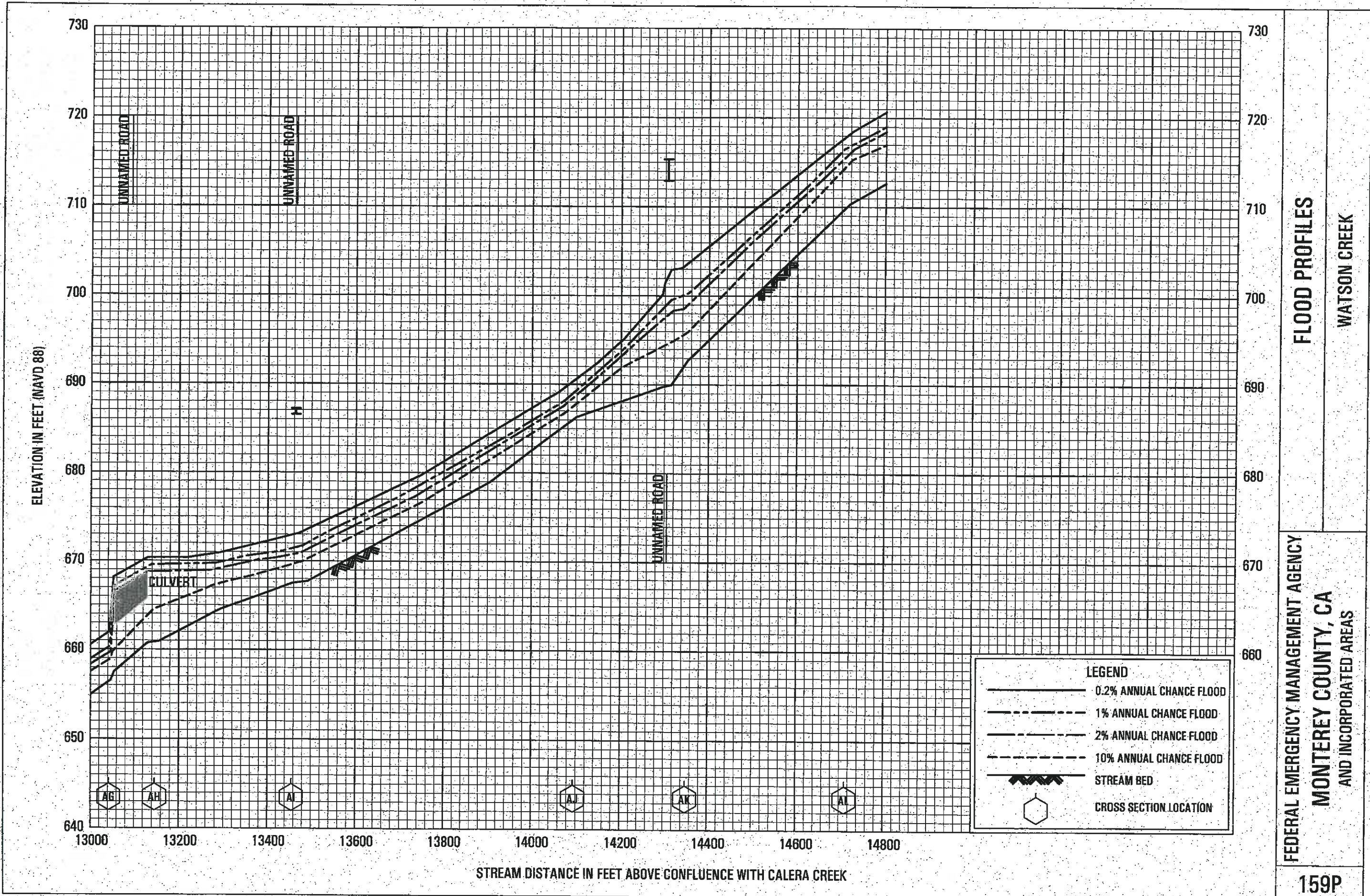


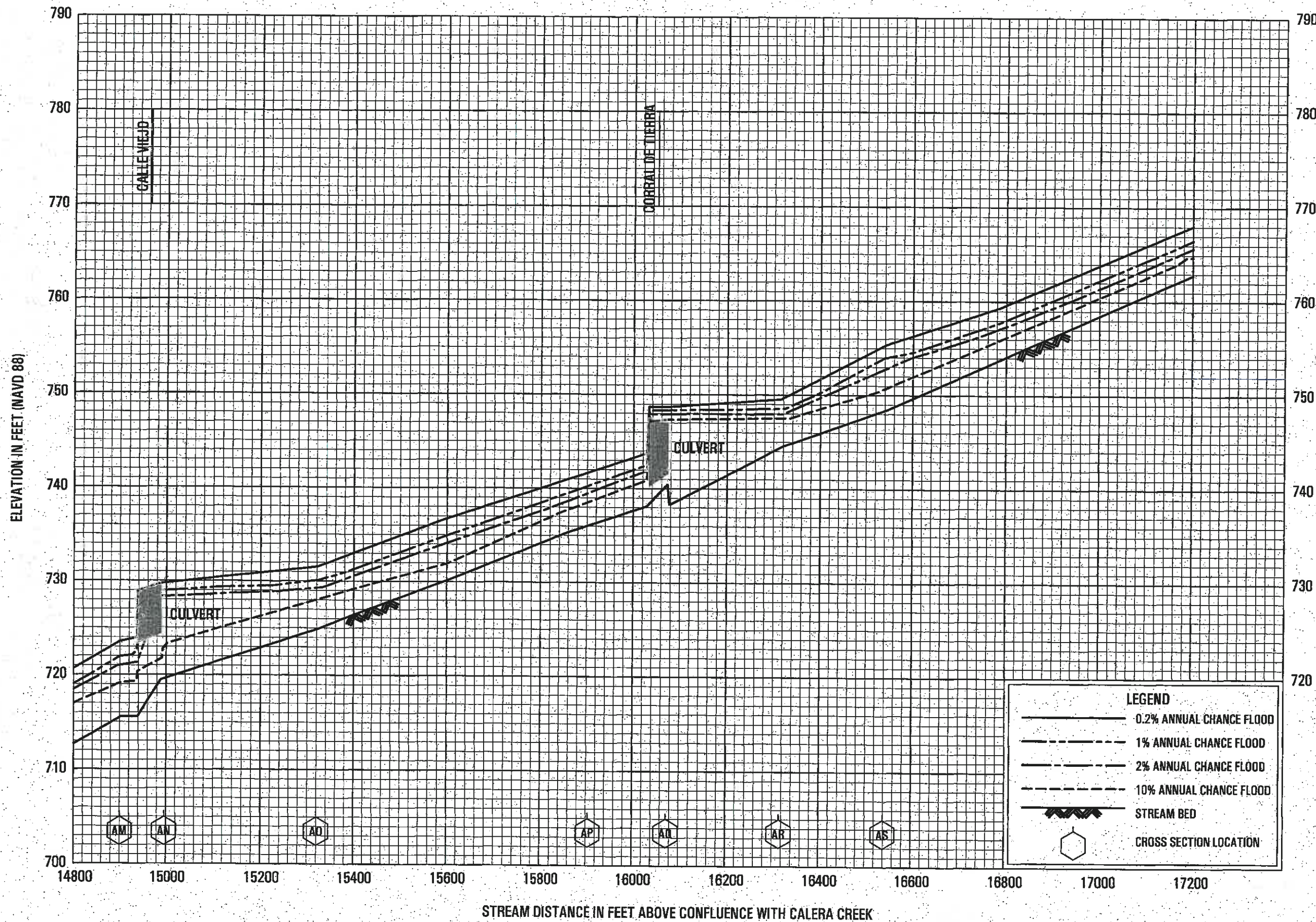
LEGEND

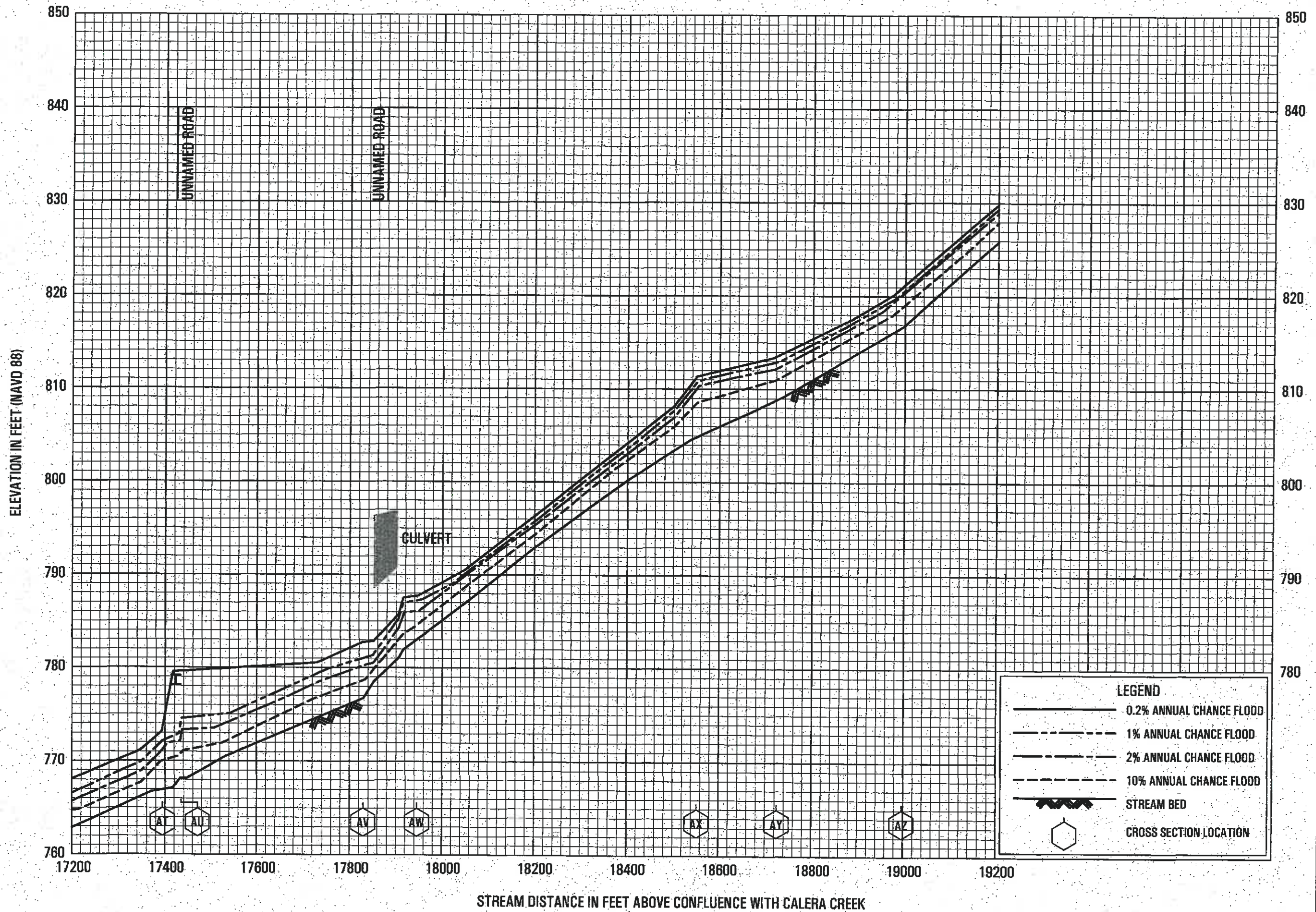
- 0.2% ANNUAL CHANCE FLOOD
- - - 1% ANNUAL CHANCE FLOOD
- · - 2% ANNUAL CHANCE FLOOD
- - - - 10% ANNUAL CHANCE FLOOD
- ▲▲▲▲— STREAM BED
- ⬡ CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY
 MONTEREY COUNTY, CA
 AND INCORPORATED AREAS

FLOOD PROFILES
 WATSON CREEK







FLOOD PROFILES

WATSON CREEK

**FEDERAL EMERGENCY MANAGEMENT AGENCY
MONTEREY COUNTY, CA
AND INCORPORATED AREAS**

