Appendix E

Flood Analysis References Include:

- Flood Insurance Rate Maps (FIRM)
- Flood Insurance Study

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later and from National Geospatial Intelligence Agency imagery produced at a scale of 1:4,000 from photography dated 2003 or later.

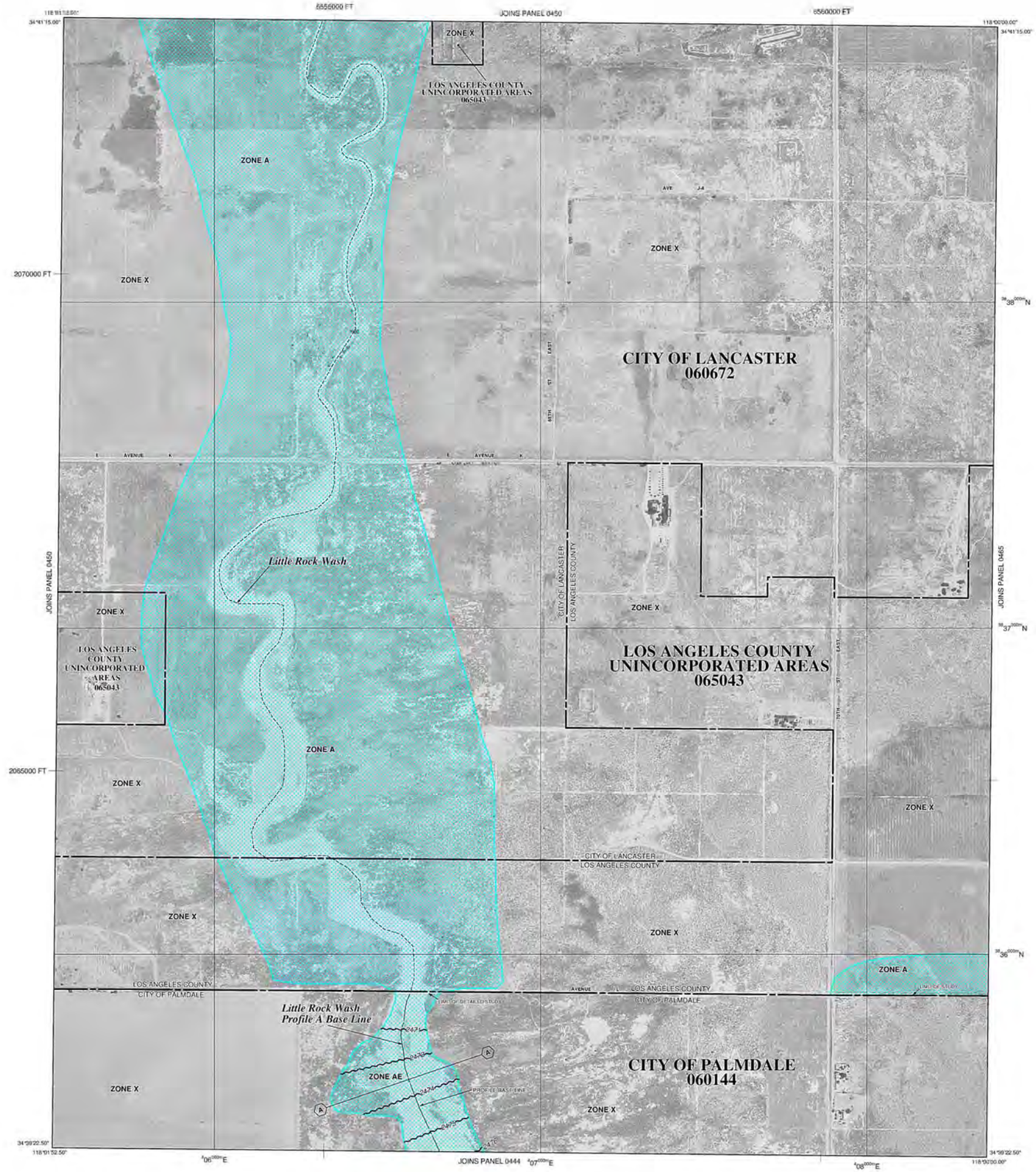
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

This 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 - - - - - 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid values, zone 11
6000000 FT	5000-foot grid ticks: California State Plane coordinate system, V zone (FIPSZONE 0405), Lambert Conformal Conic
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 26, 2008
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0442F

FIRM
FLOOD INSURANCE RATE MAP
LOS ANGELES COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 442 OF 2350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0442	F
LANCASTER, CITY OF	060672	0442	F
PALMDALE, CITY OF	060144	0442	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06037C0442F

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

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Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

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SSMC-3, #9202
1315 East-West Highway
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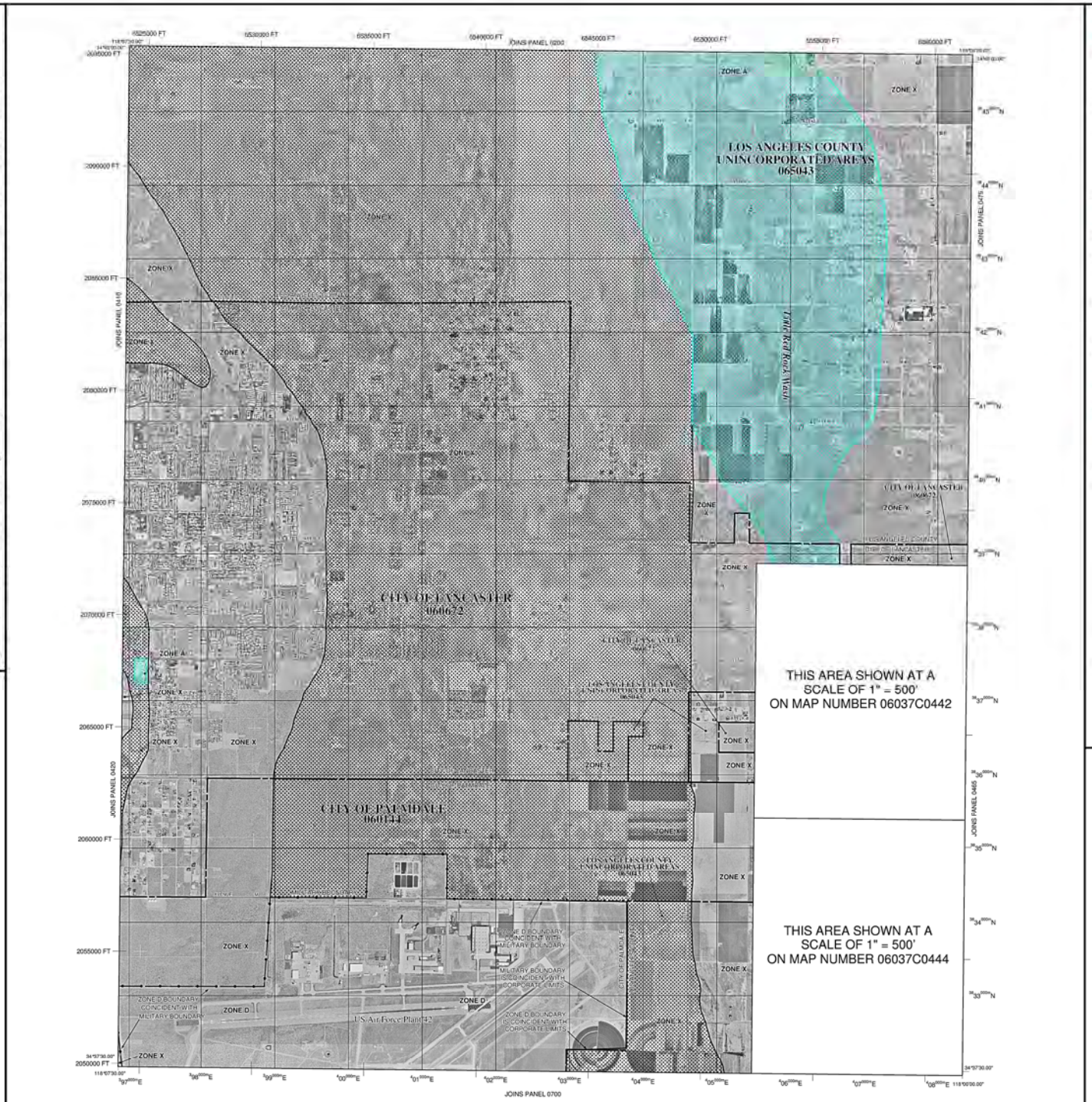

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are generally depicted within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- (A)—(A) Cross section line
- (23)———(23) Transect line
- 97°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid values, zone 11
- 6500000 FT — 5000-foot grid ticks: California State Plane coordinate system, V zone (FIPSZONE 0405), Lambert Conformal Conic
- 5000000 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- • M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 26, 2008
EFFECTIVE DATES OF REVISIONS TO THIS PANEL

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To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET

600 0 600 1200 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0450F

FIRM

FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 450 OF 2350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0450	F
LANCASTER, CITY OF	060672	0450	F
PALMDALE, CITY OF	060144	0450	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06037C0450F

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

NOTES TO USERS

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Flood Elevations shown on this map apply only landward
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at http://www.ngs.noaa.gov/ or contact the National Geodetic
llowing address:

Services

Survey

Highway
20910-3282

elevation, description, and/or location information for **bench marks**
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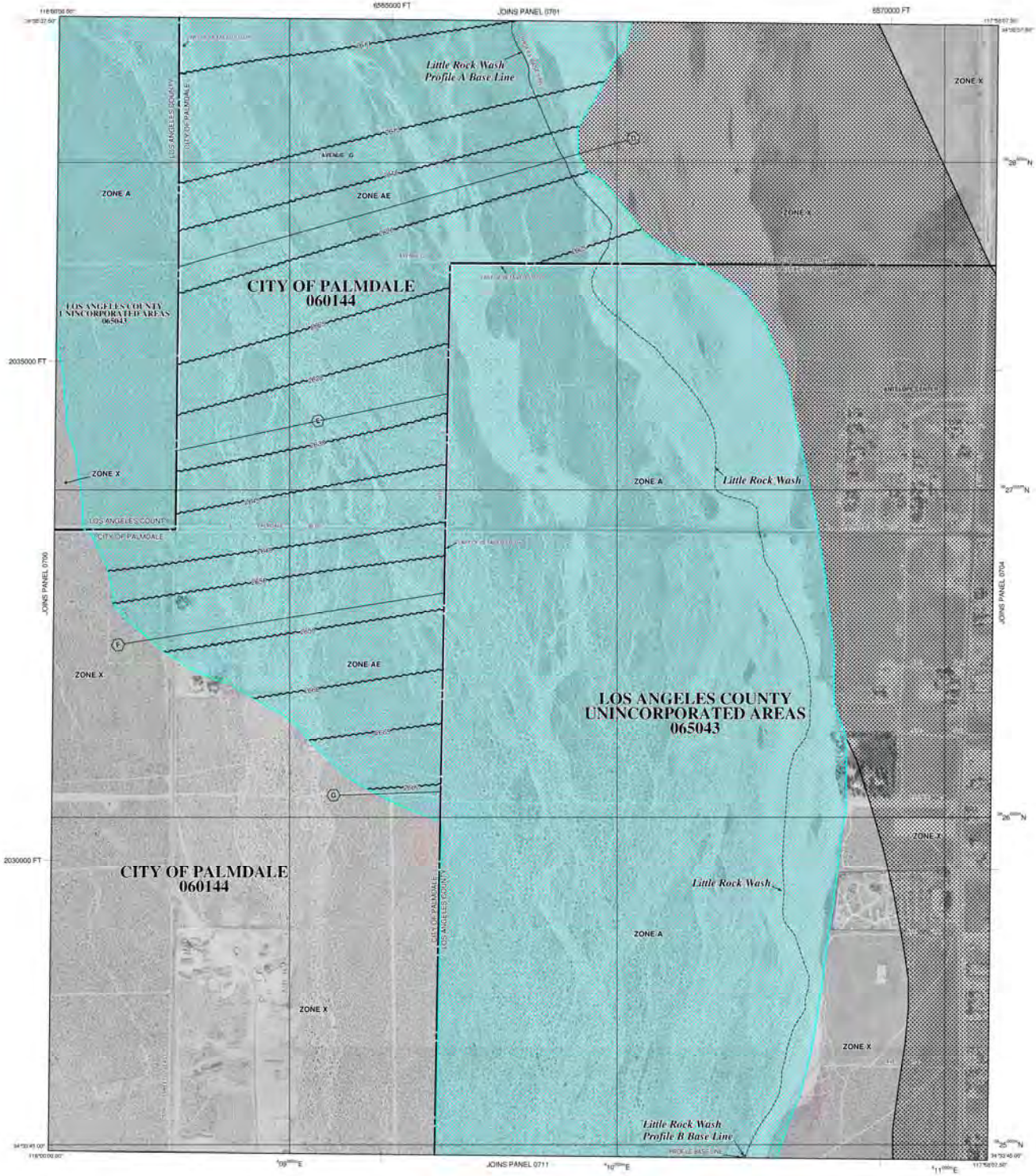

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

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ZONE A	No Base Flood Elevations determined.
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ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increase in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

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* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

(A)———(A)	Cross section line
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MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 26, 2008
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0703F

FIRM

FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 703 OF 2350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0703	F
PALMDALE, CITY OF	060144	0703	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06037C0703F

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

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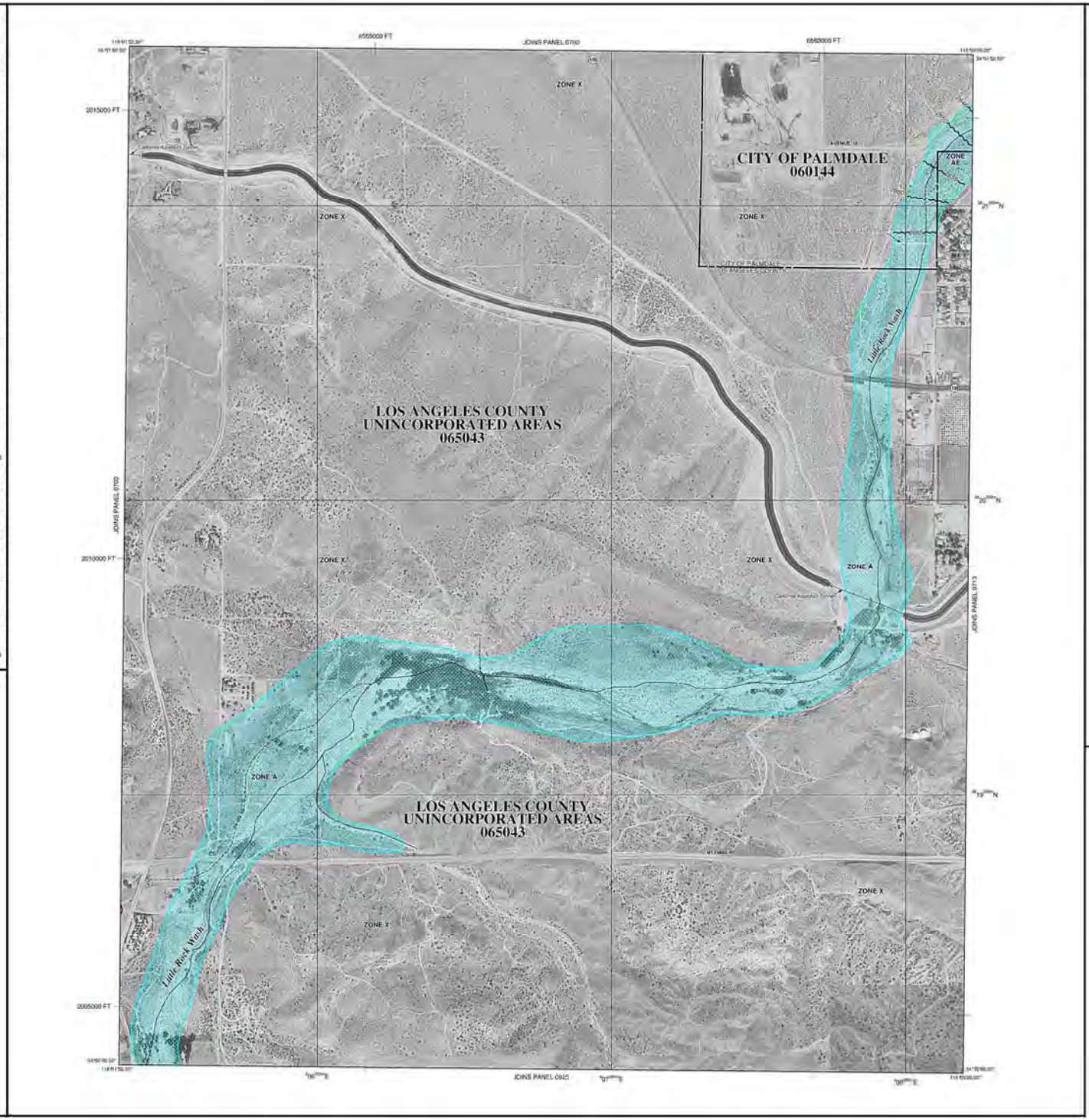
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A: Cross section line
- 23 - - - - - 23: Transect line
- 97°07'30", 32°22'30": Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4319000 m N: 1000-meter Universal Transverse Mercator grid values, zone 11
- 4000000 FT: 5000-foot grid ticks: California State Plane coordinate system, V zone (FIPSZONE 0405), Lambert Conformal Conic
- DX5510: Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5: River Mile

MAP REPOSITORIES:
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 26, 2008
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0694F

FIRM

FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 694 OF 2350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	0694	F
PALMDALE, CITY OF	060144	0694	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06037C0694F

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

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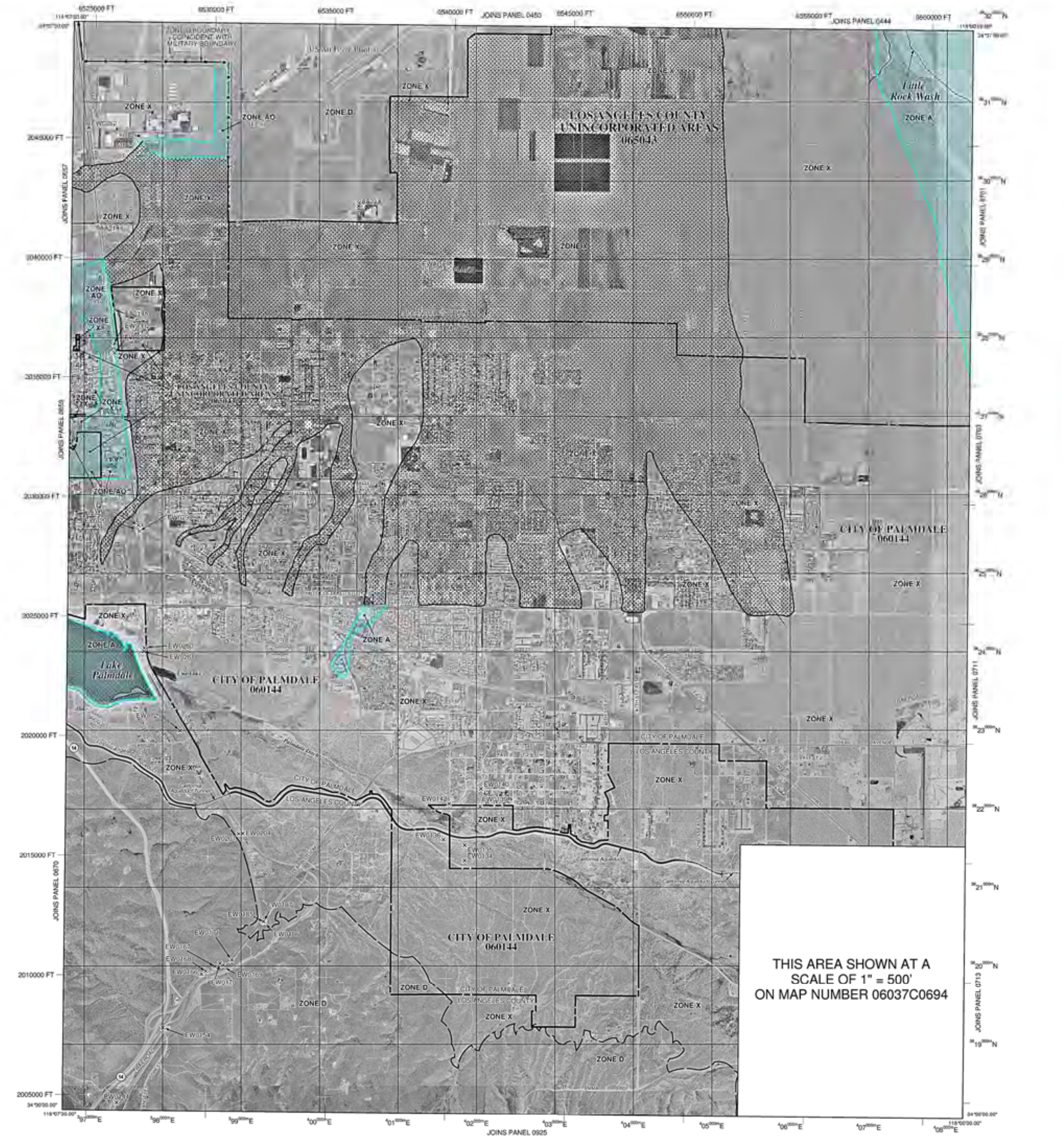

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NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0700F

FIRM
FLOOD INSURANCE RATE MAP
LOS ANGELES COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 700 OF 2350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
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PALMDALE,CITY OF	060144	0700	F

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MAP NUMBER
06037C0700F

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

FLOOD INSURANCE STUDY

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

VOLUME 1 OF 4

Community Name	Community Number	Community Name	Community Number	Community Number	Community Name	Community Number	Community Number
LOS ANGELES COUNTY, UNINCORPORATED AREAS	065043	DIAMOND BAR, CITY OF	060741	LAWNDALE, CITY OF*	060134	SAN DIMAS, CITY OF	060154
AGOURA HILLS, CITY OF	065072	DOWNEY, CITY OF	060645	LOMITA, CITY OF*	060135	SAN FERNANDO, CITY OF*	060628
ALHAMBRA, CITY OF*	060095	DUARTE, CITY OF	065026	LONG BEACH, CITY OF	060136	SAN GABRIEL, CITY OF*	065055
ARCADIA, CITY OF	065014	EL MONTE, CITY OF*	060658	LOS ANGELES, CITY OF	060137	SAN MARINO, CITY OF*	065057
ARTESIA, CITY OF*	060097	EL SEGUNDO, CITY OF	060118	LYNWOOD, CITY OF	060635	SANTA CLARITA, CITY OF	060729
AVALON, CITY OF	060098	GARDENA, CITY OF	060119	MALIBU, CITY OF	060745	SANTA FE SPRINGS, CITY OF	060158
AZUSA, CITY OF	065015	GLENDALE, CITY OF	065030	MANHATTAN BEACH, CITY OF	060138	SANTA MONICA, CITY OF	060159
BALDWIN PARK, CITY OF*	060100	GLENDORA, CITY OF	065031	MAYWOOD, CITY OF*	060651	SIERRA MADRE, CITY OF	065059
BELL GARDENS, CITY OF	060656	HAWAIIAN GARDENS, CITY OF*	065032	MONROVIA, CITY OF	065046	SIGNAL HILL, CITY OF*	060161
BELL, CITY OF*	060101	HAWTHORNE, CITY OF*	060123	MONTEBELLO, CITY OF	060141	SOUTH EL MONTE, CITY OF*	060162
BELLFLOWER, CITY OF	060102	HERMOSA BEACH, CITY OF	060124	MONTEREY PARK, CITY OF*	065047	SOUTH GATE, CITY OF	060163
BEVERLY HILLS, CITY OF*	060655	HIDDEN HILLS, CITY OF	060125	NORWALK, CITY OF	060652	SOUTH PASADENA, CITY OF*	065061
BRADBURY, CITY OF	065017	HUNTINGTON PARK, CITY OF*	060126	PALMDALE, CITY OF	060144	TEMPLE CITY, CITY OF	060653
BURBANK, CITY OF	065018	INDUSTRY, CITY OF	065035	PALOS VERDES ESTATES, CITY OF	060145	TORRANCE, CITY OF	060165
CALABASAS, CITY OF	060749	INGLEWOOD, CITY OF*	065036	PARAMOUNT, CITY OF	065049	VERNON, CITY OF*	060166
CARSON, CITY OF	060107	IRWINDALE, CITY OF*	060129	PASADENA, CITY OF	065050	WALNUT, CITY OF	065069
CERRITOS, CITY OF	060108	LA CANADA FLINTRIDGE, CITY OF	060669	PICO RIVERA, CITY OF	060148	WEST COVINA, CITY OF	060666
CLAREMONT, CITY OF	060109	LA HABRA HEIGHTS, CITY OF	060701	POMONA, CITY OF	060149	WEST HOLLYWOOD, CITY OF	060720
COMMERCE, CITY OF	060110	LA MIRADA, CITY OF	060131	RANCHO PALOS VERDES, CITY OF	060464	WESTLAKE VILLAGE, CITY OF	060744
COMPTON, CITY OF	060111	LA PUENTE, CITY OF*	065039	REDONDO BEACH, CITY OF	060150	WHITTIER, CITY OF	060169
COVINA, CITY OF	065024	LA VERNE, CITY OF	060133	ROLLING HILLS ESTATES, CITY OF*	065054		
CUDAHY, CITY OF	060657	LAKEWOOD, CITY OF	060130	ROLLING HILLS, CITY OF	060151		
CULVER CITY, CITY OF	060114	LANCASTER, CITY OF	060672	ROSEMEAD, CITY OF	060153		

*Non-floodprone communities

September 26, 2008

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
06037CV001A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Selected Flood Insurance Rate Map (FIRM) panels for the community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map (FBFM) panels (e.g. floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X (Shaded)
C	X (Unshaded)

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Countywide FIS Effective Date: September 26, 2008

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
LOS ANGELES COUNTY, CALIFORNIA AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Los Angeles County, California, including the Cities of Agoura Hills, Alhambra, Arcadia, Artesia, Avalon, Azusa, Baldwin Park, Bell Gardens, Bell, Bellflower, Beverly Hills, Bradbury, Burbank, Calabasas, Carson, Cerritos, Claremont, Commerce, Compton, Covina, Cudahy, Culver City, Diamond Bar, Downey, Duarte, El Monte, El Segundo, Gardena, Glendale, Glendora, Hawaiian Gardens, Hawthorne, Hermosa Beach, Hidden Hills, Huntington Park, Industry, Inglewood, Irwindale, La Canada Flintridge, La Habra Heights, La Mirada, La Puente, La Verne, Lakewood, Lancaster, Lawndale, Lomita, Long Beach, Los Angeles, Lynwood, Malibu, Manhattan Beach, Maywood, Monrovia, Montebello, Monterey Park, Norwalk, Palmdale, Palos Verdes Estates, Paramount, Pasadena, Pico Rivera, Pomona, Rancho Palos Verdes, Redondo Beach, Rolling Hills Estates, Rolling Hills, Rosemead, San Dimas, San Fernando, San Gabriel, San Marino, Santa Clarita, Santa Fe Springs, Santa Monica, Sierra Madre, Signal Hill, South El Monte, South Gate, South Pasadena, Temple City, Torrance, Vernon, Walnut, West Covina, West Hollywood, Westlake Village, Whittier and the unincorporated areas of Los Angeles County (referred to collectively herein as Los Angeles County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Please note that the Cities of Alhambra, Artesia, Baldwin Park, Bell, Beverly Hills, El Monte, Hawaiian Gardens, Hawthorne, Huntington Park, Inglewood, Irwindale, La Puenta, Lawndale, Lomita, Maywood, Monterey Park, Rolling Hills Estates, San Fernando, San Gabriel, San Marino, Signal Hill, South El Monte, South Pasadena, and Vernon are non-floodprone. This study has developed flood hazard data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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

1.2 Authority and Acknowledgments

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

The FIS was prepared to include the unincorporated areas of, and incorporated areas, within Los Angeles County in a countywide format. Information on the authority and acknowledgements of each jurisdiction included in this countywide FIS, as compiled from their previously printed FIS reports, is shown below.

Hydraulic analyses for unincorporated areas of the County were performed by the Los Angeles County Flood Control District, for FEMA, under Contract No. H-3940. The hydraulic analyses were completed in December 1979. In unincorporated coastal areas, the hydrologic analyses for this study were performed by Dames & Moore, for FEMA, under Contract No. C-0970. This work was completed in 1984.

The hydrologic and hydraulic analyses for the City of Agoura Hills were performed by the Los Angeles County Flood Control District, as reported in the FIS for Los Angeles County, California (Federal Emergency Management Agency, 1980). Hydrologic and hydraulic analyses for the August 3, 1998 restudy were performed for FEMA by Ensign & Buckley under Contract No. EMW-93-C-4151.

Hydraulic analyses for the City of Avalon was performed by the Los Angeles County Flood Control District, for FEMA, under Contract No. H-3940. The hydraulic analyses were completed in 1977. In coastal areas of the City of Avalon, the hydrologic and hydraulic analyses were performed by Tetra Tech, Inc., for FEMA, under Contract No. H-4543. This study was completed in June 1981.

Hydraulic analyses for the Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Lynwood, Paramount, Pico Rivera, and South Gate and for the restudy for Los Angeles County were prepared by Schaaf & Wheeler, Consulting Civil Engineers, the study contractor, for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-86-C-2248. The work for this study was completed on May 15, 1991.

Hydrologic data used in the study of the Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Lynwood, Paramount, Pico Rivera, and South Gate and in the restudy for Los Angeles County, were provided by the U.S. Army Corps of Engineers (USACE), from the "Los Angeles County Drainage Area - Draft Feasibility Report" (LACDA); Appendix A - Hydrology, updated February 1990. As-built plans for the channel and bridges were obtained from the USACE and the California Department of Transportation (CALTRANS).

Hydrologic and hydraulic analyses for the study of the City of Burbank were performed by the Los Angeles County Flood Control District, for the Federal Insurance Administration, under Contract No. H-3940. This work, which was completed in July 1978, covered all significant flooding sources affecting the City of Burbank.

The hydrologic and hydraulic analyses for the January 20, 1999 restudy were performed for FEMA by Ensign & Buckley under Contract No. EMQ-90-C-9133.

Hydrologic and hydraulic analyses for the study of the City of Culver City were performed by the Los Angeles County Flood Control District, for the Federal Insurance Administration, under Contract No. H-3940. This work, which was completed in June 1978, covered all significant flooding sources affecting the City of Culver City.

Hydrologic and hydraulic analysis for Hidden Hills for the Long Valley Storm Drain is based on plans and specifications for the Long Valley Road Storm Drain improvements dated March 27, 1991, and the Project Concept Report for Long Valley Drain dated September 1986. Based on the submitted information, the FIRM was revised to incorporate the effects to construction of Long Valley Drain and Jed Smith Drain storm water improvement projects. Based on this information, the Zone D designations from Long Valley Road near its intersection with Twin Oaks Road to the upstream corporate limits of the City and from Jed Smith Road have been removed. Also, the Zone A area just south of Long Valley Road to just south of Twin Oaks Road has also been changed to Zone X shaded as a result of the information submitted for the Long Valley Storm Drain improvement project.

Hydrologic and hydraulic analyses for the study of the City of La Mirada were performed by the Los Angeles County Flood Control District, for the Federal Insurance Administration, under Contract No. H-3940. This work, which was completed in January 1979, covered all significant flooding sources affecting the City of La Mirada.

Hydrologic and hydraulic analyses for the study of the City of Lancaster were performed by the Los Angeles County Flood Control District, for the Federal Insurance Administration, under Contract No. H-3940. This work, which was completed in March 1979, covered all significant flooding sources affecting the City of Lancaster.

Hydrologic and hydraulic analyses for the original study of the City of Long Beach were performed by the Los Angeles County Flood Control District (LACFCD) and Tetra Tech, Inc., for the Federal Emergency Management Agency (FEMA), under Contract Nos. H-3940 and H-4543. This work was completed in June 1981.

Hydraulic analysis for the restudy of the City of Long Beach was prepared by Schaaf & Wheeler, Consulting Civil Engineers, the study contractor, for FEMA, under Contract No. EMW-86-C-2248. The work for this study was completed on May 15, 1991. Hydrologic data used in this study were provided by the USACE in the "Los Angeles County Area Review - Draft Feasibility Report" (LACDA) Appendix A - Hydrology, updated February 1990. As built plans for the channel and bridges were obtained from the USACE and California Department of Transportation (CALTRANS).

Hydrologic and hydraulic analyses for the study of the City of Los Angeles were performed by Los Angeles County Flood Control District, for FEMA, under Contract No. H-3940. This study was completed in August 1979. In coastal areas,-the hydrologic analyses for this study were performed by Dames & Moore, for FEMA, under Contract No. C-0970. This work was completed in 1984.

The hydraulic analysis for the revised study for the City of Los Angeles was prepared by Schaaf & Wheeler for FEMA under contract No. EMW-86-C-2248. The work for this study was completed on May 15, 1991. Hydrologic data used in this study were provided by the USACE in the "Los Angeles County Area Review - Draft Feasibility Report" (LACDA) Appendix A - Hydrology, updated February 1990. As-built plans for the channel and bridges were obtained from the USACE and California Department of Transportation (CALTRANS). The hydraulic and hydrologic analyses for part two of this restudy were performed for FEMA by Ensign & Buckley under Contract No. EMW-90-C-9133.

Hydrologic and hydraulic analyses for the original study of the City of Montebello were performed by the Los Angeles County Flood Control District (LACFCD), for the Federal Insurance Administration (FIA), under Contract No. H-3940. This work was completed in September 1978.

Hydraulic analysis for the revised study of the City of Montebello was prepared by Schaaf & Wheeler, Consulting Civil Engineers, the study contractor, for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-86-C-2248. The work for this study was completed on May 15, 1991. Hydrologic data used in this study were provided by the USACE in the "Los Angeles County Area Review - Draft Feasibility Report" (LACDA) Appendix A - Hydrology, updated February 1990. As-built plans for the channel and bridges were obtained from the USACE and California Department of Transportation (CALTRANS).

Hydrologic and hydraulic analyses for the original study of the City of Palmdale were performed by the Los Angeles County Flood Control District (LACFCD), for the Federal Emergency Management Agency (FEMA), under Contract No. H-3940. The study was revised by Rick Engineering Company (REC) under Contract No. EMW-84-1639. This study was completed in May 1979, and revised in November 1985. The study was revised again on March 30, 1998 by Ensign & Buckley, for FEMA, under Contract No. EMW-90-C-3133.

Hydrologic and hydraulic analyses for the study of the City of Redondo Beach were performed by Tetra Tech, Inc. and the Los Angeles County Flood Control District, for the Federal Emergency Management

Agency, under Contract Nos. H-4543 and H-3940. This work, which was completed in June 1981, covered all significant flooding sources affecting the City of Redondo Beach.

Hydrologic and hydraulic analyses used to prepare the study of the City of Santa Clarita were performed by the Los Angeles Flood Control District, for the Federal Emergency Management Agency (FEMA), under Contract No. H-3940. This work was completed in 1984.

Hydrologic and hydraulic analyses for the study of the City of Santa Fe Springs were performed by the Los Angeles County Flood Control District, for the Federal Insurance Administration, under Contract No. H-3940. This work, which was completed in October 1978, covered all significant flooding sources affecting the City of Santa Fe Springs.

Hydrologic and hydraulic analyses for the study of the City of Torrance were performed by the Los Angeles County Flood Control District, for the Federal Insurance Administration, under Contract No. H-3940. This work, which was completed in August 1978, covered all significant flooding sources affecting the City of Torrance.

Hydraulic analyses for the study of the City of West Hollywood were performed by the Los Angeles County Flood Control District, for the Federal Emergency Management Agency (FEMA), as part of the Flood Insurance Study for Los Angeles County, California, under Contract No. H-3940. Because the City of West Hollywood was incorporated out of the County of Los Angeles on November 29, 1984, this Flood Insurance Study was prepared by compiling all existing technical and scientific data originally prepared for the Flood Insurance Study for Los Angeles County, California, Unincorporated Areas, dated December 2, 1980 and revised November 15, 1985. The Los Angeles County Flood Insurance Study was completed December 2, 1980 and revised November 15, 1985.

Hydrologic and hydraulic analyses for the study of the City of Whittier were performed by the Los Angeles County Flood Control District, for the Federal Insurance Administration, under Contract No. H-3940. This work, which was completed in August 1978, covered all significant flooding sources affecting the City of Whittier.

In September 2008, HDR Engineering Inc. completed a countywide DFIRM and FIS for the County of Los Angeles. HDR Engineering Inc. was hired as an IDIQ study contractor for FEMA Region IX under contract number EMF-2003-CO-0045, Task Order 15. The DFIRM process included digitizing floodplain boundaries from the effective paper FIRMs and fitting them to a digital base map, thus converting the existing manually produced FIRMs to digitally produced FIRMs, referred to as DFIRMs. Individual community effective FIS reports were also combined into one report for the entire county.

Planimetric Base map information was provided in digital format for FIRM panels. UTM grid and land ownership data were provided by Bureau of Land Management. Information on roads was provided by TIGER/Line Files, U.S. Department of Commerce, U.S. Census Bureau, Geography Division. Digital Orthophotographic Quarter Quadrangles (DOQQ) were provided by USGS. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

The coordinate system used for the production of this FIRM is Universal Transverse Mercator (UTM), North American Datum of 1983 (NAD 83), and GRS 1980 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to NAD 83. Differences in datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features and at the county boundaries. These differences do not affect the accuracy of information shown on the FIRM.

1.3 Coordination

Consultation Coordination Officer's (CCO) meetings may be held for each jurisdiction in this countywide FIS. An initial CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to explain the nature and purpose of a FIS, and to identify the streams to be studied by detailed methods. A final CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to review the results of the study.

The following agencies (Table 1 – Contacted Agencies) were contacted in an attempt to explore all possible sources of data. Information describing hydrological conditions, drainage patterns, historical storm systems, tides, and waves as well as information on the topography, roads, beach profiles, shelf bathymetry flood protection structures (sea walls, breakwaters), and the demography of communities of Los Angeles County was sought from:

Table 1 - CONTACTED AGENCIES

California Coastal Commission	California Department of Transportation	California State Department of Boating and Waterways
California State Office of Emergency Services	CH2M Hill, Inc.	City of Santa Monica
Department of Defense	Fleet Numerical Weather Center	Los Angeles County Engineers Facilities
Los Angeles County Flood Control District	Los Angeles County Office of Emergency Services	Los Angeles County Regional Planning Department
Los Angeles Public Library	National Climatic Center	National Oceanic and Atmospheric Administration
National Oceanic and Atmospheric Administration, Eastern	National Oceanic and Atmospheric Administration, Tide Predictions Branch	National Weather Service, Los Angeles
Pacific Hurricane Center	Santa Catalina Island Company	Scripps Institute of Oceanography
Security Pacific Bank	Small Business Administration	South Coast Regional Coastal Commission
U.S. Army Corps of Engineers, Coastal Engineering Research Center	U.S. Army Corps of Engineers, Los Angeles District	U.S. Army Corps of Engineers, Waterways Experiment Station
U.S. Department of Defense, Fleet Numerical Weather Center	U.S. Geological Survey	

The State Coordinator was involved in these study efforts through the San Francisco Regional office of the Federal Emergency Management Agency.

For unincorporated areas of Los Angeles County, an initial coordination meeting attended by representatives of the County, FEMA, the California State Department of Water Resources, and the study contractor was held in February 1976. The purpose of the meeting was to discuss the nature and scope of the study and to determine the areas to be studied by detailed and approximate methods.

During the course of the study, representatives of the County were contacted to gather the latest relevant information. Flood elevations and flood boundaries were reviewed with appropriate county officials.

The U.S. Soil Conservation Service; the U.S. Army Corps of Engineers; the U.S. Geological Survey, Water Resources Division; the California State Departments of Water Resources and Transportation; and the Southern Pacific (now Union Pacific) Transportation Company were contacted and provided information used in this report.

The preliminary results of the Los Angeles County study for unincorporated areas were reviewed at four intermediate coordination meetings. The Antelope Valley meeting was held on January 22, 1979; the Santa Clarita Valley meeting on July 10, 1979; and the Malibu meetings on March 3 and 4, 1980. Representatives of FEMA, the study contractor, the Office of the County Engineer, and interested citizens, attended all meetings.

The results of this study were reviewed at a final coordination meeting held on May 7, 1980. Attending the meeting were representatives of FEMA, the study contractor, the Office of the County Engineer, and the county. No problems were raised at the meeting.

On January 26, 1984, Dames & Moore was instructed by FEMA to proceed with an existing data study for the City of Agoura Hills, using the detailed study data from the Los Angeles County FIS.

In preparing the Los Angeles County FIS, the State Department of Water Resources, the U.S. Geological Survey, and the U.S. Army Corps of Engineers were contacted for information and data. In addition, the U.S. Soil Conservation Service and the Southern Pacific Transportation Company were also contacted.

In preparing this existing data study, the City of Agoura Hills was contacted for information regarding cultural features and existing conditions in the community.

The final CCO meeting for this study was held on December 20, 1984, and was attended by representatives of FEMA, the study contractor, and the City of Agoura Hills. No problems were raised at this meeting.

The initial CCO meeting for the August 3, 1998 revision was held on October 12, 1995, and attended by representatives of the City of Agoura Hills and the study contractor. Available data were discussed, and a field reconnaissance was performed jointly with the City of Agoura Hills. The scope of methods of study were proposed to, and agreed upon, by FEMA and the City of Agoura Hills.

An initial coordination meeting for study of the City of Avalon, attended by representatives of the City, FEMA, the State Department of Water Resources, and the Flood Control District, was held in February 1976. The purpose of the meeting was to discuss the nature and scope of the study and to determine the areas which would be studied by detailed and approximate methods.

During the course of the work done by the Los Angeles County Flood Control District on the City of Avalon, flood elevations and flood boundaries were reviewed with appropriate community officials.

On December 14, 1976, the preliminary results of the work were reviewed at an intermediate coordination meeting. Representatives of the Los Angeles County Flood Control District, FEMA, the State Department of Water Resources, and the offices of the City Engineer, Manager, and Planning attended the meeting.

The final coordination meeting for the City of Avalon was held on November 9, 1977. Representatives of the City, FEMA, and the study contractor attended the meeting. No major problems with the study were found at the meeting.

For information pertinent to coastal areas within the City of Avalon, used to revise and update the study, numerous agencies were contacted in an attempt to explore all possible sources of data. Information describing hydrological conditions, drainage patterns, historical storm systems, tides, and waves as well as information on the topography, roads, benchmarks, beach profiles, shelf bathymetry flood protection structures (seawalls, breakwaters), and the demography of coastal areas was sought.

The initial Consultation Coordination Officer (CCO) meeting for the Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Lynwood, Paramount, Pico Rivera, and South Gate, was held on January 28, 1986 and attended by representatives of the Cities of Downey, Long Beach, Lynwood, Vernon, Bellflower, Paramount, Los Angeles County and the Los Angeles County Flood Control District (LACFCD), the USACE, FEMA, and the study contractor.

On April 4, 1991, an interim coordination meeting was held with representatives from FEMA and community officials from the Cities of Pico Rivera, Bellflower, South Gate, Lynwood, Seal Beach, Torrance, Bell Gardens, Signal Hill, Los Angeles, Downey, Long Beach, Compton, Paramount, Lakewood, Carson, Cerritos, Gardena, and Los Angeles County, and representatives of the California Department of Water Resources, the USACE, Los Angeles District, State Senator David Roberti's office, and the study contractor. Preliminary results of the study were presented.

The USACE provided as-built plans of the channel and bridge characteristics along with peak discharge and original design information. They also provided hydrologic and hydraulic information for the study area, from the LACDA Appendix A - Hydrology, updated February 1990, and Hydraulic Appendix dated July 1989. This report will be referred to as the LACDA report. Coordination with the USACE concerning certification of levees, breakout locations and progress of work was on-going during this study. The CALTRANS was helpful in providing information regarding bridge and highway geometric data. Vertical control data to establish the Elevation Reference Marks (ERM) were obtained from the United States Geological Survey (USGS), the United States Coast and Geodetic Survey, and the Cities of Long Beach, Paramount, and Compton.

The results of the study of the Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Lynwood, Paramount, Pico Rivera, South Gate and Los Angeles County were reviewed at the final CCO meeting held on October 30, 1991, and attended by representatives of FEMA, the study contractor, and communities affected by the Los Angeles River and Rio Hondo restudy. All problems raised at that meeting have been addressed in this study.

A final CCO meeting for the restudy of the Los Angeles River and Rio Hondo affecting the City of Los Angeles was held on December 3, 1997. This meeting was attended by representatives of the City of Los Angeles and FEMA. All problems raised at this meeting have been addressed in the restudy.

An initial CCO meeting for the City of Burbank, attended by representatives of the community, the Federal Insurance Administration, the State Department of Water Resources, and the study contractor,

was held in February 1976. The purpose of the meeting was to discuss the nature and scope of the study and to determine the areas to be studied by detailed and approximate methods.

A request for information relevant to the study was made to various governmental and local agencies, including the U.S. Soil Conservation Service; the U.S. Army Corps of Engineers; the U.S. Geological Survey, Water Resources Division; and the State Department of Water Resources.

Drainage deficiency reports and historical flooding information on file at the Los Angeles County Flood Control District were reviewed.

During the course of the work done by the study contractor, flood elevations and flood boundaries were reviewed with appropriate community officials.

On May 18, 1978, the preliminary results of this study were reviewed at an intermediate coordination meeting. Representatives of the study contractor, the Federal Insurance Administration, and the office of the City Engineer attended the meeting.

The results of the study of the City of Burbank were reviewed at a final CCO meeting held on November 2, 1979. Attending the meeting were representatives of the Federal Insurance Administration, the study contractor, and the city. No problems were raised at the meeting.

Results of the January 20, 1999 revision for the City of Burbank were reviewed at a final CCO meeting held on October 15, 1997, and attended by representatives of FEMA and the City of Burbank. All problems raised at this meeting have been addressed in the restudy.

An initial CCO meeting, attended by representatives of the City of Culver City, the Federal Insurance Administration, the California State Department of Water Resources, and the Los Angeles County Flood Control District (the study contractor), was held in February 1976. The purpose of the meeting was to discuss the nature and scope of the study and to determine the areas to be studied by detailed and approximate methods.

The U.S. Soil Conservation Service; the U.S. Army Corps of Engineers; the U.S. Geological Survey, Water Resources Division; and, the California State Department of Water Resources were contacted and provided information used in the study of the City of Culver City.

On May 16, 1978, the preliminary results of the study of the City of Culver City were reviewed at an intermediate coordination meeting. Representatives of the Federal Insurance Administration, the study contractor, and the office of the City Engineer attended the meeting.

The results of the study of the City of Culver City were reviewed at a final CCO meeting held on January 11, 1979. Attending the meeting were representatives of the Federal Insurance Administration, the study contractor, and the City. No problems were raised at the meeting.

An initial CCO meeting was held for the City of La Mirada, attended by the City Engineer and representatives of the Federal Insurance Administration, the California State Department of Water Resources, and the Los Angeles County Flood Control District, in February 1976.

The U.S. Soil Conservation Service, the U.S. Army Corps of Engineers, the U.S. Geological Survey Water Resources Division, and the State Department of Water Resources were contacted for information relevant to the study. During the study, representatives from the Office of the City Engineer were contacted on several occasions to gather the latest possible relevant information. During the course of the

work done by the study contractor, flood information was reviewed with Toups Corporation and VTN Corporation.

Flood elevations and flood boundaries were reviewed with the City Engineer and the Planning Director at a meeting held in the Office of the City Engineer on September 11, 1978. Zoning information supplied by the Planning Director was used to refine the limits of flooding along La Mirada Creek upstream of La Mirada Boulevard.

On October 3, 1978, the preliminary results of the study of the City of La Mirada were reviewed at an intermediate coordination meeting. The meeting was attended by the city planning director and representatives of the study contractor, and the Federal Insurance Administration.

The results of this study were reviewed at a final community coordination meeting held on May 21, 1979. Attending the meeting were representatives of the Federal Insurance Administration, the study contractor, Los Angeles County Flood Control District, and the City. No problems were raised at the meeting.

An initial CCO meeting for the original study of the City of Long Beach, attended by the City Engineer, FEMA, the State Department of Water Resources, and the Los Angeles County Flood Control District (the study contractor), was held in February 1976.

A request for information relevant to the study was made to various governmental and local agencies, including the U.S. Soil Conservation Service; the USACE; the U.S. Geological Survey (USGS), Water Resources Division; the State Department of Water Resources; the California Coastal Commission; the CALTRANS; the State Department of Boating and Waterways; the State Office of Emergency Services; the National Oceanic and Atmospheric Administration; the National Weather Service, Los Angeles; the Fleet Numerical Weather Center; Department of Defense; the Los Angeles County Engineers Facilities; the County Office of Emergency Services; the County Regional Planning Department; CH2M Hill, Inc.; Scripps Institute of Oceanography; the South Coast Regional Coastal Commission; the City Engineer's Office, and the Long Beach Harbor Department.

On October 25, 1978, the preliminary results of this study were reviewed at an intermediate coordination meeting. Representatives of the study contractor, FEMA, and the City Engineer’s Office attended the meeting. No objections were made at this time and the study was acceptable to the community.

The final CCO meeting on the original study of the City of Long Beach was held on October 27, 1982, and was attended by representatives of FEMA, the study contractor, and the city. All problems raised at the meeting were resolved.

The initial CCO meeting for the revised study of the City of Long Beach was held on January 28, 1986 and attended by representatives of the Cities of Downey, Long Beach, Lynwood, Vernon, Bellflower, Paramount, and the LACFCD, the USACE, FEMA, and the study contractor.

On April 4, 1991, an interim coordination meeting was held with representatives from FEMA and community officials from the Cities of Pico Rivera, Bellflower, South Gate, Lynwood, Seal Beach, Torrance, Bell Gardens, Signal Hill, Los Angeles, Downey, Long Beach, Compton, Paramount, Lakewood, Carson, Cerritos, Gardena, and Los Angeles County, and representatives of the California Department of Water Resources, the USACE, Los Angeles District, State Senator David Roberti's office, and the study contractor. Preliminary results of the study were presented.

The results of the re-study of the City of Long Beach were reviewed at the final CCO meeting held on October 30, 1991, and attended by representatives of FEMA, the study contractor, and communities

affected by the Los Angeles River and Rio Hondo restudy. All problems raised at that meeting have been addressed in this study.

An initial CCO meeting on the City of Los Angeles, attended by representatives of FEMA, the California State Department of Water Resources, and the study contractor, was held in February 1976.

Agencies providing information used in this study included: the U.S. Soil Conservation Service; the U.S. Army Corps of Engineers; the U.S. Geological Survey, Water Resources Division; and the California State Department of Water Resources.

During the study, the study contractor reviewed drainage deficiencies and historic flooding information, on file at the Los Angeles County Flood Control District.

In a series of meetings held on November 7 and 9, 1978, the study contractor met with San Fernando Valley Councilpersons to review the flood elevations and flood, plain boundaries affecting their districts.

On November 28, 1978, FEMA and the study contractor, which was attended by representatives of the Mayor's Office, the City Council, the Board of Public Works, the City Planning Department, the Department of Building and Safety, and the City Engineer's Office, conducted a Flood Insurance Study session. A FEMA representative gave a briefing on the current and future status of the city in the National Flood Insurance Program (NFIP). A study contractor representative provided the City Engineer with a preview of the preliminary results of the study.

On November 1 and 9, 1978, and June 5, 1979, the study contractor displayed and explained the flood elevations and flood plain boundaries to the staff of the City Engineer's Offices representing the Harbor, San Fernando Valley, West Los Angeles, and Central Los Angeles Districts.

On July 10, 1979, representatives of FEMA and the study contractor conducted another study session for the City Councilpersons representing the West and Central Los Angeles Districts-in order to explain the city's participation in the NFIP and to review the 1-Percent Annual Chance flooding affecting their districts.

The preliminary results of the City of Los Angeles study were reviewed at three intermediate coordination meetings. The San Fernando Valley meeting was held on December 18, 1978; the Harbor District meeting was held on January 30, 1979; and a joint meeting for both the Central and West Los Angeles Districts was held on July 11, 1979. Representatives of FEMA, the study contractor, and the City Engineer's Office, as well as concerned citizens attended all meetings.

The results of this study were reviewed at a final community coordination meeting held on May 7, 1980, and attended by representatives of FEMA, the study contractor, and the City. No problems were raised at the meeting.

On April 19, 1984, the Los Angeles County Flood Control District submitted information indicating a reduction in flood hazards as a result of Bond Issue Storm Drain Project No. 5204 on Jefferson Boulevard. This information was used to revise Flood Insurance Rate Map Panels 0072, 0073, 0079, and 0080 for the City of Los Angeles.

An initial CCO meeting for the original study of the City of Montebello attended by city officials, the FIA, the State Department of Water Resources, and the study contractor, was held in February 1976. The purpose of the meeting was to discuss the nature and scope of the study and to determine the areas to be studied by detailed and approximate methods.

The U.S. Soil Conservation Service; the USACE; the United States Geological Survey (USGS), Water Resources Division; and the State Department of Water Resources were contacted for information relevant to the study.

While conducting the study, representatives of the City Engineer's office were contacted on several occasions to gather the latest possible relevant information. During the course of the work done by the study contractor, flood elevations and flood boundaries were reviewed with the City Engineer at a meeting held in the City Engineer's office on May 15, 1978.

On August 15, 1978, the preliminary results of this study were reviewed at an intermediate coordination meeting. Representatives of the study contractor, the FIA, and the offices of the City Engineer and City Planning Department attended the meeting.

The results of this original study of the City of Montebello were reviewed at the final community coordination meeting held on January 24, 1979. Attending the meeting were representatives of the FIA, the study contractor, and the City. No problems were raised at this meeting which would affect the technical results of this study.

The initial CCO meeting for the revised study of the City of Montebello was held on January 28, 1986 and attended by representatives of the Cities of Downey, Long Beach, Lynwood, Vernon, Bellflower, Paramount, and the LACFCD, the USACE, FEMA, and the study contractor.

On April 4, 1991, an interim coordination meeting was held with representatives from FEMA and community officials from the Cities of Pico Rivera, Bellflower, South Gate, Lynwood, Seal Beach, Torrance, Bell Gardens, Signal Hill, Los Angeles, Downey, Long Beach, Compton, Paramount, Lakewood, Carson, Cerritos, Gardena, and Los Angeles County, and representatives of the California Department of Water Resources, the USACE, Los Angeles District, State Senator David Roberti's office, and the study contractor. Preliminary results of the study were presented.

The USACE provided as-built plans of the channel and bridge characteristics along with peak discharge and original design information. They also provided hydrologic and hydraulic information for the study area in the LACDA Appendix A - Hydrology, updated February 1990 and Hydraulic Appendix dated July 1989. This report will be referred to as the LACDA report. Coordination with the USACE concerning the certification of the levees, the breakout locations and progress of work was on going during this study. The CALTRANS was helpful in providing information regarding bridge and highway geometric data. Vertical control data to establish the Elevation Reference Marks (ERM) were obtained from the USGS, the United States Coast and Geodetic Survey, and the Cities of Long Beach, Paramount, and Compton.

The results of the study were reviewed at the final CCO meeting for the City of Montebello, held on October 30, 1991, and attended by representatives of FEMA, the study contractor, and communities affected by the Los Angeles River and Rio Hondo restudy. All problems raised at that meeting have been addressed in this study.

An initial CCO meeting for the original study of the City of Palmdale, was held in February 1976, and was attended by city officials, representatives of the Federal Insurance Administration, the California State Department of Water Resources, and the LACFCD.

During the course of study, representatives of the City Engineering Office were contacted on several occasions to gather information. The U.S. Soil Conservation Service; the USACE; the U.S. Geological Survey, Water Resources Division; the California State Departments of Water Resources and

Transportation; and the Southern Pacific Railroad were also contacted and provided information used in this study.

During the course of the study, flood depths were reviewed with appropriate community officials.

On January 22, 1979, the preliminary results of the original study were reviewed at an intermediate coordination meeting attended by representatives of the Federal Insurance Administration, the LACFCD, and the offices of the City Manager and the City Engineer. No problems resulting in changes to the study were encountered at the meeting.

City officials, representatives of FEMA, the California State Department of Water Resources, and REC, attended an initial coordination meeting for the revised study, held in April 1984.

A notice explaining the purpose of the revised study was published in the Antelope Valley Press on October 11, 1984. This notice served as an invitation to interested parties to bring any relevant facts and technical data to the attention of FEMA.

A final CCO meeting for the study of the City of Palmdale was held on January 8, 1986, and attended by representatives of the City of Palmdale, FEMA, and REC. The revised study was found to be acceptable to the City of Palmdale.

On August 23, 1990, an initial CCO meeting for the March 30, 1998 revision for the City of Palmdale was held with representatives of FEMA, the California State Department of Water Resources, the Los Angeles County Department of Public Works, the City of Palmdale, and the study contractor. The stream to be studied and limits of study were identified at the meeting. Available mapping, previous studies, and other data were also identified at the meeting.

During the conduct of the restudy, additional meetings were held among representatives of the California Department of Water Resources, the City of Palmdale, and the study contractor.

The results of this revision were reviewed at a final CCO meeting held on April 24, 1997, and attended by representatives of FEMA and the City of Palmdale. All problems raised at this meeting have been addressed in this restudy.

An initial CCO meeting for the study of the City of Redondo Beach, attended by representatives of the City Engineering Office, the Federal Emergency Management Agency, the State Department of Water Resources, and the Los Angeles County Flood Control District (the study contractor), was held in February 1976. The purpose of the meeting was to discuss the nature and scope of the study and to determine the areas to be studied by detailed and approximate methods.

Representatives of the study contractor reviewed flood elevations and flood boundaries with representatives from the Office of the City Engineer at a meeting held on February 21, 1978. The final community coordination meeting was held on October 27, 1982, and attended by representatives of the Federal Emergency Management Agency, the study contractor, and the city. No problems were raised at this meeting.

An initial CCO meeting for the City of Santa Fe Springs, attended by representatives of the Federal Insurance Administration, the State Department of Water Resources, and the study contractor, was held in February 1976.

Initial contact was made with the city's Director of Public Works on July 6, 1977, to discuss the scope of the study, flooding problems, and study procedures. On several occasions, officials of the city's engineering department were contacted to gather the latest relevant information.

Representatives of the study contractor reviewed flood elevations and flood boundaries with the City Engineer at a meeting held in the City Engineer's office on April 25, 1978.

On August 16, 1978, the preliminary results of this study were reviewed at an intermediate coordination meeting. The meeting was attended by representatives of the study contractor, the Federal Insurance Administration, and the offices of the City Engineer and Public Works Department.

The results of the study of the City of Santa Fe Springs were reviewed at a final CCO meeting held on February 28, 1979. Attending the meeting were representatives of the Federal Insurance Administration, the study contractor, and the City. No problems were raised at the meeting.

An initial CCO meeting for the City of Torrance, attended by city officials, and representatives of the Federal Insurance Administration, the State Department of Water Resources, and the study contractor, was held in February 1976. The purpose of the meeting was to discuss the nature and scope of the study and to determine the areas to be studied by detailed and approximate methods.

During the course of the study, representatives of the City Engineer's office were contacted on several occasions to gather the latest possible relevant information.

The U.S. Soil Conservation Service; the U.S. Army Corps of Engineers; the U.S. Geological Survey, Water Resources Division; and the State Department of Water Resources were contacted for information relevant to the study.

During the course of the work done by the study contractor, flood elevations and flood boundaries were reviewed with appropriate community officials.

On May 16, 1978, the preliminary results of this study were reviewed at an intermediate coordination meeting. The meeting was attended by representatives of the study contractor, the Federal Insurance Administration, and the office of the City Engineer.

A final CCO meeting was held on January 11, 1979, attended by city officials and representatives of the Federal Insurance Administration, and the study contractor. All corrections resulting from the meeting have been incorporated into the study.

An initial coordination meeting for the study of the City of Whittier, attended by city officials, the Federal Insurance Administration, the State Department of Water Resources, and the study contractor was held in February 1976. The purpose of the meeting was to discuss the nature and scope of the study and to determine the areas to be studied by detailed and approximate methods.

While conducting the study, representatives of the community were contacted on several occasions to gather the latest information.

Drainage deficiencies and historical flooding information on file at the Los Angeles County Flood Control District were reviewed in the course of the study.

A request for information relevant to the study was made to various governmental and local agencies, including the U.S. Soil Conservation Service; the U.S. Army Corps of Engineers; the U.S. Geological Survey, Water Resources Division; and the California State Department of Water Resources. These

agencies did not have any data relevant to the study. However, Toups Corporation in the City of Santa Ana, California, supplied hydrologic data and 1-Percent Annual Chance flooding limits for La Mirada Creek in the adjoining City of La Habra.

During the course of the work done by the study contractor, flood elevations and flood with appropriate community officials.

On May 18, 1978, the preliminary results of this study were reviewed at an intermediate coordination meeting. The meeting was attended by representatives of the study contractor, the Federal Insurance boundaries were reviewed Administration, and the office of the City Engineer.

The results of this study were reviewed at a final CCO meeting held on November 1, 1979. Attending the meeting were representatives of the Federal Insurance Administration, the study contractor, the Los Angeles County Flood Control District, and the city. No problems were raised at the meeting.

An initial CCO meeting for the study of the City of Lancaster, attended by city officials and representatives of the Federal Insurance Administration, the California State Department of Water Resources, and the study contractor, was held in February 1976.

During the course of the study, representatives of the City Engineer's office were contacted on several occasions to gather the latest possible relevant information.

The U.S. Soil Conservation Service; the U.S. Army Corps of Engineers; the U.S. Geological Survey, Water Resources Division; the California State Departments of Water Resources and Transportation; and the Southern Pacific Transportation Company were contacted to provide information used in this study.

During the course of the study, flood elevations arid flood boundaries were reviewed with appropriate community officials.

On January 22, 1979, the preliminary results of this study were reviewed at an intermediate coordination meeting attended by representatives of the Federal Insurance Administration, the study contractor, and the offices of the City Engineer and Planning Department. No problems resulting in changes to the study were encountered at the meeting.

The final community coordination meeting was held in Palmdale, California, on January 13, 1981, and was attended by representatives of the Federal Insurance Administration, the study contractor, and the city. All problems and questions raised at that meeting have been resolved in this study.

On October 11, 1988, an initial CCO meeting for the City of Santa Clarita was held. On November 17, 1988, a final CCO meeting was held, at which the results of the study were reviewed. Representatives of FEMA, the City, and the community attended this meeting.

Coordination for the original study of what became the City of West Hollywood began as study of Los Angeles County’s unincorporated areas. Study began with a CCO meeting held in February 1976 attended by the County, FEMA, the California State Department of Water Resources and the study contractor.

The U.S. Soil Conservation Service; the U.S. Army Corps of Engineers; the U.S. Geological Survey, Water Resources Division; the California State Department of Water Resources and Transportation; and the Southern Pacific Transportation Company were contacted and provided information used in the Los Angeles County Flood Insurance Study.

The results of the Los Angeles County Flood Insurance Study were reviewed at a final CCO meeting held on May 7, 1980. Attending the meeting were representatives of FEMA, the study contractor, the Office of the County Engineer, and the County. No problems were raised at the meeting.

In February 1986, FEMA initiated the processing of a separate Flood Insurance Study for the City of West Hollywood. On July 3, 1986, the results of this study were reviewed and accepted at a final coordination meeting attended by representatives of the community and FEMA.

The dates of the initial and final CCO meetings held for Los Angeles County and the incorporated areas and communities within its boundaries are shown in Table 2, "Initial and Final CCO Meetings."

Table 2 - INITIAL AND FINAL CCO MEETINGS

Community Name	Initial CCO Date	Final CCO Date
Los Angeles County (Unincorporated Areas)	February 1976	May 7, 1980
Agoura Hills, City of	January 26, 1984 October 12, 1995	December 20, 1984
Alhambra, City Of	N/A	N/A
Arcadia, City Of	N/A	N/A
Artesia, City Of	N/A	N/A
Avalon, City Of	February 1976	November 9, 1977
Azusa, City Of	N/A	N/A
Baldwin Park, City Of	N/A	N/A
Bell Gardens, City Of	N/A	N/A
Bell, City Of	N/A	N/A
Bellflower, City Of	January 28, 1986	October 30, 1991
Beverly Hills, City Of	N/A	N/A
Bradbury, City Of	N/A	N/A
Burbank, City Of	February 1976	November 2, 1979 October 15, 1997
Calabasas, City Of	N/A	N/A

Table 2 - INITIAL AND FINAL CCO MEETINGS

Community Name	Initial CCO Date	Final CCO Date
Carson, City Of	January 28, 1986	October 30, 1991
Cerritos, City Of	N/A	N/A
Claremont, City Of	N/A	N/A
Commerce, City Of	N/A	N/A
Compton, City Of	January 28, 1986	October 30, 1991
Covina, City Of	N/A	N/A
Cudahy, City Of	N/A	N/A
Culver City, City Of	February 1976	January 11, 1979
Diamond Bar, City Of	N/A	N/A
Downey, City Of	January 28, 1986	October 30, 1991
Duarte, City Of	N/A	N/A
El Monte, City Of	N/A	N/A
El Segundo, City Of	N/A	N/A
Gardena, City Of	January 28, 1986	October 30, 1991
Glendale, City Of	N/A	N/A
Glendora, City Of	N/A	N/A
Hawaiian Gardens, City Of	N/A	N/A
Hawthorne, City Of	N/A	N/A
Hermosa Beach, City Of	N/A	N/A
Hidden Hills, City Of	N/A	N/A

Table 2 - INITIAL AND FINAL CCO MEETINGS

Community Name	Initial CCO Date	Final CCO Date
Huntington Park, City Of	N/A	N/A
Industry, City Of	N/A	N/A
Inglewood, City Of	N/A	N/A
Irwindale, City Of	N/A	N/A
La Canada Flintridge, City Of	N/A	N/A
La Habra Heights, City Of	N/A	N/A
La Mirada, City Of	February 1976	May 21, 1979
La Puente, City Of	N/A	N/A
La Verne, City Of	N/A	N/A
Lakewood, City Of	January 28, 1986	October 30, 1991
Lancaster, City Of	February 1976	January 13, 1981
Lawndale, City Of	N/A	N/A
Lomita, City Of	N/A	N/A
Long Beach, City Of	February 1976 January 28, 1986	October 27, 1982 October 30, 1991
Los Angeles, City Of	February 1976	May 7, 1980 December 3, 1997
Lynwood, City Of	January 28, 1986	October 30, 1991
Malibu, City Of	N/A	N/A
Manhattan Beach, City Of	N/A	N/A
Maywood, City Of	N/A	N/A
Monrovia, City Of	N/A	N/A

Table 2 - INITIAL AND FINAL CCO MEETINGS

Community Name	Initial CCO Date	Final CCO Date
Montebello, City Of	February 1976 January 28, 1986	January 24, 1979 October 30, 1991
Monterey Park, City Of	N/A	N/A
Norwalk, City Of	N/A	N/A
Palmdale, City Of	February 1976 August 23, 1990	January 8, 1986 April 24,1997
Palos Verdes Estates, City Of	N/A	N/A
Paramount, City Of	January 28, 1986	October 30, 1991
Pasadena, City Of	N/A	N/A
Pico Rivera, City Of	January 28, 1986	October 30, 1991
Pomona, City Of	N/A	N/A
Rancho Palos Verdes, City Of	N/A	N/A
Redondo Beach, City Of	February 1976	October 27, 1982
Rolling Hills Estates, City Of	N/A	N/A
Rolling Hills, City Of	N/A	N/A
Rosemead, City Of	N/A	N/A
San Dimas, City Of	N/A	N/A
San Fernando, City Of	N/A	N/A
San Gabriel, City Of	N/A	N/A
San Marino, City Of	N/A	N/A
Santa Clarita, City Of	October 11, 1988	November 17, 1988
Santa Fe Springs, City Of	February 1976	February 28, 1979

Table 2 - INITIAL AND FINAL CCO MEETINGS

Community Name	Initial CCO Date	Final CCO Date
Santa Monica, City Of	N/A	N/A
Sierra Madre, City Of	N/A	N/A
Signal Hill, City Of	N/A	N/A
South El Monte, City Of	N/A	N/A
South Gate, City Of	January 28, 1986	October 30, 1991
South Pasadena, City Of	N/A	N/A
Temple City, City Of	N/A	N/A
Torrance, City Of	February 1976	January 11, 1979
Vernon, City Of	N/A	N/A
Walnut, City Of	N/A	N/A
West Covina, City Of	N/A	N/A
West Hollywood, City Of	February 1976 February 1986	May 7, 1980 July 3, 1986
Westlake Village, City Of	N/A	N/A
Whittier, City Of	February 1976	November 1, 1979

N/A – Not Applicable

In September 2008, HDR Engineering Inc. completed a countywide DFIRM and FIS for the County of Los Angeles. HDR Engineering Inc. was hired as an IDIQ study contractor for FEMA Region IX under contract number EMF-2003-CO-0045, Task Order 15. The DFIRM process included digitizing floodplain boundaries from the effective paper FIRMs and fitting them to a digital base map, thus converting the existing manually produced FIRMs to digitally produced FIRMs, referred to as DFIRMs. Individual community effective FIS reports were also combined into one report for the entire county.

On May 9-12, 2005, the initial CCO meeting for the Los Angeles countywide DFIRM and FIS were held. Attending the meeting were representatives of FEMA Region IX, HDR Engineering Inc. the study contractor, RMC, Los Angeles County, cities of Arcadia, Bell, Burbank, Carson, Downey, La Canada

Flintridge, La Mirada, La Verne, Lakewood, Lancaster, Long Beach, Los Angeles, Lynwood, Malibu, Palos Verdes Estates, Redondo Beach, San Dimas, Santa Fe Springs, and West Covina.

On November 15-16, 2005, the final CCO meeting for the Los Angeles countywide DFIRM and FIS were held. Attending the meeting were representatives of FEMA Region IX, HDR Engineering Inc. the study contactor, Los Angeles County, cities of Agoura Hills, Arcadia, Burbank, Diamond Bar, Gardena, Glendale, Glendora, Irwindale, La Canada Flintridge, La Mirada, Lancaster, Long Beach, Los Angeles, Lynwood, Malibu, Monrovia, Pico Rivera, San Dimas, San Fernando, Santa Clarita, West Covina, and West Hollywood.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Los Angeles County, California, including the incorporated communities listed in Section 1.1. The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development.

Los Angeles County

The unincorporated areas of the County have been generally divided into four primary sub-areas: those of the Antelope Valley, Santa Clarita Valley, the Malibu area, and the Los Angeles basin. Unincorporated territory in the Los Angeles basin consists primarily of "islands" partially or completely surrounded by incorporated cities or National Forest boundaries. The largest portion of unincorporated territory in the Los Angeles basin is currently located in the Hacienda Heights-Diamond Bar area in the southeastern portion of the County. Areas within National Forest lands were not studied in detail because of low development potential. Edwards Air Force Base was not included in this study.

Flooding sources that affect developed areas or areas with high potential for development were studied by detailed methods. A detailed analysis of the Pacific Ocean was performed for the entire coastline of Los Angeles County. Portions of the County to be studied by detailed methods were selected after considering the level of existing and proposed development. Areas with little or no potential for future development were studied by approximate methods or excluded from the study.

There are watersheds of less than 1 square mile within the County that have historically caused flooding. In order to complete an adequate detailed study, it was necessary to evaluate drainage areas of less than 1 square mile.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by FEMA and Los Angeles County.

City of Agoura Hills

This FIS covers the incorporated areas of the City of Agoura Hills, Los Angeles County, California. Flooding caused by Lindero Canyon was studied in detail from its confluence with Medea Creek upstream to the southern edge of Agoura Road and from Mainmast Drive upstream through the City of Agoura Hills. Medea Creek was studied in detail from a point approximately 400 feet downstream of Sideway Road, upstream to a point approximately 1,150 feet above Canwood Street. Cheseboro Creek was studied in detail from the southern edge of Driver Avenue to a point approximately 1,450 feet upstream of Driver Avenue. Palo Comado Creek was studied in detail from a point approximately 400 feet downstream of Balkins Drive to a point approximately 5,500 feet upstream.

Medea Creek was studied by approximate methods from a point approximately 1,150 feet upstream of Canwood Street to the corporate limits.

The FIS for the City of Agoura Hills was revised on December 18, 1986 to add approximate Zone A flooding along Liberty Canyon. Depths of flooding were determined using Manning's equation. The 1-percent annual chance flood discharge was obtained from the 1980 FIS for Los Angeles County (Federal Emergency Management Agency, 1980).

The FIS for the City of Agoura Hills was also revised on August 3, 1998, to incorporate detailed flood-hazard information along Medea Creek from approximately 1,040 feet downstream of Kanan road to approximately 385 feet upstream of Fountainwood Street.

Along Medea Creek, the Los Angeles County Department of Public Works constructed approximately 2,000 linear feet of reinforced-concrete-lined channel approximately 500 feet downstream of Kanan Road to approximately 200 feet downstream of Thousand Oaks Boulevard to approximately 700 feet upstream of Thousand Oaks Boulevard. The channel has a side-slope lining with an earthen-channel invert. In addition, channel modifications have been completed from 1,600 feet upstream of Thousand Oaks Boulevard to Ventura County line. These modifications include channel excavation, installation of riprap slope protection, and construction of riprap grade stabilization structures.

City of Alhambra

The City of Alhambra is identified as a non-flood prone community.

City of Arcadia

The City of Arcadia is identified as a non-flood prone community.

City of Artesia

The City of Artesia is identified as a non-flood prone community.

City of Avalon

Coastal areas from the western corporate limits to approximately 0.3 mile from the eastern corporate limits were studied by detailed methods that considered tidal flooding and wave run-up. Avalon Canyon was also studied by detailed methods.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through 1986.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the City of Avalon.

Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Los Angeles, Lynwood, Paramount, Pico Rivera, South Gate and Los Angeles County

The primary flood threat to the communities listed above is caused by the Los Angeles River. This Countywide FIS encompasses the Los Angeles River from the Arroyo Seco confluence to the Pacific Ocean and the Rio Hondo from Whittier Narrows Dam to the confluence with the Los Angeles River in Los Angeles County, California. The study effort divided the River into four reaches. The upper reach begins at the confluence of the Arroyo Seco River and ends downstream of Interstate 10. The middle reach starts downstream of Interstate 10 and ends at the confluence of the Rio Hondo River. The lower reach extends from the confluence of the Rio Hondo to the Pacific Ocean. The Rio Hondo reach begins

at the Whittier Narrows Dam and ends at Interstate 105, the Century Freeway. Flooding from the San Gabriel River is not in the scope of this study. Discharge from Arroyo Seco enters the Los Angeles River at its confluence.

The Los Angeles River concrete channel was built by the USACE in cooperation with LACFCD in 1958. The middle reach was certified in September 1987 as having adequate design capacity to carry the 100 year discharge in accordance with FEMA guidelines. The upper and lower reach and the Rio Hondo were not certified. These areas were studied using detailed methods. Overflow maps were provided by the USACE for the middle reach. Breakout locations and magnitudes on both the Los Angeles River and the Rio Hondo as well as Compton Creek were also provided by the USACE in the LACDA report. The scope and methods of study were agreed to by FEMA, USACE, and LACFCD.

City of Azusa

Results of the mapping study were not previously summarized in an effective FIS report for the City of Azusa; therefore, no scope of study is provided.

City of Baldwin Park

Results of the mapping study were not previously summarized in an effective FIS report for the City of Baldwin Park; therefore, no scope of study is provided.

City of Bell Gardens

Results of the mapping study were not previously summarized in an effective FIS report for the City of Bell Gardens; therefore, no scope of study is provided.

City of Bell

The City of Bell is identified as a non-flood prone community.

City of Beverly Hills

Results of the mapping study were not previously summarized in an effective FIS report for the City of Beverly Hills; therefore, no scope of study is provided.

City of Bradbury

The City of Bradbury is identified as a non-flood prone community.

City of Burbank

The Los Angeles River Flood Control Channel and the Burbank Western Flood Control Channel were studied by detailed methods. All shallow flooding sources that affect the community were studied in detail. Lockheed Storm Drain was studied by approximate methods.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed upon by the Federal Insurance Administration and the City of Burbank.

The January 20, 1999 revision incorporated detailed flood hazard information along the Lockhead Drain Channel in the City of Burbank. The study limits extend from the confluence with the Burbank Western Flood Control Channel to approximately 1,300 feet downstream of Vineland Avenue. The length of the reach studied is approximately 2.9 miles. Flood hazard information along Lake Street, North Overflow, and Empire Avenue was also incorporated in this restudy.

City of Calabasas

Results of the mapping study were not previously summarized in an effective FIS report for the City of Calabasas; therefore, no scope of study is provided.

City of Cerritos

Results of the mapping study were not previously summarized in an effective FIS report for the City of Cerritos; therefore, no scope of study is provided.

City of Claremont

Revised effective FIRMs were issued 7/2/2004 and have been included into the countywide FIRM. Results of the mapping study were not previously summarized in an effective FIS report for the City of Claremont; therefore, no detailed information is provided.

City of Commerce

Results of the mapping study were not previously summarized in an effective FIS report for the City of Commerce; therefore, no scope of study is provided.

City of Covina

Results of the mapping study were not previously summarized in an effective FIS report for the City of Covina; therefore, no scope of study is provided.

City of Cudahy

Results of the mapping study were not previously summarized in an effective FIS report for the City of Cudahy; therefore, no scope of study is provided.

City of Culver City

Ballona Creek Channel, Sawtelle-Westwood Storm Drain Channel, Benedict Canyon Channel, Centinela Creek Channel, and the shallow flooding areas in the vicinity of the intersection of Adams and Washington Boulevards and along the western border of Hannum Avenue, in the northeast section of the Fox Hills Mall were studied in detail. An oil field in the eastern portion of the city was studied by approximate methods due to a lack of potential for development.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1983.

City of Diamond Bar

Results of the mapping study were not previously summarized in an effective FIS report for the City of Diamond Bar; therefore, no scope of study is provided.

City of Duarte

The City of Duarte is identified as a non-flood prone community.

City of El Monte

The City of El Monte is identified as a non-flood prone community.

City of El Segundo

Results of the mapping study were not previously summarized in an effective FIS report for the City of El Segundo; therefore, no scope of study is provided.

City of Glendale

Results of the mapping study were not previously summarized in an effective FIS report for the City of Glendale; therefore, no scope of study is provided.

City of Glendora

Results of the mapping study were not previously summarized in an effective FIS report for the City of Glendora; therefore, no scope of study is provided.

City of Hawaiian Gardens

Results of the mapping study were not previously summarized in an effective FIS report for the City of Hawaiian Gardens; therefore, no scope of study is provided.

City of Hawthorne

The City of Hawthorne is identified as a non-flood prone community.

City of Hermosa Beach

Results of the mapping study were not previously summarized in an effective FIS report for the City of Hermosa Beach; therefore, no scope of study is provided.

City of Hidden Hills

Revised effective FIRMs were issued 1/19/2006 and have been included into the countywide FIRM. Results of the mapping study were not previously summarized in an effective FIS report for the City of Hidden Hills; therefore, no detailed information is provided.

City of Huntington Park

The City of Huntington Park is identified as a non-flood prone community.

City of Industry

Results of the mapping study were not previously summarized in an effective FIS report for the City of Industry; therefore, no scope of study is provided.

City of Inglewood

Results of the mapping study were not previously summarized in an effective FIS report for the City of Inglewood; therefore, no scope of study is provided.

City of Irwindale

Results of the mapping study were not previously summarized in an effective FIS report for the City of Irwindale; therefore, no scope of study is provided.

City of La Canada Flintridge

The City of La Canada Flintridge is identified as a non-flood prone community.

City of La Habra Heights

Results of the mapping study were not previously summarized in an effective FIS report for the City of La Habra Heights; therefore, no scope of study is provided.

City of La Mirada

Flooding caused by the overflow of La Mirada Creek and ponding areas throughout the community was studied in detail.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1984.

City of La Puente

Results of the mapping study were not previously summarized in an effective FIS report for the City of La Puente; therefore, no scope of study is provided.

City of La Verne

Results of the mapping study were not previously summarized in an effective FIS report for the City of La Verne; therefore, no scope of study is provided.

City of Lancaster

Streams selected for detailed study affecting the City of Lancaster were Amargosa Creek, Amargosa Creek Tributary, and Portal Ridge Wash.

Portions of Lancaster that were studied by detailed methods were those areas shown as having a potential for development in the preliminary North Los Angeles County General Plan.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1984.

City of Lawndale

The City of Lawndale is identified as a non-flood prone community.

City of Lomita

The City of Lomita is identified as a non-flood prone community.

City of Long Beach

This FIS covers the incorporated areas of the City of Long Beach, including those affected by potential overflow of the Los Angeles River (as discussed, and as studied under the City of Bellflower, et al., above).

In addition, as discovered in the original study, some watersheds within the city which have historically caused flooding in developed low-lying areas are less than 1 square mile in area. To complete a detailed study of the community, it was necessary to evaluate these watersheds.

Low-lying areas between the San Gabriel River and the San Gabriel River Freeway were studied by approximate methods.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the study contractor.

City of Los Angeles

This FIS covers the incorporated areas of the City of Los Angeles, as studied for the Los Angeles River from the Arroyo Seco confluence to the Pacific Ocean and the Rio Hondo from Whittier Narrows Dam to the confluence with the Los Angeles River in Los Angeles County, California (as discussed under the City of Bellflower, above).

The study area was also broken into four primary subareas: the San Fernando Valley, Harbor, Central, and West Districts. This was possible because of the hydrologic independence of each watershed and

necessary because of the geographical expanse of the city. Portions of the Central District tributary to Ballona Creek were studied within the West Los Angeles District.

Flooding sources studied by detailed methods include: Weldon Canyon, Kagel Canyon, Rustic Canyon, Pacomia Wash, Little Tujunga Wash, and Big Tujunga Wash, as well as areas affected by surface runoff and shallow flooding throughout the city. There are several rock quarries, public parks, and golf courses in the city that will be flooded during a 1-percent chance flood. These areas were studied by approximate methods due to the lack of potential for development.

As mentioned earlier, a detailed analysis of coastal areas affected by the Pacific Ocean was performed along the entire coastline of the City of Los Angeles, including Los Angeles Harbor.

There are watersheds of less than 1 square mile within the city that have historically caused flooding in developed low-lying areas. Therefore, to complete a detailed study of the community, it was necessary to evaluate drainage areas of less than 1 square mile.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through 1989.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the City of Los Angeles.

The City of Los Angeles FIS was revised on May 4, 1999. This restudy was done in two parts. Part one incorporates detailed flood-hazard information from the Los Angeles River and Rio Hondo affecting the City of Los Angeles. Part two incorporates detailed flood hazard information along Overflow Area of Lockheed Drain Channel from Vanowen Street to approximately 380 feet northwest of Vanowen Street.

City of Malibu

Results of the mapping study were not previously summarized in an effective FIS report for the City of Malibu; therefore, no scope of study is provided.

City of Manhattan Beach

Results of the mapping study were not previously summarized in an effective FIS report for the City of Manhattan Beach; therefore, no scope of study is provided.

City of Maywood

The City of Maywood is identified as a non-flood prone community.

City of Monrovia

The City of Monrovia is identified as a non-flood prone community.

City of Montebello

All flooding sources that affect the community, including the flooding area at the intersection of Garfield Avenue and Beverly Boulevard, the ponding area at the intersection of Mines Avenue and Taylor Avenue, and Whittier Narrows Flood Control Basin were studied in detail for the original study. The rock quarry in the southwest portion of the city and the pond in Montebello Municipal Golf Course were studied by approximate methods due to a lack of potential for development.

Watersheds of less than 1 square mile within the city have historically caused flooding in developed low-lying areas. Therefore, to complete a detailed study of the community, it was necessary to evaluate drainage areas of less than l square mile.

Those areas studied by detailed methods for the original study were chosen with consideration given to all proposed construction and forecasted development through 1983.

The revised study of the City of Montebello included the results of the study of the Los Angeles River from the Arroyo Seco confluence to the Pacific Ocean and the Rio Hondo from Whittier Narrows Dam to the confluence with the Los Angeles River, as discussed under the City of Bellflower, et al., above.

The areas studied by detailed methods for the revised study were selected with priority given to all known flood hazards and areas of projected development or proposed construction through 1991.

City of Monterey Park

Results of the mapping study were not previously summarized in an effective FIS report for the City of Manhattan Beach; therefore, no scope of study is provided.

City of Norwalk

Results of the mapping study were not previously summarized in an effective FIS report for the City of Norwalk; therefore, no scope of study is provided.

City of Palmdale

This Countywide FIS covers the incorporated areas of the City of Palmdale, excluding U.S. Air Force Plant 42, located within the City.

Portions of Palmdale that were studied by detailed methods are those areas shown as having a potential for development in the preliminary North Los Angeles County General Plan, which includes much of central and western Palmdale. The city is situated on an alluvial fan at the northern base of the San Gabriel Mountain foothills. Floodflows discharge from the foothills onto the alluvial fan, where there are relatively few permanent streams, causing the flows to spread out over much of the city. Included in the detailed analysis are areas flooded by Amargosa Creek, Amargosa Creek Tributary, Anaverde Creek, Big Rock Wash and Little Rock Wash. Also studied in detail was flooding from segments of Anaverde Creek Tributary, located south of the city, which affects the southwestern portion of the city.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through November 1990.

Areas studied by approximate methods include an area in the western part of the city affected by alluvial fan flooding from Ritter Ridge in the San Gabriel Mountains and a small segment of Anaverde Creek in western Palmdale. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the City of Palmdale.

The March 30, 1998 restudy consisted of the analysis of approximately 2 miles of Anaverde Creek, from the Antelope Valley Freeway (California State Highway 14) to the California Aqueduct.

For approximately 4,000 feet at the upstream end of the study, Anaverde Creek has been channelized and consists of an unlined trapezoidal section. This work was performed as part of the construction of the California Aqueduct. A short floodway structure has been constructed under the California State Highway 14 undercrossing bridge for Rayburn Road at the downstream limit of this study. This

structure was constructed as part of the Route 14 project, and serves to channelize the flow under the freeway.

City of Palos Verdes Estates

Revised effective FIRMs were issued July 2, 2004 and have been included into the countywide FIRM.

Results of the mapping study were not previously summarized in an effective FIS report for the City of Palos Verdes Estates; therefore, no detailed information is provided. .

City of Pasadena

The City of Pasadena is identified as a non-flood prone community.

City of Pomona

Results of the mapping study were not previously summarized in an effective FIS report for the City of Pomona; therefore, no scope of study is provided.

City of Rancho Palos Verdes

Results of the mapping study were not previously summarized in an effective FIS report for the City of Rancho Palos Verdes; therefore, no scope of study is provided.

City of Redondo Beach

The small watersheds within the City and coastal areas along Santa Monica Bay fronted by King Harbor comprising the City were studied in detail. Redondo State Beach was not included in this study.

City of Rolling Hills Estates

Results of the mapping study were not previously summarized in an effective FIS report for the City of Rolling Hills Estates; therefore, no scope of study is provided.

City of Rolling Hills

The City of Rolling Hills is identified as a non-flood prone community.

City of Rosemead

Results of the mapping study were not previously summarized in an effective FIS report for the City of Rosemead; therefore, no scope of study is provided.

City of San Dimas

Results of the mapping study were not previously summarized in an effective FIS report for the City of San Dimas; therefore, no scope of study is provided.

City of San Fernando

Results of the mapping study were not previously summarized in an effective FIS report for the City of San Fernando; therefore, no scope of study is provided.

City of San Gabriel

The City of San Gabriel is identified as a non-flood prone community.

City of San Marino

The City of San Marino is identified as a non-flood prone community.

City of Santa Clarita

The following stream reaches were studied by detailed methods in the City of Santa Clarita:

- Santa Clara River, from western corporate limits at U.S. Highway 5 to eastern corporate limits;
- South Fork Santa Clara River, from confluence with Santa Clara River to U.S. Highway 5;
- Placerita Creek, from confluence with Newhall Creek to State Highway 14;
- Mint Canyon, from confluence with Santa Clara River to 7,250 feet upstream of Scherzinger Road;
- Sand Canyon, from confluence with Santa Clara River to approximately 6,400 feet upstream of Sulters Street;
- Newhall Creek, from confluence with South Fork Santa Clara River to. State Highway 14;
- Oak Springs Canyon, from confluence with Santa Clara River to Union Pacific (former Southern Pacific) Railroad;
- Iron Canyon, from confluence with Sand Canyon to approximately 3,000 feet upstream of Devell Road extended.

The areas studied by detailed methods were selected with priority given to known flood hazard areas and areas of projected development or proposed construction.

Several unnamed tributaries were studied by approximate methods.

City of Santa Fe Springs

The San Gabriel River, Milan Creek, Coyote Creek - North Fork, and Coyote Creek were studied in detail. Flooding from all unnamed streams in the community and from ponded areas was also studied in detail. There are watersheds of less than 1 square mile within the city which have historically caused flooding in developed low-lying areas. Therefore, to complete a detailed study of the community, it was necessary to evaluate drainage areas of less than 1 square mile.

City of Santa Monica

Results of the mapping study were not previously summarized in an effective FIS report for the City of Santa Monica; therefore, no scope of study is provided.

City of Sierra Madre

The City of Sierra Madre is identified as a non-flood prone community.

City of Signal Hill

Results of the mapping study were not previously summarized in an effective FIS report for the City of Signal Hill; therefore, no scope of study is provided.

City of South El Monte

Results of the mapping study were not previously summarized in an effective FIS report for the City of South El Monte; therefore, no scope of study is provided.

City of South Pasadena

The City of South Pasadena is identified as a non-flood prone community.

City of Temple City

The City of Temple City is identified as a non-flood prone community.

City of Torrance

All flooding sources that affect the City of Torrance were studied in detail, except for a gravel pit in the southern portion of the city and coastal flooding from the Pacific Ocean, which were studied by approximate methods.

There are watersheds of less than 1 square mile within the City that have historically caused flooding in developed low-lying areas. Therefore, to complete a detailed study of the community, it was necessary to evaluate drainage areas of less than 1 square mile.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1983.

City of Vernon

The City of Vernon is identified as a non-flood prone community.

City of Walnut

Results of the mapping study were not previously summarized in an effective FIS report for the City of Walnut; therefore, no scope of study is provided.

City of West Covina

Revised effective FIRMs were issued 12/2/2004 and have been included into the countywide FIRM. Results of the mapping study were not previously summarized in an effective FIS report for the City of West Covina; therefore, no detailed information is provided.

City of West Hollywood

Shallow flooding methods were used to study flooding sources in the vicinity of Rosewood Avenue and Huntley Drive and also in the vicinity of Santa Monica Boulevard and Genesee Avenue. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through 1989.

City of Westlake Village

Results of the mapping study were not previously summarized in an effective FIS report for the City of Westlake Village; therefore, no scope of study is provided.

City of Whittier

Areas affected by flooding along Turnbull Canyon, Savage Creek, and at Whittier Narrows Flood Control Basin were studied by detailed methods. Watersheds of less than 1 square mile within the city have caused flooding in developed and low-lying areas. Therefore, in order to complete a detailed study of the community, it was necessary to evaluate drainage areas of less than 1 square mile.

A landfill at a city dump east of Canyon Crest Drive, the Friendly Hills Country Club golf course, and La Mirada Creek were studied by approximate methods.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed upon by the Federal Insurance Administration and the City of Whittier.

All or portions of the flooding sources listed in Table 3, "Flooding Sources Studied by Detailed Methods," were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM.

Table 3 - FLOODING SOURCES STUDIED BY DETAILED METHODS

Amargosa Creek	Los Angeles River left overbank path 2
Anaverde Creek	Los Angeles River right overbank path 1
Avalon Canyon	Los Angeles River right overbank path 2
Big Rock Wash	Los Angeles River right overbank path 3
Cheseboro Creek	Malibu Creek
Cold Creek	Medea Creek
Dark Canyon	Medea Creek (above Ventura Freeway)
Dry Canyon	Mill Creek
Escondido Canyon	North Overflow
Flow Along Empire Avenue	Old Topanga Canyon
Flowline No. 1	Overflow Area of Lockheed Drain Channel
Garapito Creek	Overflow Area of Lockheed Storm Drain
Hacienda Creek	Palo Comando Creek
Kagel Canyon	Ramirez Canyon
La Mirada Creek	Rio Hondo River left overbank path 3
Lake Street Overflow	Rio Hondo River left overbank path 5
Las Flores Canyon	Rio Hondo River left overbank path 6
Las Virgenes Creek	Rustic Canyon
Liberty Canyon	Santa Maria Canyon
Lindero Canyon above confluence with Medea Creek	Stokes Canyon
Lindero Canyon above Lake Lindero	Topanga Canyon
Little Rock Wash - Profile A	Trancas Creek
Little Rock Wash - Profile B	Triunfo Creek
Little Rock Wash - Profile C	Unnamed Canyon (Serra Retreat Area)
Lobo Canyon	Upper Los Angeles River left overbank
Lockheed Drain Channel	Weldon Canyon
Lopez Canyon Channel	Zuma Canyon

All or portions of the flooding sources listed in Table 4, "Flooding Sources Studied by Approximate Methods," were studied by approximate methods. Approximate analyses were used to study only those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and Los Angeles County.

Table 4 - FLOODING SOURCES STUDIED BY APPROXIMATE METHODS

ABC River	Abrams Canyon Creek	Acton Canyon	Adams Canyon Creek
Agua Amarge Canyon	Agua Dulce Canyon Creek	Alamitos Bay	Alder Gulch
Aliso Canyon Creek	Aliso Creek	Alpine Canyon Creek	Amargosa Creek Tributary

Table 4 - FLOODING SOURCES STUDIED BY APPROXIMATE METHODS

Antimony Canyon	Arrastre Canyon Creek	Arroyo Pescadero	Arroyo San Miguel
Arroyo Sequit	Avalon Bay	Back Channel	Baldwin Grade Canyon Creek
Baldwin Hills Reservoir	Ballona Creek	Bar Creek	Bare Mountain Canyon Creek
Bartholomaus Canyon Creek	Bear Canyon Creek	Bear Gulch	Beartrap Canyon Creek
Bee Canyon	Bee Canyon Creek	Big Dalton Wash	Big Rock Creek
Big Rock Wash Profile Base Line	Big Tujunga Canyon Creek	Big Tujunga Wash	Bitter Canyon Creek
Blartrad Canyon Creek	Bleich Canyon Creek	Bluff Cove	Bobcat Canyon Creek
Bootleggers Canyon Creek	Boulder Canyon Creek	Bouquet Canyon Creek	Bouquet Reservoir
Bouton Creek	Bouton Lake	Brea Canyon Creek	Broad Canyon Creek
Browns Creek	Bull Creek	Burbank Canyon	Burbank Western Flood Control Channel
Burns Canyon Creek	Burnside Canyon Creek	California Aqueduct	Canada De Los Alamos
Canyon Creek	Carbon Canyon Creek	Carlos Canyon Creek	Carr Canyon Creek
Cassara Canyon Creek	Castaic Creek	Castaic Lagoon	Castaic Lake
Cedar Canyon Creek	Cedar Creek	Centinela Creek	Centinela Creek Channel
Cerritos Channel	Channel No. 1	Channel No. 2	Channel No. 3
Charles Oak Creek	Charlie Canyon Creek	Chatsworth Reservoir	Cherry Canyon Creek
Clark Gulch	Clear Springs	Cloudbrook Creek	Cloudburst Canyon Creek
Cold Canyon Creek	Cold Springs Canyon Creek	Colorado Lagoon	Compton Creek
Compton Creek Channel	Consolidated Channel	Coral Canyon Creek	Cow Springs Canyon Creek
Coyote Canyon Creek	Coyote Creek	Craig Spring	Cruthers Creek
Dagger Flat Canyon Creek	Dark Canyon West Branch	Deadhorse Canyon Creek	Deer Canyon Creek
Delaware River	Descanso Bay	Devil Canyon Creek	Devils Gulch

Table 4 - FLOODING SOURCES STUDIED BY APPROXIMATE METHODS

Dewitt Canyon Creek	Dix Canyon Creek	Dominguez Channel	Dorothy Canyon Creek
Dorr Canyon Creek	Dowd Canyon	Dowd Canyon Creek	Drinkwater Canyon Creek
Dry Canyon Creek	Dry Canyon Flood Control Channel	Dry Canyon Reservoir	East Basin
East Canyon Creek	East Compton Creek	Echo Park Lake	El Toro Canyon Creek
Elizabeth Canyon	Elizabeth Lake	Elizabeth Lake Canyon Creek	Eller Slough
Elsmere Canyon Creek	Encinal Canyon Creek	Encinal Creek Channel	Entrance Channel
Evil Canyon Creek	Fairmont Reservoir	Fall Canyon Creek	Fall Creek
Falls Gulch	Fenner Canyon Creek	Fish Canyon Creek	Fish Creek
Fish Fork	Fish Harbor	Flume Canyon Creek	Forsuthe Canyon Creek
Franklin Canyon Reservoir	Fryer Canyon Creek	Gail Canyon	Garden Gulch
Gary Creek	Gates Canyon Creek	Gavin Canyon Creek	Gookins Dry Lake
Gooseberry Canyon Creek	Gordon Canyon Creek	Gorman Creek	Government Canyon Creek
Graham Canyon Creek	Grande Canyon Creek	Grandview Canyon Creek	Grasshopper Canyon Creek
Halsey Canyon Creek	Happy Valley Creek	Harbor Lake	Haskell Canyon
Haskell Channel	Hasley Canyon Creek	Hauser Canyon Creek	Heryford Canyon Creek
Hiat Canyon Creek	Hidden Lake	Hideaway Canyon Creek	Hog Canyon Creek
Holcomb Canyon Creek	Holiday Lake	Hollywood Reservoir	Holmes Creek
Hondo Canyon Creek	Horse Camp Canyon Creek	Hosler Canyon Creek	Hudson River
Hughes Canyon Creek	Hughes Lake	Hunt Canyon Creek	Hutak Canyon Creek
Indian Bill Canyon Creek	Indian Canyon Creek	Inner Harbor	Iron Canyon
Iron Canyon Creek	Iron Fork	Islip Canyon Creek	Jesus Canyon Creek
John Bird Canyon Creek	Jones Canyon Creek	Kashmere Canyon	Kentucky Springs Canyon Creek

Table 4 - FLOODING SOURCES STUDIED BY APPROXIMATE METHODS

Kimbrough Canyon Creek	Kings Canyon Creek	Kitter Canyon Creek	La Canada Creek
La Canada Verde Creek	Lachusa Canyon Creek	Lake Lindero	Lake Palmdale
Latigo Canyon Creek	Laurel Canyon Creek	Leaming Canyon Creek	Lechler Canyon Creek
Lemontaine Creek	Liebre Gulch	Limekiln Canyon	Limekiln Creek
Lindero Canyon	Lindero Creek	Little Las Flores Canyon Creek	Little Red Rock Wash
Little Rock Creek	Little Rock Reservoir	Little Rock Wash	Little Tujunga Wash
Lockheed Storm Drain	Long Beach Channel	Loop Canyon Creek	Los Alisos Canyon Creek
Los Angeles County Flood Control Channel	Los Angeles County Storm Drain	Los Angeles Harbor	Los Angeles River
Los Angeles River Flood Control Channel	Los Cerritos Channel	Los Flores Canyon	Los Llajas Canyon Creek
Lost Canyon Creek	Lucky Canyon Creek	Lunada Bay	Lynx Gulch
Lyon Canyon Creek	Maher Canyon Creek	Main Channel	Malaga Canyon
Malaga Cove	Malibu Lake	Malibu Reservoir	Maple Canyon Creek
Marek Canyon Creek	Marie Canyon Creek	Marina Del Ray	Marine Stadium
Matay Canyon Creek	Mattox Canyon Creek	May Canyon Channel	May Canyon Creek
McClure Canyon Creek	McCorkle Canyon Creek	McCoy Canyon Creek	Medea Creek (above Mulholland Highway)
Michael Creek	Middle Fork Mill Creek	Middle Harbor	Milan Creek
Miller Canyon Creek	Milton B. Arthur Lakes	Mine Gulch	Mint Canyon Creek
Mint Canyon Spring	Montaria Lake	Monte Cristo Creek	Montebello Municipal Golf Course Pond
Morris Reservoir	Munz Canyon Creek	Muscal Creek	Mystic Canyon Creek
Nellus Canyon Creek	Newhall Creek	Noel Canyon Creek	North Fork Mill Creek
North Long Canyon Creek	OA Canyon Creek	Oak Springs Canyon	Oakdale Canyon
Oakgrove Canyon Creek	Old Topanga Canyon	Oro Fino Canyon	Orr Spring Canyon Creek

Table 4 - FLOODING SOURCES STUDIED BY APPROXIMATE METHODS

Osito Canyon Creek	Oso Canyon Creek	Overflow Area of Lockheed Drain	Pacific Ocean
Pacific Terrace Harbor	Pacoima Canyon Creek	Pacoima Wash	Pallett Creek
Palmdale Ditch	Palmer Trout Lake	Palomas Canyon Creek	Pan Pacific Detention Basin
Paradise Cove	Pena Canyon Creek	Pico Canyon	Pico Canyon Creek
Piedra Gorda Canyon Creek	Pine Canyon Creek	Pine Creek	Piru Creek
Placerita Creek	Plum Canyon Creek	Poison Oak Canyon Creek	Pole Canyon Creek
Portal Ridge Wash	Posey Canyon Creek	Potrero Canyon Creek	Potrero Valley Creek
Praire Fork	Pratt Canyon Creek	Price Canyon Creek	Puddingstone Reservoir
Puerco Canyon Creek	Punchbowl Canyon Creek	Puzzle Canyon Creek	Pyramid Lake
Quail Lake	Quigley Canyon Creek	Qwerty River	Railroad Canyon
Rattlesnake Canyon Creek	Reed Canyon Channel	Rice Canyon Creek	Richardson Canyon Creek
Rio Hondo Channel	Ritter Canyon Creek	Rivera Canyon Creek	Roberts Canyon Creek
Robinson Canyon Creek	Rock Creek	Rockbound Canyon Creek	Rogers Creek
Romero Canyon Creek	Ross Gulch	Rowley Channel	Ruby Canyon Creek
Rustic Canyon Channel	Salt Canyon Creek	San Antonio Creek	San Antonio Reservoir
San Antonio Wash Channel	San Dimas Wash	San Francisquito Canyon Creek	San Gabriel Reservoir
San Gabriel River	San Jose Creek	San Martinez Chiquito Canyon	San Martinez Grande Canyon Creek
San Nicholas Canyon Creek	San Pedro Bay	Sand Canyon	Sand Canyon Creek
Santa Clara River	Santa Felicia Canyon Creek	Santa Margarita Canyon Creek	Santa Monica Bay
Santa Susana Creek	Santa Susana Pass	Santa Susana Pass Wash	Santa Ynez Canyon Reservoir
Santiago Canyon Creek	Savage Creek	Saw Canyon Creek	Sawmill Canyon Creek
Sawtelle-Westwood Channel	Sawtelle-Westwood Storm Drain Channel	Schoolhouse Canyon Creek	Scychull River

Table 4 - FLOODING SOURCES STUDIED BY APPROXIMATE METHODS

Shake Canyon Creek	Sharps Canyon Creek	Sierra Canyon Creek	Silver Lake Reservoir
Sleeper Canyon Creek	Sloan Canyon Creek	Snowslide Canyon	Solano Canyon
Soldier Creek	Soledad Canyon	Solstice Canyon Creek	Sombrero Canyon Creek
Sonome Canyon Creek	Sorensen Avenue Drain	South Fork	South Fork Santa Clara River
South Portal Canyon Creek	South Tule Canyon Creek	Spade Spring Canyon Creek	Spencer Canyon Creek
Spring Canyon Creek	Steep Hill Canyon	Steep Hill Canyon Creek	Steine Canyon Creek
Stone Canyon Reservoir	Sullivan Canyon	Sulpher Canyon Creek	Sunshine Canyon
Swimming Lagoon	Sycamore Canyon Creek	Tacobi Creek	Tapia Canyon
Taylor Creek	Tentrock Canyon Creek	Texas Canyon Creek	Thompson Creek
Tonner Canyon	Towsley Canyon Creek	Trent River	Trough Canyon Creek
Tuna Canyon Creek	Turnbull Canyon	Tweedy Lake	Una Lake
Upper Franklin Canyon Reservoir	Upper Stone Canyon Reservoir	Vasquez Canyon	Via Coronel
Villa Canyon Creek	Vincent Gulch	Vine Creek	Violin Canyon Creek
Walnut Canyon Creek	Walnut Creek	Water Canyon Creek	Wayside Canyon Creek
Webb Canyon	Weldon Canyon	West Basin	West Branch
West Branch California Aqueduct Angeles	West Channel	West Fork	West Fork Fox Creek
West Fork Liebre Gulch	Whitewater Canyon Creek	Whitney Canyon Creek	Whittier Narrows
Whittier Narrows Flood Control Basin	Wickham Canyon Creek	Wilbur Creek	Wilbur Wash
Wilbur Wash East	Wildwood Canyon	Wiley Canyon Creek	Willow Springs Canyon Creek
Wilson Canyon	Wilson Canyon Drain	Winter Canyon Creek	Woodley Creek
Worsham Creek	XX River	Ybarra Canyon Creek	Young Canyon Creek

This FIS also incorporates the determinations of letters issued by FEMA resulting in map changes (Letter of Map Revision [LOMR], Letter of Map Revision - based on Fill [LOMR-F], and Letter of Map Amendment [LOMA], as shown in Table 5, "Letters of Map Change."

Table 5 - LETTERS OF MAP CHANGE

Community	Flooding Source(s)/Project Identifier	Date Issued	Type	Case Number
City of Agoura Hills	Mariposa Place Apartments	02/22/2007	LOMR	07-09-0403P
City of Azusa	San Gabriel River – 600' upstream to 3,900' upstream of confluence with Roberts Canyon Creek – and Roberts Canyon Creek from the confluence to 2,200' upstream	04/17/2002	102-D	02-09-330P
City of Burbank	Burbank Empire Center North Overflow	5/19/2004	LOMR	02-09-944P
City of Burbank	Burbank Empire Center North Overflow	5/19/2004	LOMR	02-09-944P
City of Burbank	Lockheed Channel/Burbank Costco	5/20/2004	LOMR	02-09-874P
City of Burbank	Lockheed Channel/Burbank Costco	5/20/2004	LOMR	02-09-874P
City of Calabasas	Las Virgenes Creek from Thousand Oaks Boulevard to County Boundary	7/30/1987	102A	--
City of Calabasas	Las Virgenes Creek	9/2/1999	LOMR	99-09-334P
City of Gardena City of Los Angeles	Los Angeles County Drainage Area Project (LACDA) along Compton Creek and Los Angeles River from Ocean Blvd to Long Beach Blvd. – Los Angeles River Left Overbank Path 1	2/25/2000	LOMR	00-09-177P

Table 5 - LETTERS OF MAP CHANGE

Community	Flooding Source(s)/Project Identifier	Date Issued	Type	Case Number
City of Lancaster	Amargosa Creek - Avenue M to Avenue K and Amargosa Creek Tributary – from Southern Pacific Railroad to Valleyline Drive	05/20/2005	LOMR	04-09-0375P
City of Los Angeles	Topham Street Tampa Ave To Melvin Ave	12/15/1988	LOMR	89-09-14P
City of Los Angeles	Catch Basins and Storm Drain Systems along Topham Street between Tampa and Melvin Avenues	12/22/1988	LOMR	--
City of Los Angeles	Gravel Pit bounded by Union Pacific Railroad, Laurel Canyon Boulevard, Saticoy Avenue, and Hollywood Freeway	2/18/1994	102	94-09-192P
City of Los Angeles	Adams Boulevard Drain, Units 1-3	3/30/1995	LOMR	94-09-909P
City of Los Angeles	Adams Boulevard Drainage Area	5/15/1996	LOMR	96-09-681P
City of Los Angeles	Ventura-Canoga Drain	8/20/1996	LOMR	96-09-970P
City of Los Angeles	Ventura-Canoga Drain	8/20/1996	LOMR	96-09-857P
City of Los Angeles City of West Hollywood	Hollyhills Drain, Units 1-5	3/12/1999	LOMR	99-09-419P
City of Los Angeles	Unnamed Ponding Area - 4251 West Lockwood Avenue, Conner's Subdivision, Lot 86	3/6/2001	LOMR	00-09-515P

Table 5 - LETTERS OF MAP CHANGE

Community	Flooding Source(s)/Project Identifier	Date Issued	Type	Case Number
City of Los Angeles	Unnamed Flooding Source -- Airport Boulevard Storm Drain -- Howard Hughes Development Center	11/9/2001	LOMR	01-09-557P
City of Los Angeles	Rustic Canyon 700 feet upstream of Sunset Boulevard to 2,000 feet upstream of Sunset Boulevard	6/17/2004	LOMR	04-09-0102P
City of Montebello	Storm Drains along Garfield Avenue at Wilcox Avenue and Beverly Boulevard	4/21/1998	LOMR	98-09-445P
City of Palmdale	Amargosa Creek from Avenue O to the Antelope Valley Freeway	04/29/2005	LOMR	04-09-0306P
City of Palmdale	Amargosa Creek Tributary – from Railroad to Valleyline Drive	05/20/2005	LOMR	04-09-0375P
City of Palmdale	Amargosa Creek	9/22/2006	LOMR	06-09-BD11P
City of Palmdale	Ritter Ranch Anaverde Creek – North Branch Tract 51508	03/30/2007	LOMR	07-09-0755P
City of Redondo Beach City of Torrance	Doris Coast Drain	12/15/1997	LOMR	98-09-097P
City of Santa Clarita	Santa Clara River – South Fork from Lyons Avenue to South of Wiley Canyon Road	3/21/1990	LOMR	--

Table 5 - LETTERS OF MAP CHANGE

Community	Flooding Source(s)/Project Identifier	Date Issued	Type	Case Number
City of Santa Clarita	Tract 31198	7/18/1990	LOMR	--
City of Santa Clarita	Near Santa Clara River	8/20/1990	LOMR	--
City of Santa Clarita	Santa Clara River 1,100 feet downstream to 800 feet downstream of the Sierra Highway	10/6/1992	LOMR	92-09-170P
City of Santa Clarita	Bouquet Canyon Tributary	10/20/1992	LOMR	92-09-191P
City of Santa Clarita	Unnamed Wash just north of Placerita Creek	11/16/1993	LOMR	94-09-045P
City of Santa Clarita	Area bounded by Lyons Avenue, Wayman Avenue, Eighth Street, and Arcadia Street	5/23/1994	LOMR	94-09-256P
City of Santa Clarita	Newhall Canyon at confluence with Railroad Canyon	1/18/2000	LOMR	99-09-399P
City of Santa Clarita	Sand Canyon Lateral	5/15/2000	LOMR	00-09-025P
City of Santa Clarita	Tract 51963-Dockweiler, M.T.D. 1525 Storm Drain	10/24/2000	LOMR	00-09-851P
City of Santa Clarita	Newhall Creek - Tract No. 53114, Mtd No. 1670	1/12/2004	LOMR	04-09-0237P
City of Santa Clarita	Santa Clara River from 5,000’ downstream to 1,000’ downstream of McBean Parkway; South Fork Santa Clara River from the confluence with the Santa Clara River to Valencia Boulevard	07/23/2004	LOMR	04-09-1001P
City of Santa Clarita	Santa Clara River from 3,100 feet downstream of 2,100 downstream of Soledad Canyon Road	10/22/2004	LOMR	03-09-1325P

Table 5 - LETTERS OF MAP CHANGE

Community	Flooding Source(s)/Project Identifier	Date Issued	Type	Case Number
City of Santa Clarita	Santa Clara River from 6,500 feet downstream of 1.500 downstream of the Los Angeles Aqueduct	3/3/2005	LOMR	04-09-1681P
City of Santa Clarita	River Park Soil Cement Bank Protection	05/29/2007	LOMR	07-09-1041P
Los Angeles County	Levee within Tract 31198 from Antelope Valley Freeway to 1,500 feet downstream of Antelope Valley Road	12/22/1986	102	--
Los Angeles County	Las Virgenes Creek from Thousand Oaks Boulevard to County Boundary	7/30/1987	LOMR	--
Los Angeles County	Oakdale Canyon	8/9/1988	102	--
Los Angeles County	Tributary to Santa Clara River – Acton Area	1/23/1992	102A	92-09-018P
Los Angeles County	Dry Canyon Creek 5,900 feet upstream of Francisquito Road	3/2/1992	LOMR	92-09-007P
Los Angeles County	Channel Improvements along Oakdale Canyon and along Unnamed Wash north of Placerita Creek	10/05/1993	102A	93-09-501P
Los Angeles County	Santa Clarita Family Recreation Center	5/23/1994	LOMR	94-09-049P
Los Angeles County City of Los Angeles City of West Hollywood	Pan Pacific Flood Control System Area	6/3/1994	102A	94-09-540P
Los Angeles County	Violin Canyon Creek from confluence with Castaic Creek to 2,600 feet Upstream of Lake Hughes Road	9/12/1994	102	94-09-680P

Table 5 - LETTERS OF MAP CHANGE

Community	Flooding Source(s)/Project Identifier	Date Issued	Type	Case Number
Los Angeles County	Medea Creek (above Mulholland Highway)	11/18/1994	102	94-09-552P
Los Angeles County	Castaic Creek from Interstate 5 to 2,700 feet downstream of Interstate 5	3/1/1995	102	94-09-716P
Los Angeles County	Harbor Area	9/13/1995	LOMR	95-09-405P
Los Angeles County	Santa Clara River 500 feet downstream of McBean Parkway to 1,800 feet upstream of confluence with South Fork Santa Clara River and along the South Fork Santa Clara River from confluence with Santa Clara River to 1,200 upstream of confluence	10/25/1995	102	95-09-398P
Los Angeles County	Basin at Villa Canyon Road and Route 5	1/3/1997	102	97-09-070P
Los Angeles County	Bouquet Canyon Creek, Dry Canyon And Santa Clara River	8/18/1997	102	97-09-783P
Los Angeles County	San Francisquito Canyon Creek	2/19/1998	LOMR	98-09-285P
Los Angeles County	Hasley Canyon Creek	9/18/1998	LOMR	98-09-1022P
Los Angeles County City of Compton	Los Angeles County Drainage Area Project (LACDA) along Compton Creek and Los Angeles River from Ocean Blvd to Long Beach Blvd. – Los Angeles River Left Overbank Path 1	2/25/2000	LOMR	00-09-177P

Table 5 - LETTERS OF MAP CHANGE

Community	Flooding Source(s)/Project Identifier	Date Issued	Type	Case Number
Los Angeles County	Hacienda Heights; Private Drain Nos. 746, 1446, & 1560 & Road Dept. Drain No. 024	3/9/2001	102	00-09-294P
Los Angeles County	Hillcrest Park, Private Drains 2157, 2279, 2316, & 2467	5/1/2001	102	01-09-190P
Los Angeles County	Private Drain No. 2275, Tract No. 48150	5/23/2001	102	01-09-127P
Los Angeles County	San Francisquito Canyon Creek	6/7/2001	102	01-09-491P
Los Angeles County	Haskel Canyon, Tract 47657, P.D. No. 2469	8/22/2001	102	01-09-459P
Los Angeles County City of Bellflower City of Carson City of Compton City of Downey City of Lakewood City of Long Beach City of Lynwood City of Montebello City of Paramount City of Pico Rivera City of South Gate	Los Angeles County Drainage Area Project (LACDA) along Compton Creek and Los Angeles River from Ocean Blvd to Long Beach Blvd	1/11/2002	LOMR	02-09-034P
Los Angeles County	Santa Clara River at confluences with San Martinez Chiquito Canyon and San Martinez Grande	10/24/2002	102	01-09-559P
Los Angeles County	Pico Canyon Creek at confluence with Dewitt Canyon Creek	1/15/2003	102	03-09-0065P

Table 5 - LETTERS OF MAP CHANGE

Community	Flooding Source(s)/Project Identifier	Date Issued	Type	Case Number
Los Angeles County	Santa Clara River - Tract 45023 upstream of Antelope Valley Freeway	4/21/2003	LOMR	02-09-404P
Los Angeles County City of Santa Clarita	San Francisquito Canyon Creek from 500 feet downstream of Decoro Drive to 1,800 feet upstream of Copper Hill Drive, Tract 44831-A	4/30/2003	102	03-09-0041P
Los Angeles County City of Santa Clarita	Soilcement Bank Protection At East Creek	4/30/2003	LOMR	03-09-0694X
Los Angeles County	Hasley Canyon Creek	9/26/2003	102	03-09-0311P
Los Angeles County City of Palmdale	Amargosa Dam	3/10/2005	LOMR	04-09-1388P
Los Angeles County	Oak Creek Mixed Use Development Tentative Tract 53752,Medea Creek From Canwood Street up 1,700 feet upstream	6/30/2005	LOMR	04-09-1686P
Los Angeles County	San Francisquito Canyon Creek – Tract No. 51644	10/31/2005	LOMR	05-09-A120P
Los Angeles County	Triunfo Creek – upstream of Hidden Park Bridge	11/14/2005	LOMR	05-09-0892P
Los Angeles County	Pico Canyon Creek upstream of Stevenson Ranch Parkway	11/14/2005	LOMR	05-09-1072P
Los Angeles County	Plum Canyon Creek – 3,000’ upstream to 6,780’ upstream of Bouquet Creek	02/28/2006	LOMR	06-09-B003P
Los Angeles County	San Francisquito Canyon Creek	10/16/2006	LOMR	06-09-BE13P

Table 5 - LETTERS OF MAP CHANGE

Community	Flooding Source(s)/Project Identifier	Date Issued	Type	Case Number
Los Angeles County	River Ranch	12/18/2006	LOMR	06-09-B867P
Los Angeles County	Valencia Commerce Center	12/22/2006	LOMR	06-09-BF37P
Los Angeles County City of Palmdale	Amargosa Creek Soils Cement Improvements and Arch Culverts @ 10th Street West	02/09/2007	LOMR	07-09-0322P
Los Angeles County	Plum Creek Canyon	10/31/2007	LOMR	07-09-1877P

-- Data Unknown

2.2 Community Description

Los Angeles County

Los Angeles County is located in southwestern California and is bounded on the east by San Bernardino County, on the south by Orange County and the Pacific Ocean, on the west by the Pacific Ocean and Ventura County, and on the north by Kern County.

The communities comprising the incorporated portions of Los Angeles County encompass the vast majority of developable land within the County. The total land area of the County is approximately 4,061 square miles. The total unincorporated area of the County is approximately 3,000 square miles. The primary areas where significant development has occurred and is continuing are the canyon floors of the Antelope Valley, the Santa Clarita Valley, and the Malibu area. In addition, there are many relatively small "islands" in the Los Angeles basin area which are partially or completely surrounded by incorporated cities. Many of these islands are fully developed or undergoing rapid development. The balance of the county area is located within the rugged mountains of the Angeles National Forest or undeveloped agricultural lands. The population of the County has risen from approximately 1,005,900 in 1977, when many original FIS studies were prepared, to approximately 10,179,716 by 2004 (U.S. Census data, 2005), an increase of over 1,000 percent. Along with this phenomenal boom in population has been an accompanying in-filling of much of the remaining developable land in the County.

Land use in Los Angeles County is highly diversified. Development ranges from densely populated areas in the Los Angeles basin, to lower density semi-rural development in the Santa Clarita Valley, Antelope Valley, and Malibu area, to some almost uninhabited mountainous areas of the Angeles National Forest. The terrain within the County can be classified in broad terms as being 30 percent alluvial plain and 70 percent rugged mountains and hills. Elevations range from sea level to nearly 10,000 feet at some locations in the San Gabriel Mountains.

The incorporated areas of Los Angeles County drain to the ocean largely through a system of human-modified channels and storm drains. Much of the incorporated area is protected by a vast network of flood control channels, debris basins, and flood control reservoirs. In the unincorporated areas of the County, with the exception of a few improved channels, the Malibu area is drained by natural watercourses which discharge directly to the Pacific Ocean. The Santa Clarita Valley is drained by the largely-natural channel of the Santa Clara River and its tributaries, which discharges into Ventura County and thence, to the ocean. Some improved channels have been constructed in the Santa Clarita Valley. Flows in the Antelope Valley are northerly from the mountains across the broad alluvial plain, through a network of largely unimproved channels. During minor storms, much of the flow percolates into the ground. In major storms, flows reach the lake at the northern county limits, where flood flows pond until evaporated. With the exception of a small portion of Amargosa Creek, there are no flood control improvements in the Antelope Valley.

Throughout most of the County, nearly all precipitation occurs during December through March. Precipitation during the summer is infrequent, except in the desert areas, where intense, short-duration thunderstorms can occur. Major storms consist of one or more frontal systems, and occasionally last 4 days or longer. Average annual rainfall ranges from 13.8 inches at the ocean, to 28.2 inches in the San Gabriel Mountains, to 7.9 inches in the Antelope Valley. In highly developed areas, runoff volumes have increased as the soil surface has become covered by impervious materials, natural ponding areas have been eliminated, and flood control facilities have been constructed.

City of Agoura Hills

The City of Agoura Hills is located in southwest Los Angeles County, in southwestern California, in a relatively flat basin between the Santa Monica Mountains and cluster of hills separating it from Simi Valley. The City of Los Angeles is located approximately 6 miles to the east.

The City of Agoura Hills is bordered by unincorporated areas of Los Angeles County to the east, south, and west, and unincorporated areas of Ventura County to the north.

According to the U.S. Bureau of the Census, the population of the City of Agoura Hills in 2000 was 20,537.

The Agoura Hills area is bisected by a number of drainage courses including Las Virgenes Canyon, Liberty Canyon, Lindero Canyon, and Triunfo Canyon. The most prominent physical feature in the city is Ladyface Mountain, which at an elevation of 2,036 feet is visible from nearly all points in the Agoura Hills area. A prominent ridge line runs along Ladyface Mountain for approximately 2 miles. Much of the terrain in the Santa Monica Mountains is rugged and steep. Elevations in the study area range from 600 feet to approximately 2,000 feet. The canyon bottoms are generally flat, with relatively abrupt transitions to canyon sides sloping at 25 percent to 35 percent from the bottom.

The soils in the Malibu/Santa Monica Mountains Plan area are highly susceptible to erosion. Slope stability hazards not only cause erosion, but erosion leads to problems of run-off and siltation. The top soils are termed expansive in nature.

Land development within the city ranges from low-density rural in Old Agoura to a higher density and urban development in the newer sections of the city.

There are several types of vegetation within the Agoura Hills area consisting of chaparral, coastal sage scrub, Bigleaf Maple. Western Sycamore, and Coast Live Oak. Grassland, characterized by herbs and native grasses, is also found in the area.

Most precipitation occurs during December through March. Precipitation during the summer is infrequent. The average rainfall is 17 inches a year.

City of Alhambra

Results of the mapping study were not previously summarized in effective FIS report for the City of Alhambra; therefore, no community description is provided.

City of Arcadia

Results of the mapping study were not previously summarized in effective FIS report for the City of Arcadia; therefore, no community description is provided.

City of Artesia

Results of the mapping study were not previously summarized in effective FIS report for the City of Artesia; therefore, no community description is provided.

City of Avalon

The City of Avalon is located on Santa Catalina Island, approximately 26 miles south of Los Angeles Harbor. The City is approximately 1.2 square miles in size. It is situated on the coast, and is surrounded by steep headwaters that are primarily unincorporated areas of Los Angeles County. Development is primarily residential, with scattered hotels and commercial areas.

The population of Avalon was 2,022 in 1980, and approximately 3,000 in 2004. This represents an approximate 200 percent increase from the 1970 population of 1,520.

The terrain in Avalon can be classified in broad terms as being 15 percent alluvial plain, 5 percent moderately sloping canyons, and 80 percent mountains. Relief of the terrain ranges from sea level to an elevation of approximately 900 feet.

Nearly all precipitation occurs during December through March. Precipitation during the summer is infrequent, and rainless periods of several months are common. Precipitation in the area occurs primarily as winter orographic rainfall associated with extra-tropical cyclones of North Pacific origin. Major storms consist of one or more frontal systems and occasionally last 4 days or longer.

In mountain areas, the steep canyon slopes and stream channel gradients are conducive to rapid concentration of storm runoff quantities. The watersheds tributary to the City are composed of rough, broken, and stony land not suitable for agricultural production. The soils are classified as having moderately low infiltration rates and, therefore, moderately high runoff rates.

The principal vegetative cover of the upper mountain areas consists of various species of brush and shrubs known as chaparral. Grasses are the principal natural vegetation on the undeveloped portions of the alluvial plains.

A large portion of the developed area of the City of Avalon is situated on a broad alluvial plain at the mouth of Avalon Canyon. The tributary watershed is approximately 3 square miles in size. A small drainage ditch, which originates high up in Avalon Canyon, meanders down to the developed area of the city.

City of Azusa

Results of the mapping study were not previously summarized in effective FIS report for the City of Azusa; therefore, no community description is provided.

City of Baldwin Park

Results of the mapping study were not previously summarized in effective FIS report for the City of Baldwin Park; therefore, no community description is provided.

City of Bell Gardens

Results of the mapping study were not previously summarized in effective FIS report for the City of Bell Gardens; therefore, no community description is provided.

City of Bell

Results of the mapping study were not previously summarized in effective FIS report for the City of Bell; therefore, no community description is provided.

City of Bellflower

The City of Bellflower is located in southeastern Los Angeles County approximately 10 miles from downtown Los Angeles. Bellflower is bordered by the Cities of Downey on the north, Paramount and Long Beach on the west, Lakewood on the south, and Cerritos and Norwalk on the east.

The population of Bellflower was 53,441 in 1980, and approximately 72,878 in 2000, an increase of 36 percent. Bellflower covers an area of 6.1 square miles and is served by State Highway 91 (Artesia Freeway) and State Highway 19. The San Gabriel River flows north to south along the eastern corporate limits of the City.

The Los Angeles River, which is the primary flood threat to the City of Bellflower, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County. The portion of the river that affects the City of Bellflower begins at the Arroyo Seco and ends at the mouth of the river at the Pacific Ocean. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence, passes through the Cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach, to its terminus at the Pacific Ocean.

The Rio Hondo originates from the eastern part of Los Angeles County at Whittier Narrows Dam east of the Montebello Hills. The River flows southwest through the Cities of Montebello, Pico Rivera, Bell Gardens, Downey and South Gate to its confluence with the Los Angeles River just north of the Imperial Highway.

The metropolitan areas adjacent to the Los Angeles River and the Rio Hondo are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of Bellflower resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River.

Underlying soils are considered alluvial, and vary from coarse sand and gravel, to silty clay and gravel or clay. The land is generally well drained, with relatively few perched water or artesian areas. Large deposits of petroleum are present along the coast. Extensive pumping for oil has caused subsidence in the lower reach.

The climate is considered subtropical. The precipitation regime contributing to the Bellflower area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Beverly Hills

Results of the mapping study were not previously summarized in effective FIS report for the City of Beverly Hills; therefore, no community description is provided.

City of Bradbury

Results of the mapping study were not previously summarized in effective FIS report for the City of Bradbury; therefore, no community description is provided.

City of Burbank

The City of Burbank is an urbanized community situated at the southerly foothills of the Verdugo Mountains at the east end of the San Fernando Valley and the central portion of the Los Angeles County basin. It is located approximately 11 miles northeast of the downtown area of the City of Los Angeles. Burbank is bordered on the east by the City of Glendale, on the north by the Verdugo Mountains, and on the west and south by the City of Los Angeles.

The City is approximately 17.1 square miles in size. The population of the City was approximately 83,300 in 1977, and approximately 100,316 in 2000, an increase of 20 percent.

The majority of development in the flood plain is residential, while small portions are either commercial or undergoing re-development.

The topography of the coastal plain on which the City of Burbank resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River.

The terrain within the corporate limits of the City of Burbank can be classified in broad terms as being 80 percent alluvial plain and 20 percent moderately sloping canyons and mountains. Elevation ranges from 500 feet at the southern portion of the city to approximately 2,600 feet at the Verdugo Mountains to the northeast. The mountain area is characterized by very steep and rugged terrain with very little residential development. The foothill area is characterized by steep (greater than 10 percent slope) ground surface and street gradients. Residential development in the lower foothills has occurred on sites created by varying degrees of cut and fill that have produced a terraced effect. The alluvial fan area, lying between the foothill and valley floor areas, is characterized by moderate (3 to 10 percent slope) ground surface and street gradients, whereas, the valley floor area consists of- flatter slopes (less than 3 percent). The majority of development in these two areas is residential, while a significant portion is commercial.

The Los Angeles River, which is the primary flood threat to the City of Burbank, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County.

The climate is considered subtropical. The precipitation regime contributing to the Burbank area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San

Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

Soils within the City are generally of the clay type. Vegetation consists primarily of private gardens and urban landscape. The less developed portions of the city, especially the upper foothills and mountain slopes, are characterized by vegetation of the chaparral type, an ecological community occurring widely in southern California and comprised of shrubby plants especially adapted to dry summers and moist winters.

In highly developed areas of the City, local runoff volumes have increased as the soil surface has become covered by impervious materials. Peak runoff rates for valley areas have also increased due to elimination of natural ponding areas and improved hydraulic efficiency of water conveyance systems, such as streets and storm drain systems. Surface runoff traverses the city in a southeasterly direction, draining into the Los Angeles River, located to the south of the community.

City of Calabasas

Results of the mapping study were not previously summarized in effective FIS report for the City of Calabasas; therefore, no community description is provided.

City of Carson

The City of Carson is located in southern Los Angeles County. It is bordered by the City of Los Angeles to the east, south, and west. It is bordered by the City of Compton to the north and the City of Long Beach to the east. The population of the City of Carson was approximately 81,221 in 1980, and approximately 89,730 in 2000, an increase of 10 percent.

Carson has an area of approximately 19.8 square miles. Primary land uses include residential, commercial, and light industrial.

The highest point in Carson is 195 feet above sea level located between Victoria and 190th Street on Wilmington Avenue. The lowest point on land has an elevation of 5 feet below sea level and is located in Del Amo Park. The lowest point is in the center of the Dominguez Channel located at the southeastern corner of the city with an elevation of 14.71 feet below sea level.

The Los Angeles River, which is the primary flood threat to the City of Carson, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County. The portion of the river that affects the City of Carson begins at the Arroyo Seco and ends at the mouth of the river at the Pacific Ocean. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence, passes through the Cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach, to its terminus at the Pacific Ocean.

The topography of the coastal plain on which the City of Carson resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River.

Underlying soils are considered alluvial, and vary from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Carson area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Cerritos

Results of the mapping study were not previously summarized in effective FIS report for the City of Cerritos; therefore, no community description is provided.

City of Claremont

Results of the mapping study were not previously summarized in effective FIS report for the City of Claremont; therefore, no community description is provided.

City of Commerce

Results of the mapping study were not previously summarized in effective FIS report for the City of Commerce; therefore, no community description is provided.

City of Compton

The City of Compton is located in southern Los Angeles County approximately 10 miles south of downtown Los Angeles City. The population of Compton was approximately 78,547 in 1970 and 93,393 in 2000, an increase of approximately 19 percent.

The Los Angeles River, which is the primary flood threat to the City of Compton, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County. The portion of the river that affects the City of Compton begins at the Arroyo Seco and ends at the mouth of the river at the Pacific Ocean. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence, passes through the Cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach, to its terminus at the Pacific Ocean.

The metropolitan areas adjacent to the Los Angeles River containing the City of Compton are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of Compton resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Compton area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Covina

Results of the mapping study were not previously summarized in effective FIS report for the City of Covina; therefore, no community description is provided.

City of Cudahy

Results of the mapping study were not previously summarized in effective FIS report for the City of Cudahy; therefore, no community description is provided.

City of Culver City

Culver City is an urbanized community situated at the westerly base of the Baldwin Hills, in the western portion of the Los Angeles County basin. The City is approximately 4.9 square miles in size. The City had a population in 1977 of approximately 38,600, and approximately 38,816 in 2000, almost no increase in 30 years. It is located approximately 11 miles west of the downtown area of the City of Los Angeles and is bordered by the City of Los Angeles and unincorporated County territory.

The terrain within Culver City's corporate limits can be classified, in broad terms, as being 90 percent alluvial plain and 10 percent moderately sloping canyons and hills. Elevations range from 20 feet at the western portion of the city to approximately 400 feet at the Baldwin Hills to the east.

The terrain within Culver City's corporate limits can be classified, in broad terms, as being 90 percent alluvial plain and 10 percent moderately sloping canyons and hills. Elevations range from 20 feet at the western portion of the city to approximately 400 feet at the Baldwin Hills to the east.

Nearly all precipitation occurs during the months of December through March. Precipitation during the summer months is infrequent, and rainless periods of several months are common. Precipitation in the area occurs primarily in the form of winter orographic rainfall associated with extratropical cyclones of North Pacific origin. Major storms consist of one or more frontal systems and occasionally last 4 days or longer.

In the highly developed areas, local runoff volumes have increased as the soil surface has become covered by impervious materials.

Peak runoff rates for valley areas have also increased due to elimination of natural ponding areas and improved hydraulic efficiency of water carriers, such as streets and storm drain systems.

City of Diamond Bar

Results of the mapping study were not previously summarized in effective FIS report for the City of Diamond Bar; therefore, no community description is provided.

City of Downey

The City of Downey, incorporated December 17, 1956, is located 12 miles southeast of Los Angeles in Los Angeles County. The population of Downey was approximately 88,573 in 1970, and approximately 107,323 in 2000, and increase of 21 percent.

Downey is serviced by the Santa Ana Freeway (Interstate 5), Long Beach Freeway (Interstate 710), and the San Gabriel Freeway (Interstate 605). Downey is approximately 8 miles from Long Beach Airport and 17 miles from Los Angeles International Airport.

The Rio Hondo, which is the primary flood threat to the City of Downey, originates at Whittier Narrows Dam, a flood control facility that controls runoff originating in the northeastern portion of the County. The Rio Hondo channel joins the Los Angeles River downstream of the City of Downey. Rio Hondo flows southwest through the Cities of Montebello, Pico Rivera, Bell Gardens, Downey and South Gate to its confluence with the Los Angeles River just north of the Imperial Highway. The Los Angeles River and Rio Hondo are part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County.

The metropolitan areas adjacent to the Los Angeles River and the Rio Hondo are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The metropolitan areas adjacent to the Rio Hondo containing the City of Downey are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of Downey resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Downey area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and

gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Duarte

Results of the mapping study were not previously summarized in effective FIS report for the City of Duarte; therefore, no community description is provided.

City of El Monte

Results of the mapping study were not previously summarized in effective FIS report for the City of El Monte; therefore, no community description is provided.

City of El Segundo

Results of the mapping study were not previously summarized in effective FIS report for the City of El Segundo; therefore, no community description is provided.

City of Gardena

The City of Gardena is located in southwestern Los Angeles County, 12 miles south of the City of Los Angeles. It is bordered by the City of Hawthorne to the west and north, the City of Torrance to the west and south, and the City of Los Angeles to the east and south.

Gardena was incorporated in 1930 and was once known as the world's strawberry capital. The population of Gardena was approximately 45,165 in 1980, and approximately 57,746 in 2000, an increase of 28 percent. The primary employment markets for Gardena are manufacturing, professional and retail sales.

Gardena covers an area of 5.7 square miles and is serviced by the San Diego Freeway (Interstate 405), the Harbor Freeway (Interstate 110) and the Artesia Freeway (State Highway 91).

The Los Angeles River, which is the primary flood threat to the City of Gardena, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County. The portion of the river that affects the City of Gardena begins at the Arroyo Seco and ends at the mouth of the river at the Pacific Ocean. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence, passes through the Cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach, to its terminus at the Pacific Ocean.

The metropolitan areas adjacent to the Los Angeles River containing the City of Gardena are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of Gardena resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Gardena area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Glendale

Results of the mapping study were not previously summarized in effective FIS report for the City of Glendale; therefore, no community description is provided.

City of Glendora

Results of the mapping study were not previously summarized in effective FIS report for the City of Glendora; therefore, no community description is provided.

City of Hawaiian Gardens

Results of the mapping study were not previously summarized in effective FIS report for the City of Hawaiian Gardens; therefore, no community description is provided.

City of Hawthorne

Results of the mapping study were not previously summarized in effective FIS report for the City of Hawthorne; therefore, no community description is provided.

City of Hermosa Beach

Results of the mapping study were not previously summarized in effective FIS report for the City of Hermosa Beach; therefore, no community description is provided.

City of Hidden Hills

Results of the mapping study were not previously summarized in effective FIS report for the City of Hidden Hills; therefore, no community description is provided.

City of Huntington Park

Results of the mapping study were not previously summarized in effective FIS report for the City of Huntington Park; therefore, no community description is provided.

City of Industry

Results of the mapping study were not previously summarized in effective FIS report for the City of Industry; therefore, no community description is provided.

City of Inglewood

Results of the mapping study were not previously summarized in effective FIS report for the City of Inglewood; therefore, no community description is provided.

City of Irwindale

Results of the mapping study were not previously summarized in effective FIS report for the City of Irwindale; therefore, no community description is provided.

City of La Canada Flintridge

Results of the mapping study were not previously summarized in effective FIS report for the City of La Canada Flintridge; therefore, no community description is provided.

City of La Habra Heights

Results of the mapping study were not previously summarized in effective FIS report for the City of La Habra Heights; therefore, no community description is provided.

City of La Mirada

The City of La Mirada is an urban community situated south of the Puente Hills, in the eastern portion of the Los Angeles County basin. The City is approximately 6 square miles in size. The City had a 1977 population of approximately 40,500, and approximately 46,783 in 2000, and increase of 16 percent. It is located approximately 20 miles southeast of downtown Los Angeles and is bordered by the Cities of Cerritos to the south and west, Santa Fe Springs to the west, La Habra to the north and east, Fullerton to the east, and Buena Park to the south. It is also bordered by unincorporated areas of Los Angeles County to the north and east and Orange County to the south and west.

The terrain within the La Mirada corporate limits can be classified in broad terms as 90 percent alluvial plain and 10 percent moderately sloping canyons and hills. Elevations range from approximately 200 feet in the northern portion of the city to 60 feet at the southern corporate limits.

Nearly all precipitation occurs during the months of December through March. Precipitation during the summer months is infrequent, with rainless periods of several months being common. Precipitation in the area occurs primarily in the form of winter orographic rainfall associated with extratropical cyclones of North Pacific origin. Major storms consist of one or more frontal systems and occasionally last 4 days or longer.

In the highly developed areas, local runoff volumes have increased because the soil surface has become covered by impervious materials, such as pavement areas and rooftops. Peak runoff rates for coastal plain areas have also increased due to the elimination of natural ponding areas and improved hydraulic efficiency of water carriers, such as streets and storm drain systems.

City of La Puente

Results of the mapping study were not previously summarized in effective FIS report for the City of La Puente; therefore, no community description is provided.

City of La Verne

Results of the mapping study were not previously summarized in effective FIS report for the City of La Verne; therefore, no community description is provided.

City of Lakewood

The City of Lakewood, incorporated April 16, 1954, is located 20 miles southeast of the City of Los Angeles in Los Angeles County. Lakewood is bordered by the Cities of Bellflower on the north, Long Beach to the west and south, Cerritos on the east and Bellflower on the north. The San Gabriel River flows north to south along the eastern corporate limits.

The population of Lakewood was approximately 82,973 in 1970, and 79,345 in 2000, a decrease of 4 percent. Lakewood is serviced by Interstate Highways 5, 405, 605, and 710 and State Highways 19 and 91. Long Beach Airport is approximately 2 miles and Los Angeles International Airport is approximately 20 miles from Lakewood.

The Los Angeles River, which is the primary flood threat to the City of Lakewood, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County. The portion of the river that affects the City of Lakewood begins at the Arroyo Seco and ends at the mouth of the river at the Pacific Ocean. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence, passes through the Cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach, to its terminus at the Pacific Ocean.

The metropolitan areas adjacent to the Los Angeles River containing the City of Lakewood are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of Lakewood resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Lakewood area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Lancaster

Lancaster is an urbanized community situated in the Antelope Valley of northeastern Los Angeles County, in southern California. The City had a population of approximately 44,600 in 1977, and 118,718 in 2000, an increase of 266 percent. It is located approximately 56 miles north of the downtown area of the City of Los Angeles, and it is bordered by the City of Palmdale to the south and unincorporated county land to the west, north, and east.

The terrain within Lancaster's corporate limits can be classified, in broad terms, as being 100 percent alluvial plain.

The Antelope Valley is located on the leeward side of the San Gabriel Mountains, so orographic rainfall is generally sparse and occurs only during the winter months. Some snow falls at the higher elevations. Intense, short-duration summer thunderstorms are not uncommon and have created flooding in downstream areas.

The primary flood threat to the City of Lancaster is created by runoff originating in the Amargosa Creek and Portal Ridge Wash watersheds.

The average annual rainfall in Lancaster is approximately 6 inches. In the mountain watersheds to the south, the annual rainfall averages over 19 inches. On occasion, rainfall is of such intensity or duration that flows continue down major stream courses to the dry lakes north of the city where it ponds and eventually evaporates.

City of Lawndale

Results of the mapping study were not previously summarized in effective FIS report for the City of Lawndale; therefore, no community description is provided.

City of Lomita

Results of the mapping study were not previously summarized in effective FIS report for the City of Lomita; therefore, no community description is provided.

City of Long Beach

The City of Long Beach is located on the coast, in the southern region of the Los Angeles County basin. The City is approximately 50 square miles in size. The City had a population in 1980 of approximately 361,334, and approximately 461,522 in 2000, an increase of 28 percent.

Long Beach is located approximately 24 miles south of the downtown area of the City of Los Angeles. The city is bordered by the Cities of Paramount, Bellflower, Lakewood, Seal Beach, Signal Hill, Los Angeles, and Carson; unincorporated areas of Los Angeles County; and the Pacific Ocean.

The development in the flood-prone areas of Long Beach is commercial, industrial, and residential.

The terrain within the Long Beach corporate limits can be classified in broad terms as being 100 percent coastal plain. Elevation ranges from 60 feet in the northern portion of the city to sea level along the coast.

In the highly developed areas, local runoff volumes have increased as the soil surface has become covered by impervious materials. Peak runoff rates for coastal plain areas have also increased due to elimination of natural ponding areas and improved hydraulic efficiency of water carriers, such as streets and storm drain systems.

The Los Angeles River, which is the primary flood threat to the City of Long Beach, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County. The portion of the river that affects the City of Long Beach begins at the Arroyo Seco and ends at the mouth of the river at the Pacific Ocean. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence, passes through the Cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach, to its terminus at the Pacific Ocean.

The metropolitan areas adjacent to the Los Angeles River containing the City of Long Beach are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of Long Beach resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River. Two prominent hill formations are located in the lower reach of the floodplain. They include the Dominguez Hills on the west side of the Los Angeles River approximately 4 miles north of the coast and Signal Hill in the City of Long Beach. The Dominguez Hills reach an elevation of 200 feet and Signal Hill reaches 110 feet. Industrial areas just north of the Long Beach Harbor experience depressed elevations of -8.0 feet below sea level.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas. Deposits of petroleum are present along the coast. Extensive pumping for oil has caused subsidence in the lower reach. ERMs along the coast and in the City of Long Beach are updated on a regular basis.

The climate is considered subtropical. The precipitation regime contributing to the Long Beach area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Los Angeles

The City of Los Angeles is the largest city in Los Angeles County. It is located in the southwestern portion of Los Angeles County. The City of Los Angeles occupies the central portion of the Los Angeles basin, surrounded by the. San Gabriel, Santa Susana, and Verdugo Mountains on the north; incorporated cities within the coastal plain on the east; the Pacific Ocean on the south and southwest; and unincorporated areas of Los Angeles County and Malibu on the west. The Malibu area is within the

western portion of the Santa Monica Mountains, which also extends to the east within the downtown area of the city.

The city encompasses an area of approximately 464 square miles. The City had a population in 1977 of approximately 2,762,000, and 3,694,820 in 2000, an increase of 34 percent. The City of Los Angeles is bordered by the Cities of Burbank, Glendale, Pasadena, South Pasadena, Alhambra, Monterey Park, Commerce, Vernon, Huntington Park, Carson, Long Beach, Rancho Palos Verdes, Lomita, Torrance, Gardena, Inglewood, Culver City, and Santa Monica, and by unincorporated areas of Los Angeles County.

Land use in the City of Los Angeles is diverse, with large areas of residential, commercial, and industrial development. Development varies from the densely populated central city to the quiet, secluded areas of the Santa Monica Mountains. The full development of the flat lands of the Los Angeles basin, the great demand for new residential units, and the tremendous increase in real estate values in the past years have resulted in extensive hillside development in the San Gabriel, Verdugo, and Santa Monica Mountains.

The terrain within the Los Angeles corporate limits can be classified in broad terms as being 75 percent alluvial plain and 25 percent rugged canyons and hills. Elevations range from 5,074 feet at Sister Elsie Peak in the San Gabriel Mountains to nearly mean sea level in the southwestern part of the city.

The Los Angeles River, which is the primary flood threat to the City of Los Angeles, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County. The portion of the river that affects the City of Los Angeles begins at the Arroyo Seco and ends at the mouth of the river at the Pacific Ocean. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence, passes through the Cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach, to its terminus at the Pacific Ocean.

The remaining major drainage networks within the City are those of the Ballona Creek and Dominguez Channel systems. The West Los Angeles area is tributary to Ballona Creek and other channels that discharge into the Pacific Ocean on the west side of the County. The Central District is tributary to Compton Creek and the Los Angeles River, which flows southerly beyond the city limits and discharges into the ocean. The Harbor District is tributary to Dominguez Channel and Harbor Lake, which drain adjacent to the Los Angeles River mouth.

The topography of the coastal plain on which much of the City of Los Angeles resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River. The City contains numerous steep, developed hillside residential areas.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Los Angeles area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting

associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Lynwood

The City of Lynwood is a residential community, with scattered areas of commercial and industrial development, situated in the central basin area of Los Angeles County. The City is approximately 5.0 square miles in size. The City of Lynwood had a population in 1980 of approximately 48,548, and approximately 69,845 in 2000, an increase of 44 percent. It is located approximately 11 miles southeast of the downtown area of the City of Los Angeles and is bordered by the Cities of South Gate, Paramount, Compton, and Los Angeles and incorporated county territory.

The Los Angeles River, which is the primary flood threat to the City of Lynwood, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County. The portion of the river that affects the City of Lynwood begins at the Arroyo Seco and ends at the mouth of the river at the Pacific Ocean. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence, passes through the Cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach, to its terminus at the Pacific Ocean.

The metropolitan areas adjacent to the Los Angeles River containing the City of Lynwood are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of Lynwood resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River. The terrain within the Lynwood corporate limits can be classified in broad terms as being 100 percent coastal plain. Elevations range from 95 feet at the northerly corporate limits of the city to 71 feet along the southerly corporate limits.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Lynwood area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and

gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Malibu

Results of the mapping study were not previously summarized in effective FIS report for the City of Malibu; therefore, no community description is provided.

City of Manhattan Beach

Results of the mapping study were not previously summarized in effective FIS report for the City of Manhattan Beach; therefore, no community description is provided.

City of Maywood

Results of the mapping study were not previously summarized in effective FIS report for the City of Maywood; therefore, no community description is provided.

City of Monrovia

Results of the mapping study were not previously summarized in effective FIS report for the City of Monrovia; therefore, no community description is provided.

City of Montebello

The City of Montebello is an urbanized community situated in the east-central portion of the Los Angeles County basin. It is located approximately 8 miles east of the downtown area of the City of Los Angeles and is bordered by the Cities of Commerce, Monterey Park, Pico Rivera, and Rosemead, and unincorporated territory of Los Angeles County. The city is approximately 8.2 square miles in size. The City had a population of approximately 52,929 in 1980, and approximately 62,150 in 2000, an increase of 17 percent.

The Rio Hondo, which is the primary flood threat to the City of Montebello, originates at Whittier Narrows Dam, a flood control facility that controls runoff originating in the northeastern portion of the County. The Rio Hondo channel joins the Los Angeles River downstream of the City of Montebello. Rio Hondo flows southwest through the Cities of Montebello, Pico Rivera, Bell Gardens, Downey and South Gate to its confluence with the Los Angeles River just north of the Imperial Highway. The Los Angeles River and Rio Hondo are part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County.

The metropolitan areas adjacent to the Los Angeles River and the Rio Hondo are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The metropolitan areas adjacent to the Rio Hondo containing the City of Montebello are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of Montebello resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel

Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River. The terrain within Montebello's corporate limits can be classified, in broad terms, as being 90 percent alluvial plain and 10 percent moderately sloping hills. Elevations range from 160 feet in the southern portion of the city to approximately 500 feet in the Montebello Hills to the northeast.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Montebello area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Monterey Park

Results of the mapping study were not previously summarized in effective FIS report for the City of Monterey Park; therefore, no community description is provided.

City of Norwalk

Results of the mapping study were not previously summarized in effective FIS report for the City of Norwalk; therefore, no community description is provided.

City of Palmdale

The City of Palmdale is a growing urban community situated in the Antelope Valley area of northeastern Los Angeles County. It is located approximately 48 miles north of downtown Los Angeles and is bordered by the City of Lancaster and unincorporated areas of Los Angeles County. The population of the City of Palmdale was approximately 20,024 in 1977, and approximately 116,670 in 2000, an increase of 583 percent.

Floodplain development east of the Antelope Valley Freeway is generally commercial and industrial development west of the freeway is primarily residential. Between 10th Street East and 50th Street East, there is a mix of residential and commercial development. Palmdale International Airport is proposed in the northeastern section of the city. Floodplain development along Little Rock Wash is largely agricultural and rural/urban development, with one dwelling unit per 1.0 to 2.5 acres. The proposed land use for this area is generally neighborhood commercial.

The community is located in the Amargosa, Anaverde, Little Rock, and Big Rock Wash watersheds. Major streams, such as Amargosa Creek, Anaverde Creek, Amargosa Creek Tributary, Little Rock Wash, and Big Rock Wash, originate in the San Gabriel Mountains and flow northerly and northeasterly through Palmdale. Anaverde Creek Tributary also originates in the San Gabriel Mountains and flows northerly toward Palmdale. Elevations range from 2900 feet at the foothills of the San Gabriel Mountains in the south and west, to approximately 2450 feet in the northern portion of the city. The terrain within

Palmdale corporate limits can be classified as being 95 percent alluvial fan and 5 percent moderately sloping canyons and hills.

Antelope Valley is located on the leeward side of the San Gabriel Mountains, therefore, orographic rainfall is generally sparse and occurs only during the winter. Some snow falls at the higher elevations. The average annual rainfall in Palmdale is approximately 6 inches. In the mountain watersheds to the south, the annual rainfall averages over 19 inches. On occasion, rainfall is of such intensity or duration that flows continue down major stream courses to the dry lakes in the northern portion of the city where water ponds and eventually evaporates.

Soils in the vicinity of Palmdale consist of sandy alluvial deposits ranging from very coarse deposits near the base of the San Gabriel Mountains to finer deposits extending to the northeast.

City of Palos Verdes Estates

Results of the mapping study were not previously summarized in effective FIS report for the City of Palos Verdes Estates; therefore, no community description is provided.

City of Paramount

The City of Paramount is located in southern Los Angeles County approximately 12 miles southeast of downtown Los Angeles City. The population of the City of Paramount was approximately 36,407 in 1980, and 55,266 in 2000, and increase of 52 percent.

The Los Angeles River, which is the primary flood threat to the City of Paramount, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County. The portion of the river that affects the City of Paramount begins at the Arroyo Seco and ends at the mouth of the river at the Pacific Ocean. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence, passes through the Cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach, to its terminus at the Pacific Ocean.

The metropolitan areas adjacent to the Los Angeles River containing the City of Paramount are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of Paramount resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River. The terrain within the Paramount corporate limits can be classified in broad terms as being 100 percent coastal plain. Elevations range from 95 feet at the northerly corporate limits of the city to 71 feet along the southerly corporate limits.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Paramount area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at

elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Pasadena

Results of the mapping study were not previously summarized in effective FIS report for the City of Pasadena; therefore, no community description is provided.

City of Pico Rivera

The City of Pico Rivera is located in southern Los Angeles County approximately 10 miles east of downtown Los Angeles City. The population of Pico Rivera was approximately 58,459 in 1980, and 63,428 in 2000, an increase of 8 percent.

The Rio Hondo, which is the primary flood threat to the City of Pico Rivera, originates at Whittier Narrows Dam, a flood control facility that controls runoff originating in the northeastern portion of the County. The Rio Hondo channel joins the Los Angeles River downstream of the City of Pico Rivera. Rio Hondo flows southwest through the Cities of Montebello, Pico Rivera, Bell Gardens, Downey and South Gate to its confluence with the Los Angeles River just north of the Imperial Highway. The Los Angeles River and Rio Hondo are part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County.

The metropolitan areas adjacent to the Rio Hondo containing the City of Pico Rivera are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of Pico Rivera resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River. The terrain within Pico Rivera's corporate limits can be classified, in broad terms, as being 90 percent alluvial plain and 10 percent moderately sloping hills. Elevations range from 160 feet in the southern portion of the city to approximately 500 feet in the Montebello Hills to the northeast.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Pico Rivera area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or

may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Pomona

Results of the mapping study were not previously summarized in effective FIS report for the City of Pomona; therefore, no community description is provided.

City of Rancho Palos Verdes

Results of the mapping study were not previously summarized in effective FIS report for the City of Rancho Palos Verdes; therefore, no community description is provided.

City of Redondo Beach

The City of Redondo Beach is located on the central coastline along the western County boundary bordering the Pacific Ocean on Santa Monica Bay. It is located approximately 23 miles southwest of the downtown area of the City of Los Angeles and is bordered by the Cities of Hermosa Beach and Manhattan Beach to the northwest, Hawthorne to the north, Lawndale and Torrance to the east, Palos Verdes Estates to the south, and the Pacific Ocean to the west.

The population of the City of Redondo Beach was approximately 63,100 in 1979, and 63,261 in 2000, a negligible increase.

The coastline of Los Angeles County is approximately 74 miles in length, extending from Sequit Point to the San Gabriel River just south of the Los Angeles/Long Beach Harbor. The shoreline is diverse and varied, consisting of sandy beaches, eroding cliffs, and rock outcroppings. It includes two prominent headlands, Point Dume and Palos Verdes Peninsula, and two bays, Santa Monica Bay and San Pedro Bay. Redondo Beach is on the northeastern portion of Palos Verdes Peninsula off Santa Monica Bay. The shoreline is characterized by a sandy beach backed by cliffs in its northern portion and by extensive urban development behind the beaches along the southern portion of Santa Monica Bay. The coastline of Palos Verdes Peninsula is rocky, with pocket beaches of sand and cobble typical of Redondo Beach. The southern stretch along San Pedro Bay is the highly developed Los Angeles/Long Beach Harbor area.

The City of Redondo Beach is densely populated with residential, commercial, and light industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of Redondo Beach resides is gradually sloped from inland communities and hills to the east, to the Pacific Ocean with a few exceptions of rising coastal dune ridges and depressed areas.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Redondo Beach area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Major storms consist of one or more frontal systems which may last up to four or more days each. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains north east of the City. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F.

City of Rolling Hills Estates

Results of the mapping study were not previously summarized in effective FIS report for the City of Rolling Hills Estates; therefore, no community description is provided.

City of Rolling Hills

Results of the mapping study were not previously summarized in effective FIS report for the City of Rolling Hills; therefore, no community description is provided.

City of Rosemead

Results of the mapping study were not previously summarized in effective FIS report for the City of Rosemead; therefore, no community description is provided.

City of San Dimas

Results of the mapping study were not previously summarized in effective FIS report for the City of San Dimas; therefore, no community description is provided.

City of San Fernando

Results of the mapping study were not previously summarized in effective FIS report for the City of San Fernando; therefore, no community description is provided.

City of San Gabriel

Results of the mapping study were not previously summarized in effective FIS report for the City of San Gabriel; therefore, no community description is provided.

City of San Marino

Results of the mapping study were not previously summarized in effective FIS report for the City of San Marino; therefore, no community description is provided.

City of Santa Clarita

The City of Santa Clarita is located in west-central Los Angeles County, in southwestern California. Santa Clarita is just north of U.S. Route 5 and State Route 14 on the canyon floor of the Santa Clarita Valley.

Santa Clarita is considered a low-density, semi-rural development, with medium-density development rapidly occurring in alluvial fan and canyon areas. The Santa Clarita Valley is drained by the Santa Clara River and its tributaries, which discharge into Ventura County, eventually reaching the Pacific Ocean. Some improved channels have been constructed in the Santa Clarita Valley.

The topography of the broad floodplain in which much of the City resides is gradually sloped from the foothills upstream of the City, to the Pacific Ocean with major mountainous landforms on either side. Ground elevations range from over 5,000 feet in the mountains, to mean sea level at the Pacific Ocean west of the City.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Santa Clarita area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting

associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Santa Fe Springs

The City of Santa Fe Springs is located in southeast Los Angeles County, in southern California.

The City is approximately 8.8 square miles in size, had a population of approximately 15,500 in 1977, and approximately 17,438 in 2002, an increase of 13 percent. It is located approximately 14 miles east of downtown Los Angeles and is bordered by the Cities of Norwalk, Cerritos, La Mirada, Downey, and Whittier and unincorporated areas of Los Angeles County.

The City of Santa Fe Springs is a diverse community with large areas of residential, commercial, industrial, and oil well development. The community is situated in the eastern portion of the Los Angeles County basin.

There is no development within the floodplain in the City of Santa Fe Springs. The San Gabriel River follows the western corporate limits. Its headwaters are located deep in the San Gabriel Mountains, and it flows approximately 31 miles through several residential communities, finally discharging into the Pacific Ocean south of the City.

The terrain within Santa Fe Springs can be broadly classified as a gently sloping plain. Elevations range from 155 feet in the north-central portion of the city to approximately 80 feet at the southern corporate limits.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Santa Fe Springs area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Santa Monica

Results of the mapping study were not previously summarized in effective FIS report for the City of Santa Monica; therefore, no community description is provided.

City of Sierra Madre

Results of the mapping study were not previously summarized in effective FIS report for the City of Sierra Madre; therefore, no community description is provided.

City of Signal Hill

Results of the mapping study were not previously summarized in effective FIS report for the City of Signal Hill; therefore, no community description is provided.

City of South El Monte

Results of the mapping study were not previously summarized in effective FIS report for the City of South El Monte; therefore, no community description is provided.

City of South Gate

The City of South Gate is located in southern Los Angeles County approximately 6 miles south of downtown Los Angeles City. The population of South Gate was approximately 66,784 in 1980, and 96,375 in 2000, an increase of 44 percent.

The Los Angeles River, which is the primary flood threat to the City of South Gate, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the LACFCD and USACE to minimize flooding in the County. The portion of the river that affects the City of South Gate begins at the Arroyo Seco and ends at the mouth of the river at the Pacific Ocean. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence, passes through the Cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach, to its terminus at the Pacific Ocean.

The metropolitan areas adjacent to the Los Angeles River containing the City of South Gate are densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of impervious development.

The topography of the coastal plain on which the City of South Gate resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the City, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River. The terrain within the South Gate corporate limits can be classified in broad terms as being 100 percent coastal plain. Elevations range from 95 feet at the northerly corporate limits of the city to 71 feet along the southerly corporate limits.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the South Gate area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snow fall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep

canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of South Pasadena

Results of the mapping study were not previously summarized in effective FIS report for the City of South Pasadena; therefore, no community description is provided.

City of Temple City

Results of the mapping study were not previously summarized in effective FIS report for the City of Temple City; therefore, no community description is provided.

City of Torrance

The City of Torrance is an urbanized community situated in southwestern Los Angeles County. The city is approximately 20.5 square miles in size. The City had a population of approximately 135,000 in 1977, and approximately 137,946 in 2000, an increase of 2 percent. It is located approximately 19 miles southwest of the downtown area of the City of Los Angeles and is bordered by the Cities of Gardena, Lawndale, Lomita, Los Angeles, Palos Verdes Estates, Redondo Beach, and Rolling Hills Estates, and unincorporated areas of Los Angeles County.

The terrain within the corporate limits of Torrance can be classified, in broad terms, as being 100 percent coastal plain. Elevations range from 300 feet at the southern portion of the city to sea level along the coast.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Torrance area and its surrounding watershed is primarily determined by the course of rainfall associated with extra-tropical cyclones during the months between December and March. Major storms consist of one or more frontal systems which may last up to four or more days each. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F.

City of Vernon

Results of the mapping study were not previously summarized in effective FIS report for the City of Vernon; therefore, no community description is provided.

City of Walnut

Results of the mapping study were not previously summarized in effective FIS report for the City of Walnut; therefore, no community description is provided.

City of West Covina

Results of the mapping study were not previously summarized in effective FIS report for the City of West Covina; therefore, no community description is provided.

City of West Hollywood

West Hollywood is one of Los Angeles County's older, more established communities. The city was newly incorporated November 29, 1984. It is the 84th, city to be incorporated in Los Angeles County. According to the December 1985 issue of City News, the population of West Hollywood was approximately 37,000, but was recorded as 35,716 in the 2000 Census. The City of West Hollywood, located in Los Angeles County California, is bordered to the south by the City of Beverly Hills and to the east by the City of Hollywood.

Over 51 percent of the land area in West Hollywood is developed as single and multiple family dwellings. Commercial and industrial area accounts for approximately 187 of the 2 square miles of land area within the city.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the West Hollywood area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

City of Westlake Village

Results of the mapping study were not previously summarized in effective FIS report for the City of Westlake Village; therefore, no community description is provided.

City of Whittier

Whittier is an urban community at the southern base of the Puente Hills, in the southeastern corner of Los Angeles County. It is approximately 15 miles east of the downtown area of the City of Los Angeles and is bordered by the cities of La Habra and Santa Fe Springs, and unincorporated areas of Los Angeles and Orange Counties. The city is approximately 12.1 square miles in area. The City had a population of approximately 70,300 in 1977, and approximately 83,680 in 2000, an increase of 19 percent. Development in the flood plain is mostly residential with some commercial development along Painter Avenue.

Elevations range from 140 feet in the southwest portion of the city to approximately 800 feet at the Puente Hills to the northeast. The terrain within the city can be classified in broad terms as being 90 percent alluvial land and 10 percent moderately sloping canyons and hills.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Whittier area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Major storms consist of one or more frontal systems which may last up to four or more days each. The fall of precipitation is greatly

intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the City. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F above zero with an average daily maximum of 80.2°F in July.

2.3 Principal Flood Problems

Los Angeles County

Los Angeles County has a long history of destructive flooding. The County suffered the effects of flooding episodes in 1811, 1815, 1825, 1832, 1861-62, 1867, 1876, 1884, 1888-91 (each year), 1914, 1921, and 1927. Similar, and better-documented floods have occurred in January 1934, March 1938, February 1941, January 1943, January 1952, January 1956, January and February 1969, March 1978, January 1979, March 1980, March 1983, January 1992, and January 1994. Many flood control facilities were constructed after the heavy loss of life and property damage incurred in the January 1934 flood event. These facilities have eliminated much of the damage which could have resulted in their absence. However, the floods of January and February 1969 and February and March 1978 demonstrated that Los Angeles County will always be susceptible to flood disaster. Of particular concern are mudflows which frequently occur in the foothill areas during intense rainfall, usually following wildfires in the upstream watershed. This hazard has not been addressed in this study but has been identified and addressed in numerous ways by the County, such as the construction of over one hundred debris basins at the mouths of mountainous canyons, to retain the high volume of sediment and debris that flood flows may carry during large floods. Debris basins have been demonstrated to be the only effective means of keeping downstream channel free of debris blockage, and the subsequent overtopping that would result during large flood events.

As an example of the continued threat from floods, during the 1969 storms, considerable damage occurred in the eastern portion of Los Angeles County, particularly in the foothill areas of the San Gabriel Mountains. Water and mud destroyed or damaged many residences and other buildings near the Cities of Glendora and Azusa, despite the presence of a large network of local flood control channels, storm drains, and debris basins.

In unincorporated areas of the County, much of the damage occurred downstream of brush fires which occurred during the summer of 1968. In the Malibu area, damage was experienced along Malibu Creek and Topanga Canyon where flows damaged homes, swept away bridges, and washed out roads. Approximately 500 people were left homeless or isolated. In the Santa Clarita Valley, most damage was caused by erosion and sedimentation of natural watercourses.

In the Antelope Valley, at least one home was completely destroyed. Railroads, public utilities, and agricultural interests also sustained considerable damage.

Although much of the damage, which occurred during the 1978 storms, was in the City of Los Angeles, unincorporated areas also sustained severe damage. In the La Crescenta area, a debris basin overflowed inundating several homes with mud and water. In addition, localized flooding damaged other homes in the area. Virtually all of the Flood Control District debris basins in this area were filled to capacity. In the Hidden Springs area, mud and water flowing down Mill Creek took 10 lives and destroyed numerous structures.

In the Los Angeles basin area, an extensive flood control system has eliminated much of the flood hazard experienced in years past. However, in the less densely populated areas of Malibu, Santa Clarita Valley, and Antelope Valley, relatively few flood control facilities have been constructed. These areas remain subject to flood hazard during major storms.

Mud flow mapping was incorporated into the DFIRM for the unincorporated areas of Los Angeles County.

City of Agoura Hills

The Los Angeles County Flood Control District indicates a history of flooding in the area from major storms in January 1934, March 1938, February 1941, January 1952, and January 1956 (Los Angeles County Flood Control District, Flood Overflow Maps, Updated Periodically).

Many flood control facilities have been constructed since these storms occurred. These facilities would have eliminated much of the damage which resulted from these storms. However, the more recent storms of January and February 1969 and February and March 1978 have demonstrated that Los Angeles County is still susceptible to flood disaster. Of particular concern are mudflows which frequently occur in the foothills during intense rainfall, usually following brush fires in the upstream watershed.

Damage from the 1969 storms was considerable in the Malibu area. Much of the damage occurred downstream of brush fire areas occurring in the summer of 1968. The Malibu area experienced damage to homes, bridges, and roads. Virtually all of the Flood Control Distict debris basins were filled to capacity. However, relatively few flood control facilities have been constructed in the area.

City of Alhambra

The City of Alhambra is identified as a non-flood prone community.

City of Arcadia

The City of Arcadia is identified as a non-flood prone community.

Mud flow mapping was incorporated into the DFIRM for the City of Arcadia.

City of Artesia

The City of Artesia is identified as a non-flood prone community.

City of Avalon

A small drainage ditch that channels runoff through the City exists along the eastern side of the headwaters canyon at an elevation somewhat higher than that of adjacent developed areas. The channel has capacity for approximately 15 percent of the 1-percent chance flood event. Excess flows break out as sheet flow and spread across the city, creating a wide flood plain that may inundate approximately 75 percent of all the structures located on the canyon floor. Research of local newspaper accounts, and interviews with residents reveal that the capacity of the channel has been exceeded during numerous past floods, and that shops and homes in the floodplain have experienced inundation damage.

Coastal areas of the City may be exposed to waves generated by winter and summer storms originating in the Pacific Ocean. The occurrence of such a storm event in combination with high astronomical tides and strong winds can cause a significant wave run-up allowing waves to reach higher than normal elevations along the coastline. When this occurs, shoreline erosion and coastal flooding frequently results in damage to inadequately protected structures and facilities located along low-lying portions of the shoreline.

On March 27, 1964, 10-foot waves, set in motion by a violent Alaskan earthquake, damaged the unsheltered coast of Santa Catalina Island. No damage was reported on the sheltered side of the island where Avalon Bay and the isthmus anchorage are located. However, there have been occasions when large, wind-driven waves have threatened structures fronting Avalon Bay.

Mud flow mapping was incorporated into the DFIRM for this city

City of Azusa

Results of the mapping study were not previously summarized in the effective FIS report for the City of Azusa; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of Azusa.

City of Baldwin Park

Results of the mapping study were not previously summarized in the effective FIS report for the City of Baldwin Park; therefore, no flood protection measures are provided.

City of Bell Gardens

Results of the mapping study were not previously summarized in the effective FIS report for the City of Bell Gardens; therefore, no flood protection measures are provided.

City of Bell

The City of Bell is identified as a non-flood prone community.

Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Long Beach, Los Angeles, Lynwood, Montebello, Paramount, Pico Rivera, Santa Fe Springs, South Gate, and Whittier

The Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Long Beach, Los Angeles, Lynwood, Montebello, Paramount, Pico Rivera, Santa Fe Springs, South Gate, and Whittier have a history of flooding roughly parallel to that of the larger Los Angeles River watershed. Prior to the construction of the extensive storm drain and flood control channel system protecting numerous communities within the County, these cities suffered the continual damage wrought by overflow of the Los Angeles River and/or its tributaries. Following completion of this system, and due to the lack of a very large flood event during the intervening period, the major cause of flood damage within these cities has been flooding by overflow of local drainage systems and smaller tributaries to the Los Angeles River system.

Localized flooding occurred to a large extent during the floods of January and February 1969, February and March 1978, and February 1980, March 1983, January 1992, and January 1994. This flooding was due to the occurrence of localized high-intensity rainfall events, which overwhelmed the ability of local storm drains and flood control channels to drain off the excess runoff.

Flood control facilities constructed after the large events of the 1930's eliminated much of the damage which could have resulted in their absence; however, the level of protection offered by these facilities may have diminished during this period of reapid development of the Los Angeles basin, demonstrated by the almost break-out of the Los Angeles River in 1980, during an event that was recorded as considerably smaller than that of the expected design level of protection. Construction of the Los Angeles County Drainage Area Project (LACDA) has brought to level of protection offered by the system up to a level of greater than a 1-percent annual chance event.

These cities remain susceptible to flood damage from other sources. Of particular concern are mudflows which frequently occur in the foothill areas during intense rainfall, usually following wildfires in the upstream watershed.

Prior to completion of the Corps of Engineers' Los Angeles County Drainage Area study and Los Angeles River and Rio Hondo flood control channel modifications, the upper and lower reach of the Los Angeles River Channel were not capable of adequately conveying a 1-percent annual chance flood event. Overbank areas were susceptible to flooding caused by overtopping and potential failure of levee structures. Completion of this project, and its subsequent pursuit of Map Revision and USACE certification of the level of protection offered by the project, has resulted in these cities' removal from the regulatory 1-percent annual chance floodplain. Breakout is still possible during events larger than the current design of the system is capable of conveying.

In addition to land-based storms, the coastline of the cities of Long Beach and Los Angeles are also susceptible to storm-associated flooding. The southern California coastline is exposed to waves generated by winter and summer storms originating in the Pacific Ocean. It is not uncommon for these storms to cause 15-foot breakers. The occurrence of such a storm event in combination with high astronomical tides and strong winds can cause a significant wave runup and allow storm waves to attack higher than normal elevations along the coastline. When this occurs, shoreline erosion and coastal flooding frequently results in damage to inadequately protected structures and facilities located along low-lying portions of the shoreline.

Brief descriptions of several significant storms follow, which provide information to which coastal flood hazards and the projected flood depths can be compared.

September 16, 1910

Heavy seas and high ground swells undermined homes in the Long Beach area. Efforts were made to check the destruction of the waves by building temporary bulkheads along the waterfront at its most exposed points, but until the tide began to recede late in the evening, little effective good was done. The ocean eroded into the sidewalks which stretch from the Long Beach Bath House to Seaside Park at high tide on the afternoon of the 16th. Within a short period of time, over a mile of the bulkhead and sidewalk were destroyed.

September 1934

A recurrence of destructive waves, similar to those of August 21, 1934, broke along the coast centering northward in the Long Beach area. Damage was reported at Malibu, where portions of the Roosevelt Highway were flooded due to waters backed up at a storm drain project under construction. In addition, the Pine Avenue Pier in Long Beach was destroyed. No damage was reported at either San Pedro or Santa Monica. Structures along the pike were endangered and temporary devices of protection were installed.

September 24-25, 1939

A tropical cyclone lashed the entire southern California coastline on Sunday, September 24th and Monday, September 25th. The storm brought approximately a 20°F drop in temperature throughout southern California and winds reached 65 miles per hour. The gales and rain claimed lives, wreaked havoc with power and phone lines, temporarily destroyed the main railroad systems, closed highways, and flooded homes. Eight large homes along the waterfront at Sunset Beach were swept away. In Long Beach, plate glass windows were smashed by fierce winds. Some Pacific Electric track was washed out at Hermosa Beach. Disruption of phone service was heaviest in the Bellflower, Hynes-Clearwater, and Artesia areas. Homes along the shore from Malibu to Huntington Beach were heavily damaged by pounding seas and high winds. Many small boats were washed ashore, and several were wrecked when

the high waves dashed them upon breakwaters or rocky shores. At least 10 yachts and barges were sunk or wrecked upon breakwaters or sands. At Santa Monica, the 227-foot fishing barge Minne A was washed ashore. Five deaths in the surf were reported; two at Los Angeles, two at Long Beach, and one at Newport Beach. At Burbank, one woman was drowned and others injured when a boat overturned.

December 25, 26, and 27, 1940

Twenty- and thirty-foot waves undermined residences and portions of the Strand at Redondo Beach. Two houses collapsed and five blocks of ocean-front walk were destroyed. In addition, 25-foot breakers undermined a house and store 50 feet landward of the normal high tide mark. At Belmont Peninsula, Long Beach, 70 homes were threatened with being cut off from the mainland by intense wave action.

May 22, 1960

Resurgent seismic-triggered ocean waves stemming from Chilean earthquakes smashed dock facilities and hundreds of small craft. Damage was estimated at upwards of $1 million. Hardest hit was the Los Angeles-Long Beach Harbor complex, where a series of tidal currents surged back and forth through narrow Cerritos Channel wreaking havoc among the yacht anchorages. Some 300 yachts and small boats were torn from their slips and estimates indicated that from 15 to 30 boats were sunk. The closing of the Terminal Island bridges and suspension of ferry service caused monumental traffic jams in the Los Angeles/Long Beach area. The peak surge was estimated at between 8 and 9 feet.

Winter 1977-1978

A combination of high astronomical tides, strong onshore winds, and high storm waves resulted in significant coastal flooding along the coastline of Los Angeles County. High tides and waves were responsible for an estimated $1 to 1.8 million in private property losses to homes located along beaches in Malibu; $80,000 worth of damage to the Santa Monica Pier; $150,000 worth of damage to the Long Beach Harbor; and $140,000 worth of damage to a bicycle path in 81 Segundo. Other losses resulting from wave damages occurred at Leo Carillo State Beach, Redondo Beach, Avalon, and other areas along the county shoreline.

Oil pumping in past years has caused subsidence along the ocean front areas of Long Beach. Settlements of up to 30 feet have occurred in some areas of the Long Beach Harbor subjecting many locations along the coast to damage from direct wave action. Much of Naples Island and Belmont Shores in southeastern Long Beach, lie at elevations less than the maximum recorded tide. Interior drainage is handled by means of flap-gated outlets in the seawall.

Mud flow mapping was incorporated into the DFIRM for the Cities of Los Angeles, Montebello, and Whittier.

City of Beverly Hills

Results of the mapping study were not previously summarized in the effective FIS report for the City of Beverly Hills; therefore, no flood protection measures are provided.

City of Bradbury

The City of Bradbury is identified as a non-flood prone community.

Mud flow mapping was incorporated into the DFIRM for the City of Bradbury.

City of Burbank

Stormflows entering the City of Burbank are generated from relatively small watersheds on the southwesterly side of the Verdugo Mountains. Flooding is caused by surface runoff associated with high-intensity orographic rainfalls of several hours duration. Once the ground is saturated, subsequent rainfall,

augmented by canyon floodflows and coupled with inadequate local drainage facilities, produces shallow flooding and ponding to a depth of approximately 3 feet.

Los Angeles County Flood Control District flood overflow delineations on U.S. Geological Survey maps indicate a history of flooded streets and streams in Burbank; however, minimal damage has occurred due to the construction of up-graded drainage facilities and flood protection structures.

Mud flow mapping was incorporated into the DFIRM for this city.

During a February 1992 storm, localized flooding was observed in the following locations in the City of Burbank:

1. In the area west of the Lockheed Drain and Burbank Western Flood Control Channels, east of Victory Boulevard, north of the southern branch of the Southern Pacific Railroad (SPRR), and south of Burbank Boulevard. Channel overflows flowed down Lake Street and ponded north of the SPPR tracks prior to returning to the Burbank Western Flood Control Channel.

2. Lockheed Drain overtopped upstream of an existing railroad spur bridge and flowed south down Griffith Park Drive to Burbank Boulevard. The overflow then flowed east along Burbank Boulevard until joining the flood flows described above.

3. Overflow through the existing railroad trestle weir located upstream of Clybourn Street.

4. No other significant flooding problems have been documented. The Los Angeles County Flood Control District (LACFCD) has prepared a deficiency analyses study (Los Angeles County Flood Control District, August 1982) that identifies several other potential flood-hazard areas.

City of Calabasas

Results of the mapping study were not previously summarized in the effective FIS report for the City of Calabasas; therefore, no flood protection measures are provided.

City of Cerritos

Results of the mapping study were not previously summarized in the effective FIS report for the City of Cerritos; therefore, no flood protection measures are provided.

City of Claremont

Results of the mapping study were not previously summarized in the effective FIS report for the City of Claremont; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of Claremont.

City of Commerce

Results of the mapping study were not previously summarized in the effective FIS report for the City of Commerce; therefore, no flood protection measures are provided.

City of Covina

Results of the mapping study were not previously summarized in the effective FIS report for the City of Covina; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of Covina.

City of Cudahy

Results of the mapping study were not previously summarized in the effective FIS report for the City of Cudahy; therefore, no flood protection measures are provided.

City of Culver City

The City of Culver City has an extensive history of floods and flooding. Sources of flooding include the Ballona Creek channel and associated tributaries, as well as drainage channels originating in the Baldwin Hills and surrounding cities.

The Los Angeles County Flood Control District's flood overflow maps indicate a history of flooded streets and low-lying areas along the streams of Culver City that resulted from major storms discussed above.

City of Diamond Bar

Results of the mapping study were not previously summarized in the effective FIS report for the City of Diamond Bar; therefore, no flood protection measures are provided.

City of Duarte

The City of Duarte is identified as a non-flood prone community

Mud flow mapping was incorporated into the DFIRM for the City of Duarte.

City of El Monte

The City of El Monte is identified as a non-flood prone community

City of El Segundo

Results of the mapping study were not previously summarized in the effective FIS report for the City of El Segundo; therefore, no flood protection measures are provided.

City of Glendale

Results of the mapping study were not previously summarized in the effective FIS report for the City of Glendale; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of Glendale.

City of Glendora

Results of the mapping study were not previously summarized in the effective FIS report for the City of Glendora; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of Glendora.

City of Hawaiian Gardens

Results of the mapping study were not previously summarized in the effective FIS report for the City of Hawaiian Gardens; therefore, no flood protection measures are provided.

City of Hawthorne

The City of Hawthorne is identified as a non-flood prone community

City of Hermosa Beach

Results of the mapping study were not previously summarized in the effective FIS report for the City of Hermosa Beach; therefore, no flood protection measures are provided.

City of Hidden Hills

Results of the mapping study were not previously summarized in the effective FIS report for the City of Hidden Hills; therefore, no flood protection measures are provided.

City of Huntington Park

The City of Huntington Park is identified as a non-flood prone community

City of Industry

Results of the mapping study were not previously summarized in the effective FIS report for the City of Industry; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of Industry.

City of Inglewood

Results of the mapping study were not previously summarized in the effective FIS report for the City of Inglewood; therefore, no flood protection measures are provided.

City of Irwindale

Results of the mapping study were not previously summarized in the effective FIS report for the City of Irwindale; therefore, no flood protection measures are provided.

City of La Canada Flintridge

The City of La Canada Flintridge is identified as a non-flood prone community.

Mud flow mapping was incorporated into the DFIRM for the City of La Canada Flintridge.

City of La Habra Heights

Results of the mapping study were not previously summarized in the effective FIS report for the City of La Habra Heights; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of La Habra Heights.

City of La Mirada

Los Angeles County Flood Control District flood overflow maps indicate a history of flooded streets and natural watercourses in La Mirada. This flooding resulted from major storms of March 1938, January'1956, January and February 1969, February 1978, March 1980, February 1983, and January 1994. La Mirada Creek is an unimproved watercourse which flows southwest through the City. Between Santa Gertrudes Avenue and Stamy Road, the channel runs into La Mirada Creek Park. The park has been designed as a greenbelt flood plain management area and the 1-Percent Annual Chance discharge is contained within city-owned park property. Downstream of Stamy Road, the floodflows follow the natural watercourse alignment of La Mirada Creek. Between Stamy Road and Imperial Highway, the existing development is rural-residential and the flood plain is occupied by horse corrals and small barns. The water ponds upstream of Imperial Highway inundate approximately 3 acres of undeveloped property. Between Imperial Highway and La Mirada Boulevard, the flows continue through a miniature golf course and a residential development. The residential structures are located on high ground substantially above the flood plain. Downstream of La Mirada Boulevard, the watercourse traverses an

open field which is part of Biola College. An existing flood control channel, downstream of the field, collects floodwaters, which are ultimately conveyed to North Fork Coyote Creek.

Watersheds of less than one square mile within the City have historically caused flooding in developed low-lying areas. These areas are located in the vicinity of the intersection of Valeda Drive and De Alcala Drive, between Goldendale Drive and Telegraph Road, the eastern end of Capella Street, the intersection of San Feliciano Drive and Figueras Road, the intersection of Crosswood Road and Pemberton Drive, the intersection of Borda Drive and San Ardo Drive, and north of the Atchison, Topeka, and Santa Fe Railway near Castellon Road.

City of La Puente

Results of the mapping study were not previously summarized in the effective FIS report for the City of La Puente; therefore, no flood protection measures are provided.

City of La Verne

Results of the mapping study were not previously summarized in the effective FIS report for the City of La Verne; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of La Verne.

City of Lancaster

Lancaster is situated on the alluvial floodplain of the Antelope Valley. Consequently, the type of flooding experienced in the city is typical of that experienced by communities developed on alluvial fans. Flood flows discharge from the mountainous canyons onto the desert floor, where, due to the lack of well-incised streambeds, it spreads out in uncontrolled patterns.

Flood discharges have overflowed in normally dry streambeds, resulting in heavy damage as floodwaters pass through developed areas. During the period of comparatively recent record, floods of major proportions have occurred. The office of the County Engineer has identified the areas in which moderate to severe flooding was observed during the heavy storms of 1938, 1965, 1969, 1978, 1980, 1983, 1994 on flood overflow maps. Flooding from Little Rock Creek was experienced in the eastern portion of. the city. During these floods, widespread damage to orchards, irrigation systems, buildings, and roads occurred.

City of Lawndale

The City of Lawndale is identified as a non-flood prone community

City of Lomita

The City of Lomita is identified as a non-flood prone community

City of Malibu

Results of the mapping study were not previously summarized in the effective FIS report for the City of Malibu; therefore, no flood protection measures are provided.

City of Manhattan Beach

Results of the mapping study were not previously summarized in the effective FIS report for the City of Manhattan Beach; therefore, no flood protection measures are provided.

City of Maywood

The City of Maywood is identified as a non-flood prone community.

City of Monrovia

The City of Monrovia is identified as a non-flood prone community.

Mud flow mapping was incorporated into the DFIRM for the City of Monrovia.

City of Monterey Park

Results of the mapping study were not previously summarized in the effective FIS report for the City of Monterey Park; therefore, no flood protection measures are provided.

City of Norwalk

Results of the mapping study were not previously summarized in the effective FIS report for the City of Norwalk; therefore, no flood protection measures are provided.

City of Palmdale

The type of flooding in the city is typical of that experienced by communities developed on alluvial fans. Flood flows discharge from the mountainous canyons onto the desert floor, where, due to the lack of well incised streambeds, water spreads out in uncontrolled patterns. Intense, short-duration summer thunderstorms are not uncommon and have created flooding in downstream areas.

The principal flood problems for both the Little Rock and Big Rock Washes can be attributed to three factors: the very flat topography, the absence of well-defined natural channels, and the lack of a developed flood control system. In the steeper upstream reaches of both washes, water is confined mostly to the main channel. Flooding problems occur when the flows reach the valley floor where the channels flatten out. This allows the flows to spread out over great distances inundating the surrounding areas.

In some instances, flooding from different sources converges in specific drainage areas of the city. In the east-central part of the city, flooding studied by approximate methods originates in the north, east of Amargosa Creek, and converges with flooding studied by detailed methods that originate in the foothills to the south.

Flood discharges have overflowed normally dry streambeds, resulting in heavy damage as floodwaters travel through developed areas. During the period of comparatively recent record, floods of major proportions have occurred. The office of the County Engineer has identified the areas in which moderate to severe flooding was observed during heavy storms in 1938, 1965, and 1969 on flood overflow maps. During these floods, widespread damage to orchards, irrigation systems, buildings, and roads occurred.

Thunderstorms have caused localized damage in various portions of the valley, particularly along the foothills of the San Gabriel Mountains to the south and southwest of the city.

Mud flow mapping was incorporated into the DFIRM for the City of Palmdale.

City of Palos Verdes Estates

Results of the mapping study were not previously summarized in the effective FIS report for the City of Palos Verdes Estates; therefore, no flood protection measures are provided.

City of Pasadena

The City of Pasadena is identified as a non-flood prone community.

Mud flow mapping was incorporated into the DFIRM for the City of Pasadena.

City of Pomona

Results of the mapping study were not previously summarized in the effective FIS report for the City of Pomona; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of Pomona.

City of Rancho Palos Verdes

Results of the mapping study were not previously summarized in the effective FIS report for the City of Rancho Palos Verdes; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of Rancho Palos Verdes.

City of Redondo Beach

The watersheds of Redondo Beach are relatively small with storm flows either draining directly into the ocean or accumulating in numerous small sumps. The Los Angeles County Flood Control District flood overflow maps indicate a history of flooded streets and sumps in the community which resulted from the major storms of 1938, 1965, 1969, 1978, 1980, 1983, and 1994.

Flooding caused by the 1-percent annual chance flood is limited to street rights of way, areas of shallow flooding less than one foot deep, and ponding areas. Shallow flooding occurs along Avenue I between South Elena and Esplanade Avenues; along Julia Avenue between Camino Real and South Juanita Avenue; between Del Amo, Diamond, Garnsey, and Vincent Streets; between Vincent Street, South Irena Avenue, Spencer Street, and El Rondo; between Anita Street, North Prospect Avenue, Agate Street, and Harkness Lane; along Carnegie Lane between Blossom and Green Lanes; between Aviation Way and Artesia and Aviation Boulevards; between Gibson Avenue, Deland Boulevard, Dow Avenue, and Manhattan Beach Boulevard; at the intersection of the Atchinson, Topeka, and Santa Fe Railway and Inglewood Avenue; and along Compton Boulevard between Freeman and Aviation Boulevards.

The southern California coastline is exposed to waves generated by winter and summer storms originating in the Pacific Ocean. It is not uncommon for these storms to cause 15-foot breakers. The occurrence of such a storm event in combination with high astronomical tides and strong winds can cause a significant wave runup and allow storm waves to attack higher than normal elevations along the coastline. When this occurs, shoreline erosion and coastal flooding frequently result in damage to inadequately protected structures and facilities located along low-lying portions of the county shoreline.

Brief descriptions of several significant storms provide historic information to which coastal flood hazards and the projected flood depths can be compared.

September 16, 1910

On September 16, 1910, a heavy sea and high ground swells undermined homes in the Long Beach area. The ocean began to erode the sidewalks which stretch from the Long Beach Bath House to Seaside Park at high tide that afternoon and, in a short period of time, over a mile of the bulkhead and sidewalk were destroyed. Efforts were made to check the destruction of the waves by building temporary bulkheads along the waterfront at the most exposed points; however, these measures proved ineffective until the tide began to recede late in the evening.

December 7-12, 1934

Another recurrence of waves was reported from December 7th through December 12th. Two large openings were made through the rock-mound breakwater at Santa Monica, indicating that the force of the waves was sufficient to displace very heavy granite rocks.

August 21, 1934

On August 21, 1934, waves of a reported height exceeding 30 feet broke with tremendous force along the coast from Laguna to Malibu. At Venice, the seaward end of the pier was destroyed by the heavy seas. The pier at the entrance to the Playa del Rey Lagoon was weakened by the loss of piling. At Hermosa Beach, considerable sand in front of Long Beach was washed away. Basements of seaside cottages along 100 miles of beach were filled with sand, some to a depth of 5 feet. An unusually heavy sea surged over the Santa Monica breakwater carrying some of the rocks away and doing some damage to the pier by destroying a few of the piles. Breakers 15 feet high were reported at Santa Monica.

September 1934

A recurrence of destructive waves, similar to those of August 1934, broke along the coast centering northward in the Long Beach area. Damage was reported at Malibu where portions of the Roosevelt Highway were flooded due to waters backed up at a storm drain project under construction. In addition, the Pine Avenue Pier in Long Beach was destroyed. Structures along the pike were endangered and temporary protection devices were installed. No damage was reported at either San Pedro or Santa Monica.

September 24, 1939

On September 24th and 25th, a tropical cyclone occurred along the entire southern California coastline. The storm resulted in a 20 degree drop in temperatures throughout Southern California. The gales and rain caused death, disrupted power lines, temporarily destroyed main railroad systems, closed highways, and flooded homes.

The winds, reaching a velocity of 65 miles per hour, caused considerable damage. Eight large homes along the waterfront at Sunset Beach were destroyed. In Long Beach, plate-glass windows were shattered by the fierce winds. Some Pacific Electric trackage was destroyed at Hermosa Beach. Phone and power lines were down at Sunset Beach. Disruption of phone service was heaviest at Bellflower, Hynes-Clearwater, and the Artesia area. Homes along the shore from Malibu to Huntington Beach were damaged heavily by pounding seas and the high wind. In addition, the storm caused the grounding of all airplanes at airports in the Los Angeles area.

The Hamilton, a large storm basin, overflowed its banks and flooded houses and stores. Families in the surrounding district were evacuated from their homes. Schools were closed because of flooded streets. As the stormwaters rushed seaward from the uplands, homes in the residential districts of the lowlands and beach cities were flooded.

Many small boats were washed ashore and several were wrecked when the high waves dashed them upon breakwaters or rocky shores. Early estimates indicated that at least ten yachts and barges sank or were wrecked upon breakwaters and sands. At Santa Monica, the 227-foot fishing barge Minne A was washed ashore.

Five deaths were reported. Two died at Los Angeles Harbor, two at Long Beach, and one at Newport Beach. At Burbank, one woman drowned and others were injured when a boat overturned.

Catalina Island reported a 50 mile per hour wind at Diamond Point.

December 25, 26, and 27, 1940

Twenty- and thirty-foot waves undermined residences and portions of the Strand at Redondo Beach. Two houses collapsed and five blocks of ocean-front walk were destroyed. In addition, 25-foothigh breakers undermined a house and store 50 feet landward of the normal high-tide mark.

At Belmont Peninsula, Long Beach, 70 homes were threatened to be cut off from the mainland by intense wave action.

May 22, 1960

Resurgent seismic-triggered ocean waves stemming from Chilean earthquakes destroyed dock facilities and hundreds of small craft. Damage was estimated at upwards of one million dollars. Hardest hit was the Los Angeles-Long Beach Harbor complex, where a series of tidal currents surged back and forth through narrow Cerritos Channel, wreaking havoc among the yacht anchorages. Some 300 yachts and small boats were torn from their slips, and early estimates indicated that from 15 to 30 had been sunk.

Monumental traffic jams occurred in the Los Angeles/Long Beach Harbor area coincident with suspension of ferry service and closing of the Terminal Island bridges. The surge was estimated at 8 and 9 feet high at times.

March 27, 1964

Ten-foot waves, set in motion by a violent Alaskan earthquake, damaged the unsheltered coast of Santa Catalina Island. No damage was reported on the sheltered side of the island where Avalon Bay and the isthmus anchorage are located.

At Marina del Rey, the rise was measured at 52 inches in the harbor and 5 feet at the entrance during low tide.

Winter 1977-1978

A combination of high astronomical tides, strong onshore winds, and high storm waves resulted in significant coastal flooding along the coastline of Los Angeles County. High tides and waves were responsible for 1 to 1.8 million dollars in private property losses to homes located along beaches in Malibu; $80,000 in damages to the Santa Monica Pier; $150,000 in damages to the Long Beach Harbor; and $140,000 in damages to a bicycle path in El Segundo. Other smaller losses resulting from wave damages occurred at Leo Carillo State Beach, Redondo Beach, Avalon, and other areas along the county shoreline.

City of Rolling Hills Estates

Results of the mapping study were not previously summarized in the effective FIS report for the City of Rolling Hills Estates; therefore, no flood protection measures are provided.

City of Rolling Hills

The City of Rolling Hills is identified as a non-flood prone community.

Mud flow mapping was incorporated into the DFIRM for the City of Rolling Hills.

City of Rosemead

Results of the mapping study were not previously summarized in the effective FIS report for the City of Rosemead; therefore, no flood protection measures are provided.

City of San Dimas

Results of the mapping study were not previously summarized in the effective FIS report for the City of San Dimas; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of San Dimas.

City of San Fernando

Results of the mapping study were not previously summarized in the effective FIS report for the City of San Fernando; therefore, no flood protection measures are provided.

City of San Gabriel

The City of San Gabriel is identified as a non-flood prone community.

City of San Marino

The City of San Marino is identified as a non-flood prone community.

City of Santa Clarita

Los Angeles County Flood Control District flood-overflow maps indicate a history of flooding in this area from major storms during 1934, 1938, 1941, 1943, 1952, 1956, separate storm events in January and February 1969, February and March 1978, and 1980, 1983, 1992, and 1994. These events demonstrate that the City of Santa Clarita is susceptible to flood damage. Of particular concern are mudflows that frequently occur in the foothill areas during intense rainfall, usually following brush fires in the upstream watershed. This hazard has not been addressed in this study.

During the 1969 storms in the Santa Clarita Valley, much damage was caused by erosion and sedimentation of the natural watercourses. The most significant damage to private property was the destruction of a zoological compound located in the Santa Clara River floodplain.

City of Santa Monica

Results of the mapping study were not previously summarized in the effective FIS report for the City of Santa Monica; therefore, no flood protection measures are provided.

City of Sierra Madre

The City of Sierra Madre is identified as a non-flood prone community.

Mud flow mapping was incorporated into the DFIRM for the City of Sierra Madre.

City of Signal Hill

Results of the mapping study were not previously summarized in the effective FIS report for the City of Signal Hill; therefore, no flood protection measures are provided.

City of South El Monte

The City of South El Monte is identified as a non-flood prone community.

City of South Pasadena

The City of South Pasadena is identified as a non-flood prone community.

City of Temple City

The City of Temple City is identified as a non-flood prone community.

City of Torrance

The LACFCD flood overflow map at a scale of 1: 24, 000 (Los Angeles County Flood Control District, 1993) indicate a history of flood streets, sumps, and general flooding among Dominguez Channel in Torrance, which resulted from the major storms of March 1938, February 1941, January 1952, January 1956, and January 1969. The flooding problems were related to the inadequacy of local drainage facilities.

The city is also exposed to potential coastal high hazard caused by storm surge and wave runup from the Pacific Ocean.

City of Vernon

The City of Vernon is identified as a non-flood prone community.

City of Walnut

Results of the mapping study were not previously summarized in the effective FIS report for the City of Walnut; therefore, no flood protection measures are provided.

Mud flow mapping was incorporated into the DFIRM for the City of Walnut.

City of West Covina

Results of the mapping study were not previously summarized in the effective FIS report for the City of West Covina; therefore, no flood protection measures are provided.

City of West Hollywood

The major causes of flooding in West Hollywood are short-duration, high intensity storms. Los Angeles County Flood Control District flood overflow maps indicate a history of flooding from the major storms of January 1934, March 1938, February 1941, January 1943, January 1952, and January 1956. A more recent storm, January 1969, was the worst storm recorded for the Los Angeles Basin.

City of Westlake Village

Results of the mapping study were not previously summarized in the effective FIS report for the City of Westlake Village; therefore, no flood protection measures are provided.

2.4 Flood Protection Measures

Los Angeles County

A complex drainage system has been constructed to alleviate flooding in Los Angeles County. The major components of the Los Angeles County flood control system are the Los Angeles River, the San Gabriel River, Rio Hondo, Ballona Creek, and Dominguez Channel. In addition, numerous other storm drains, channels and debris basins have been constructed by the U.S. Army Corps of Engineers, local agencies, and private developers. Responsibility for maintaining the majority of this system, which serves the incorporated cities as well as unincorporated county territory, lies with the Los Angeles County Flood Control District. Generally, the larger drainage systems mentioned above are designed to contain a 1-percent annual chance flood event.

The major drainage systems in the western and northern portions of the county are largely unimproved, although developed areas generally contain drainage systems providing a level of protection less than that of a 1-percent annual chance event. Development in these areas, which includes the Malibu area, and the Santa Clarita and Antelope Valleys, is less dense than that of the Los Angeles basin, but is rapidly reaching the point of complete build-out in some areas.

Although a number of drainage systems have been constructed to protect areas of development, environmental concerns, and a desire to retain “natural” channels that retain environmental functions, recharge capability, and water quality improvement qualities make extensive flood control channel development unlikely. Therefore, it appears that most areas of the County will have to be protected from flood hazard by exercising sensible flood plain management. Current floodplain management measures

include the reviewing of new developments before permits are issued and the undertaking of additional studies designed to supplement this Flood Insurance Study.

City of Agoura Hills

The major drainage systems in the western portion of the county are largely unimproved. Development in these areas, which includes the Malibu area, is far more sparse than in the Los Angeles basin. Although a few drainage systems have been constructed to protect portions of the existing development, lack of funding and environmental concerns make extensive flood control work unlikely. Therefore, for the foreseeable future, it appears that most future development will have to be protected from flood hazard by exercising sensible floodplain management. Current floodplain management measures include the reviewing of new developments before permits are issued.

City of Alhambra

The City of Alhambra is identified as a non-flood prone community.

City of Arcadia

The City of Arcadia is identified as a non-flood prone community.

City of Artesia

The City of Artesia is identified as a non-flood prone community.

City of Avalon

Currently, there are no flood protection devices or measures that protect the City from damaging floods, other than the presence of small drainage ditches and natural channels.

City of Azusa

Results of the mapping study were not previously summarized in the effective FIS report for the City of Azusa; therefore, no flood protection measures are provided.

City of Baldwin Park

Results of the mapping study were not previously summarized in the effective FIS report for the City of Baldwin Park; therefore, no flood protection measures are provided.

City of Bell Gardens

Results of the mapping study were not previously summarized in the effective FIS report for the City of Baldwin Park; therefore, no flood protection measures are provided.

City of Bell

The City of Bell is identified as a non-flood prone community.

Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Long Beach, Los Angeles, Lynwood, Montebello, Paramount, Pico Rivera, Santa Fe Springs, South Gate, and Whittier.

The Los Angeles County Flood Control District, in conjunction with the Corps of Engineers, have built a series of dams, reservoirs, debris basins, and channel and storm drain systems, to minimize flooding in the Los Angeles River basin and its tributaries. Responsibility for maintaining most of the system lies with the LACFCD.

The Los Angeles River is the major flood control system affecting these cities. The current flood control channel was designed to convey flood waters safely through the County to its outlet on the Pacific Ocean

at Long Beach. The current channel was modified in the 1990's to carry an event larger than a 1-percent chance flood.

Components of the system protecting these cities includes the Hansen and Sepulveda Flood Control Dams, 15 major channels within the City of Los Angeles, including the Los Angeles River, Pacoima Wash, Tujunga Wash, Sawtelle-Westwood Flood Control System, and Ballona Creek systems. Additionally, the Los Angeles County Flood Control District has constructed 111 debris basins, additional major flood control channels in the San Fernando Valley, the Ballona Creek system, which collects flood flows from West Los Angeles and discharges into the Pacific Ocean, and the Laguna Dominquez Flood Control System, which drains the southern portion of these cities and a portion of the Harbor area into San Pedro Bay. Moreover, the City of Los Angeles operates and maintains approximately 1,100 miles of open channels and underground drains. The Los Angeles County Flood Control District has constructed and is responsible for the operation and maintenance of approximately 1,000 miles of storm-drain bond issue projects within the city. The City of Los Angeles and the Los Angeles County Flood Control District operate and maintain 13 pumping plants in the Harbor, San Fernando Valley, and West Los Angeles areas to alleviate inundation of low-lying areas during storms.

In addition, the City of Long Beach has constructed seawalls and levees around the piers in Long Beach Harbor to keep the seawater out of the areas where subsidence has occurred.

The extension of the Detached Federal Breakwater by the USACE to its present terminus opposite the mouth of San Gabriel River in 1946 has eliminated progressive beach erosion. Concrete bulkheads were constructed on Naples Islands by a Works Progress Administration project in the 1930s. In 1967, the City of Long Beach added a reinforced concrete cap approximately 18 inches high to these walls, raising the top to an elevation of 9.0 feet. The city has also constructed several pump plants in the vicinity of Naples Island and Long Beach Harbor.

The only major nonstructural flood protection measure is the Public Warning System for severe weather conditions and tsunamis, operated by the National Oceanic and Atmospheric Administration through its National Weather Service, in cooperation with various State, county, and local officials. This system can provide some measure of flood protection by alerting coastal residents to take necessary precautions in the event of a tsunami or major storm.

The City of Santa Fe Springs is currently protected by the San Gabriel River, Coyote Creek channel (both located outside the corporate limits), and the Coyote Creek - North Fork. The Los Angeles County Flood Control District has constructed several local storm drain projects providing relief to flood-prone areas. Milan Creek upstream of Marquardt Avenue (outside the corporate limits) is permanently improved. However, downstream of Marquardt Avenue, the channel remains unimproved.

The City of Whittier is currently protected by a series of small drainage channels and storm drain systems, as well as the larger system of La Mirada Creek, where it passes through the southeast corner of Whittier. The Los Angeles County Flood Control District has constructed several local storm-drain projects, providing relief to flood-prone areas by controlling the 1-percent annual chance flood event. The U.S. Army Corps of Engineers has constructed levees along the San Gabriel River, west and north of Whittier. These levees control the 1-percent annual chance flood event downstream of Whittier Narrows Flood Control Basin.

City of Beverly Hills

Results of the mapping study were not previously summarized in the effective FIS report for the City of Beverly Hills; therefore, no flood protection measures are provided.

City of Bradbury

The City of Bradbury is identified as a non-flood prone community.

City of Burbank

The City of Burbank is protected by the Los Angeles River and the Burbank Western Flood Control Channel. The Los Angeles River and Burbank Western Flood Control Channels are currently capable of conveying the 1-percent annual chance flood event. In addition, the Los Angeles County Flood Control District has constructed several debris basins, major channels, and numerous local storm drain projects, including the Lockheed Storm Drain, to provide relief to flood-prone areas. Most channels and storm drains built within the city are capable of controlling discharges associated with the 1-percent annual chance event; however, several areas do not have this level of protection and shallow flooding is, therefore, not uncommon.

Burbank has also adopted flood plain management regulations incorporating building and safety standards as well as ordinances controlling construction in the floodplain.

The Lockheed Drain Channel is a constructed storm-drain channel. Upstream of Clybourn Avenue the channel is an excavated earthen section with a levee on the north side of the channel. Downstream of Clybourn Avenue the channel is either in a closed conduit (reinforced-concrete pipe or reinforced-concrete box section) or is a rectangular reinforced concrete open channel section. Bridge crossings of the rectangular section consist of a reinforced concrete slab over the rectangular channel section.

Immediately upstream of Clybourn Avenue, a multiple-pipe spillway structure has been constructed to convey excess discharge under the SPRR. This structure replaces an open-channel trestle-type structure and is intended to spill excess flows to the area south of the Lockheed Drain Channel, thereby preventing overtopping of the levee located along the north side of the drain and the railroad embankment on the south side of the drain. As part of this restudy, the railroad embankment on the south side of the Lockheed Drain Channel was evaluated as if it were a levee. However, in this restudy it was determined that as a result of replacing the former open-channel facility with the current multiple-pipe structure, the south-side embankment will not have the minimum 3 feet of freeboard during a 1-percent annual chance flood event as outlined in Section 65.10 of FEMA publication "National Flood Insurance Program and Related Regulations" (Federal Emergency Management Agency, October 1, 1994). As part of this restudy, the levee system along the north bank of the Lockheed Drain Channel and the embankment along the south bank were analyzed as providing protection during a 1-percent annual chance flood event and as failing during a 1-percent annual chance flood event. The guidelines found in Section 65.10 of "National Flood Insurance Program and Related Regulations" were applied where it was assumed that the levee or railroad embankment may not exist due to the lack of requisite freeboard or structural and soil data that would confirm the adequacy of the existing levee or railroad embankment. Analyses were performed alternatively assuming the facilities to be in place.

Analyses were also performed for the following facilities, as above, based on the guidelines found in Section 65.10 of "National Flood Insurance Program and Related Regulations":

1. The SPRR embankments, from just upstream of Naomi Street to Buena Vista Street and from Lincoln Street to Parish Place, did not meet the minimum freeboard requirements.

2. The existing masonry walls around the City of Burbank electrical substation at Lincoln Street.

3. The subdivision masonry wall located between the City of Burbank substation at Lincoln Street and Parish Place.

The base (1-percent annual chance) flood elevations (BFEs) shown on the FIRM and Flood Profiles for the Lockheed Drain Channel represent the results of the analyses performed with the above facilities being in place during a 1-percent annual chance flood event. The Zone X areas delineated along the south overbank in the vicinity of Frederick Street and Parish Place represent the results of the analyses that were performed assuming that the above facilities were not in place during a 1-percent annual chance flood event.

City of Calabasas

Results of the mapping study were not previously summarized in the effective FIS report for the City of Calabasas; therefore, no flood protection measures are provided.

City of Cerritos

Results of the mapping study were not previously summarized in the effective FIS report for the City of Cerritos; therefore, no flood protection measures are provided.

City of Claremont

Results of the mapping study were not previously summarized in the effective FIS report for the City of Claremont; therefore, no flood protection measures are provided.

City of Commerce

Results of the mapping study were not previously summarized in the effective FIS report for the City of Commerce; therefore, no flood protection measures are provided.

City of Covina

Results of the mapping study were not previously summarized in the effective FIS report for the City of Covina; therefore, no flood protection measures are provided.

City of Cudahy

Results of the mapping study were not previously summarized in the effective FIS report for the City of Cudahy; therefore, no flood protection measures are provided.

City of Culver City

The City of Culver City is protected by the Ballona Creek Channel, Centinela Creek Channel, Sawtelle-Westwood Storm Drain Channel, and Benedict Canyon Channel, in addition to numerous local storm drain projects providing relief to flood-prone areas. Benedict Canyon is below ground for its entire study length.

City of Diamond Bar

Results of the mapping study were not previously summarized in the effective FIS report for the City of Diamond Bar; therefore, no flood protection measures are provided.

City of Duarte

The City of Duarte is identified as a non-flood prone community.

City of El Monte

The City of El Monte is identified as a non-flood prone community.

City of El Segundo

Results of the mapping study were not previously summarized in the effective FIS report for the City of El Segundo; therefore, no flood protection measures are provided.

City of Glendale

Results of the mapping study were not previously summarized in the effective FIS report for the City of Glendale; therefore, no flood protection measures are provided.

City of Glendora

Results of the mapping study were not previously summarized in the effective FIS report for the City of Glendora; therefore, no flood protection measures are provided.

City of Hawaiian Gardens

Results of the mapping study were not previously summarized in the effective FIS report for the City of Hawaiian Gardens; therefore, no flood protection measures are provided.

City of Hawthorne

The City of Hawthorne is identified as a non-flood prone community.

City of Hermosa Beach

Results of the mapping study were not previously summarized in the effective FIS report for the City of Hermosa Beach; therefore, no flood protection measures are provided.

City of Hidden Hills

Results of the mapping study were not previously summarized in the effective FIS report for the City of Hidden Hills; therefore, no flood protection measures are provided.

City of Huntington Park

The City of Huntington Park is identified as a non-flood prone community.

City of Industry

Results of the mapping study were not previously summarized in the effective FIS report for the City of Industry; therefore, no flood protection measures are provided.

City of Inglewood

Results of the mapping study were not previously summarized in the effective FIS report for the City of Inglewood; therefore, no flood protection measures are provided.

City of Irwindale

Results of the mapping study were not previously summarized in the effective FIS report for the City of Irwindale; therefore, no flood protection measures are provided.

City of La Canada Flintridge

The City of La Canada Flintridge is identified as a non-flood prone community.

City of La Habra Heights

Results of the mapping study were not previously summarized in the effective FIS report for the City of La Habra Heights; therefore, no flood protection measures are provided.

City of La Mirada

The City of La Mirada is protected from flood flows by the Los Angeles River system, and the flood control facility of Coyote Creek, which generally follows the eastern corporate limits. Also, the Los

Angeles County Flood Control District has constructed several local storm drains providing relief to flood-prone areas.

City of Puente

Results of the mapping study were not previously summarized in the effective FIS report for the City of Puente; therefore, no flood protection measures are provided.

City of La Verne

Results of the mapping study were not previously summarized in the effective FIS report for the City of La Verne; therefore, no flood protection measures are provided.

City of Lancaster

Flooding conditions within the City of Lancaster have been improved with the installation of flood control structures by various agencies and property owners. Major public and private improvements, such as the Antelope Valley Freeway (State, Routes 14 and 138), the Union (former Southern) Pacific Railroad, and the California Aqueduct, have incorporated provisions for the passage of flood flows. During construction of the Antelope Valley Freeway, an interceptor drain was constructed for Amargosa Creek. The drain starts at Avenue K and continues northward along the east side of the freeway through the city. The drain will contain a 1-percent annual chance flood.

City of Lawndale

The City of Lawndale is identified as a non-flood prone community.

City of Lomita

The City of Lomita is identified as a non-flood prone community.

City of Malibu

Results of the mapping study were not previously summarized in the effective FIS report for the City of Malibu; therefore, no flood protection measures are provided.

City of Manhattan Beach

Results of the mapping study were not previously summarized in the effective FIS report for the City of Manhattan Beach; therefore, no flood protection measures are provided.

City of Maywood

The City of Maywood is identified as a non-flood prone community.

City of Monrovia

The City of Monrovia is identified as a non-flood prone community.

City of Monterey Park

Results of the mapping study were not previously summarized in the effective FIS report for the City of Monterey Park; therefore, no flood protection measures are provided.

City of Norwalk

Results of the mapping study were not previously summarized in the effective FIS report for the City of Norwalk; therefore, no flood protection measures are provided.

City of Palmdale

Flooding conditions within the City of Palmdale have been improved with the installation of smaller flood control systems by various agencies and property owners. Major public and private improvements, such as the Antelope Valley Freeway (State Route 14), the Union (former Southern) Pacific Railroad, and the California Aqueduct (located south of Palmdale), have provided for the passage of flood flows.

City of Palos Verdes Estates

Results of the mapping study were not previously summarized in the effective FIS report for the City of Pomona; therefore, no flood protection measures are provided.

City of Pasadena

The City of Pasadena is identified as a non-flood prone community.

City of Pomona

Results of the mapping study were not previously summarized in the effective FIS report for the City of Pomona; therefore, no flood protection measures are provided.

City of Rancho Palos Verdes

Results of the mapping study were not previously summarized in the effective FIS report for the City of Rancho Palos Verdes; therefore, no flood protection measures are provided.

City of Redondo Beach

The City of Redondo Beach is protected by a system of drainage channels and storm drain systems.

Major structural modifications have been made along the 74 miles of coastline in Los Angeles County. Over 50 miles of seawalls and revetments have been constructed to halt erosion and to absorb the impact of wave forces. In addition, 41 groins, 9 breakwaters, and 6 jetties have been constructed to serve a number of purposes, including flood protection.

The only major countywide nonstructural flood protection measure is the Public Warning System for severe weather conditions and tsunamis, operated by the National Oceanic and Atmospheric Administration through its National Weather Service, in cooperation with various State, county, and local officials.

This system can provide some measure of flood protection by alerting the coastal residents to take necessary precautions in the event of a tsunami or major storm.

In addition, the City of Redondo Beach as well as other coastal communities in the County are participating in either the emergency or regular phase of the National Flood Insurance Program.

City of Rolling Hills Estates

Results of the mapping study were not previously summarized in the effective FIS report for the City of Rolling Hills Estates; therefore, no flood protection measures are provided.

City of Rolling Hills

The City of Rolling Hills is identified as a non-flood prone community.

City of Rosemead

Results of the mapping study were not previously summarized in the effective FIS report for the City of Rosemead; therefore, no flood protection measures are provided.

City of San Dimas

Results of the mapping study were not previously summarized in the effective FIS report for the City of San Dimas; therefore, no flood protection measures are provided.

City of San Fernando

Results of the mapping study were not previously summarized in the effective FIS report for the City of San Fernando; therefore, no flood protection measures are provided.

City of San Gabriel

The City of San Gabriel is identified as a non-flood prone community.

City of San Marino

The City of San Marino is identified as a non-flood prone community.

City of Santa Clarita

The major drainage systems in and around the City of Santa Clarita are currently undergoing major change. Numerous developments within the City are protected by facilities constructed to convey the 1-percent chance flood event. No comprehensive flood control system as yet exists. Environmental concerns and funding limitations make the construction of a large concrete flood control channel system unlikely. Therefore, sound floodplain management may remain a primary means of limiting flood hazards to new development. Current floodplain management measures include reviewing new development before permits are issued and performing additional studies designed to supplement this Flood Insurance Study.

City of Santa Monica

Results of the mapping study were not previously summarized in the effective FIS report for the City of Santa Monica; therefore, no flood protection measures are provided.

City of Sierra Madre

The City of Sierra Madre is identified as a non-flood prone community.

City of Signal Hill

Results of the mapping study were not previously summarized in the effective FIS report for the City of Signal Hill; therefore, no flood protection measures are provided.

City of South El Monte

The City of South El Monte is identified as a non-flood prone community.

City of South Pasadena

The City of Pasadena is identified as a non-flood prone community.

City of Temple City

The City of Temple City is identified as a non-flood prone community.

City of Torrance

The City of Torrance is currently protected by a series of small drainage channels and storm drain systems. The Dominguez Channel and several local storm drain projects, provide relief to flood-prone areas.

FLOOD INSURANCE STUDY

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

VOLUME 2 OF 4

Community Name	Community Number	Community Name	Community Number	Community Number	Community Name	Community Number	Community Number
LOS ANGELES COUNTY, UNINCORPORATED AREAS	065043	DIAMOND BAR, CITY OF	060741	LAWNDALE, CITY OF*	060134	SAN DIMAS, CITY OF	060154
AGOURA HILLS, CITY OF	065072	DOWNEY, CITY OF	060645	LOMITA, CITY OF*	060135	SAN FERNANDO, CITY OF*	060628
ALHAMBRA, CITY OF*	060095	DUARTE, CITY OF	065026	LONG BEACH, CITY OF	060136	SAN GABRIEL, CITY OF*	065055
ARCADIA, CITY OF	065014	EL MONTE, CITY OF*	060658	LOS ANGELES, CITY OF	060137	SAN MARINO, CITY OF*	065057
ARTESIA, CITY OF*	060097	EL SEGUNDO, CITY OF	060118	LYNWOOD, CITY OF	060635	SANTA CLARITA, CITY OF	060729
AVALON, CITY OF	060098	GARDENA, CITY OF	060119	MALIBU, CITY OF	060745	SANTA FE SPRINGS, CITY OF	060158
AZUSA, CITY OF	065015	GLENDALE, CITY OF	065030	MANHATTAN BEACH, CITY OF	060138	SANTA MONICA, CITY OF	060159
BALDWIN PARK, CITY OF*	060100	GLENDORA, CITY OF	065031	MAYWOOD, CITY OF*	060651	SIERRA MADRE, CITY OF	065059
BELL GARDENS, CITY OF	060656	HAWAIIAN GARDENS, CITY OF*	065032	MONROVIA, CITY OF	065046	SIGNAL HILL, CITY OF*	060161
BELL, CITY OF*	060101	HAWTHORNE, CITY OF*	060123	MONTEBELLO, CITY OF	060141	SOUTH EL MONTE, CITY OF*	060162
BELLFLOWER, CITY OF	060102	HERMOSA BEACH, CITY OF	060124	MONTEREY PARK, CITY OF*	065047	SOUTH GATE, CITY OF	060163
BEVERLY HILLS, CITY OF*	060655	HIDDEN HILLS, CITY OF	060125	NORWALK, CITY OF	060652	SOUTH PASADENA, CITY OF*	065061
BRADBURY, CITY OF	065017	HUNTINGTON PARK, CITY OF*	060126	PALMDALE, CITY OF	060144	TEMPLE CITY, CITY OF	060653
BURBANK, CITY OF	065018	INDUSTRY, CITY OF	065035	PALOS VERDES ESTATES, CITY OF	060145	TORRANCE, CITY OF	060165
CALABASAS, CITY OF	060749	INGLEWOOD, CITY OF*	065036	PARAMOUNT, CITY OF	065049	VERNON, CITY OF*	060166
CARSON, CITY OF	060107	IRWINDALE, CITY OF*	060129	PASADENA, CITY OF	065050	WALNUT, CITY OF	065069
CERRITOS, CITY OF	060108	LA CANADA FLINTRIDGE, CITY OF	060669	PICO RIVERA, CITY OF	060148	WEST COVINA, CITY OF	060666
CLAREMONT, CITY OF	060109	LA HABRA HEIGHTS, CITY OF	060701	POMONA, CITY OF	060149	WEST HOLLYWOOD, CITY OF	060720
COMMERCE, CITY OF	060110	LA MIRADA, CITY OF	060131	RANCHO PALOS VERDES, CITY OF	060464	WESTLAKE VILLAGE, CITY OF	060744
COMPTON, CITY OF	060111	LA PUENTE, CITY OF*	065039	REDONDO BEACH, CITY OF	060150	WHITTIER, CITY OF	060169
COVINA, CITY OF	065024	LA VERNE, CITY OF	060133	ROLLING HILLS ESTATES, CITY OF*	065054		
CUDAHY, CITY OF	060657	LAKEWOOD, CITY OF	060130	ROLLING HILLS, CITY OF	060151		
CULVER CITY, CITY OF	060114	LANCASTER, CITY OF	060672	ROSEMEAD, CITY OF	060153		

*Non-floodprone communities

September 26, 2008

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
06037CV002A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Selected Flood Insurance Rate Map (FIRM) panels for the community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map (FBFM) panels (e.g. floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X (Shaded)
C	X (Unshaded)

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Countywide FIS Effective Date: September 26, 2008

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index

Flood Insurance Rate Map

City of Vernon

The City of Vernon is identified as a non-flood prone community.

City of Walnut

Results of the mapping study were not previously summarized in the effective FIS report for the City of Walnut; therefore, no flood protection measures are provided.

City of West Covina

Results of the mapping study were not previously summarized in the effective FIS report for the City of West Covina; therefore, no flood protection measures are provided.

City of West Hollywood

The City of West Hollywood is currently protected by a series of small drainage channels and storm drain systems. Plans are underway to upgrade the flood protection measures exercised in West Hollywood. The Los Angeles County Flood Control District maintains the majority of the drainage system.

City of Westlake Village

Results of the mapping study were not previously summarized in the effective FIS report for the City of Westlake Village; therefore, no flood protection measures are provided.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the County, standard hydrologic and hydraulic modeling methodologies were used to determine the flood hazard data required for this FIS. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 2-, 1-, or 0.2-percent annual chance period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 1-Percent Annual Chance flood (1-percent chance of annual exceedance) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the county at the time of completion of this FIS. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding sources studied in detail affecting the County.

Many of the incorporated community within, and the unincorporated areas of Los Angeles County, have a previously printed FIS report. The hydrologic analyses described in those reports have been compiled and are summarized below.

Because many of the communities affected by the Los Angeles River and its tributaries were removed from the regulatory floodplain based on completion of the Los Angeles County Drainage Area

(LACDA), the discussion in this FIS for numerous communities is based on the revised analyses conducted by the Corps of Engineers, and reviewed and certified by the USACE and FEMA, for that project. Information on the methods used to determine peak discharge-frequency relationships for the streams restudied as part of this countywide FIS is shown below.

Depending on the availability of hydrologic data, numerous different approaches were used throughout the County. These are discussed in the following paragraphs.

Los Angeles County

Antelope Valley (not including the communities of Lancaster and Palmdale).

The U.S. Army Corps of Engineers, Los Angeles District, developed discharge-frequency relationships for the Antelope Valley. The U.S. Army Corps of Engineers using the log-Pearson Type III frequency analysis computed the 1-percent annual chance peak flow rates for Little Rock Creek and Big Rock Creek. The gage for Little Rock Creek, located at Little Rock Reservoir, has operated since 1931 and records flow from a drainage area of approximately 48 square miles. The gage located at the mouth of Big Rock Creek has been operated since 1923 and records flow from a drainage area of approximately 23 square miles.

The remaining streams tributaries to the Antelope Valley are ungaged. Therefore, discharge-frequency curves were developed by the U.S. Army Corps of Engineers from the Little Rock Creek and Big Rock Creek curves. An average of the two curves was developed using standard deviation and average skew coefficient of the two gages. The U.S. Army Corps of Engineers Standard Project Flood peak discharge at the concentration points was used as the basis for transposing the frequency curves to ungaged streams.

For the summer peak discharges in the Antelope Valley desert region, the U.S. Army Corps of Engineers determined from gages on nine streams that the major events were independent with relatively short records. Therefore, the peak discharges were considered collectively as a single flood record representative of the region.

To develop a summer storm discharge-frequency curve at any ungaged location, the Standard Project Flood was used as the basis for transposing the frequency curves.

The Los Angeles County Flood Control District employed the U.S. Army Corps of Engineers study as a data base to develop yield-versus-area curves for the 10-, 2-, 1-, and 0.2-percent annual chance frequency flow rates for the concentration points. These curves were used to determine the peak flow rates for intermediate points along the major watercourses and for adjacent watersheds.

Santa Clarita Valley (not including the City of Santa Clarita)

Much of the hydrologic data for this portion of the County was also supplied by the U.S. Army Corps of Engineers. For watersheds greater than 20 square miles, the U.S. Army Corps of Engineers formula for the geometric mean flood was used to predict 1-percent annual chance frequency peak flow rates. For drainage areas less than 20 square miles, this formula was modified slightly to yield runoff values more closely related to observed values using engineering judgment. This modification was reviewed by the Los Angeles District office of the U.S. Army Corps of Engineers.

Malibu Area

Streams in the Malibu area that have Los Angeles County Flood Control District gage records sufficient for frequency analysis are Malibu Creek, Station F130-R; Zuma Creek, Station F53-R; and Topanga Canyon, Station F548-R. The peak flow rates were computed at these locations using log-Pearson Type

III frequency analysis. Following this analysis, the peak flow rates were also computed using the Regional Runoff Frequency Equations developed by the Los Angeles County Flood Control District. These regional runoff frequency equations were developed through the multiple-linear regression analysis of the peak flow data of 48 gaging stations in Los Angeles County. Comparison of the results obtained indicated that the log-Pearson Type III analysis of the stream gages in the Malibu area produced higher peak flow rates than the Regional Runoff Frequency Equations. Therefore, the ratio of the flow rates predicted by the two methods was computed at each gage. Flow rates were then computed for the remaining points in the watershed by multiplying the regional equation flow rate by the appropriate ratio. The ratio used was determined by comparing the watershed being analyzed to those analyzed by the log-Pearson Type III analysis to determine which one was most similar.

Los Angeles Basin

The remaining portions of unincorporated territory are located in the Los Angeles basin and were analyzed in conjunction with the incorporated cities on a drainage area basis. For streams with gages of sufficient length of reliable record, log-Pearson Type III analysis was used to determine 1-percent annual chance flood flow rates. The flow rates for the remaining streams were calculated by the Regional Runoff Frequency Equations developed by the District.

The flow rates used in the Los Angeles County study do not reflect the substantial amount of mud and debris flows which can be generated by a burned watershed. Therefore, it should be emphasized that the results of the study do not reflect the true degree of flood and mudflow hazard to the community.

Due to the configuration of the channels and overbanks, storage can cause floods to pond or break away from the channels resulting in an inverse discharge-drainage area relationship to exist along portions of Zuma, Ramirez, Escondido, Topanga, and Lobo Canyons, and Medea and Triunfo Creeks.

Analyses were carried out to establish the peak elevation-frequency relationships for each flooding source studied in detail.

Coastal flood hazard areas subject to inundation by the Pacific Ocean were determined on the basis of water-surface elevations established from regression relations defined by Thomas. These regression relations were defined as a practical method for establishing inundation elevations at any site along the southern California mainland coast. They were defined through analysis of water-surface elevations established for 125 locations in a complex and comprehensive model study by Tetra Tech, Inc.. The regression relations establish wave run-up and wave set-up elevations having 10-, 1-, and 0.02-percent chances of occurring in any year and are sometimes referred to as the 10-, 100-, and 500-year flood events, respectively.

Wave run-up elevations were used to determine flood hazard areas for sites along the open coast that are subject to direct assault by deep-water waves. Runup elevations range with location and local beach slope and were computed at 0.5-mile intervals, or more frequently in areas where the beach profile changes significantly over short distances. Areas with ground elevations 3.0 feet or more below the 1-percent annual chance wave run-up elevation are subject to velocity hazard.

Wave setup elevations determined from the regression equations on the basis of location along the coast were used to identify flood hazard areas along bays, coves, and areas sheltered from direct action of deep-water waves.

City of Agoura Hills

Streams in the Malibu area that have Los Angeles County Flood Control District gage records sufficient for frequency analysis are Malibu Creek, Station F130-R; Zuma Creek, Station F53-R; and Topanga

Canyon, Station F548-R. The peak flow rates were computed at these locations using log-Pearson Type III frequency analysis (U.S. Water Resources Council, March 1976). Following this analysis, the peak flow rates were also computed using the Regional Runoff Frequency Equations developed by the Los Angeles County Flood Control District (Los Angeles County Flood Control District, November 1977). These regional runoff frequency equations were developed through the multiple-linear regression analysis of the peak flow data of 48 gaging stations in Los Angeles County. Comparison of the results obtained indicated that the log-Pearson Type III analysis of the stream gages in the Malibu area produced higher peak flow rates than the Regional Runoff Frequency Equations. Therefore, the ratio of the flow rates predicted by the two methods was computed at each gage. Flow rates were then computed for the remaining points in the watershed by multiplying the regional equation flow rate by the appropriate ratio. The ratio used was determined by comparing the watershed being analyzed to those analyzed by the log-Pearson Type III analysis to determine which one was most similar.

The flow rates used in this study do not reflect the substantial amount of mud and debris flows which can be generated by a burned watershed. Therefore, it should be emphasized that the results of the study do not reflect the true degree of flood and mudflow hazard to the community.

The 1-percent annual chance flood discharges used for the 1998 revision to the Agoura Hills FIS were developed by the Los Angeles County Flood Control District (Los Angeles County, Construction Drawings PM 100203, September 6, 1979 and Construction Drawings PM 7982, August 17, 1979) and Simons, Li & Associates, Inc., using Los Angles County "Capital Flood" metholodgy (Simons, Li & Associates, Inc., October 7, 1992).

City of Avalon

There are no gaged streams in the Avalon watershed; therefore, regional run-off frequency equations developed by the Los Angeles County Flood Control District were used to calculate flow rates based on runoff frequency. These regional runoff frequency equations were developed through the multiple-linear regression analyses of the peak flow data of 48 stream gaging stations within the county. Runoff data from the 48 gaging stations were first analyzed to obtain peak flows of the selected recurrence intervals at the gage sites. These peak values were then regressed against a number of physical parameters of the drainage basins.

Two of the important parameters included in the regional runoff frequency equations are rainfall intensity and runoff coefficients.

Rainfall records maintained by the City of Avalon, Harbor Department, for the period from 1947 through 1973 were used in the rainfall analysis for this study. A log-Pearson probability distribution analysis of the rainfall records was used to arrive at the 2-percent annual chance flood, 24-hour amount. This value is 5.02 inches and is similar to rainfall in the J rainfall zone. The analysis indicated that the distribution of rainfall at the Avalon gage over a 24-hour period is similar to the J rainfall zone distribution; therefore, the J rainfall zone intensity-duration curves were used to arrive at the 2-percent annual chance flood, 1-hour duration intensity. This value is 0.75 inch per hour and was used in the regional runoff frequency equation.

The district categorized and experimentally established runoff coefficient graphs for numerous areas of homogeneous runoff characteristics. To apply the appropriate runoff coefficients for this study, it was first necessary to determine the characteristics of the watersheds tributary to Avalon.

The study contractor was provided with a Soil Conservation Survey map for the eastern end of Santa Catalina Island. The survey specifically covered the Avalon watershed area. Watershed areas were categorized by soil type, texture, permeability, effective depth, and erodibility.

Examination of the soil map indicates that the tributary watersheds are composed of medium texture topsoil of moderate to shallow effective depth, low to moderately low infiltration rates, and moderate erodibility. The runoff characteristics of these watersheds compare very closely with watersheds found on the county mainland along the Santa Monica Mountain Range. This area is described as rough, broken, and stony, nonagricultural land, and is classified as Soil Type No. 022, for which the study contractor has runoff coefficient graphs. The graph was used to obtain the runoff coefficient of 0.624 at a rainfall intensity of 2 inches per hour. This value was used in the regional runoff frequency equations. The rest of the parameters used in the regional run-off frequency equation were obtained from topographic maps and other information on file with the Los Angeles County Flood Control District, and are in accordance with standard practice.

Coastal flood hazard areas in Avalon were analyzed using a complex hydrodynamic model which considered the effects of storm generated waves/swells and their transformation due to shoaling, refraction and frictional dissipation. Limited fetch distances preclude the City of Avalon from being directly exposed to severe storm-induced surge flooding. Locally generated storm waves combined with astronomical tide is the major cause of flooding along coastal areas in the vicinity of Avalon. Analysis of wave effects included a statistical analysis of historical local wind data to obtain the 10-, 2-, 1-, and 0.2-percent annual chance floods maximum wind magnitudes. Wave characteristics were then computed for the various wind recurrence intervals. Using the methodology cited above, the wave runup and setup elevations were calculated based on the wave characteristics. The wave runup and setup elevations were then statistically combined with the astronomical tide to yield the final coastal flooding conditions.

Wave runup elevations were used to determine flood hazard areas for sites along the open coast that are subject to direct assault by deep-water waves. Runup elevations range with location and local beach slope. Areas with ground elevations 3.0 feet or more below the 1-perecent annual chance wave runup elevation are subject to velocity hazard.

Wave setup elevations, determined on the basis of location along the coast, were used to identify flood hazard areas along bays, coves, and areas sheltered from direct action of deep-water waves. For this study, no wave setup elevations are shown.

Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Long Beach (flooding from terrestrial sources only), Lynwood, Paramount, Pico Rivera, Santa Fe Springs, South Gate, Whittier

Hydrologic data for the Los Angeles River and the Rio Hondo were obtained from the USACE. The basis of the hydrologic data was HEC-1 and HEC-5 computer models. The HEC-1 model was calibrated for each subbasin using observed flow data where applicable. In addition, frequency-discharge calculations were made to compare the USACE results. The results were based on statistical analysis of stream gage data obtained from the LACFCD. The data were analyzed using the criteria in Bulletin 17-B.

The 1-Percent Annual Chance breakout hydrology for the Los Angeles River lower reach and the Rio Hondo were also obtained from the USACE. The peak values given in the LACDA report were used for hydraulic calculations in the overbank areas.

The timing of the breakouts on the left levee of the Rio Hondo at Beverly Boulevard and Stewart and Gray Road and the left levee of the Los Angeles River at Fernwood Avenue (Century Freeway) was also considered in determining the peak flow rate in the left overbank downstream of the Century Freeway. The USACE has determined that the peaks on the Rio Hondo breakouts do not occur at the same time as the peak on the Los Angeles River breakout. Therefore, downstream of the Century Freeway, the peak flow rate in the left overbank from the Rio Hondo breakouts is not combined with the peak flow rate

from the breakout near the Century Freeway. Only the peak flow from the Los Angeles River breakout is used since it has a larger magnitude.

City of Burbank

Regional Runoff Frequency Equations developed by the Los Angeles County Flood Control District were used to calculate flow rates for the Burbank Western Flood Control Channel in the City of Burbank, based on runoff frequency for the ungaged flood sources. These Regional Runoff Frequency Equations were developed through the multiple-linear regression analyses of the peak flow data of 48 gaging stations operated by the Los Angeles County Flood Control District within Los Angeles County. Runoff data from these stations were first analyzed to obtain peak flows of the selected recurrence intervals at the gage sites. These peak values were then regressed against a number of physical parameters of the drainage basins.

The Los Angeles River Flood Control Channel, which traverses the city's southern corporate limits, and the Burbank Western Flood Control Channel are the only gaged streams in the Burbank study area. The 1-percent annual chance peak flow rate for the Los Angeles River Flood Control Channel was computed using the log-Pearson Type III frequency analysis, and discharges associated with this event were found to be contained within the channel within the City. One of the 48 gaging stations operated by the Los Angeles County Flood Control District within Los Angeles County is located at Tujunga Avenue on the Burbank Western Flood Control Channel. It has been operated since 1950 and has a drainage area of approximately 401 square miles. The gage records for this location were considered inaccurate for frequency analysis purposes because of the residential development that has occurred in the watershed over the past 20 years. Therefore, Regional Runoff Frequency Equations developed by the Los Angeles County Flood Control District were used to calculate flow rates based on runoff frequency, and 1-percent annual chance flood discharges were found to be contained within the channel.

The flow rates used in this study do not include the substantial amount of mud and debris flows which could be generated from a burned watershed.

For the January 20, 1999 revision, the USACE HEC-1 computer program (U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, September 1990) was used to establish peak discharges having recurrence intervals of 10- and 1-percent annual chance. The parameters used were developed based on site conditions and in accordance with the guidelines contained in Natural Resources Conservation Service (NRCS) (formerly the Soil Conservation Service) Technical Release No. 55, "Urban Hydrology For Small Watersheds" (U.S. Department of the Interior, 1976).

Drainage areas were delineated on U.S. Geological Survey (USGS) 7.5-minute series topographic maps at a scale of 1:24,000, with a contour interval of 40 feet (U.S. Department of the Interior, 1966, Photorevised 1972), of the area based on previous studies by the LACFCD (Los Angeles County Flood Control District, August 1982).

The NRCS dimensionless unit-hydrograph option within HEC-1 was used. Times of concentration and lag were determined using NRCS methodology and criteria. Losses were determined using the NRCS curve-number method, in accordance with Technical Release No. 55 guidelines. Land use was determined from City of Burbank mapping and field reconnaissance. A 24-hour nested balanced storm was used with precipitation values determined from statistics developed by the California Department of Water Resources (California Department of Water Resources, 1986) for the Burbank Valley Pump recording rain gage. The 1-percent annual chance precipitation for this gage ranged from 0.40 inch for 5 minutes to 1.51 inches for 1 hour to 7.44 inches for 24 hours.

Flows were routed and combined using the channel-storage (modified-Puts) and Muskingum-Cunge channel-routing methods within the HEC-1 model.Discharges were determined for 10- and 1- percent annual chance return periods. The 10-percent annual chance discharges were compared with discharges determined by the LACFCD and loss rates were adjusted so the discharges would agree within 1 to 5 percent. The 1-percent annual chance discharges within the channel are limited by channel capacity.

City of Culver City

The gaged streams tributary to Culver City are the Ballona Creek Channel and the Sawtelle-Westwood Storm Drain Channel. The 1-percent annual chance peak flow rates for these streams were computed using the log-Pearson Type III frequency analysis. The U.S. Army Corps of Engineers, Los Angeles District, performed the analysis of Ballona Creek Channel. The gage, located at Sawtelle Boulevard, has been operated since 1927 and records flows from a drainage area of approximately 89 square miles. The flow rates were modified due to cultural changes in the watershed (i.e., agricultural to urbanized). The study contractor performed frequency analysis for the gage on Sawtelle-Westwood Channel. The gage, located at Culver Boulevard, has been operated since 1951 and records flows from a drainage area of approximately 23 square miles. Benedict Canyon Channel is completely underground through Culver City.

The remaining streams tributary to Culver City are ungaged. Therefore, regional runoff frequency equations developed by the Los Angeles County Flood Control District were used to calculate flow rates based on runoff frequency. These regional runoff frequency equations were developed through the multiple linear regression analyses of the peak flow data of 48 stream gaging stations within Los Angeles County. Runoff data from the 48 gaging stations were first analyzed to obtain peak flows of the selected recurrence intervals at the gage sites. These peak values were then regressed against a number of physical parameters of the drainage basins.

As a result of these analyses, it was determined that the 1-percent annual chance flood discharges for Ballona Creek Channel, Sawtelle-Westwood Storm Drain Channel, Benedict Canyon Channel, and Centinela Creek Channel were contained in the channels except for Ballona Creek Channel in the vicinity of the northeast corporate limits near Washington Boulevard. The 0.2-percent annual chance flood event was not studied for channel segments that contain the 1-percent annual chance flood peak discharge.

City of La Mirada

There are no gaged streams in the watersheds tributary to La Mirada Creek; therefore, regional runoff frequency equations developed by the study contractor were used to calculate flow rates based on runoff frequency. These regional runoff frequency equations were developed through the multiple-linear regression analyses of the peak flow data of 48 stream gaging stations within Los Angeles County. Runoff data from the 48 gaging stations were first analyzed to obtain peak flows of the selected recurrence intervals at the gage sites. These peak values were then regressed against a number of physical parameters of the drainage basins.

City of Lancaster

The U.S. Army Corps of Engineers, Los Angeles District, developed discharge-frequency relationships for streams in the Antelope Valley and the City of Lancaster. The 1-percent annual chance peak flow rates for Little Rock Creek and Big Rock Creek were computed using log-Pearson Type III frequency analyses. The analysis for Little Rock Creek was based on the stream gage located at Little Rock Reservoir, south of the City of Palmdale, which has been in operation since 1931 and records streamflow from a drainage area of approximately 49 square miles. The gage located at the mouth of Big Rock

Creek, southwest of the City of Palmdale, has been in operation since 1923 and records flows from a drainage area of approximately 23 square miles.

Amargosa Creek, Amargosa Creek Tributary, and Portal Ridge Wash are ungaged. Therefore, discharge-frequency curves were developed by the U.S. Army Corps of Engineers from the Little Rock Creek and Big Rock Creek frequency curves. An average of the two curves was developed using standard deviation and average skew coefficient of the two gages. The U.S. Army Corps of Engineers Standard Project Flood peak discharge at the concentration points was used as the basis for transposing the frequency curves to ungaged streams originating in the San Gabriel Mountains.

For the summer peak discharges in the Antelope Valley desert region, the U.S. Army Corps of Engineers determined from the gages of nine streams that the major events were independent with relatively short gage records. Therefore, the peak discharges recorded at each of the gages were considered collectively as a single flood record representative of the region. To develop a summer storm discharge-frequency curve at any engaged location, the Standard Project Flood was used as the basis for transposing the frequency curves.

The Los Angeles County Flood Control District employed the U.S. Army Corps of Engineers study as a data base to develop yield versus area curves for the 10-, 2-, 1-, and 0.2-percent annual chance flow rates for the concentration points. These curves were used to determine the peak flow rates for intermediate points along the major watercourses and for adjacent watersheds.

City of Long Beach (Coastal Flooding only; terrestrial flooding covered under Cities of Bellflower, et al., above)

Coastal flooding in the City of Long Beach, as analyzed for the original study of the City, originates from San Pedro and Alamitos Bays. This flooding is attributed to the following mechanisms:

1. Swell runup from intense offshore winter storms in the Pacific
2. Tsunamis from the Aleutian-Alaskan and Peru-Chile Trenches
3. Runup from wind waves generated by landfalling storms
4. Swell runup from waves generated off Baja California by tropical cyclones
5. Effects of landfalling tropical cyclones

The influence of the astronomical tides on coastal flooding is also incorporated in each of the previously mentioned mechanisms. A flood producing event from any of these mechanisms is considered to occur with a random phase of the astronomical tide. Each of these mechanisms is considered to act alone, so that the joint occurrence of any combination of the above mechanisms in a flooding event is considered to be irrelevant to the determination of flood elevations with return periods of less than 0.02-percent annual chance.

For each mechanism, the frequency of occurrence of causative events, as well as the probability distribution of flood elevations at a given location due to the ensemble of events were determined using methods discussed in "Methodology for Coastal Flooding in Southern California." A brief outline follows.

Winter Swell

The statistics of flooding due to winter swell runup were determined using input data provided by the Navy Fleet Numerical Weather Center (FNWC). These input data consist of daily values of swell heights, periods, and directions at three deep water locations beyond the continental shelf bordering the study area. The data are inclusive from 1951 to 1974, and were computed by FNWC using input from ship observations, meteorological stations, and synoptic surface meteorological charts of the Pacific

Ocean. For the original study, the incoming swells provided by FNWC were classified into 12 direction sectors of 10 degrees band width each. (Exposure of the study area to winter swells was confined to a 120 degree band, from directions 220° to 340°T). Within each sector, 10 days of swell height and period values were selected from the 24 years of FNWC data to represent extreme flood producing days. The selection criteria were guided by Hunts formula for runup. The 120 days at each of the three deepwater stations were merged to obtain a master list of 161 extreme runup producing days. For each of 161 days, the input swell provided by FNWC was refracted across the continental shelf and converted to runup at selected locations in the study area. The techniques used and data required are described in Section 3.2. Of the 161 days, a number of groups of consecutive days could be identified.

Each such group of days is considered to represent one event only; the largest runup from each group of days was selected as the maximum runup for that event. As a result of refraction and island sheltering effects, a number of the input swells produced no significant runup at certain locations. Therefore, the number of extreme runup events is less than 161. The average number of events in the study area is approximately 40. For each location in the study area, the runup for the extreme events were fitted to a Weibull distribution to obtain a probability distribution of runup from winter swell. The Weibull distribution was found to be best suited for representing runup statistics. Because extreme winter swell runup lasts for at least one day, the maximum runup must be considered to USACExist with the maximum high tide.

Regarding the extreme runup values as a statistical sample only, the influence of the astronomical tides was included by convolving the probability distribution of runup with the probability distribution of daily "high tides. The latter was obtained from standard tide prediction procedures using the harmonic constants at the nearest available tide gage for which such data exists as supplied by the Tidal Prediction Branch of the National Oceanic and Atmospheric Administration. At each location, the frequency of occurrence of extreme events is determined by the number of runup values used in the Weibull curve fit. The number of years over which these occur is 24. The product of the frequency occurrence with the complement of cumulative probability distribution of the runup-plus-tide (convolved) distribution gives the exceedence frequency curve for flood elevations due to winter swell runup.

Tsunamis

Elevation-frequency curves for tsunami flooding were obtained from information supplied by the USACE's Waterways Experiment Station (WES). The use of the results of the WES study were directed by FEMA.

In the WES study, the statistics of tsunami elevations along the coastline were derived by synthesizing data on tsunami source intensities, source dimensions, and frequencies of occurrence along the Aleutian-Alaskan and Peru-Chile Trenches. As a result, 75 different tsunamis, each with a known frequency of occurrence, were generated and propagated across the Pacific Ocean using a numerical hydrodynamic model of tsunamis. At a number of locations in the study area, these 75 tsunami time signatures were each added to the tidal time signature at the nearest tide gage location for which harmonic constants for tide computations are available. One year of tidal signature was generated from the harmonic constants. A given tsunami signature was then combined with the tide signature and the maximum of tsunami plus tide for the combination recorded. To simulate the occurrence of the tsunami at random phases of the tide, the tsunami signature was repeatedly combined to the tide signature starting at random phases over the entire year of the tide signature. Each combination produces a maximum tsunami-plus tide elevation with a frequency of occurrence equal to the frequency of occurrence of the particular tsunami signature used, divided by the total number of such combinations for that particular tsunami. The process was repeated for all 75 tsunamis and the elevation frequency curve for tsunami flooding was thus established.

Wind Waves From Landfalling Storms

The source of data for wind waves is the same as that for winter swell, the FNWC (1951 through 1974) data. The stations for which daily height, period, and direction data are available are also the same as for winter swells. The FNWC wind-wave data are directly correlated to local wind speeds. For obtaining runup statistics, the FNWC daily wave data were converted to daily runup data using the method outlined in Section 3.2. The daily runup data were then fitted to a Weibull distribution and convolved with the tide in the same manner as for winter swells.

Tropical Cyclone Swell

Runup from swell generated by tropical cyclones off Baja California was computed using the techniques discussed in Section 3.2. To establish the statistics of hurricane swell runup, the following procedure was used. Data concerning tropical cyclone tracks were obtained from the National Climatic Center (NCC). The data comprise 12-hourly positions of eastern North Pacific tropical cyclones from 1949 to 1974. This was supplemented by data on tropical cyclone tracks from the period 1975 to 1978, as reported in the Monthly Weather Review.

Besides position data, storm intensities at each 12-hourly position are also given. The intensity classifications are based on estimated maximum wind speeds. The intensity categories are tropical depression (less than 35 knot winds), tropical storm (less than 65 knot winds), and hurricane (at least 65 knot winds). Storms with tropical depression status were considered to generate negligible swell and omitted from this study. Data on actual maximum wind speeds were available from the NCC only from 1973 to 1977. These were used as the basis for obtaining values to represent maximum wind speeds from each of the two intensity classifications associated with the track data. Data on storm radii were derived from North American Surface Weather Charts by analysis of pressure fields of tropical cyclones off Baja California. These were used to define typical radius of maximum winds for each of two relevant intensity classes. For each tropical cyclone between 1949 and 1918, the hurricane wind waves were computed using the mean radius and maximum wind speeds established for each intensity class along with the track data. The swell and resultant runup were computed using the techniques described in Section 3.2. For each tropical cyclone and each location of interest in the study area, a time history of swell runup was determined. These were added to time histories of the local astronomical tide in a procedure analogous to that used in determining tsunami plus tide effects. The exceedence frequencies of tropical cyclone swell runup were computed in a manner similar to that used for tsunamis.

Landfalling Tropical Cyclones

The frequency of landfalling tropical cyclones in southern California is extremely low. During those years covered by the NCC tape of eastern North Pacific tropical cyclones (1949 to 1974), no tropical cyclone hit southern California. A longer period of record was used to estimate the frequency of an event such as the Long Beach 1939 storm. A study by Pyke was used to compile a list of landfalling tropical cyclones along the coast of southern California. The study was a result of extensive investigation of historical records such as precipitation and other weather and meteorological data. The study spanned the period from 1889 to 1977 and showed only 5 or 6 identifiable landfalling tropical cyclones, of which the 1939 Long Beach event was the strongest, and only one in the tropical storm category. The others were all weak tropical depressions (with maximum winds of less than 35 knots). The low frequency event, once in 105 years over approximately 360 miles of coastline, coupled with an impact diameter of approximately 60 miles, implies that for any given location, the return period of a landfalling tropical cyclone is about 600 years. Therefore, landfalling tropical cyclones were not considered in the original study.

At each location within the study area, the exceedence frequencies at a given elevation due to the various flood-producing mechanisms were summed to give the total exceedence frequency at the flood elevation.

City of Los Angeles

The following streams within the City of Los Angeles have Los Angeles County Flood Control District records sufficient for frequency analysis purposes: Aliso Creek, Station F152B-R, at Nordhoff Street; Big Tujunga Wash, Station F213-R, located 2 miles above the mouth of the canyon; Los Angeles River, Station F300-R, located at Tujunga Avenue and Station F57C-R, located at the confluence with Arroyo Seco; Sawtelle Channel, Station F301-R, located 141 feet upstream of Culver Boulevard; Ballona Creek, Station F38C-R, located 530 feet upstream of Sawtelle Boulevard; and Compton Creek, Station F37B-R, located at Greenleaf Boulevard. The 1-percent annual chance frequency peak flow rates for these streams were computed using the log-Pearson Type III frequency analyses.

The remaining streams in the Los Angeles study area are ungaged; therefore, regional runoff frequency equations developed by the Los Angeles County Flood Control District were used to calculate flow rates based on runoff frequency. These regional runoff frequency equations were developed through the multiple-linear regression analyses of the peak flow data of 48 stream-gaging stations within Los Angeles County. Runoff data from the 48 gaging stations were first analyzed to obtain peak flows of the selected recurrence intervals at the gage sites. These peak values were then regressed against a number of physical parameters of the drainage basins.

The flow rates used in the Los Angeles study do not include the substantial amount of mud and debris flows that could be generated from a burned watershed. Therefore, it should be-emphasized that the results of this study may not reflect the true degree of flood hazard in the community.

Coastal flood hazard areas subject to inundation by the Pacific Ocean were determined on the basis of water-surface elevations established from regression relations defined by Thomas. These regression relations were defined as a practical method for establishing inundation elevations at any site along the southern California mainland coast. They were defined through analysis of water-surface elevations established for 125 locations in a complex and comprehensive model study by Tetra Tech, Inc.. The regression relations establish wave runup and wave setup elevations that have 10-, 1-, and 0.02 –percent chances of occurring in any year and are sometimes referred to as the 10-, 100-, and 500-year flood events, respectively.

Wave runup elevations were used to determine flood hazard areas for sites along the open coast that are subject to direct assault by deep-water waves. Runup elevations range with location and local beach slope and were computed at 0.5-mile intervals, or more frequency in areas where the beach profile changes significantly over short distances. Areas with ground elevations 3.0 feet or more below the 1-percent annual chance wave runup elevation are subject to velocity hazard.

Wave setup elevations determined from the regression equations on the basis of location along the coast were used to identify flood hazard areas along bays, coves, and areas sheltered from direct action of deep-water waves.

City of Montebello

The only gaged stream in the Montebello study area is located on Drainage District Improvement No. 23, upstream of the Rio Hondo Channel. In the original study, this gage was found unsatisfactory for frequency analysis purposes due to diversions in the watershed, substantial residential development, and the effect of backwater from the Rio Hondo Channel. Therefore, Regional Runoff Frequency Equations developed by the LACFCD were used to calculate flow rates based on runoff frequency. These Regional Runoff Frequency Equations were developed through the multiple-linear regression analyses of the peak flow data of 48 stream gaging stations within Los Angeles County. Runoff data from the 48 gaging

stations were first analyzed by obtaining peak flows of the selected recurrence intervals at the gage sites. These peak values were then regressed against a number of physical parameters of the drainage basins.

The flow rates used in the original study do not include the substantial amount of mud and debris flow that could be generated from a burned watershed. Therefore, it should be emphasized that the results of the study do not reflect the mud and debris flow hazard in the community.

For the areas of the City of Montebello affected by the Los Angeles River/Rio Hondo system, hydrology was generated using the methodologies outlined in the section on the Cities of Bellflower, et al., above.

The timing of the breakouts on the left levee of the Rio Hondo at Beverly Boulevard and Stewart and Gray Road and the left levee of the Los Angeles River at Fernwood Avenue (Century Freeway) was also considered in determining the peak flow rate in the left overbank downstream of the Century Freeway. The USACE has determined that the peaks on the Rio Hondo breakouts do not occur at the same time as the peak on the Los Angeles River breakout. Therefore, downstream of the Century Freeway, the peak flow rate in the left overbank from the Rio Hondo breakouts is not combined with the peak flow rate from the breakout near the Century Freeway. Only the peak flow from the Los Angeles River breakout is used since it has a larger magnitude.

City of Palmdale

Discharge-frequency relationships for the City of Palmdale were developed by the USACE, Los Angeles District. In their study, the 1-percent annual chance peak flow rates for Little Rock Wash and Big Rock Wash were computed using the log-Pearson Type III frequency analysis. The gage located at Little Rock Reservoir, south of Palmdale, has operated since 1931 and records reflect flow from a drainage area of approximately 48 square miles. The gage located at the mouth of Big Rock Wash, southwest, has been operated since 1923 and records flows from a drainage area of approximately 23 square miles.

Amargosa Creek, Amargosa Creek Tributary, Anaverde Creek, and Anaverde Creek Tributary are ungaged. Therefore, discharge-frequency curves were developed by the USACE from Little Rock Wash and Big Rock Wash curves. An average of the two curves was developed using the standard deviation and average skew coefficient of the two gages. The USACE Standard Project Flood peak discharge at the concentration points was used as the basis for transposing the frequency curves to ungaged streams.

For the summer peak discharges in the Antelope Valley desert region, the USACE determined from gages on nine streams that the major events were independent with relatively short records. Therefore, the peak discharges were considered collectively as a single flood record representative of the region. To develop a summer storm discharge-frequency curve at any ungaged location, the Standard Project Flood was used as the basis for transposing the frequency curves.

The LACFCD used the USACE study as a data base to develop yield-versus-area curves for the 10-, 2-, 1-, and 0.2-percent annual chance flow rates for the concentration points. These curves were used to determine the peak flow rates for intermediate points along the major watercourses and for adjacent watersheds.

For the March 30, 1998 revision, the 1-percent annual chance discharges were calculated using regional regression equations developed by FEMA. The FEMA regression equation for the 1-percent annual chance discharges is:

$$Q = 660\ A^{0.62};$$

where A is the total contributing watershed in square miles.

This equation was developed from data for 41 gaging stations in the South Lohonton-Colorado Desert (SLCD) region, as defined in the U.S. Geological Survey (USGS) Water Resources Investigations 77-21, “Magnitude and Frequency of Floods in California” (U.S. Department of the Interior, Geological Survey, June 1977). Anaverde Creek is in the SLCD region. The above equation is applicable for estimating flood discharges for Anaverde Creek because three gaging stations in the vicinity of Anaverde Creek were included in the regression analysis.

City of Redondo Beach

The watersheds of Redondo Beach are relatively small and there are no gaged streams in the study area. Therefore, the 1-percent annual chance peak flow rates were determined by use of the Los Angeles County Flood Control District Primary Regional Run-Off Frequency Equation for ungaged streams. Where 1-percent annual chance flood discharges exceeded the drain capacities, a field review and calculations of street capacities were made. At several locations, localized sumps were found where the existing drains do not adequately convey the 1-Percent Annual Chance flows or where drains do not exist. The excess flows create ponding conditions and the Los Angeles County Flood Control District Regional Normalized Hydrograph Equations were used to determine the volumes of ponding water. Where necessary, the volumes were reduced by reservoir routing the flows through the ponding areas.

The principal source of coastal flooding in Redondo Beach is from the Pacific Ocean and its landward intrusions such as Alamitos and Marina del Rey.

Coastal flooding is attributed to the following mechanisms:

6. Swell runup from intense offshore winter storms in the Pacific
7. Tsunamis from the Aleutian-Alaskan and Peru-Chile trenches
8. Runup from wind waves generated by landfalling storms
9. Swell runup from waves generated off Baja California by tropical cyclones
10. Effects of landfalling tropical cyclones

The influence of the astronomical tides on coastal flooding is also incorporated in each of the above mechanisms. A flood-producing event from any of the above mechanisms is considered to occur with a random phase of the astronomical tide. Each of the above mechanisms are considered to act alone. This is the joint occurrence of any combination of the above mechanisms in a flooding event is considered to be irrelevant to the determination of flood elevations with return periods of less than 0.2-percent annual chance.

For each mechanism, the frequency of occurrence of causative events as well as the probability distribution of flood elevations at a given location due to the ensemble of events was determined according to the methodology given in "Methodology for Coastal Flooding in Southern California." A brief outline of it is presented in the section on the City of Los Angeles, above.

City of Santa Clarita

Much of the hydrologic data used in this FIS study for the City of Santa Clarita was taken from a report prepared by the U.S. Army Corps of Engineers. For watersheds greater than 20 square miles, the USACE formula for the geometric mean flood was used to predict 1-percent annual chance peak flow rates. For drainage areas less than 20 square miles, this formula was modified slightly to yield runoff values more closely related to observed values and engineering judgment. This modification was reviewed by the Los Angeles District Office of the USACE.

City of Santa Fe Springs

Floods impacting the City of Santa Fe Springs are generated from watersheds on the southwesterly side of the Puente Hills, located to the north of Santa Fe Springs. The only gaged streams in the Santa Fe Springs study area are the San Gabriel River and Coyote Creek (both located outside the corporate limits). The 1-percent annual chance peak flow rates for these streams were computed using log-Pearson Type III frequency analyses.

The analysis of the San Gabriel River is based on the Los Angeles County Flood Control District Stream Gage No. F 262E-R, which is located approximately 1400 feet upstream of Florence Avenue near the western corporate limits. This gage has a drainage area of 216 square miles and 43 years of record. However, only the past 16 years of record were used for the frequency analysis, and they were compiled following completion of the Santa Fe and Whittier Narrows Dams, which are major flood control facilities located 15 miles and 5 miles upstream of the gage, respectively. The 1-percent annual chance peak discharge for the San Gabriel River at Florence Avenue was determined to be 13,000 cubic feet per second (cfs). The design capacity of the channel at this location is 19,000 cfs. Therefore, it was determined that no flooding from the San Gabriel River affects the city. The analysis for Coyote Creek - North Fork was based on the Los Angeles County Flood Control District Stream Gage No. 3208, which is located on the main branch of Coyote Creek at Centralia Street. This gage is located 4 miles downstream of Santa Fe Springs, has a drainage area of 110 square miles, and has 34 years of record. The 1-percent annual chance peak discharge is approximately 10,000 cfs as compared to design capacity of 42,000 cfs for Coyote Creek downstream of the City of Santa Fe Springs. It was also determined that no flooding from Coyote Creek and Coyote Creek - North Fork affect the city.

The remaining streams in the Santa Fe Springs study area are ungaged; therefore, regional runoff-frequency equations developed by the Los Angeles County Flood Control District were used to calculate flow rates based on runoff frequency. These regional runoff-frequency equations were developed through the multiple-linear regression analyses of the peak flow data of 48 stream gaging stations within Los Angeles County. Runoff data from the 48 gaging stations were first analyzed to obtain peak flows of the selected recurrence intervals at the gage sites. These peak values were then regressed against a number of physical parameters of the drainage basins.

City of Torrance

Flood conveyance channels within the City of Torrance are relatively small, and stormflows either accumulate in numerous small sumps, drain directly into the Pacific Ocean or are tributary to Dominguez Channel. Dominquez Channel is the only gaged watershed in the City of Torrance. However, the gage has an insufficient length of record for frequency analysis purposes. Dominquez Channel was analyzed through a comparison with Compton Creek, a gaged stream in an adjacent watershed outside of the corporate limits with similar hydrologic and hydraulic characteristics. The 1-percent annual chance peak flow for Compton Creek was computed using the log-Pearson Type III frequency analysis method. The ratio of the 1-percent annual chance peak flow for Compton Creek to the peak flow recorded in Compton Creek during the major storm of 1969 was applied to the 1969 peak flow in Dominguez Channel to obtain an approximate 1-percent annual chance peak flow for Dominguez Channel. This peak flow was estimated to be 12,500 cubic feet per second (cfs). Because the available channel capacity is 17,000 cfs, it was concluded that Dominguez Channel has ample capacity to convey the 1-percent annual chance discharge, and no further analysis was necessary.

The remaining watersheds tributaries to the City of Torrance are ungaged. Therefore, regional runoff frequency equations developed by the Los Angeles County Flood Control District were used to calculate flow rates based on runoff frequency. These regional runoff frequency equations were developed through the multiple-linear regression analyses of the peak flow data of 48 stream gaging stations within Los

Angeles County. Runoff data from the 48 gaging stations were first analyzed to obtain peak flows of the selected recurrence intervals at the gage sites. These peak values were then regressed against a number of physical parameters of the drainage basins.

City of West Hollywood

Regional runoff frequency equations developed by the Los Angeles County Flood Control District were used to calculate peak discharges for the City of West Hollywood.

City of Whittier

There are no gaged streams in the watersheds draining the City of Whittier; therefore, Regional Runoff Frequency Equations developed by the Los Angeles County Flood Control District were used to calculate flow rates based on runoff frequency. These Regional Runoff Frequency Equations were developed through the multiple-linear regression analyses of the peak-flow data of 48 gaging stations operated by the Los Angeles County Flood Control District within Los Angeles County. Runoff data from these stations were first analyzed in order to obtain peak flows of the selected recurrence intervals at the gage sites. These peak values were then regressed against a number of physical parameters of the drainage basins.

The flow rates used in this study do not include the substantial amount of mud and debris flows which could be generated from a burned watershed. Therefore, it should be emphasized that the study does not reflect this type of flood hazard in the community.

Peak inflow volumes determined for the ponding areas studied by detailed methods in Torrance are shown in Table 6, "Summary of Inflow Volumes."

Table 6 - SUMMARY OF INFLOW VOLUMES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Inflows (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Surface Runoff – Deep Ponding Area					
Southwest of the intersection of Carson Street and Madrona Avenue	0.3	50	110	140	210
At intersection of Doris Way and Reese Road	0.5	160	350	450	700
Surface Runoff – Ponding Area					
At intersection of Anza Avenue and Spencer Street	0.1	10	20	25	40
Northwest of Sepulveda Boulevard and Madrona Avenue	0.3	60	140	180	280

At intersection of California Street and Alaska Avenue	0.7	190	250	270	330
At intersection of Amsler Street and Dormont Avenue	6.2	1,330	2,950	3,760	5,880

A summary of the drainage area-peak discharge relationships for all the streams studied by detailed methods is shown in Table 7, "Summary of Peak Discharges."

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
3,500 feet Northeast of the Intersection of Via Montana and Country Club Drive	0.7	--	--	600	--
At the Intersection of Alameda Avenue and Main Street	1.2	--	--	750	--
At the Intersection of Chestnut and Lake Streets	1.3	--	--	670	--
Amargosa Creek					
At Outlet of Ritter Ranch Detention Pond	23.8	--	--	1,856	--
At Vineyard Ranch	26.5	--	--	2,063	--
At Elizabeth Lake Ford Crossing	28.6	--	--	2,288	--
At 25th Street West Bridge	30.0	--	--	2,341	--
At 10th Street West	32.0	--	--	2,364	--
Amargosa Creek Tributary					
Intersection of Avenue L and 3rd Street East	2.4	150	420	560	1,000
Intersection of Avenue I and Spearman Avenue	7.2	310	900	1,220	2,400

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Avenue M and Valleyline Drive	1.8	120	340	460	850
Anaverde Creek					
1.85 Miles Downstream of California Aqueduct	15.66	--	--	3,630	--
1.47 Miles Downstream of California Aqueduct	12.79	--	--	3,200	--
Antelope Freeway	16.35	--	--	3,730	--
1.85 miles Downstream of California Aqueduct	15.66	--	--	3,630	--
1.47 miles Downstream of California Aqueduct	12.79	--	--	3,200	--
0.75 miles Downstream of California Aqueduct	11.79	--	--	3,050	--
California Aqueduct	8.25	--	--	2,440	--
Anaverde Creek Tributary					
Division Street between Avenue P and Avenue P-8	1.4	300	1,100	1,600	3,000
Antelope Valley					
Amargosa Creek at 90th Street West	6.9	580	2,000	3,100	4,500

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Amargosa Creek Approximately Midway between 20th Street West and 10th Street West	32.7	1,800	3,300	5,000	10,100
West of Antelope Valley Freeway North of Avenue H	147	2,000	5,600	8,400	18,000
East of Antelope Valley Freeway North of Avenue H	206	3,000	9,000	13,000	30,000
Avenue F at Sierra Highway	206	3,000	9,000	13,000	30,000
Anaverde Creek East of Antelope Valley Freeway	16	700	2,100	3,000	6,400
West of Sierra Highway at Avenue P-8	19	700	2,100	3,100	6,600
West of 136th Street East at Avenue W-8	2.4	440	1,500	1,900	3,900
165th Street East Approximately 4,000 feet South of Pearblossom Highway	1.0	370	1,300	1,600	3,100
3,000 feet East of 165th Street East and 4.000 feet South of Pearbloosom Highway	7.3	500	1,700	2,300	4,700
Acton Canyon Road, Escondido Canyon Road, and Crown Valley Road	20.3	--	--	3,421	6,052

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Acton Canyon at Intersection of Crown Valley Road and Acton Avenue	20.3	--	--	3,421	6,052
Agua Dulce Canyon Approximately 5,600 feet Upstream of Darling Road	10.3	--	--	3,509	6,360
Agua Dulce Canyon Approximately 800 feet Upstream of Escondido Canyon Road	14.3	--	--	4,401	7,977
Sand Canyon Approximately 800 feet Upstream of Placerita Canyon Road	6.4	--	--	4,371	5,961
Sand Canyon Approximately 2,900 feet Downstream of Placerita Canyon Road	7.3	--	--	4,908	6,693
Sand Canyon Approximately 250 feet Downstream of Iron Canyon Confluence	10.1	--	--	6,372	8,689
Iron Canyon Approximately 2,000 feet Upstream of Sand Canyon Road	2.8	--	--	2,078	2,833
Oak Springs Canyon Approximately 100 feet Upstream of Union Pacific Railroad (former Southern Pacific Railroad)	5.7	--	--	2,703	4,054
At intersection of Sixth Street and Quincy Avenue	1.0	271	598	763	1,194

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Avalon Canyon					
At Cross Section A	3.65	859	1,895	2,419	3,785
At Cross Section G	1.83	440	971	1,239	1,938
Ballona Creek Channel					
At intersection of Adams Boulevard and Genesee Avenue	16.7	2,100	4,700	6,000	9,400
Big Rock Wash					
At mouth, Southwest	23.0	--	--	15,000	--
Chatsworth Area					
Vicinity of Santa Susanna Pass Road and Santa Susanna Avenue	1.46	450	990	1,300	2,000
Cheseboro Creek					
1,100 feet Upstream of Driver Avenue	7.6	2,169	4,779	6,088	9,551
Hacienda Creek					

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Cross Section A	1.46	626	1,381	1,762	2,758
Harbor Area					
North of Carson Street Between Vermont and Berendo Avenues	0.35	74	164	209	327
Hidden Springs Area					
Mill Creek (Cross Section B)	14.8	2,274	5,019	6,405	10,024
Industry Area					
Vicinity of Brea Canyon Road and Lycoming Street	3.85	952	2,102	2,682	4,197
Iron Canyon					
Approximately 2,000 feet Upstream of Sand Canyon Road	2.8	--	--	2,078	2,833
Kagel Canyon Area					
Kagel Canyon Channel (Cross Section A)	2.04	490	1,081	1,380	2,159

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Little Tujunga Wash Approximately 3,000 feet Upstream of the City of Los Angeles Corporate Limits	17.9	2273	5,019	6,405	10,022
La Mirada Area					
Mystic Street, Vicinity of Parkinson Avenue	0.31	81	179	228	357
La Mirada Creek					
At Ocaso Avenue	4.6	610	1,340	1,700	2,670
Approximately 1100 feet Downstream of La Mirada Boulevard	5.0	610	1,350	1,720	2,690
Ladera Heights Area					
Vicinity of La Cienega Boulevard and Slauson Avenue	0.53	138	305	389	609
Lindero Canyon					
700 feet Downstream of Thousand Oaks Boulevard	4.1	1,369	3,024	3,858	6,037
At Reyes Adobe Road	3.4	1,290	2,847	3,632	5,685

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Little Rock Wash					
Little Rock Reservoir	48.0	--	--	20,000	--
Lockheed Drain Channel					
Approximately 150 feet Downstream of Hollywood Way	0.90	--	--	965	--
Approximately 300 feet Upstream of Lima Street	1.44	--	--	1,635	--
At Ontario Street	1.82	--	--	2,054	--
Approximately 100 feet Downstream of Naomi Street	1.89	--	--	2,026	--
Approximately 300 feet Downstream of Victory Place	2.48	--	--	2,410	--
Approximately 100 feet Downstream of Burbank Boulevard	3.73	--	--	2,910	--
Lopez Canyon Area					
Lopez Canyon Channel (Cross Section A)	1.78	682	1,506	1,922	3,007
Los Angeles River					

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
At Compton Creek	808	92,900	133,000	142,000	143,000
At Imperial Highway	752	89,400	126,000	140,000	156,000
Malibu Area					
Trancas Creek Upstream of Pacific Coast Highway (Cross Section A)	8.6	2,499	5,518	7,040	11,106
Zuma Canyon (Cross Section A)	8.9	2,024	4,469	5,705	8,925
Zuma Canyon (Cross Section W)	8.4	2,079	4,590	5,858	9,167
Ramirez Canyon (Cross Section B)	3.3	1,066	2,352	3,000	4,696
Ramirez Canyon (Cross Section I)	2.8	1,150	2,540	3,240	5,070
Escondido Canyon (Cross Section B)	3.2	958	2,116	2,700	4226
Escondido Canyon (Cross Section F)	1.7	986	2176	2778	4,346
Malibu Creek (Cross Section A)	109.6	14183	31,648	40,544	63,934
Malibu Creek (Cross Section B)	109.2	14,183	31,648	40,544	63,934

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Unnamed Canyon (Serra Retreat Area) (Cross Section C)	0.4	281	619	791	1,237
Las Flores Canyon (Cross Section F)	4.1	1,758	3,882	4,954	7,752
Topanga Canyon (Cross Section H)	19.6	4,095	9,040	11,537	18,054
Topanga Canyon (Cross Section M)	15.0	5,404	11,930	15,223	23,882
Topanga Canyon (Cross Section Q)	14.5	5,208	11,499	14,672	22,960
Topanga Canyon (Cross Section T)	7.3	2,560	5,656	7,215	11,289
Topanga Canyon (Cross Section V)	7.0	2,364	5,222	6,601	10,422
Topanga Canyon (Cross Section X)	5.5	1,862	4,113	5,247	8,210
Topanga Canyon (Cross Section AG)	0.3	259	572	729	1,141
Santa Maria Canyon (Cross Section C)	3.1	1,070	2,333	3,016	4,719
Old Topanga Canyon (Cross Section E)	1.7	567	1,253	1,597	2,499
Old Topanga Canyon (Cross Section H)	0.8	251	554	706	1,104
Garapito Canyon (Cross Section A)	2.9	996	2,171	2,807	4,392

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Garapito Canyon (Cross Section E)	2.0	675	1,470	1,910	2,974
Cold Creek (Cross Section A)	8.1	2,280	5,019	6,406	10,023
Cold Creek (Cross Section C)	7.8	2,280	5,041	6,432	10,066
Cold Creek (Cross Section G)	5.7	1,734	3,826	4,881	7,640
Dark Canyon (Cross Section A)	1.2	753	1,600	2,118	3,314
Lobo Canyon (Cross Section B)	3.8	1,572	3,473	4,429	6,932
Lobo Canyon (Cross Section C)	2.5	1,625	3,588	4,579	7,166
Stokes Canyon (Cross Section B)	2.9	1,089	2,403	3,067	4,799
Stokes Canyon (Cross Section C)	2.4	934	2,062	2,631	4,117
Dry Canyon (Cross Section C)	1.1	527	1,104	1,484	2,323
Dry Canyon (Cross Section M)	0.8	490	1,083	1,382	2,162
Dry Canyon (Cross Section T)	0.4	242	534	681	1,065
Cheseboro Creek (Cross Section B)	7.6	2,169	4,779	6,088	9,551

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Palo Comado Creek (Cross Section E)	4.1	1,159	2,562	3,268	5,113
Palo Comado Creek (Cross Section J)	3.5	1,074	2,374	3,028	4,738
Palo Comado Creek (Cross Section K)	3.2	1,032	2,279	2,908	4,551
Las Virgenes Creek (Cross Section D)	14.3	3,591	7,928	10,165	15,832
Las Virgenes Creek (Cross Section H)	12.2	3,542	7,822	9,980	15,619
Liberty Canyon (Cross Section E)	1.4	938	2,072	2,645	4,140
Medea Canyon (Cross Section B)	24.6	5,794	12,788	16,319	25,537
Medea Canyon (Cross Section H)	23.0	6,174	13,628	17,389	25,537
Medea Canyon (Cross Section K)	22.2	6,363	14,074	17,925	28,049
Medea Canyon (Cross Section P)	6.3	2,558	5,647	7,204	11,272
Lindero Canyon (Cross Section C)	6.7	1,725	3,809	4,860	7,604
Lindero Canyon (Cross Section E)	4.1	1,369	3,024	3,858	6,037
Lindero Canyon (Cross Section H)	3.8	1,343	2,965	3,783	5,920

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Lindero Canyon (Cross Section M)	3.4	1,290	2,847	3,632	5,685
Lindero Canyon (Cross Section N)	3.1	1,258	2,776	3,542	5,545
Triunfo Creek (Cross Section B)	28.7	4,781	11,396	14,898	24,298
Triunfo Creek (Cross Section E)	28.3	4,846	11,544	15,090	24,606
Malibu Lake	64.6	11,859	26,556	34,043	53,712
Medea Creek					
Downstream of Venture Highway	6.3	2,560	2,645	7,200	11,270
Approximately 950 feet Upstream of Canwood Street	--	--	--	6,720	--
Approximately 1,100 feet Upstream of Kanan Road	--	--	--	5,960	--
At Thousand Oaks Boulevard	--	--	--	5,946	--
Approximately 1,700 feet Downstream of Laro Drive	4.1	--	--	5,320	
Approximately 575 feet Downstream of Fountainwood Street	3.9	--	--	5,240	--

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Just Upstream of Fountainwood Street	3.4	--	--	4,700	--
Mint Canyon					
Downstream of Sierra Highway Crossing	29.3	--	--	8,300	14,581
Downstream of Vasquez Canyon Road	26.8	--	--	7,896	14,179
Approximately 2,600 feet Downstream of Davenport Road	19.9	--	--	6,691	12,604
Newhall Canyon					
Approximately 800 feet Upstream of Railroad Canyon	5.2	--	--	3,224	4,396
Approximately 650 feet Upstream of Railroad Canyon	6.2	--	--	3,390	5,424
Approximately 650 feet Downstream of Railroad Canyon	7.3	--	--	3,892	6,228
Oak Springs Canyon					
Approximately 100 feet Upstream of Union Pacific Railroad (former Southern Pacific Railroad)	5.7	--	--	2,703	4,054

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Overland Flow					
North of Florence Avenue and East of Pioneer Boulevard	1.34	270	596	760	1,190
North of Lakeland Road, 1000 feet East of Bloomfield Avenue	0.42	68	151	192	301
Marquardt Avenue, 1400 feet North of Rosecrans Avenue	2.09	411	907	1,158	1,812
Palo Comado Creek					
At Fairview Place	3.5	1,074	2,374	3,028	4,738
Placerita Creek					
Approximately 575 feet Downstream of San Fernando Road	9.3	--	--	5,321	7,981
Approximately 2,900 feet Upstream of San Fernando Road	8.6	--	--	4,988	7,482
Approximately 2,000 feet Upstream of Quigley Canyon Road	7.1	--	--	4,085	6,313
Approximately 850 feet Downstream of Antelope Valley Freeway	6.3	--	--	3,546	5,673

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Ponding					
At Intersection of Mines Avenue and Taylor Avenue	0.5	120	250	330	510
Savage Creek at Intersection of York Avenue and Mar Vista Street	0.9	260	570	730	1,150
Turnbull Canyon at intersection of Painter Avenue and Camilla Street	1.0	250	540	690	1,080
Portal Ridge Wash					
Intersection of Avenue H and Antelope Valley Freeway	147.0	1,600	5,000	7,200	16,000
Rio Honda					
At Stewart and Gray Road	132	35,600	41,000	39,300	40,200
At Beverly Boulevard	113	33,800	37,50	38,000	38,400
At Outflow from Whittier Narrows Dam	110	33,500	36,500	36,500	36,500
San Fernando Valley District					
San Fernando					

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Pacoima Wash, Approximately 150 feet Downstream of Shablow Avenue	31.07	1,900	5,600	8,100	12,100
Lockheed Drain Channel, Approximately 450 feet Upstream of Clybourn Avenue	0.42	278	--	448	--
Lakeview Terrace					
Little Tujunga Canyon, Approximately 1,600 feet Upstream of Foothill Boulevard	20.29	2,700	6,000	7,700	12,200
Kagel Canyon, Approximately 650 feet Upstream of Osborne Avenue	2.04	490	1,100	1,400	12,200
Sunland					
Big Tujunga Canyon, Approximately 1,200 feet Upstream of Foothill Boulevard and Tujuna Valley Street	34.57	8,100	24,700	36,500	62,600
Big Tujunga Canyon, Upstream of Wheatland Avenue	43.25	9,300	26,800	38,900	66,000

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Sylmar					
East Side of Golden State Freeway South of Sierra Highway	0.22	50	120	150	240
Weldon Canyon, Approximately 1,570 feet Downstream of Sierra Highway and San Fernando Road	1.47	410	900	1,150	1,800
Van Nuys					
Victory Boulevard, Vicinity of Hayvenhurst Avenue	0.73	90	200	250	390
Porter Ranch					
Mayerling Street, Northwest of Shoshone Avenue	0.19	40	100	120	190
Vicinity of Sesnon Boulevard	0.10	30	60	70	120
Granada Hills					
Superior Street, West of Paso Robles Avenue	0.53	90	200	260	400
Vicinity of Balboa Boulevard and Citronia Street	0.53	90	200	260	400

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Sepulveda					
RosUSACE Boulevard at Haskell Avenue	0.84	160	360	460	720
Haskell Avenue North of Union Pacific Railroad (former Southern Pacific Railroad)	1.0	230	500	640	1,000
Chatsworth					
Vicinity of Chatsworth Street and Corbin Avenue	0.85	220	480	610	960
Vicinity of Variel Avenue and Chatsworth Street	13.43	2,100	4,700	6,000	9,300
Vicinity of Canoga Avenue and Devonshire Street	0.77	230	510	650	1,000
Vicinity of Valley Circle Boulevard and Lassen Street	0.75	220	480	600	950
Vicinity of Topanga Canyon Boulevard and Lassen Street	0.25	50	120	150	230
Vicinity of Farrolone Avenue and Lassen Street	0.42	100	220	280	440
Vicinity of Topanga Canyon Boulevard and Santa Susana Place	0.10	20	50	60	100

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Vicinity of Santa Susana Pass Road and Santa Susana Avenue	1.46	450	990	1,300	2,000
Woodland Hills					
Vicinity of Mulholland Drive and Ventura Freeway	2.27	490	1,100	1,400	2,200
Vicinity of Saltillo Street and Canoga Avenue	0.32	100	250	300	500
Sherman Oaks					
Magnolia Boulevard at Haskell Avenue	1.23	360	800	1,000	1,600
San Gabriel River					
Whittier Narrows Flood Control Basin At Siphon Road	524.0	--[2]	--[2]	90,000	--[3]
Sand Canyon					
Approximately 250 feet Downstream of Confluence with Iron Canyon	10.1	--	--	6,372	8,689
Approximately 2,900 feet Downstream of Placerita Canyon Road	7.3	--	--	4,908	6,693

-- Data Unknown

[2] Discharge not determined because 1% Annual Chance Flood is contained within Whittier Narrows Flood Control Basin

[3] Not Required by the Federal Insurance Administration

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Approximately 800 feet Upstream of Placerita Canyon Road	6.4	--	--	4,371	5,961
Sand Canyon Lateral					
At Robinson Ranch Road	0.9	--	--	1,480	--
Santa Clara River					
Approximately 2,600 feet Upstream of Los Angeles Aqueduct	235.4	--	--	15,182	26,369
At Sand Canyon Road	179.4	--	--	8,408	13,849
Santa Clarita Valley					
Santa Clara River Approximately 3,500 feet Upstream of Arrastre Canyon Road	67.7	--	--	8,408	13,849
Santa Clara River 7,600 feet Upstream of Oak Springs Canyon	172.7	--	--	13,412	22,588
Santa Clara River at Sand Canyon Road	179.4	--	--	13,934	23,467

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Mint Canyon 3,600 feet Downstream of Vasquez Canyon Road	26.8	--	--	7,896	14,179
Mint Canyon 1,600 feet Downstream of Sierra Highway Crossing	29.3	--	--	8,300	14,581
Mint Canyon Approximately 2,600 feet Downstream of Davenport Road	19.9	--	--	6,691	12,604
Vasquez Canyon Approximately 1,373 feet Upstream of Vasquez Canyon Road	4.2	--	--	2,851	5,009
Bouquet Canyon Approximately 4,500 feet Upstream of Vasquez Canyon Road	38.6	--	--	11,303	23,161
Placerita Creek Approximately 850 feet Downstream of Antelope Valley Freeway	6.3	--	--	3,546	5,673
Placerita Creek Approximately 2,000 feet Upstream of Quigley Canyon Road	7.1	--	--	4,085	6,313

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Placerita Creek Approximately 2,900 feet upstream of Quigley Canyon Road	8.6	--	--	4,988	7,482
Placerita Creek Approximately 575 feet Upstream of San Fernando Road	9.3	--	--	5,321	7,981
Newhall Creek Approximately 800 feet Downstream of Sierra Highway	5.2	--	--	3,224	4,396
Newhall Creek Approximately 650 feet Upstream of Railroad Canyon	6.2	--	--	3,390	5,424
Newhall Creek Approximately 650 feet Downstream of Railroad Canyon	7.3	--	--	3,892	6,228
Railroad Canyon Approximately 350 feet upstream of San Fernando Road	1.2	--	--	835	1,253
South Fork Santa Clara River Approximately 600 feet Downstream of Golden State Freeway	12.8	--	--	8,417	13,596

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Wildwood Canyon Approximately 600 feet Upstream of Intersection of Valley Street and Maple Street	0.23	--	--	172	279
South Fork Santa Clara River Approximately 500 feet Downstream of Wiley Canyon Road	12.9	--	--	8,483	13,704
Santa Clara River Approximately 2,600 feet Upstream of Los Angeles Aqueduct	235.4	--	--	15,182	26,369
Approximately 1,800 feet South of Intersection of San Fernando Road and Magic Mountain Parkway	1.9	--	--	1,437	2,495
Bouquet Canyon Approximately 2,600 feet Upstream of Bouquet Canyon Road	32.1	--	--	11,117	22,707
Plum Canyon Approximately 2,350 feet Upstream of Bouquet Canyon Road	3.4	--	--	1,942	3,453
Haskell Canyon Approximately 1,300 feet Downstream of Headworks	6.7	--	--	5,363	10,516

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Haskell Canyon Approximately 6,400 feet Upstream of Confluence with Bouquet Canyon	10.4	--	--	7,268	14,072
Dry Canyon Approximately 2,000 feet Upstream of San Francisquito Road	5.5	--	--	5,235	10,470
San Martinez-Chiquito Canyon Approximately 1,000 feet Upstream of Chiquito Canyon Road (Lower Crossing)	4.7	--	--	4,659	8,607
San Martinez-Chiquito Canyon Approximately 400 feet Upstream of Chiquito Canyon Road (Upper Crossing)	3.1	--	--	3,112	5,705
San Martinez-Chiquito Canyon Approximately 250 feet Downstream of Verdale Street	1.1	--	--	1,205	2,208
Halsey Canyon Approximately 1,150 feet Downstream of Halsey Canyon Road	7.3	--	--	5,544	10,163

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Halsey Canyon Approximately 550 feet Downstream of Romero Canyon Road	5.9	--	--	4,523	8,292
Castaic Creek Approximately 2,100 feet Upstream of Confluence with Charlie Canyon	16.8	--	--	11,805	22,326
Violin Canyon Approximately 2,000 feet Downstream of Interstate Highway 5	10.5	--	--	9,421	17,818
Gorman Creek Approximately 250 feet North of Interstate Highway 5 Overcrossing Gorman Road	3.8	--	--	1,713	3,221
Elizabeth Canyon Approximately 2,300 feet Downstream of Elizabeth Lake Pine Canyon Road	7.7	--	--	3,455	7,176
Pine Canyon Approximately 1,200 feet Upstream of Lake Hughes Road	6.4	--	--	2,969	6,166
Dowd Canyon at Calle Corona Extended	3.9	--	--	2,982	5,963
San Francisquito Canyon at Spunky Road	2.7	--	--	2,140	4,281

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Santa Fe Springs Area					
Vicinity of Rivera Road and Vicki Drive	0.38	80	176	225	352
Shallow Flooding					
Turnbull Canyon in the Vicinity of Broadway and Alta Drive	1.0	250	540	690	1,080
At intersection of Ripley Avenue and Rindge Lane	N/A	61	135	172	270
At Gould Avenue between Ford and Goodman Avenues	0	66	146	186	291
At intersection of Vincent Street and South Irena Avenue	N/A	68	149	190	298
At intersection of Camino Real and South Juanita Avenue	10	50	111	141	221
At intersection of Avenue H and Massena Avenue	5[1]	154	340	434	679
South Fork Santa Clara River					
Approximately 500 feet downstream of Wiley Canyon Road	12.9	--	--	8,483	13,704

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Approximately 600 feet downstream of Golden State Freeway	12.8	--	--	8,417	13,596
Surface Runoff at Intersection of Garfield Avenue and Beverly Boulevard	2.9	820	1,810	2,310	3,610
Vicinity of Rosewood Avenue and Huntley Drive	1.06	670	1,479	1,888	3,329
West Los Angeles and Central Districts					
Happy Lane	1.73	640	1,400	1,800	2,800
Laurel Canyon Boulevard at Hollywood Boulevard	1.91	600	800	1,160	2,100
West Hollywood					
Genesse Avenue North of Hollywood Boulevard	1.00	370	820	1,000	1,600
Third Street, Vicinity of La Cienga Boulevard	5.10	1,600	3,500	4,500	7,200
Fifth Street, Vicinity of Orlando Avenue	5.66	1,600	3,600	4,500	7,100

-- Data Unknown

[1] Pump Capacity

N/A Not Applicable

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Beverly Boulevard, Vicinity of Spaulding Avenue	4.02	730	1,600	2,100	2,900
Third Street, Vicinity of Fairfax Avenue	6.13	1,500	3,200	4,100	6,800
Hollywood					
Santa Monica Boulevard, Vicinity of Mariposa Avenue	2.79	940	2,100	2,700	4,200
South of Hollywood Freeway, Vicinity of Kenmore Avenue	3.20	830	1,800	2,300	3,700
Third Street at Kenmore Avenue	3.43	800	1,800	2,300	3,500
Madison Avenue at Monroe Street	0.54	160	350	440	690
Silver Lake					
Griffith Park Boulevard at Tracy Street	0.64	220	490	620	970
Between Hyperion Avenue and Griffith Park Boulevard, North of Fountain Avenue	0.91	290	650	830	1,300
Myra Avenue, Vicinity of Del Mar Avenue	1.80	490	1,110	1,400	2,200

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Silver Lake Boulevard East of Virgil Avenue	1.27	420	900	1,100	1,800
Westlake					
Vicinity of Wilshire Boulevard West of Hoover Street	1.40	360	790	1,000	1,600
Hancock Park					
Sixth Street, Vicinity of Alexandria Avenue	8.09	2,100	4,600	5,900	9,200
Lucerne Boulevard at Francis Avenue	0.26	70	160	200	320
Olympic Boulevard at Hudson Avenue	0.56	130	290	370	570
Vicinity of Western Avenue and 11th Street	3.48	670	1,300	1,600	2,500
Vicinity of Bronson Avenue and Country Club Drive	18.07	3,700	7,900	9,600	14,000
Vicinity of West Boulevard and Dockweiler Street	18.76	3,600	7,600	9,300	13,600
Vicinity of San Vicente and Pico Boulevards	18.91	3,500	7,400	9,000	13,100
Vicinity of Highland Avenue and St. Elmo Drive	20.21	3,600	7,700	9,300	13,700

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Arlington Avenue, Vicinity of 37th Place	0.73	440	990	1,400	2,500
Victoria Avenue, Vicinity of Jefferson Boulevard	1.17	320	1,100	1,400	2,600
Chesapeake Avenue, Viciniy of Exposition Boulevard	7.97	1,100	2,400	3,000	3,700
Harcourt Avenue, Vicinity of Westhaven Street	0.53	160	350	450	700
Park La Brea					
Wilshire Boulevard, Vicinity of Crescent Heights Avenue	6.62	1,500	3,300	4,200	6,600
Vicinity of Orange Drive and Pickford Street	24.67	4,400	9,500	11,800	17,700
Vicinity of Whitworth Drive and La Cienega Boulevard	17.13	3,400	7,600	9,700	15,200
Venice Boulevard, Vicinity of Fairfax Avenue	18.44	3,400	7,500	9,500	14,900
Redondo Boulevard, Vicinity of Santa Monica Freeway	1.16	300	670	860	1,300
Redondo Boulevard, Vicinity of Roseland Street	14.53	2,000	4,400	5,700	9,100
Houser Boulevard, Vicinity of La Cienega Boulevard	14.76	1,900	4,300	5,500	8,800
Fairfax Avenue, Vicinity of La Cienga Boulevard	16.67	2,100	4,700	6,000	9,600

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
West Los Angeles					
Balsam Avenue, Vicinity of Olympic Boulevard	1.19	290	550	660	940
Manning Avenue, Vicinity of Tennessee Avenue	3.40	530	1,300	1,700	2,600
Between Westwood Boulevard and Overland Avenue, Vicinity of Exposition Boulevard	4.00	190	1,200	1,500	2,700
Roundtree Road, Vicinity of Manning Avenue	0.72	500	740	840	1,100
Century City					
Northwest of Santa Monica Boulevard and Avenue of the Stars	0.49	400	590	700	900
Bel Air Estates					
Stone Canyon Road South of Somma Way	0.66	480	710	800	1,100
Stone Canyon Road South of Bellagio Road	1.02	630	940	1,100	1,400
Beverly Glen Boulevard North of Sunset Boulevard	1.18	700	1,000	1,200	1,600

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Brentwood					
North of San Vicente Boulevard, West of Westgate Avenue	0.21	60	140	180	280
Northeast of Sunset Boulevard and Barrington Avenue	0.24	230	340	390	520
Pacific Palisades					
Rustic Canyon, Approximately 1,030 feet Downstream (South) of Sunset Boulevard	5.67	700	1,500	2,000	3,100
Westchester					
Approximately 300 feet East of Sepulveda Boulevard and 1,300 feet North of 74th Street	1.39	310	690	880	1,400
Sepulveda Boulevard South of San Diego Freeway	1.39	310	690	880	1,400
Arizona Avenue North of Arizona Circle	1.65	340	740	950	1,500
Hyde Park					

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Halldale Avenue, Vicinity of 65th Street	1.20	300	660	850	1,300
Wilton Place, Vicinity of Gage Avenue	3.29	770	1,600	1,900	3,000
South of Southwest Drive, Vicinity of Van Ness Avenue	4.15	730	1,600	2,100	3,200
Harbor District					
Harbor Lake, Southeast of Vermont Avenue and Pacific Coast Highway	18.97	3,200	7,000	8,900	14,000
Denker Avenue, Vicinity of 204th Street	0.28	60	130	170	260
West Hollywood Area					
Vicinity of Rosemead Avenue and Huntley Drive	1.06	670	1,479	1,888	3,329
Vicinity of Pan Pacific Auditorium	4.02	730	1,600	3,600	4,500
Whittier Area					
Vicinity of Turnbull Canyon Road	1.0	246	543	692	1,084
Whittier Narrows Flood Control Basin	524	--[2]	--[2]	90,000	--[3]

Table 7 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs)			
		10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Windsor Hills Area					
Vicinity of La Brea and Slauson Avenues	0.25	67	147	188	294

[2] Discharge not determined because 1% Annual Chance Flood is contained within Whittier Narrows Flood Control Basin

[3] Not Required by the Federal Insurance Administration

A summary of breakout discharge is shown in Table 8, “Summary of Breakout Discharges.”

Table 8 - SUMMARY OF BREAKOUT DISCHARGES

Flooding Source and Location	Breakout Discharges (cfs)			
	10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Compton Creek				
Upstream of the Confluence of Compton Creek and Los Angeles River, Right Overbank	--	--	14,800	--
Los Angeles River				
At Fernwood Avenue	--	--	75,200	--
Left Overbank	--	--	57,000	--
Right Overbank	--	--	18,200	--
At Wardlow Road	--	--	45,400	--
Left Overbank	--	--	14,200	--
Right Overbank	--	--	31,200	--
Rio Honda				
At Beverly Boulevard, Left Overbank	--	--	13,700	--
At Stewart and Gray Road	--	--	2,790	--
Left Overbank	--	--	1,395	--
Right Overbank	--	--	1,395	--

Table 8 - SUMMARY OF BREAKOUT DISCHARGES

Flooding Source and Location	Breakout Discharges (cfs)			
	10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Upper Los Angeles River				
At Broadway, Left Overbank	--	--	100	--

-- Data Unknown

Elevations for floods of the selected recurrence intervals on the Pacific Ocean are showing Table 9, “Summary of Elevations.”

Table 9 - SUMMARY OF ELEVATIONS

Flooding Source and Location	10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Los Angeles River	7.3	7.8	9.9	15.6
Los Cerritos Channel	6.9	7.5	8.7	12.2
Pacific Ocean				
San Pedro Bay	7.4	7.9	10.0	15.7
San Pedro Bay	7.0	7.6	8.8	12.3
San Pedro Bay	8.9	--	8.9	--
Alamitos Bay	7.0	7.6	8.8	12.3
Swimming Lagoon	7.4	7.9	10.0	15.7
At King Harbor	6.9	6.9	6.9	8.3
At Pleasure Pier	8.9	--	8.9	--
At Pleasure Pier	10.3	11.2	11.6	12.3
Ponding 600 feet East of Bloomfield Avenue North of Lakeland Road	139.8	142.8	143.8	143.8
Ponding 1,000 feet East of Bloomfield Avenue North of Lakeland Road	116.8	148.3	148.8	149.8
Ponding at Marquardt Avenue 1,400 feet North of Rosecrans Avenue	83.8	85.8	86.8	88.8

Table 9 - SUMMARY OF ELEVATIONS

Flooding Source and Location	10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Ponding from Savage Creek				
Intersection of York Avenue and Mar Vista Street	382.8	382.8	382.8	382.8
Ponding from Turnbull Canyon				
Intersection of Painter Avenue and Camilla Street	411.8	419.8	420.8	421.8
San Gabriel River				
At Whittier Narrows Flood Control Basin	213.8	222.8	222.8	231.8
Shallow Flooding				
Intersection of Ripley Avenue and Rindge Lane	--	62.9	64.9	68.9
At Gould Avenue between Ford and Goodman Avenues	83.4	91.4	95.9	105.9
Intersection of Vincent Street and South Irena Avenue	81.9	82.9	83.6	84.9
Intersection of Camino Real and South Juanita Avenue	120.5	121.9	122.9	124.3
Intersection of Avenue H and Massena Avenue	61.4	64.4	65.4	67.4
Surface Runoff – Deep Ponding Area				

Table 9 - SUMMARY OF ELEVATIONS

Flooding Source and Location	10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Southwest of the Intersection of Carson Street and Madrona Avenue	60.1	66.1	68.8	74.8
Intersection of Doris Way and Reese Road	61.6	64.8	65.8	67.7
Surface Runoff – Ponding Area				
Intersection of Anza Avenue and Spencer Street	82.6	83.4	83.8	84.9
Northeast of Sepulveda Boulevard and Madrona Avenue	77.3	78.4	78.8	79.5
Intersection of California Street and Alaska Avenue	78.7	80.1	80.8	81.6
Intersection of Mines Avenue and Taylor Avenue	186.7	188.8	188.8	188.8

-- Data Unknown

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were performed to provide estimates of the flood elevations of the selected recurrence intervals. Users should be aware that flood elevations shown on the Flood Insurance Rate Map (FIRM) represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

The elevations have been determined for the 10-, 2-, 1-, and 0.2-percent annual chance floods for the flooding sources studied by detailed methods.

Cross sections were determined from topographic maps and field surveys. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry. All topographic mapping used to determine cross sections are referenced in Section 4.1.

Locations of selected cross sections used in the hydraulic analyses 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 FIRM.

The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1988 (NAVD 88).

Los Angeles County

Santa Clarita and Antelope Valley

Preliminary flood elevations were determined by routing peak discharges through the county using the boundaries of the alluvial fans, historical records, and field reviews. Topographic and cross section data were compiled from existing topographic maps and from topographic maps prepared by the County Engineer for use in the Antelope Valley Flood Study. Features that cause changing flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant, and backwater calculations were not used. Roughness coefficients (Manning's "n") for overland flow conditions were estimated by field inspection of the areas under investigation. The Manning's "n" values ranged from 0.03 in the channels to 0.06 in the overbanks.

The preliminary flood elevations were field reviewed for verification of actual field conditions. Features such as local obstructions or depressions which would affect flood elevations or depths were noted, and flood elevations were revised accordingly, based on engineering judgment. Average depths of flooding were assigned based on standard normal-depth calculations through irregular cross sections. In many instances, the assigned average depth is not representative of the true degree of flood hazard. This occurs when average depths are based on a wide cross section which encompasses one or more low-flow drainage courses. The actual depth of flooding and, consequently, the true flood hazard will be greater adjacent to the drainage course. In some locations in the Santa Clarita Valley, the low-flow drainage course has been designated Zone A to reflect both the more severe hazard and that no development will take place. The adjacent flood plain is then given a shallow flooding designation based on average depth across the entire cross section.

Water-surface profiles were not prepared because the 1-percent annual chance flooding in the Antelope and Santa Clarita Valleys are not readily associated with channel flooding and flood profiles. Therefore, flooding limits were established through the use of available topography and field reviews.

Flood elevations for flooding sources in areas of little existing development and low potential for future development were determined by approximate methods based on Flood Hazard Boundary Maps, field reviews, and historical records.

Malibu Area

Flooding sources in the Malibu area typically are well-incised streams with relatively high velocities. Flood profiles have been prepared for all flooding sources studied in detail except for the downstream portion of Malibu Creek. In this instance, shallow flooding designations were assigned in. accordance with FEMA criteria.

Peak discharges were routed through the Malibu area considering the capacities of existing flood control systems. Capacities of these systems were obtained from design records or were computed using Manning's Equation. Topographic and cross section data were compiled from existing topographic maps and field surveys. Features which cause change in flow depths, such a changing ground slope or obstructions, were considered in determining water-surface elevations. Roughness coefficients (Manning's "n") were estimated by field inspection of the areas under investigation. Manning's "n" values ranged from 0.03 in the channels to 0.05 in the overbanks.

Los Angeles Basin

The pockets of unincorporated territory within Los Angeles County were analyzed with the various city Flood Insurance Studies on a drainage-area basis. Where applicable, flood profiles were prepared using the same procedure as for the Malibu area of the study. With the exception of Kagel Canyon Channel, Mill Creek, Lopez Canyon Channel, and Hacienda Creek, most flooding in these areas consists of shallow flooding in developed areas. Flow depths for shallow flooding areas were calculated using available topographic maps, street plan data, and field surveys. The flow depths were determined using Manning's Equation based on normal-depth assumptions. Features such as changing ground slope or obstructions were considered.

Because the effectiveness of the calculated cross sections is reduced by the presence of obstructions such as buildings or walls, a "wetted perimeter reduction factor" was used in heavily developed areas. This factor is a measure of the percentage of blockage across the cross sectional area and has the effect of reducing the flow-carrying capacity of the cross section. This has the effect of raising the calculated water-surface elevation. Manning's "n" values for Kagel Canyon Channel, Mill Creek, Lopez Canyon Channel, and Hacienda Creek ranged from 0.03 in the channels to 0.06 in the overbanks. For shallow flooding areas, a Manning's "n" value of 0.03 was used.

Throughout the county, ponding conditions and reservoirs were analyzed using the Los Angeles County Flood Control District Regional Normalized Hydrograph Equation. This equation determines the volume of water generated by 1-percent annual chance flood discharges. Where necessary, the volumes were reduced by reservoir routing flood flows through ponded areas.

Starting water-surface elevations used in the study were determined from normal-depth calculations adjusted to field conditions.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1).

City of Agoura Hills

Peak discharges were routed through the area considering the capacities of existing flood control systems. Capacities of these systems were obtained from design records or were computed using Manning's Equation. Topographic and cross section data were compiled from existing topographic maps (Los Angeles County Flood Control District, 1968 and U.S. Department of the Interior, Geological Survey, 1967) and field surveys. Features which cause changes in flow depths such as changing ground slope or obstructions were considered in determining water-surface elevations.

Roughness coefficients (Manning's "n") were estimated by field inspection of the areas under investigation. Manning's "n" values ranged from 0.03 in the channels to 0.05 in the overbanks.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1).

Starting water-surface elevations used in this study were determined from normal-depth calculations adjusted to field conditions.

For the 1998 revision to the Agoura Hills FIS, the water-surface elevations for the 1-percent annual chance flood event were computed through the use of the U.S. Army Corps of Engineers (USACE) HEC-2 computer program (U.S. Department of the Army, Corps of Engineers, September 1990) and manual calculations.

At the downstream end of the restudy, from approximately 1,040 feet downstream of Kanan Road to the concrete channel downstream of Kanan Road, the HEC-2 model was developed using cross-section information developed for the previous Flood Insurance Study for the City of Agoura Hills (Federal Emergency Management Agency, December 18, 1986), including cross-section data and workmaps obtained from Los Angeles County (Los Angeles County Department of Public Works, September 4, 1979 and September 25, 1979) and as-built construction drawings provided by Los Angeles County (Los Angeles County, Construction Drawings PM 100203, September 6, 1979 and Construction Drawings PM 7982, August 17, 1979).

For the reinforced-concrete channel from downstream of Kanan Road to Thousand Oaks Boulevard, the 1-percent annual chance discharges are contained under supercritical flow conditions as supported by design calculations submitted by the Los Angeles County Public Works Department, which were prepared by Hale, Haaland & Associates, Inc. (Hale, Haaland & Associates, Inc., February 1979).

For the restudy area upstream of Thousand Oaks Boulevard to the Ventura County line, the analyses were primarily based on the USACE HEC-2 computer model prepared by Simons, Li & Associates, Inc., for the Medea Creek Rehabilitation as part of the Morrison Ranch Project (U.S. Department of Housing and Urban Development, 1978). The as-built-conditions HEC-2 model provided by the City of Agoura Hills was also used (City of Agoura Hills, December 6, 1993). The model was extended downstream approximately 600 feet to tie into the upstream end of the concrete channel at Thousand Oaks Boulevard. This extension was based on the Los Angeles County as-built construction drawings (Los Angeles County, Construction Drawings PM 100203, September 6, 1979 and Construction Drawings PM 7982, August 17, 1979). The downstream starting water surface elevation was based on the Los Angeles County design water surface elevation at the upstream end of the supercritical reinforced-concrete-lined section.

Roughness coefficients (Manning's "n" values) used in the hydraulic analyses along Medea Creek ranged from 0.015 to 0.070 for the channel and from 0.040 to 0.070 for the overbank areas. Roughness coefficients were assigned based on the assumption of little or no channel maintenance.

City of Avalon

Topographic and cross section data were compiled from existing topographic maps, street plan data, and by field survey work. Topographic maps were obtained from the city at scales of 1:2,400, with contour intervals of 2 and 5 feet and 1:6,000, with a contour interval of 10 feet. Plans of all bridges and culverts were reviewed to determine elevation data, hydraulic characteristics, and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1).

Design capacities of storm drains and channels were derived from existing design data for each facility. Where design data were lacking, drain capacities were determined using Manning's Equation based on normal-depth assumptions.

Overland flows were routed through the community considering capacities of all existing drainage facilities. In those areas where storm discharges of the selected recurrence intervals exceeded drain capacities, surface flows existed and field cross sections were used to determine flood depths. Features which cause changing flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant and calculations for backwater were not warranted; therefore, uniform flow characteristics do exist and normal-depth analysis was used.

However, because the hydraulic effectiveness of the cross section is reduced by the presence of many obstructions, such as structures and walls, a wetted perimeter reduction factor was applied to appropriate cross sections. The factor is a measure of the percentage of blockage across the cross sectional area and has the effect of reducing the flow-carrying capacity of the cross section, thus increasing the water-surface elevation of peak discharges.

For determining depths and limits of flooding, the floodplain was divided into 3 study sections: the open area upstream of Tremont Street; the densely developed area between Tremont and Beacon Streets; and the section downstream of Beacon Street.

The section upstream of Tremont Street is characterized by sparse development, and hydraulic calculations were based on this condition. The section between Tremont and Beacon Streets is densely developed, but has a few vacant lots scattered throughout the area. The effect of these vacant lots on the depth of flooding throughout the overall area is negligible. Therefore, the vacant lots were assumed improved, and the wetted perimeter reduction factor was uniformly applied throughout this section. The section downstream of Beacon Street includes a large, open plaza area which was considered as open space in the hydraulic calculations.

Roughness coefficients (Manning's "n") for overland flow conditions were estimated by field inspection at the locations under investigation and ranged from 0.030 to 0.050.

Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Long Beach (terrestrial flooding sources only), portions of Los Angeles affected by Los Angeles River, Lynwood, Paramount, Pico Rivera, South Gate

Cross section data developed for the backwater analysis of floods affecting these cities were obtained from aerial photogrammetry. The channel cross sections in the upper reaches of the Los Angeles River were developed from as-built plans obtained from the USACE. Elevation data for interstate highways crossing the channel and floodplain were obtained from the USACE and CALTRANS.

The roughness factor (Manning's "n") of 0.016 used for the channel was chosen based on engineering judgment of the design parameters and field observation of the concrete channel.

The roughness factors (Manning's "n") in the overbank areas were adjusted to compensate for the urbanized areas in the floodplain. The adjustment is based on the percentage of blockage parallel and perpendicular to the direction of flow. This factor has the effect of reducing the flow-carrying capacity of the cross section, thus raising the calculated water-surface elevation. The overbanks were divided into industrial and residential for this analysis. Industrial developed cross sections indicated a roughness factor of 0.05 with residential ranging from 0.10 to 0.15. A weighted average was used for cross sections comprised of industrial and residential development.

CALTRANS provided geometrical information for the backwater-producing structures in the lower reach. They include Interstates 405, 91, 710, and 105. Spot elevation data points in conjunction with aerial cross sections were used to determined weir elevations of the SPRR, the Union Pacific Railroad (UPRR), the Atchison Topeka and Santa Fe Railroad (ATSFRR) and ridges of high ground which separate flow paths in the overbank areas.

Expansion and contraction coefficients of 0.3 to 0.5, respectively, were used upstream and downstream of highways and railroads where flows were constricted to underpasses or limited crossing areas. A 1:1 contraction of flow upstream and a 4:1 expansion of flow downstream of the structures was used to define the effective flow areas and non-effective hydraulic "shadows". Cross-sections were modified by the use of encroachment routines and/or modification of cross-section geometry to describe ineffective flow areas.

Starting water-surface elevations used in the USACE computer program, HEC-2, for the overbank areas were based on critical depth, normal depth or depths over weirs.

The 1-percent annual chance peak overbank flow rates developed by the USACE and documented in the LACDA report for the Los Angeles River lower reach and the Rio Hondo were used to determine potential overbank water surface elevations and floodplain limits.

Locations of selected cross sections for the entire study used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1).

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

The following information refers to different flow paths. These flow paths are limited to smaller reaches than the profile flow paths and the names differ from those used to label the profiles.

Los Angeles River Left Overbank

The left overbank of the Lower Los Angeles River is divided into two areas. The first area floods as a result of a levee failure on the Los Angeles River near the Century Freeway. The second area floods as a result of levee failure near Wardlow Road.

The first area extends from the Century Freeway to the Pacific Ocean east of Signal Hill. According to the LACDA report the left levee of the Los Angeles River fails at Fernwood Avenue. The LACDA report assumes that the Century Freeway is not in place. The location of levee failure did not take into account the new freeway. However, recent correspondence with the USACE confirms that the levee failure location should not change significantly with the inclusion of the Century Freeway. Therefore, for the purposes of this Flood Insurance Study, the Century Freeway will be considered "in place." The magnitudes and locations of breakout are given in the LACDA report. The Fernwood Avenue breakout is assumed to be downstream of the Century Freeway. The peak flow rate is reduced through this reach due to attenuation as was done in the LACDA report.

The floodplain analysis in the first area includes three different flow paths. For the reach between the Century Freeway and just upstream of the Artesia Freeway the entire breakout is modeled in one flow path with a discharge of 57,000 cfs. Just upstream of the Artesia Freeway the overbank is divided into two paths. The main flow path with a discharge of 39,700 cfs is west of the UPRR and the second flow path with a discharge of 17,000 cfs is east of the railroad.

Downstream of the Artesia Freeway, the UPRR and Paramount Boulevard are elevated above the adjacent ground and form a barrier for flows draining in the east or west direction. Water may only flow in those directions when it has ponded high enough on either side to flow over the top. In order to analyze this area two separate flow paths have been modeled. The main flow path is west of the UPRR. The secondary flow path is east of Paramount Boulevard. In the second flow path, flow is limited by high ground at Clark Avenue on the east and Paramount Boulevard on the west. The HEC-2 split flow option was used to simulate weir flow over Paramount Boulevard and the UPRR. The weir extended from the Artesia Freeway for approximately 2,500 feet. Downstream of this reach oil berms and high ground block any additional transfer of flow. The flow in the second flow path continues south but is limited from spreading west by the UPRR. Downstream of Del Amo Boulevard the flow paths are permanently divided by Signal Hill. The secondary flow path is prevented from spreading east beyond the high ground near Bellflower Boulevard until it reaches Del Amo Boulevard. Downstream of Del Amo Boulevard the HEC-2 split flow option is used to simulate the transfer of flows east toward the San Gabriel River. Normal depth outflow through the streets is assumed. This area where flow is transferred east to the San Gabriel River is designated as an AO Zone. Between Carson Street and Monlaco Road high ground prevents the further transfer of flow and an island is formed. A separate flow path is modeled adjacent to the San Gabriel River using the results of the split flow analysis. Downstream of the island an effective flow line is used to simulate the spread of the recombining of the flows. The total combined flow then continues south to Los Alamitos Bay.

As previously discussed, the main flow path carries its flow adjacent to the Los Angeles River at the Artesia Freeway. Between the Artesia Freeway and the oil tank berms additional flows are added from the secondary flow path. Downstream of this location the main flow path is confined on the east by the UPRR. Downstream of Washington Street the UPRR turns and runs diagonally toward the Los Angeles River. Because the railroad is elevated, it forces water back in the river. The Los Angeles River levees are assumed to remain in place therefore water is forced over the levees into the river. Critical depth was assumed as the starting water surface elevation. A constriction is formed just downstream of where the UPRR crosses the Los Angeles River which prevents any additional overbank flows. This constriction is caused by Signal Hill.

The second area of the left overbank of the Los Angeles River is flooded downstream of the San Diego Freeway (Interstate 405) due to a levee failure and a breakout discharge of 14,200 cfs in the vicinity of Wardlow Road. Downstream of this breakout the levee is assumed to remain in place and flows are attenuated as described in the LACDA report.

HEC-2 backwater runs were made from the ocean to the San Diego Freeway. These runs indicate that it is possible for water to pond high enough to overtop the Los Angeles River levee and flow back into the main channel. The split flow option (weir flow) in HEC-2 was used to allow water to flow over the levee back into the channel.

Los Angeles River Right Overbank

In the right overbank of the lower Los Angeles River upstream of Del Amo Boulevard, water-surface elevations were determined using HEC-2 and the 1-percent annual chance peak flow rates developed by the USACE for the LACDA report for the breakout at Fernwood Avenue. The actual breakout of 18,200 cfs will be downstream of the Century Freeway as discussed for the Los Angeles River left overbank. Floodplain limits extend upstream of the actual breakout location due to backwater effects. Starting

water-surface elevations were determined from critical depth at the Compton Creek levees and the results of the downstream studies at Del Amo Boulevard.

The reach downstream of Del Amo Boulevard to Interstate 405 is affected by breakouts at two different locations: the Compton Creek breakout from the north and the Wardlow Road breakout from the east. The water-surface elevations were determined at each street intersection in the reach between the Los Angeles River and the SPRR assuming normal depth and using Manning's equation. A trial and error process was used to balance the flows going to and from each intersection. Two outflow locations exist for this area. The first is Interstate 405 where flows drain south through the underpasses. The outflow at these underpasses was determined from normal depth calculations. The second outflow location is the SPRR where flows drain west over the SPRR to the Dominguez sink area. The Dominguez sink area is a natural depression with a capacity of approximately 20,000 acre-feet at elevation 20 feet. The outflow over the SPRR was determined from weir flow calculations.

Two separate inflow locations to the Dominguez Sink were analyzed. The first source is the weir flow over the SPRR between Del Amo Boulevard and Interstate 405. The second source of flow to the Dominguez Sink is from a constricted section downstream of Interstate 405, just east of Wilmington Avenue. Weir flow calculations were used to determine the amount of flow to the Dominguez Sink from this source. Water does not pond high enough in the sink to allow flows to drain out of the sink area during the 1-Percent Annual Chance flood.

For the reach upstream of Interstate 405 between the SPRR and the Dominguez Sink the depth of water was determined by using the 1-percent annual chance peak flow rate over the SPRR (with the exception of what drains through Wilmington Avenue). This flow was distributed across the available area resulting in a shallow flooding area with a depth of 3 feet.

The remainder of flow which does not go to the Dominguez Sink continues downstream to the Pacific Ocean. The flow rates obtained by the analyses described above do not result in the same flow rates obtained by the USACE in the LACDA report. The USACE did not take into account the second source of flow to the Dominguez Sink from the constricted section downstream of Interstate 405. Therefore, the flow rates used in this Flood Insurance Study are less than those obtained by the USACE. Once the final peak flow rates were determined, the HEC-2 computer program was used to determine the water-surface elevations.

Rio Hondo Left Overbank

The left overbank of the Rio Hondo extends from the Whittier Narrows Dam to the Century Freeway. Just downstream of Whittier Narrows Dam the overbank floods as a result of the levee failure at Beverly Boulevard. A portion of the breakout is confined to spreading grounds on both sides of the channel and is considered ineffective. The remainder of the flow, 9,020 cubic feet per second (cfs), drains south to the UPRR where it crosses through underpasses at Rosemead Boulevard, Lexington Avenue and Whittier Boulevard. The peak flow rate is reduced throughout this reach due to attenuation as was done in the LACDA report. Percolation basins adjacent to the Rio Hondo and the San Gabriel River are considered ineffective flow areas since these basins may be full at the time of a flood event.

Downstream of the UPRR to the ATSFRR, the overbank is divided into three separate flow paths. One flow path is bounded by the Rio Hondo on the west and a ridge near Rosemead Boulevard on the east. A second flow path is bound by the ridge near Rosemead Boulevard on the west and another ridge near Passons Boulevard on the east. The third flow path is bound by the ridge near Passons Boulevard on the west and the San Gabriel River on the east. High ground between these flow paths prevents the overbank flows from spreading unhindered to the east. The HEC-2 split flow option for weir flow was used to determine the amount of flow which crosses east over the ridges between each cross section and continues south in the overbank.

Most of the water that spreads east to the third flow path, adjacent to the San Gabriel River, overtops the river levees and escapes to the channel. This is possible since these levees are often lower than the adjacent overbank. Along with the HEC-2 split flow option, hand calculations were used to determine the amount of flow which enters the San Gabriel River. Based on the LACDA report and conversations with the USACE, it was determined that adequate capacity existed in the San Gabriel River, above the 1-percent annual chance flows releases from Whittier Narrows Dam, to allow the flows from the Rio Hondo overbank to enter the channel. A total of almost two-thirds of the breakout flows from the Rio Hondo overtop the levees between the dam and the Century Freeway with most of the flows escaping upstream of the ATSFRR.

Once the final flow rates in each path were determined the HEC-2 computer program was used to determine water-surface elevations and floodplain limits. Normal depth calculations were used to determine the depths in the shallow flooding areas.

At the ATSFRR, all the flow remaining in the left overbank crosses at the Rosemead Boulevard underpass. This water then flows south between the Rio Hondo and a ridge of high ground at approximately Passons Boulevard to Interstate 5. At Burke Street, downstream of Slausen Avenue, a small portion of the flow escapes east over the ridge as determined by the HEC-2 split flow weir analysis. The water that flows east over the high ground at Burke Street continues east toward the San Gabriel River and flows over the river levees near the ATSFRR. The San Gabriel River levees in this reach are lower than the adjacent ground which is sloping eastward toward the river. The area between Passons Boulevard and the San Gabriel River is zoned as a shallow flooding area with average depths of 1 foot. This depth was based on normal depth calculations using the elevations of the streets in the direction of flow.

Downstream of Interstate 5 to the Century Freeway a total of three flow paths exist with high ground separating each flow path. The main flow path is adjacent to the Rio Hondo and extends from Interstate 5 to the Century Freeway. At Stewart and Gray Road additional breakouts from the Rio Hondo join the left overbank flows. The second flow path is immediately east of the main flow path between Florence Avenue and the SPRR. A portion of the flows from the first flow path escapes to the second flow path at Florence Avenue. The third flow path begins at Gallatin Road where flows from the first flow path begin to flow over high ground. Flow paths two and three combine downstream of the SPRR. The combined flow from the second and third flow paths extend to the Century Freeway and is adjacent to the San Gabriel River.

At Interstate 5 all flow passes through the openings at Paramount and Lakewood Boulevards. This water then flows south adjacent to the Rio Hondo in the main flow path. Between Interstate 5 and Gallatin Road a small portion of the flow crosses east over high ground near Lakewood Boulevard into the third path. The amount of flow crossing over the high ground was determined using weir flow of the split flow option in the HEC-2 hydraulic model. At Florence Avenue a portion of the flow from the main flow path escapes east into the second flow path. This amount of flow was determined using normal depth calculations for the available street capacity at the known water-surface elevation (from the main flow path HEC-2 runs). Due to high ground adjacent to Burke Street and the southeastern slope of the land, none of the flow that escapes east from the main flow path returns. At Stewart and Gray Road the discharge is reduced to account for attenuation. At this location the additional breakout flows of 1,395 cfs are also added as determined by the USACE. Between the Imperial Highway and the Century Freeway the UPRR crosses diagonally through the main flowpath. The railroad is elevated on fill. This reach was analyzed for two conditions. The first condition assumes the railroad embankment fails and water distributes evenly across the floodplain in one flow path. The second condition assumed the embankment remains in place and flows east of the railroad must pond to the elevation of the railroad embankment before it can cross over to the west. The amount of flow that crosses over the railroad was determined using weir flow of the split flow option in the HEC-2 hydraulic model with the railroad

embankment elevations used for the weir crest elevations. HEC-2 backwater runs were made to determine water-surface elevations for the entire main flow path using the flow rates determined above. The HEC-2 runs that resulted in the greater water-surface elevations were used in mapping the floodplains. The starting water-surface elevation used at the Century Freeway was the water-surface elevation obtained from the downstream study of the Los Angeles River left overbank.

In the second flow path the water is confined between high ground to the east and west until it gets downstream of the SPRR. At this point the flows between the second flow path begin combining with the flows in the third flow path. HEC-2 backwater runs were made to determine the water-surface elevations in the second flow path. The starting water-surface elevation was determined using normal depth calculations. In the transition between flow paths 2 and 3 a shallow flooding zone occurs with water depths varying from one to two feet as determined from spot elevations.

Flows from the main path adjacent to the Rio Hondo begin entering the third flow path downstream of Interstate 5. These flows are prevented from continuing east to the San Gabriel River until upstream of Firestone Boulevard. At this point the high ground is reduced and the flows are free to drain to the east and flow against the San Gabriel River levees. Further downstream water from flow path two enters the third flow path and also continues east to the San Gabriel River levees. The HEC-2 backwater analysis indicates that the water-surface elevation is high enough at this point to allow a portion of the flows to flow over the San Gabriel River levee. This was determined using the HEC-2 split flow option for weir flow and the as-built levee elevations on the San Gabriel River levee for the weir elevations. The remaining flow in the overbank continues south to the Century Freeway.

At the Century Freeway the flows in the third flow path (which includes the flows from the second flow path) run into the depressed freeway section and drain west toward the Los Angeles River where they combine with flows from the main flow path and cross over into the left overbank adjacent to the Los Angeles River. At this same location another breakout occurs on the Los Angeles River. The magnitude of the breakout of the Los Angeles River is much greater than that of the Rio Hondo breakouts. The peaks of the two breakouts occur at different times according to the USACE, therefore, only the larger breakout amount from the Los Angeles River is used to analyze the floodplain limits and depths downstream of the Century Freeway.

Rio Hondo Right Overbank

Upstream of the Los Angeles River-Rio Hondo confluence a triangle is formed which is flooded from a breakout of the right Rio Hondo levee at Stewart and Gray Road. The Los Angeles River levees upstream of the confluence are certified by the USACE.

In order for water to get back into the channels (Rio Hondo or Los Angeles River) it must pond behind the levees at the confluence then flow over them. Water-surface elevations were determined using the HEC-2 model.

City of Burbank

In order to compute water-surface elevations within the City of Burbank, peak discharges were routed through the community considering capacities of existing flood control facilities. At locations where peak discharges exceeded the available drainage system capacity, field reviews and cross section data were used to determine depths of the overland flows. Capacities of channels and storm drains were obtained from design records or were derived from available data using Manning's equation based on normal depth assumptions. Topographic and cross section data were compiled from existing topographic maps, field reviews, and street plan data on file at the Los Angeles County Flood Control District.

Water-surface profiles were not prepared because the 1-percent annual chance flooding in Burbank is not readily associated with channel flooding and flood profiles.

Roughness coefficients (Manning's "n") for overland flow conditions were estimated by field inspection of the areas under investigation, and values ranging from 0.014 to 0.050 were used.

Country Club Drive in Sunset Canyon acts as a channel for storm runoff, and depths calculated are based on normal depth assumptions indicating supercritical flow. However, it was concluded that the combined effects of variations in channel roughness, short-radius curves, and debris will cause the flows to be at critical depth and, therefore, the flooding limits in Sunset Canyon were based on critical depth calculations.

Features which cause changing flow depths, such as changing around slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant and backwater calculations were not used. However, because the effectiveness of the calculated cross sections are reduced by the presence of obstructions, such as buildings and walls, a wetted perimeter reduction factor was applied. The factor is a measure of the percentage of blockage across the cross sectional area and has the effect of reducing the flow-carrying capacity of the cross section, thus increasing the water-surface elevation of peak discharges.

To analyze pondinq conditions, the Los Angeles County Flood Control District's Regional Normalized Hydrograph Equation was used to determine the volume of water generated by the 1-percent annual chance flood event. Where necessary, the volume was reduced by reservoir routing floodflows through the ponded areas.

For the January 20, 1999 revision, water-surface elevations were computed through the use of the USACE HEC-2 computer program (U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, September 1990). The parameters used were as follows:

1. Channel cross sections and structure dimensions were obtained from as-built plans for the Lockheed Drain Channel (Federal Works Agency, November 1944).

2. Cross sections in the overbank areas were determined from City of Burbank topographic mapping at a scale of 1"=100', with a contour interval of 2 feet (Analytical Surveys, Inc., May 1988), supplemented by grading plans (City of Burbank, March 1991 and Lockheed Engineering and Science Co., October 1993) and field-reconnaissance surveys.

3. The roughness coefficient (Manning's "n" value) for various lined portions of the channel was set at 0.020. All other values were based on field inspection. Earthen channel "n" values were set at 0.035. Overbank "n" values ranged from 0.020 to 0.045, and were determined using the procedure developed by the USGS (U.S. Department of the Interior, Geological Survey, October 1977). Building blockages were estimated from the City's topographic mapping (Analytical Surveys, Inc., May 1988) and field-reconnaissance surveys. These values ranged between 0.100 and 0.150.

4. Starting water-surface elevations were calculated using the slope-area method.

5. All culverts and bridges were modeled on assumed unobstructed flow. Bridges were modeled using the HEC-2 special-culvert or normal-bridge methods. For the long pipe conduit that begins at Clybourn Avenue, an elevation discharge rating curve was determined by manual calculation and was used for the HEC-2 analyses.

6. HEC-2 split-flow routines, based on a weir discharge coefficient of 2.6, were used to determine channel overflows.

The boundaries of the 1-percent annual chance flood were delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using aerial

topographic mapping at a scale of 1"=100', with a contour interval of 2 feet, that was prepared for this restudy (Analytical Surveys, Inc., May 1988). The sheet-flow areas where flooding depths are less than 1 foot are designated Zone X. Areas where flooding depths exceed 1 foot are designated Zone AE and the calculated 100-year BFEs are designated on the Flood Insurance Rate Map.

City of Culver City

Peak discharges for locations within the City of Culver City were routed through the community considering where peak discharges exceeded the available drainage system capacity, field reviews and cross section data were used to determine depths of the overland flows. Capacities of channels and storm drains were obtained from design records or were derived from available data using Manning's equation based on normal depth assumptions. Topographic and cross section data were compiled from existing topographic maps and street plan data.

Features that cause changing flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant, and backwater calculations were not used. However, because the effectiveness of the calculated cross sections are reduced by the presence of obstructions, such as buildings and walls, a wetted perimeter reduction factor was applied. The factor is a measure of the percentage of blockage across the cross sectional area and has the effect of reducing the flow-carrying capacity of the cross section, thus increasing the water-surface elevations of peak discharges.

Roughness coefficients (Manning's "n") for overland flow conditions were estimated by field inspection of the areas under investigation, and a value of 0.040 was used throughout the study.

Water-surface profiles were not prepared because the 1-percent annual chance flooding in Culver City is not readily associated with channel flooding and flood profiles. Therefore, flooding limits and depth were established through the use of available topography and field reviews.

Shallow flooding, resulting from inadequate drainage and having an average depth of 1 foot, occurs on the east side of Ballona Creek Channel in the vicinity of the intersection of Adams and Washington Boulevards. Also, shallow flooding with depths less than 1 foot occurs along the western border of Hannum Avenue, in the northeast section of the Fox Hills Mall.

City of La Mirada

The peak discharges for floods of the selected recurrence intervals within the City of La Mirada were routed through the community with consideration given to the capacities of existing flood-control facilities. At locations review and cross section data were used to determine depths of the overland flow. Capacities of channels and storm drains were obtained from design records or were derived from available data using Manning's Equation, based on normal depth assumptions. Topographic and cross section data were compiled from existing topographic maps, street plan data, and field reviews. Features which cause changing flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant and backwater calculations were not used. However, because the effectiveness of the calculated cross section is reduced by the presence of obstructions, such as buildings and walls, a wetted perimeter reduction factor was applied. The factor is a measure of the percentage of blockage across the cross sectional area and has the effect of reducing the flow-carrying capacity of the cross section, thus increasing the water-surface elevation of peak discharges.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1).

Roughness coefficients (Manning's "n") for overland flow conditions were estimated by field inspection; values ranged from 0.025 to 0.030 for both channel and overbank areas.

To analyze ponding conditions, the Regional Normalized Hydrograph Equation of the Los Angeles County Flood Control District was used to determine the volume of water generated during a 1-percent annual chance flood event. Where necessary, the volumes were reduced by reservoir-routing flood flows through the ponded areas.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1).

City of Lancaster

The preliminary flood depths within the City of Lancaster were determined by routing peak discharges through the community using the boundaries of the alluvial fans, historical records, and field reviews. Average depths of flooding were assigned based on standard hydraulic calculations through irregular cross sections. In many instances, the assigned average depth is not representative of the true degree of flood hazard. This occurs when average depths are based on a wide cross section which encompasses one or more low-flow drainage courses. The actual depth of flooding, and, consequently, the true flood hazard, will be greater adjacent to the drainage course.

Features that cause changing flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant, and backwater calculations were not used.

Topographic and cross section data were compiled from existing topographic maps and from topographic maps prepared by the County Engineer.

Roughness coefficients (Manning's "n") for overland flow conditions were estimated by field inspection of the areas under investigation, and a value of 0.04 was used throughout.

Water-surface profiles were not prepared because the 1-percent annual chance flooding in Lancaster is not readily associated with channel flooding, and flood profiles are not applicable.

City of Long Beach

Analyses of the hydraulic characteristics of flooding from oceanic sources were carried out to provide estimates of the elevations of floods of selected recurrence intervals along each of the shorelines. The discussion of flood hydraulics from terrestrial sources is covered in the section on the Cities of Bellflower, et al., above.

In order to obtain runup values for the various flood producing mechanisms, data on offshore bathymetry and beach profiles were obtained from U.S. Coast and Geodetic Survey and National Oceanic and Atmospheric Administration bathymetric charts; USGS topographic maps; surveys of beach profiles conducted by the USACE, Los Angeles District; and from aerial photographs of the study area.

City of Los Angeles

Analysis of the City of Los Angeles included all those issues related to the study of communities within the Los Angeles River watershed, and are covered under the Cities of Bellflower, at al. above. Areas outside the influence of the Los Angeles River are discussed below.

Peak discharges were routed through the City considering capacities of existing flood-control facilities. At locations where peak discharges exceeded the available drainage system capacity, field reviews and cross section data were used to determine depths of the overland flows. Capacities of channels and storm drains were obtained from design records or were derived from available data using Manning's equation

based on normal-depth assumptions. Topographic and cross section data were compiled from existing topographic maps, street plan data, and field surveys.

Features that cause change in flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant, and backwater calculations were not used. However, because the effectiveness of the calculated cross sections is reduced by the presence of obstructions, such as buildings and walls, a "wetted perimeter reduction factor" was applied. The factor is a measure of the percentage of blockage across the cross sectional area and has the effect of reducing the flow-carrying capacity of the cross section, thus increasing the water-surface elevation.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed, selected cross section locations are also shown on the FIRM.

Roughness coefficients (Manning's "n") for overland flow conditions were estimated by field inspection of. the areas under investigation, and values of 0.030 and 0.040 were used throughout as appropriate. Values of 0.065, 0.055, and 0.035 were used as Manning's "n" in the hydraulic analyses of the natural watercourses.

Starting water-surface elevations were determined from normal-depth calculations.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1). No profiles are shown for Pacoima, Little Tujunga, aid Big Tujunga Washes because of the unpredictability of the location of the stream across the width of the alluvial fan.

To analyze ponding conditions, the Los Angeles County Flood Control District regional normalized hydrograph equation was used to determine the volumes of water generated by the 1-percent annual chance discharges. Where necessary, the volumes were reduced by reservoir routing floodflows through the ponded areas.

One of the mapped areas of shallow flooding is along the upper reaches of Browns Creek, which results from shallow overbank flows. During the 1-percent annual chance flood event, the water will leave the improved channel because the bridges will become plugged with debris due to the lack of a debris retention facility upstream.

Big Tujunga, Little Tujunga, and Pacoima Washes exit the San Gabriel Mountains on alluvial fans. The potential limits of flooding were delineated by determining the boundaries of the alluvial fans. The depths were assigned using mean depth at critical slope through the irregular cross sections.

Harbor Lake (previously known as Bixby Slough) was analyzed by comparing the inflow to the lake with the outflow from the lake to San Pedro Bay. Outflow is limited by the capacity of a large underground culvert, Project No. 1103.

City engineers have indicated that an inland strip along the beach, northwest of Ballona Creek outlet, has historically been subject to shallow flooding because, during major storms, the drains serving the area have not functioned at high tide.

City of Montebello

Analysis of the City of Montebello included all those issues related to the study of communities within the Los Angeles River watershed, and are covered under the Cities of Bellflower, at al. above. Areas outside the influence of the Los Angeles River are discussed below.

The 1-percent annual chance peak discharge for the original study was routed through the community considering capacities of existing flood-control facilities. At locations where peak discharges exceeded the available drainage system capacity, field reviews and cross section data were used to determine depths of the overland flows. Capacities of channels and storm drains were obtained from design records or were derived from available data using Manning's Equation based on normal depth assumptions. Topographic and cross section data were compiled from existing topographic maps.

Features that cause changing flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant, and backwater calculations were not used. However, because the effectiveness of the calculated cross sections is reduced by the presence of obstructions, such as buildings and walls, a "wetted perimeter reduction factor" was applied. The factor is a measure of the percentage of blockage across the sectional area and has the effect of reducing the flow-carrying capacity of the cross section, thus increasing the water-surface elevation of peak discharges.

Roughness coefficients (Manning's "n") for overland flow conditions were estimated by field inspection of the areas under investigation and values of 0.015 and 0.020 were used.

As a result of these calculations, it was determined that shallow flooding with depths of 1 foot and less than 1 foot would occur in the vicinity of Garfield Avenue.

To analyze ponding conditions, the LACFCD Regional Normalized Hydrograph Equation was used to determine the volume of water generated by the 1-percent annual chance discharge. Where necessary, the volume was reduced by reservoir routing floodflows through the ponded areas.

The volume of water generated by the 1-percent annual chance flood at Whittier Narrows Dam is contained within the reservoir area. The USACE has entered into lease agreements with private owners for use of the reservoir lands. These individual owners could be eligible for flood insurance; and, at the FIA's instructions, the reservoir area has been mapped showing 1-percent annual chance flood boundaries only. It was not deemed necessary to determine 0.2-percent annual chance discharges or elevations.

Field investigation was the method used to study approximate areas.

City of Palmdale

The preliminary flood depths for Amargosa Creek, Amargosa Creek Tributary, Anaverde Creek, and Anaverde Creek Tributary were determined by routing peak discharges through the community using the boundaries of the alluvial fans, historical records, and field reviews. Average depths of flooding were assigned based on standard hydraulic calculations through irregular cross sections. In many cases, the assigned average depth is not representative of the true degree of flood hazard. This situation occurs where average depths are based on a wide cross section which encompasses one or more lowflow drainage courses. The actual depth of flooding and, consequently, the true flood hazard will be greater adjacent to the drainage course.

Features that cause changing flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant, and backwater calculations were not used.

Topographic and cross-section data were compiled from topographic maps prepared by the County Engineer.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). Selected cross section locations are also shown on the Flood Insurance Rate Map.

Flood depths for Big Rock Wash and Little Rock Wash were determined utilizing the U.S. Army Corps of Engineers HEC-2 step-backwater computer program. Cross-sections used in the backwater computations were derived from photogrammetric compilation of aerial photographs, flown in November 1984 January 1985, at a scale of 1:14,400. Topographic mapping was compiled at a scale of one (1) inch equals 400 feet, with a four foot contour interval. Bridges were field surveyed to obtain elevation data and structural geometry.

Starting water-surface elevations were based on approximate hydraulic computations using Manning's equation. Roughness coefficients (Manning's "n") values, were estimated using S.C.S. Guidelines, field investigations, and engineering judgment. For overland flow conditions on Amargosa Creek and Tributary, Anaverde Creek and Tributary, as "n" value of 0.04 was used throughout. Big Rock Wash channel "n" value was 0.05, and an "n" value of 0.05 was used for the overbanks. The "n" values used for Little Rock Creek Wash were 0.03 for the channel, and 0.05 for the overbanks.

Flood depths in the western portion of the city resulting from the flooding of an unnamed tributary from Ritter Ridge northwest of the city and a small segment of Anaverde Creek in western Palmdale, were determined by approximate methods based on the Flood Hazard Boundary Map published by the Federal Insurance Administration, field reviews, historical records, and the Los Angeles County Flood Overflow Maps.

For the March 30, 1998 revision, the water-surface elevations were computed through the use of the U.S. Army Corps of Engineers (USACE) HEC-2 computer program (U.S. Army, Corps of Engineers, Hydrologic Engineering Center, November 1976, Updated May 1984). The HEC-2 model was developed using topographic maps obtained from the State of California Department of Water Resources (State of California, Department of Water Resources, April 9, 1990) and field measurements at road crossings.

Channel and overbank cross sections were determined from State of California Department of Water Resources topographic mapping at a horizontal scale of 400 feet, with a 4-foot contour interval (State of California, Department of Water Resources, April 9, 1990), as well as field measurements.

Manning’s “n” roughness values were established based on a field observations and USACE and USGS guidelines and criteria. Channel roughness values used ranged from 0.035 to 0.060 and overbank roughness values used ranged from 0.035 to 0.075.

Contraction and expansion coefficients of 0.1 and 0.3 were used for open-channel sections. Contraction and expansion coefficients at culverts and bridges ranged from 0.4 to 0.6.

The downstream starting water-surface elevation was determined using the HEC-2 slope-area method, starting approximately 1,100 feet downstream of State Route 14, the downstream study limit.

Supercritical flow conditions can occur in some channel reaches. Subcritical analyses were conducted to determine base (1-percent annual chance flood) flood elevations (BFEs) for all stream reaches.

City of Redondo Beach

The hydraulic analysis of the small channels that exist in much of the City of Redondo beach were performed by the methodologies discussed under the section on the City of La Mirada, above.

Hydraulic analyses of the shoreline characteristics of the flooding sources studied in detail within the City of Redondo beach were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the shorelines. The limit of runup was used to designate flood zones.

To obtain runup values for the various flood-producing mechanisms, data on offshore bathymetry and beach profiles were obtained from the U.S. Coast and Geodetic Survey and the National Oceanic and Atmospheric Administration bathymetric charts, U.S. Geological Survey topographic maps, surveys of beach profiles conducted by the U.S. Army Corps of Engineers, Los Angeles District, and from aerial photographs of the study area.

To analyze ponding conditions, the Los Angeles County Flood Control District Regional Normalized Hydrograph Equation was used to determine the volume of water generated by the 1-percent annual chance flood event. Where necessary, the volumes were reduced by reservoir routing floodflows through the ponded areas.

City of Santa Clarita

Preliminary flood elevations in the City of Santa Clarita were determined by routing peak discharges through the community using the boundaries of alluvial fans, flood overflow maps, and field reviews. Topographic and cross section data were compiled from existing topographic and floodplain boundary maps. Features that cause changing flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant, and backwater calculations were not used.

Roughness coefficients (Manning's "n") for overland flow conditions were estimated by field inspection of the areas under investigation. The Manning's "n" values used were 0.03 in the channels and 0.06 in the overbanks.

The preliminary flood elevations were field reviewed for verification of actual conditions. Features that would affect flood elevations or depths were noted, and flood elevations were revised accordingly, based on engineering judgment. Average depths of flooding were assigned based on standard normal-depth calculations through irregular cross sections. In many instances, the assigned average depth is not representative of the true degree of flood hazard. This occurs when average depths are based on a wide cross section that encompasses one or more low-flow drainage courses. The actual depth of flooding (and consequently, the true flood hazard) will be greater when located adjacent to the drainage course. In some locations in the Santa Clarita Valley, the low-flow drainage course has been designated Zone A to reflect a more severe flood hazard and to prohibit development. The adjacent floodplain is then given a shallow flooding designation based on average depth across the entire cross section.

Water-surface profiles were not prepared because the 1-percent annual chance flooding in the Santa Clarita Valley is not readily associated with channel flooding and flood profiles. Therefore, flooding limits were established using available topography and field reviews.

City of Santa Fe Springs

Peak discharges were routed through the community considering capacities of existing flood-control facilities. At locations where peak discharges exceeded the available drainage system capacity, field reviews and cross section data were used to determine depths of the overland flows. Capacities of channels and storm drains were either obtained from design records or were derived from available data using Manning's equation based on normal depth assumptions. Topographic and cross section data were compiled from existing topographic maps at a scale of 1:24,000, with a contour interval of 5 feet, street plan data, and field surveys.

Water-surface profiles were prepared for the natural watercourse north of the intersection of Pioneer Boulevard and Florence Avenue (shown as Flowline No. 1 on the map) by use of normal depth analysis. Features which cause changes in flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant and backwater calculations were not used. However, because the effectiveness of the

calculated cross sections are reduced by the presence of obstructions, such as buildings and walls, a wetted perimeter reduction factor was applied. This factor is a measure of the percentage of blockage across the cross sectional area and has the effect of reducing the flow-carrying capacity of the cross section, thus increasing the water-surface elevation of peak discharges.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1).

Roughness coefficients (Manning's "n") for overland flow conditions were estimated by field inspection, and a value of 0.030 was used throughout.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1).

Starting water-surface elevations were determined by use of the broad-crested weir formula.

To analyze ponding conditions, the Los Angeles County Flood Control District's Regional Normalized Hydrograph Equation was used to determine the volumes of water generated by the 1-percent annual chance discharges. Where necessary, the volumes were reduced by reservoir routing flood flows through the ponded areas.

City of Torrance

Peak discharges were routed through the community, considering capacities of existing flood-control facilities. At locations where peak discharges exceeded the avai1able drainage system capacity, field surveys, field reviews, and cross section data were used to determine depths of the overland flow:;. Capacities of channel and storm drains were obtained from design records or were derived from available data using Manning's equation based on normal depth assumptions. Topographic and cross section data were compiled from existing topographic maps at scales of 1:24,000 with contour intervals of 5 and 20 feet, and 1:480, with a contour interval of 2 feet, field surveys, and street plan data.

Features that cause changing flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were deemed to be insignificant, and backwater calculations were not used.

To analyze ponding conditions, the Los Angeles County Flood Control District's regional normalized hydrograph equation was used to determine the volume of water generated by the 1-percent annual chance flood peak discharge. Where necessary, the volumes were reduced by reservoir routing floodflows through the ponded areas.

Water-surface profiles were not prepared because the 1-percent annual chance flooding in Torrance is not associated with channel flooding and flood profiles.

An approximate coastal high-hazard analysis was conducted for this study. Flooding due to storm surge and wave runup was approximated by adding 3 feet to the highest tide observed in the Los Angeles area. The highest tide observed was taken from observations at Los les .titer Harbor by the U.S. Coast and Geodetic Survey, during the period from 1941 through 1959. The highest tide observed during that period was 4.9 feet. The city's coastline has been designated as beach land by the County of Los Angeles, which will preclude any substantial development of the beach below an elevation of 7.9 feet. Because there are no existing structures and no likelihood of structures being built in the future below an elevation of 7.9 feet along the Torrance coastline, only an approximate coastal high-hazard area has been shown.

City of West Hollywood

Throughout the City, ponding conditions and reservoirs were analyzed using the Los Angeles County Flood Control District Regional Normalized Hydrograph Equation. This equation determines the volume of water generated by the 1-percent annual chance flood event. Where necessary, the volumes were reduced by reservoir routing flood flows through ponded areas.

Flow depths for shallow flooding areas were calculated using available topographic maps, street-plan data, and field surveys. The flow depths were determined using Manning's Equation based on normal-depth assumptions. Features such as changing ground slope or obstructions were considered.

Because the effectiveness of the calculated cross sections is reduced by the presence of obstructions such as buildings or walls, a "wetted perimeter reduction factor" was used in heavily developed areas. This factor is a measure of the percentage of blockage across the cross sectional area and has the effect of reducing the flow-carrying capacity of the cross section. This has the effect of raising the calculated water-surface elevation.

Starting water-surface elevations used in the study were determined from normal-depth calculations adjusted to field conditions. The Manning's "n" value of 0.03 was used to determine flood depths.

City of Whittier

Analyses of the hydraulic characteristics of streams in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each stream studied in the community.

The 1-percent annual chance peak discharges were routed through the community considering capacities of existing flood-control facilities. At locations where peak discharges exceeded the available drainage-system capacity, field reviews and cross section data were used to determine depths of the overland flows. Capacities of channels and storm drains were obtained from design records or were-derived from available data by using Manning's equation based on normal-depth assumptions. Topographic and cross section data were compiled from existing topographic maps and street plan data.

Features which cause changing flow depths, such as changing ground slope or obstructions, were considered. In all cases, the changes in flow depth caused by these features were considered to be insignificant, and backwater calculations were not used. However, because the effectiveness of the calculated cross sections is reduced by the presence of obstructions such as buildings and walls, a wetted perimeter reduction factor was applied. The factor is a measure of the percentage of blockage across the cross sectional area and has the effect of reducing the flow-carrying capacity of the cross section, thus increasing the water-surface elevation of peak discharges.

Roughness coefficients (Manning's "n") for overland flow conditions were estimated by field inspection of the areas under investigation, and a value of 0.03 was used throughout the study. As a result of these calculations, it was determined that shallow flooding with depths of 1 foot occurs in the vicinity of Painter Avenue and Camilla Street.

Water-surface profiles were not prepared because the 1-percent annual chance flooding in Whittier is not readily' associated with channel flooding.

In order to analyze ponding conditions, the Los Angeles County Flood Control District's Regional Normalized Hydrograph Equation was used to determine the volume of water generated by the 1-percent annual chance flood discharge. Where necessary, the volume was reduced by reservoir routing floodflows through the ponded areas.

The volume of water generated by the 1-percent annual chance flood at Whittier Narrows Dam is contained within the reservoir area. The U.S. Army Corps of Engineers has entered into lease agreements with private owners for use of the reservoir lands. These individual owners could be eligible for flood insurance; and, at the Federal Insurance Administration's instructions, the reservoir area has been studied for the 1-percent chance flood only. It was not deemed necessary to determine 0.2-percent annual chance flood discharges or elevations.

Flood elevations for the city's landfill site, the Friendly Hills County Club golf course, and La Mirada Creek were determined by field investigation and engineering judgment.

During the analysis, 1-percent annual chance shallow flooding was determined along streets having inadequate drainage facilities.

Roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the streams and floodplain areas. Roughness factors for all streams studied by detailed methods are shown in Table 10, "Manning's "n" Values."

Table 10 - MANNING'S "n" VALUES

Stream	Left Overbank "n"	Channel "n"	Right Overbank "n"
Amargosa Creek	0.04	0.04	0.04
Anaverde Creek	0.04	0.04	0.04
Avalon Canyon	0.030 – 0.050	0.030 – 0.050	0.030 – 0.050
Big Rock Wash	0.05	0.05	0.05
Cheseboro Creek	0.05	0.03	0.05
Cold Creek	0.05	0.03	0.05
Dark Canyon	0.05	0.03	0.05
Dry Canyon	0.05 – 0.06	0.03	0.05 – 0.06
Escondido Canyon	0.05	0.03	0.05
Flow along Empire Avenue	0.014 – 0.050	0.014 – 0.050	0.014 – 0.050
Flowline No. 1	0.030	0.030	0.030
Garapito Creek	0.05	0.03	0.05
Hacienda Creek	0.06	0.03	0.06
Kegal Canyon	0.035 – 0.065	0.035 – 0.065	0.035 – 0.065
La Mirada Creek	0.025 – 0.030	0.025 – 0.030	0.025 – 0.030
Lake Street Overflow	0.014 – 0.050	0.014 – 0.050	0.014 – 0.050
Las Flores Canyon	0.05	0.03	0.05
Las Virgenes Creek	0.05	0.03	0.05
Liberty Canyon	0.05	0.03	0.05
Lindero Canyon above Confluence with Medea Creek	0.05	0.03	0.05
Lindero Canyon above Spillway above Lake Lindero	0.05	0.03	0.05
Little Rock Wash – Profile A	0.05	0.03	0.05
Little Rock Wash – Profile B	0.05	0.03	0.05
Little Rock Wash – Profile C	0.05	0.03	0.05
Lobo Canyon	0.05	0.03	0.05
Lockheed Drain Channel	0.014 – 0.050	0.014 – 0.050	0.014 – 0.050
Lopez Canyon Channel	0.06	0.03	0.06

Table 10 - MANNING'S "n" VALUES

Stream	Left Overbank "n"	Channel "n"	Right Overbank "n"
Los Angeles River Left Overbank Path 2	0.05 – 0.15	0.016	0.05 – 0.15
Los Angeles River Right Overbank Path 1	0.05 – 0.15	0.016	0.05 – 0.15
Los Angeles River Right Overbank Path 2	0.05 – 0.15	0.016	0.05 – 0.15
Malibu Creek	0.05	0.03	0.05
Medea Creek	0.05	0.03	0.05
Medea Creek (above Ventura Freeway)	0.03	0.05	0.03
Mill Creek	0.06	0.03	0.06
North Overflow	0.014 – 0.050	0.014 – 0.050	0.014 – 0.050
Old Topanga Canyon	0.05	0.03	0.05
Overflow Area of Lockheed Drain Channel	0.030 – 0.040	0.030 – 0.040	0.030 – 0.040
Overflow Area of Lockheed Storm Drain	0.014 – 0.050	0.014 – 0.050	0.014 – 0.050
Palo Comando Creek	0.05	0.03	0.05
Ramirez Canyon	0.05	0.03	0.05
Rio Honda Left Overbank Path 3	0.05 – 0.15	0.05 – 0.15	0.05 – 0.15
Rio Honda Left Overbank Path 5	0.05 – 0.15	0.05 – 0.15	0.05 – 0.15
Rio Honda Left Overbank Path 6	0.05 – 0.15	0.05 – 0.15	0.05 – 0.15
Rustic Canyon	0.035 – 0.065	0.035 – 0.065	0.035 – 0.065
Santa Maria Canyon	0.05	0.03	0.05
Stokes Canyon	0.05	0.03	0.05
Topanga Canyon	0.05	0.03	0.05
Trancas Creek	0.05	0.03	0.05
Triunfo Creek	0.05	0.03	0.05
Unnamed Canyon (Serra Retreat Area)	0.05	0.03	0.05
Upper Los Angeles River Left Overbank	0.05 – 0.15	0.05 – 0.15	0.05 – 0.15
Weldon Canyon	0.035 – 0.065	0.035 – 0.065	0.035 – 0.065
Zuma Canyon	0.05	0.03	0.05

Refraction

Refraction computations were conducted to trace the evolution of winter swell and tropical cyclone swell from their source to the 60-foot depth contour. A large grid (200 by 250 miles) covering the coastal water of southern California with 1,000 by 1,000-foot grid spacing was used for the refraction calculations. Standard raytracing procedures were used to trace rays inward from the deep ocean grid boundaries. Ray spacing was chosen at 1,000 feet to provide adequate density of ray coverage. Wave heights at the 60-foot contour were computed using the principle of wave energy flux conservation between neighboring rays. One set of refraction computations was performed for each selected event from the list of extreme winter swells and the list of tropical cyclones off Baja California. The winter swell input values were obtained for the FNWC tape for the selected days of extreme events. The values at the three FNWC stations were the basis for linear interpolation to obtain input values in between them. For swell generated by tropical cyclones, the tropical cyclone swell procedure was used to provide input to the refraction program.

Wave Runup

Shoreward of the 60-foot contour, wave runup was determined for each beach profile of interest by adapting to composite beaches the standard empirical runup formulas valid for uniformly sloping beaches. The results of the refraction calculations were used as input. The beach profiles selected were

assumed to be locally one-dimensional in order to apply the empirical runup formulas. However, the influence of incident wave directions, refraction, and shoaling effects were also taken into consideration. Wave heights within the surf zone were also computed using empirical formulas to establish the zone where waves exceed 3 feet.

Computed elevations for wave runup, wave setup, and other inundation hazard characteristics are shown in Table 11, "Summary Elevations for Wave Runup and Wave Setup."

Table 11 - SUMMARY OF ELEVATIONS FOR WAVE RUNUP AND WAVE SETUP

	Wave Runup Elevation[1] (feet)			Wave Setup Elevation[1](feet)		
Flooding Source and Location	10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance	10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Pacific Ocean						
At Will Rogers Beach, Approximately 400 feet South of the Intersection of Tramonto Drive and Porto Marina Way	14.3	19	22.1	--	--	--
At Will Rogers Beach, Approximately 300 feet South of the Intersection of Breve Way and Porta Marina Way	13.4	17.5	20.4	--	--	--
At Will Rogers Beach, at Sunset Boulevard Extended	11.3	13.9	16.5	--	--	--
At Will Rogers Beach at Temescal Canyon Road Extended	10.9	13.3	15.8	--	--	--
At Will Rogers Beach, Approximately 900 feet South of the Intersection of Beirut Avenue and Via De Las Olas	11	13.5	16	--	--	--
At Will Rogers Beach at Entrada Drive Extended	12	15.1	17.8	--	--	--
At Venice Beach at Washington Street Extended	12	15.1	17.8	--	--	--
At Marina Del Ray Entrance Channel and Ballona Creek	--	--	--	7.7	8.9	11.1
At Dockweiler Beach, at Culver Boulevard Extended	11.3	14	16.6	--	--	--
At Dockweiler Beach, at Beaumont Street Extended	11.9	14.9	17.6	--	--	--
At Dockweiler Beach, at Foutainbleau Street Extended	12.5	15.9	18.7	--	--	--
At Dockweiler Beach, at Ipswich Street Extended	13.7	18	21	--	--	--

Table 11 - SUMMARY OF ELEVATIONS FOR WAVE RUNUP AND WAVE SETUP

Flooding Source and Location	Wave Runup Elevation[1] (feet) 10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance	Wave Setup Elevation[1] (feet) 10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
At Dockweiler Beach, Approximately 900 feet Northwest of the Intersection of Imperial Highway and Vista Del Mar	13.1	17.1	19.9	--	--	--
At Dockweiler Beach, Approximately 5,000 feet Northwest of the Corporate Limits	12.8	16.1	18.9	--	--	--
At Dockweiler Beach, Approximately 4,100 feet Northwest of the Corporate Limits	12	15.2	17.9	--	--	--
Along Dockweiler Beach, Approximately 3,400 feet Northwest of the Corporate Limits	11.5	14.2	16.8	--	--	--
Along Dockweiler Beach, Approximately 2,400 feet Northwest of the Corporate Limits	10.9	13.3	15.8	--	--	--
Along Dockweiler Beach, Approximately 1,000 feet Northwest of the Corporate Limits	11.5	14.3	16.9	--	--	--
Along Dockweiler Beach, Approximately 100 feet Northwest of the Corporate Limits	12.1	15.3	18.1	--	--	--
At Corporate Limits, at Royal Palms Beach, Approximately 1,000 feet Northwest of Shad Place Extended	14.1	18.7	21.7	--	--	--
At Royal Palms Beach, at Anchovy Avenue Extended	12.9	16.7	19.5	--	--	--
At Whites Point	12.3	15.7	18.4	--	--	--
At Beach, at Weymouth Avenue Extended	13.5	17.7	20.6	--	--	--
At Point Fermin Beach, at	12.3	15.7	18.4	--	--	--

Table 11 - SUMMARY OF ELEVATIONS FOR WAVE RUNUP AND WAVE SETUP

Flooding Source and Location	Wave Runup Elevation[1] (feet) 10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance	Wave Setup Elevation[1](feet) 10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Barbara Street Extended						
At Point Fermin Beach, at Cabrillo Avenue Extended	13.8	18.2	21.2	--	--	--
Approximately 1,000 feet North of Point Fermin along Beach	17.4	24.7	28.3	--	--	--
At Beach, at Carolina Street Extended	16.5	22.7	26.1	--	--	--
At Beach, at Pacific Avenue Extended	15.5	21	24.3	--	--	--
At Cabrillo Beach, at 40th Street Extended	14.1	18.7	21.7	--	--	--
At Los Angeles Harbor	--	--	--	7.7	8.9	11.1
Catalina Avenue Extended at Beach	7.3	7.9	8.2	--	--	--
Approximately 1,500 feet North of Catalina Avenue Extended along Beach	8.8	10	10.7	--	--	--
At Hamilton Beach	7.9	8.8	9.2	--	--	--
At Sequit Point	11.5	14.3	16.9	--	--	--
At Arroyo Sequit Mouth	10.7	13	15.5	--	--	--
Approximately 800 feet East of Arroyo Sequit Mouth along Beach	11.5	14.3	17	--	--	--
Approximately 800 feet South of the Intersection of Nicholas Beach Road and Pacific Coast Highway	12	15.2	17.8	--	--	--
Approximately 2,400 feet West of Los Alisos Canyon Creek Mouth along Beach	14.3	19	22	--	--	--
At Los Alisos Canyon Creek Mouth	12	15.1	17.8	--	--	--
Approximately 900 feet Southeast of the Intersection of Encinal Canyon Road and Pacific	12.3	15.7	18.4	--	--	--

Table 11 - SUMMARY OF ELEVATIONS FOR WAVE RUNUP AND WAVE SETUP

Flooding Source and Location	Wave Runup Elevation[1] (feet) 10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance	Wave Setup Elevation[1](feet) 10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Coast Highway along Beach						
At Encinal Canyon Creek Mouth	12.9	16.7	19.5	--	--	--
Approximately 250 feet South of the Intersection of Seal Level Drive and Roxanne Beach Road	10.9	13.3	15.8	--	--	--
At Lechuza Point	15.5	20.8	24.3	--	--	--
At Steep Hill Canyon Creek Mouth	13.1	17	19.9	--	--	--
At Trancas Creek	10.9	13.3	15.8	--	--	--
Approximately 200 feet West of Point Dume	12.4	16	18.8	--	--	--
At Point Dume	15.5	20.8	24.3	--	--	--
At Dume Cove, Approximately 500 feet Southeast of the Intersection of Dume Drive and Cliffside Drive	13.1	16.9	19.9	--	--	--
At Dume Cove, Approximately 400 feet South of the Intersection of Fernhill Drive and Cliffside Drive	12.1	15.3	18.1	--	--	--
At Dume Cove, Approximately 750 feet South of the Intersection of Grayfox Street and Cliffside Drive	13.1	16.9	19.9	--	--	--
At Paradise Cove, at Walnut Canyon	12.4	15.8	18.6	--	--	--
At Paradise Cove, Approximately 2,000 feet Northeast of Walnut Canyon Creek Mouth along Beach	15.8	20.8	24.3	--	--	--
At Paradise Cove, at Ramirez Canyon Mouth	11.5	14.3	16.9	--	--	--
At Escondido Beach, at Escondido Canyon Mouth	10.7	12.9	15.5	--	--	--
At Escondido Beach, Approximately 200 feet East of	11.5	14.3	16.9	--	--	--

Table 11 - SUMMARY OF ELEVATIONS FOR WAVE RUNUP AND WAVE SETUP

Flooding Source and Location	Wave Runup Elevation[1] (feet) 10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance	Wave Setup Elevation[1] (feet) 10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
the Intersection of Latigo Shore Place and Latigo Shore Drive						
Approximately 500 feet West of Solstice Canyon Creek Mouth along Beach	13.9	18.3	21.3	--	--	--
At Solstice Canyon Creek Mouth	12.1	15.3	18.1	--	--	--
At Corral Beach, at Corral Canyon Creek Mouth	11.3	13.9	16.4	--	--	--
At Corral Beach, Approximately 250 feet South of the Intersection of Malibu Road and Pacific Coast Highway	13	16.9	19.6	--	--	--
Approximately 1,500 feet East of Corral Canyon Creek Mouth along Beach	13	16.9	19.6	--	--	--
At Puerco Beach, Approximately 200 feet South of the Intersection of Puerco Canyon Road and Malibu Road	11.3	13.9	16.4	--	--	--
At Puerco Beach, at Puerco Canyon Creek Mouth	13	16.9	19.6	--	--	--
At Amarillo Beach, Approximately 2,200 feet East of Marie Canyon Creek Mouth along Beach	11.3	13.9	16.4	--	--	--
At Amarillo Beach, Approximately 3,000 feet East of Marie Canyon Creek Mouth Along Beach	13	16.9	19.6	--	--	--
At Malibu Beach, Approximately 850 feet Southwest of Intersection of Malibu Road and Malibu Colony Drive	11.3	13.9	16.4	--	--	--
At Malibu Creek Mouth	10.6	12.8	15.2	7.7	8.9	11.1
At Las Flores Canyon Mouth	11.3	13.9	16.4	--	--	--
Approximately 2,500 feet East of Las Flores Canyon Mouth along Beach	11.6	14.5	17.1	--	--	--

Table 11 - SUMMARY OF ELEVATIONS FOR WAVE RUNUP AND WAVE SETUP

	Wave Runup Elevation[1] (feet)			Wave Setup Elevation[1](feet)		
Flooding Source and Location	10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance	10-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Approximately 1,500 feet West of Piedra Gorda Canyon Creek Mouth along Beach	11.4	14.2	16.8	--	--	--
Approximately 100 feet South of the Intersection of Budwood Motorway and Pacific Coast Highway	11.9	14.9	17.6	--	--	--
At Topanga Canyon Mouth	11.4	14.1	16.7	--	--	--
At Marina Del Ray	--	--	--	7.7	8.9	11.1

[1] Average Elevations Given; Elevations May Vary Within the Area Cited

-- Data Not Computed

Tsunamis

Tsunamis were computed using numerical models of the long wave equations describing tsunami behavior. The results were taken from the U.S. Army Corps of Engineers Study which details the method used to compute tsunami behavior.

Tropical Cyclone Swells

Waves generated by a tropical cyclone were determined using the JONSWAP spectrum with empirically derived shape and intensity parameters, which were correlated to radial position and wind speed. A cosine function centered about the local wind direction was used for the directional distribution function of the spectrum. The size of the tropical cyclone was defined by the radius at which the wind speed drops below 35 knots. Details of the node are discussed in "Methodology for Coastal Flooding in Southern California".

Flood elevations in areas studied by approximate methods were based on engineering judgment used in conjunction with topographic maps.

Levee Hazard Analysis

Some flood hazard information presented in prior FIRMs and in prior FIS reports for Los Angeles County and its incorporated communities was based on flood protection provided by levees. Based on the information available and the mapping standards of the National Flood Insurance Program at the time that the prior FISs and FIRMs were prepared, FEMA accredited the levees as providing protection from the flood that has a 1-percent-chance of being equaled or exceeded in any given year. For FEMA to continue to accredit the identified levees with providing protection from the base flood, the levees must meet the criteria of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10), titled “Mapping of Areas Protected by Levee Systems.”

On August 22, 2005, FEMA issued Procedure Memorandum No. 34 - Interim Guidance for Studies Including Levees. The purpose of the memorandum was to help clarify the responsibility of community officials or other parties seeking recognition of a levee by providing information identified during a study/mapping project. Often, documentation regarding levee

design, accreditation, and the impacts on flood hazard mapping is outdated or missing altogether. To remedy this, Procedure Memorandum No. 34 provides interim guidance on procedures to minimize delays in near-term studies/mapping projects, to help our mapping partners properly assess how to handle levee mapping issues.

While 44 CFR Section 65.10 documentation is being compiled, the release of more up-to-date FIRM panels for other parts of a community or county may be delayed. To minimize the impact of the levee recognition and certification process, FEMA issued Procedure Memorandum No. 43 - Guidelines for Identifying Provisionally Accredited Levees on March 16, 2007. These guidelines will allow issuance of preliminary and effective versions of FIRMs while the levee owners or communities are compiling the full documentation required to show compliance with 44 CFR Section 65.10. The guidelines also explain that preliminary FIRMs can be issued while providing the communities and levee owners with a specified timeframe to correct any maintenance deficiencies associated with a levee and to show compliance with 44 CFR Section 65.10.

FEMA contacted the communities within Los Angeles County to obtain data required under 44 CFR 65.10 to continue to show the levees as providing protection from the flood that has a 1-percent-chance of being equaled or exceeded in any given year.

FEMA understood that it may take time to acquire and/or assemble the documentation necessary to fully comply with 44 CFR 65.10. Therefore, FEMA put forth a process to provide the communities with additional time to submit all the necessary documentation. For a community to avail itself of the additional time, it had to sign an agreement with FEMA. Levees for which such agreements were signed are shown on the final effective FIRM as providing protection from the flood that has a 1-percent-chance of being equaled or exceeded in any given year and labeled as a Provisionally Accredited Levee (PAL). Communities have two years from the date of FEMA's initial coordination to submit to FEMA final accreditation data for all PALs. Following receipt of final accreditation data, FEMA will revise the FIS and FIRM as warranted.

FEMA coordinated with the U.S. Army Corps of Engineers, the local communities, and other organizations to compile a list of levees that exist within Los Angeles County. Table 12, "List of Levees Requiring Flood Hazard Revisions" lists all levees shown on the FIRM, to include PALs, for which corresponding flood hazard revisions were made.

Approximate analyses of "behind levee" flooding were conducted for all the levees in Table 12 to indicate the extent of the "behind levee" floodplains. The methodology used in these analyses is discussed below.

The approximate levee analysis was conducted using information from existing hydraulic models (where applicable) and USGS topographic maps.

The extent of the 1-percent-annual-chance flood in the event of levee failure was determined. Base flood elevations and topographic information (where available) were used to estimate an approximate 1-percent-annual-chance floodplain and traced along the contour line representing the base flood elevation. If base flood elevations were not available they were estimated from effective FIRM maps and available information. Topographic features such as highways, railroads, and high ground were used to refine approximate floodplain boundary limits.

Table 12 - LIST OF LEVEES REQUIRING FLOOD HAZARD REVISIONS

Community	Flood Source	Levee Inventory ID	Coordinates Latitude/Longitude	FIRM Panel	USACE Levee
City of Santa Clarita	South Fork Santa Clara River	2	(-118.542, 34.391)	06037C0820F	No
City of Santa Clarita	Santa Clara River	5	(-118.473, 34.415) (-118.471, 33.440)	06037C0840F	No
City of Santa Clarita [1]	South Fork Santa Clara River Placerita Creek Newhall Creek	15	(-119.230, 39.400) (-119.230, 39.410)	06037C0820F	No
City of Compton City of Long Beach	Compton Creek	20b	(-118.209, 33.847) (-118.217, 33.795)	06037C1955F	No
City of Cerritos City of Lakewood City of Hawaiian Gardens City of Long Beach	Coyote Creek	21	(-118.042, 33.895) (-118.090, 33.795)	06037C1990F	No
City of Carson City of Los Angeles	Dominguez Channel	22a	(-118.270, 33.847) (-118.253, 33.830)	06037C1935	No
City of Carson City of Los Angeles	Dominguez Channel	22b	(-118.241, 33.777) (-118.229, 33.812)	06037C1965	No

Table 12 - LIST OF LEVEES REQUIRING FLOOD HAZARD REVISIONS

Community	Flood Source	Levee Inventory ID	Coordinates Latitude/Longitude	FIRM Panel	USACE Levee
City of Bell City of Cudahy City of Southgate City of Vernon	Los Angeles River	25a	(-118.180, 33.994) (-118.174, 33.946)	06037C0100F	Yes
Los Angeles County [2]	Undetermined	28a	(-118.623, 34.794) (-118.588, 34.788)	06037C0100F	No
Los Angeles County [2]	Undetermined	28c	(-117.953, 34.523) (-117.949, 34.523)	06037C0715F	No
Los Angeles County [2]	Undetermined	28d	(-117.828, 34.480) (-117.825, 34.480)	06037C0975F	No
City of Los Angeles [1]	Undetermined	29	(-118.322, 33.982) (-118.313, 33.986)	06037C1780F	No

Table 12 - LIST OF LEVEES REQUIRING FLOOD HAZARD REVISIONS

Community	Flood Source	Levee Inventory ID	Coordinates Latitude/Longitude	FIRM Panel	USACE Levee
City of Bellflower City of Cerritos City of Downey City of Lakewood City of Long Beach City of Norwalk City of Pico Rivera	San Gabriel River	33	(-118.090, 33.795) (-118.056, 34.020)	06037C1664F 06037C1668F 06037C1829F 06037C1830F 06037C1840F 06037C1841F 06037C1980F 06037C1988F 06037C1990F 06037C2076F	No

Several levees within Los Angeles County and its incorporated communities meet the criteria of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10), titled “Mapping of Areas Protected by Levee Systems.” Table 13, “List of Certified and Accredited Levees” lists all levees shown on the FIRM that meet the requirements of 44 CFR 65.10 and have been determined to provide protection from the flood that has a 1-percent-chance of being equaled or exceeded in any given year.

Table 13 – LIST OF CERTIFIED AND ACCREDITED LEVEES

Community	Flood Source	Levee Inventory ID	Coordinates Latitude/Longitude	FIRM Panel	USACE Levee
City of Carson	Compton Creek	20b	(-118.209, 33.847) (-118.204, 33.842)	06037C1955F	No
City of Long Beach City of Southgate City of Paramount	Los Angeles River	25b	(-118.174, 33.946) (-118.205, 33.765)	06037C1668F 06037C1664F 06037C1830F 06037C1820F 06037C1840F 06037C1980F 06037C1990F 06037C1988F 06037C2076F	No
City of Bell Gardens City of Commerce City of Downey City of Montebello City of Pico Rivera City of Southgate	Rio Hondo River	31	(-118.084, 34.020) (-118.175, 33.932)	06037C1663F 06037C1664F 06037C1810F 06037C1820F 06037C1830F	No

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD). With the finalization of the North American Vertical Datum of 1988 (NAVD), many FIS reports and FIRMs are being prepared using NAVD as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD 88. Structure and ground elevations in the community must, therefore, be referenced to NAVD 88. It is important to note that adjacent communities may be referenced to NGVD. This may result in differences in Base (1-percent-annual-chance) Flood Elevations (BFEs) across the corporate limits between the communities.

Flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD 88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the NGVD and NAVD, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Springs, MD 20910-3282
(301) 713-3242

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook (TSDN) associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

The conversion factor for each stream studied by detailed methods is shown below in Table 14, "Stream Conversion Factor."

Table 14 - STREAM CONVERSION FACTOR

Stream Name	Elevation (feet NAVD above NGVD)
Amargosa Creek	+2.8
Anaverde Creek	+2.8
Avalon Canyon	+2.8
Big Rock Wash	+2.8
Cheseboro Creek	+2.9
Cold Creek	+2.9
Dark Canyon	+2.9
Dry Canyon	+2.9

Table 14 - STREAM CONVERSION FACTOR

Stream Name	Elevation (feet NAVD above NGVD)
Escondido Canyon	+2.9
Flow Along Empire Avenue	+2.8
Flowline No. 1	+2.8
Garapito Creek	+2.9
Hacienda Creek	+2.8
Kagel Canyon	+2.8
La Mirada Creek	+2.8
Lake Street Overflow	+2.8
Las Flores Canyon	+2.9
Las Virgenes Creek	+2.9
Liberty Canyon	+2.9
Lindero Canyon above confluence with Medea Creek	+2.9
Lindero Canyon above Lake Lindero	+2.9
Little Rock Wash - Profile A	+2.8
Little Rock Wash - Profile B	+2.8
Little Rock Wash - Profile C	+2.8
Lobo Canyon	+2.9
Lockheed Drain Channel	+2.8
Lopez Canyon Channel	+2.8
Los Angeles River left overbank path 2	+2.8
Los Angeles River right overbank path 1	+2.8
Los Angeles River right overbank path 2	+2.8
Malibu Creek	+2.9
Medea Creek	+2.9
Medea Creek (above Ventura Freeway)	+2.9
Mill Creek	+2.8
North Overflow	+2.8
Old Topanga Canyon	+2.9
Overflow Area of Lockheed Drain Channel	+2.8
Overflow Area of Lockheed Storm Drain	+2.8
Palo Comando Creek	+2.9
Ramirez Canyon	+2.9
Rio Hondo River left overbank path 3	+2.8
Rio Hondo River left overbank path 5	+2.8

Table 14 - STREAM CONVERSION FACTOR

Stream Name	Elevation (feet NAVD above NGVD)
Rio Hondo River left overbank path 6	+2.8
Rustic Canyon	+2.8
Santa Maria Canyon	+2.9
Stokes Canyon	+2.9
Topanga Canyon	+2.9
Trancas Creek	+2.9
Triunfo Creek	+2.9
Unnamed Canyon (Serra Retreat Area)	+2.9
Upper Los Angeles River left overbank	+2.8
Weldon Canyon	+2.9
Zuma Canyon	+2.9

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS provides 1-percent annual chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent annual chance flood elevations; delineations of the 1- and 0.2-percent annual chance floodplains; and 1-percent annual chance floodway. This information is presented on the FIRM and in many components of the FIS, including Flood Profiles, Floodway Data tables, and Summary of Elevation tables. Users should reference the data presented in the FIS as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance flood is employed to indicate additional areas of flood risk in the county. For the streams studied in detail, the 1- and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at scales of 1:480, 1:1,200, 1:4,800, 1:6,000, and 1:24,000 with contour intervals of 2, 5, 10, and 25 feet. The flood boundaries were then refined through field investigations and street-plan and profile data supplied by the county. At some locations where topographic maps did not supply adequate information, field surveys were made to allow better evaluation of flooding limits.

The 1- and 0.2-percent annual chance floodplain boundaries are shown on the FIRM. On this map, the 1-percent annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, V, and VE), and the 0.2-percent annual chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent annual chance floodplain boundaries are close together, only the 1-percent annual chance floodplain boundary has been

shown. 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.

For the streams studied by approximate methods, only the 1-percent annual chance floodplain boundary is shown on the FIRM.

4.2 Floodways

Encroachment on 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 1-percent annual chance 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 1-percent annual chance 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 FIS 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 for certain stream segments 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 (see Table 15, Floodway Data). In cases where the floodway and 1-percent annual chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in the Floodway Data Table for certain downstream cross sections are lower than the regulatory flood elevations in that area, which must take into account the 1-percent annual chance flooding due to backwater from other sources.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage, and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in the Floodway Data table. In order to reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

Los Angeles County

In this study, Trancas, Malibu, Garapito, Cold, Cheseboro, Palo Comado, Las Virgenes, Medea, Lindero, Triunfo, Mill, and Hacienda Creeks; Zuma, Ramirez, Escondido, Unnamed (Serra Retreat Area), Las Flores, Topanga, Santa Maria, Old Topanga, Dark, Logo, Stokes, Dry, and Liberty Canyons; and Lopez Canyon and Kagel Canyon Channels have relatively high velocity discharges which have historically eroded the main channel. This results in unpredictable meandering of floodflows and presents a severe hazard to structures located within the floodplain. In addition, flooding depths often preclude practical floodproofing of structures.

City of Agoura Hills

In Agoura Hillls, Cheseboro, Palo Comado, Medea, and Lindero Canyon channels have relatively high-velocity discharges which have historically eroded the main channel. This results in unpredictable meandering of floodflows and presents a severe hazard to structures located

within the floodplain. In addition, flooding depths often preclude practical floodproofing of structures. For these reasons the 1-percent annual chance floodplain is designated as the floodway.

No floodways were computed for Medea Creek as part of the 1998 restudy due to the high degree of development in this area. However, the 1-percent annual chance floodplain is designated as the floodway along Medea Creek due to the relatively high velocity discharges.

City of Avalon

In Avalon, this concept of encroachment is not appropriate. In the densely developed area, the 1-foot rise in flood height that would result from allowing encroachment in the floodway fringe would increase the flood hazard to many existing properties. However, development of the few vacant lots between Tremont and Beacon Streets would not increase the base flood elevations because those lots were assumed to be developed for this study. In the open area upstream of Tremont Street, new development would greatly increase the flood hazard to the developed area downstream of Tremont Street, unless a channel was built that would adequately collect and convey the base flood through the city to the ocean. In the reach downstream of Beacon Street, development of the plaza area would increase the base flood and, consequently, the flood hazard to existing properties. For these reasons, it is recommended that the entire Avalon flood plain be designated as the floodway, thus prohibiting development that would cause any increase in water-surface elevation.

Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Long Beach, Lynwood, Montebello, Paramount, Pico Rivera, South Gate, Whittier

In this study the Los Angeles River channel and the Rio Hondo channel carry generally high velocities. The density of development within overbank areas in these communities affected by potential overflow of the Los Angeles River or Rio Hondo will limit overbank flow to relatively low velocities, due to relatively flat gradients and large open space available within the floodplain encroachments. For these reasons, floodways were not computed for this study.

City of Burbank

A regulatory floodway was not computed because the flooded area is fully developed and the degree of flooding meets the Zones AO and AH shallow flooding criteria.

Floodways for the Lockheed Drain Channel were not determined as part of this restudy. Due to the lack of capacity of the storm-drain channel, floodway limits cannot be defined in the study area because any increase in water surface elevation will result in increased overflows and flooding in other areas.

City of Culver City

The special flood hazard areas in Culver City are areas of shallow flooding; therefore, the concept of a floodway was not applied to this community.

City of La Mirada

The floodway concept was explained to the City Planning Director, at a meeting held on September 11, 1978. The city recognizes this flood hazard area and has already adopted regulatory zoning and building restrictions on a portion of the flooded area. At the intermediate coordination meeting held on October 3, 1978, the City Planning Director indicated that the city is prepared to adopt ordinances to restrict development in the remainder of the flooded area; therefore, the floodway concept was not applied to the City of La Mirada. This has been approved by the Federal Insurance Administration.

City of Los Angeles

The regulatory floodway concept was explained to representatives of the City Engineer. It was emphasized that in natural watercourses in the city, high-velocity flows have historically eroded the main channel and resulted in unpredictable meandering of floodflows. The city recognizes the highly erosive nature of these streams and agrees with the conclusion that, in the case of Weldon, Kagel, and Rustic Canyons, the entire 1-percent annual chance flood plain should be delineated as a floodway. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway was computed.

The floodway concept was not applied to Big Tujunga, Little Tujunga, or Pacoima Washes where alluvial fan zones are designated. Also, floodways were not computed in areas where flooding is caused by ponding water.

City of Lancaster

For this study, floodways have not been determined because the special flood-hazard areas in Lancaster are areas of alluvial fan shallow flooding, or have poorly defined channels.

City of Palmdale

In areas of high velocities and potential subcritical flow conditions, encroachment analyses were performed to determine floodway boundaries and to limit both the increase in water-surface elevation and energy grade lines to maximum of 1 foot.

The floodplain and floodway boundaries, as determined by hydrologic and hydraulic analyses, have been delineated on the State of California Department of Water Resources horizontal-scale orthophoto topographic mapping at a scale of 1” = 400’, with a 5-foot contour interval (State of California, Department of Water Resources, April 9, 1990).

In this restudy, the floodway for Anaverde Creek was 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.

Floodplain boundaries were defined based on BFEs as determined by subcritical flow analyses. In channel reaches were subcritical flow conditions could occur, the BFEs were based on critical depth.

High-channel velocities and localized high-overbank velocities should be considered significant floodplain management factors. Channel velocities exceeded potential erosive magnitudes up to a maximum of over 13 feet per second (fps). Overbank velocities reached up to 7 fps.

City of Redondo Beach

The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 1-percent annual chance flood may be carried without substantial increases in flood heights. A floodway generally is not applicable in areas where the dominant source of flooding is from coastal waters; thus, no floodway was computed for this study.

City of Santa Clarita

In the Santa Clarita Valley, flood flows sometimes unpredictably meander, presenting a severe hazard to structures located within the floodplains. Therefore, no floodways were computed for this study.

City of Santa Fe Springs

The special flood hazard areas shown with constant elevations on the map are caused by ponding water; therefore, the concept of a floodway was not applicable. The flooding northeast of the intersection of Pioneer Boulevard (Flowline No. 1) is caused by flowing water. The floodway concept was explained to

the City Director of Public Works (the City Engineer) at a meeting on April 25, 1978. The city recognizes this flood-hazard area and indicated that development of the property will not be permitted until the flood hazard is removed. Therefore, the floodway concept was not applied at this location.

City of Torrance

The special flood hazard areas in the city are caused by ponding and shallow flooding; therefore, the concept of a floodway was not applied to the community.

City of West Hollywood

For this study, floodways have not been determined because areas studied within the community exhibit shallow flooding.

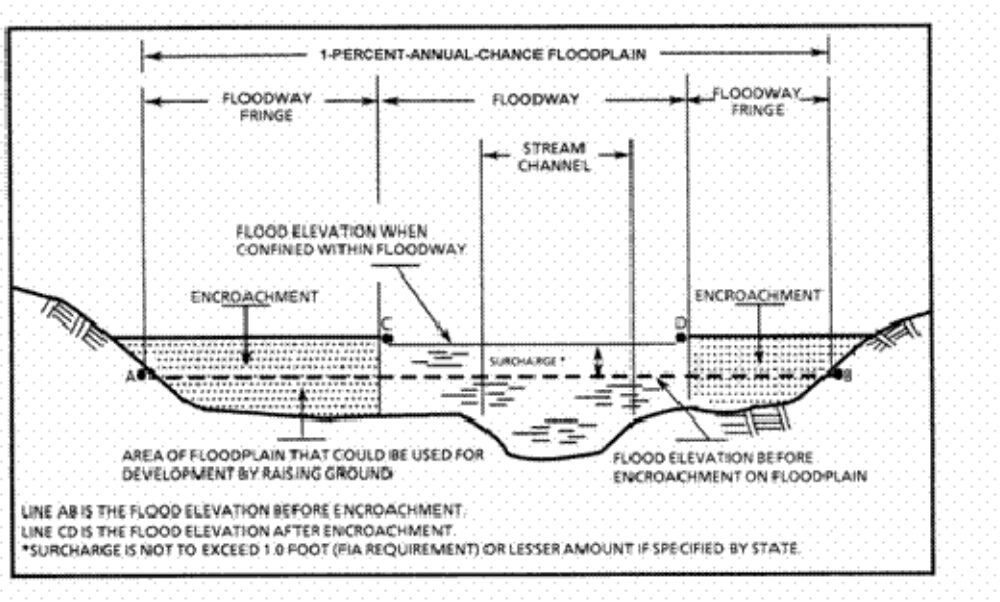

Figure 1 - FLOODWAY SCHEMATIC

The area between the floodway and 1-percent annual chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent annual chance flood by 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 1.

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Anaverde Creek								
A	1,220	104	354	10.5	2,744.4	2,744.4	2,744.4	0.0
B	1,410	105	342	10.9	2,745.2	2,745.2	2,745.2	0.0
C	2,110	310	535	7.0	2,756.3	2,756.3	2,756.4	0.1
D	2,400	285	403	9.3	2,760.6	2,760.6	2,761.0	0.4
E	3,020	579[2]	596	6.3	2,768.9	2,768.9	2,768.9	0.0
F	4,090	257[2]	436	8.6	2,785.3	2,785.3	2,785.9	0.6
G	4,371	480	549	6.8	2,800.2	2,800.2	2,800.7	0.5
H	4,476	480	3,261	1.1	2,801.2	2,801.2	2,801.9	0.7
I	5,251	140	391	9.5	2,803.2	2,803.2	2,803.2	0.0
J	8,501	57[3]	292	12.4	2,859.5	2,859.5	2,859.5	0.0
K	8,871	53[3]	329	11.0	2,869.2	2,869.2	2,869.2	0.0
L	9,261	80[3]	372	9.8	2,875.4	2,875.4	2,875.4	0.0
M	9,711	105[3]	488	7.4	2,879.8	2,879.8	2,880.3	0.5
N	10,191	127[3]	342	9.4	2,886.7	2,886.7	2,886.7	0.0
O	12,251	139[3]	549	5.8	2,905.7	2,905.7	2,905.7	0.0
P	12,581	139[3]	432	7.4	2,907.6	2,907.6	2,907.6	0.0
Q	13,291	220	1,008	3.2	2,914.0	2,914.0	2,914.1	0.1
R	13,561	220	1,401	2.3	2,914.4	2,914.4	2,914.6	0.2
S	13,941	250	997	3.2	2,914.6	2,914.6	2,914.9	0.3
T	14,381	139	333	7.3	2,916.2	2,916.2	2,916.6	0.4
U	18,091	115	812	3.0	2,928.4	2,928.4	2,928.5	0.1
V	18,341	31	300	8.1	2,928.6	2,928.6	2,928.7	0.1
W	18,611	31	272	9.0	2,931.8	2,931.8	2,931.8	0.0

[1] Feet above Division Street
[2] Area of stilling basin -- no floodway determined between sections
[3] Lies entirely outside corporate limits of City of Palmdale

TABLE 15

FEDERAL EMERGENCY MANAGEMENT AGENCY
LOS ANGELES COUNTY, CALIFORNIA
AND INCORPORATED AREAS

FLOODWAY DATA

ANAVERDE CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Kagel Canyon								
A	650[2]	100	149	7.23	1,150.8	1,150.8	1,150.8	0.0
Rustic Canyon								
A	4,164[3]	60	216	9.63	192.8	192.8	192.8	0.0
B	4,780[3]	120	243	8.29	204.8	204.8	204.8	0.0
C	5,400[3]	150	149	7.23	219.8	219.8	219.8	0.0
D	6,130[3]	65	230	7.97	235.6	235.6	235.6	0.0
E	7,350[3]	29	180	9.81	259.2	259.2	259.2	0.0
F	8220[3]	49	141	12.01	281.6	281.6	281.6	0.0
Weldon Canyon								
A	1,290[1]	70	210	5.40	1,377.9	1,377.9	1,377.9	0.0

[1] Feet Upstream of Golden State Freeway Bridge
[2] Feet Upstream from Northwest Edge of Osbourne Street
[3] Feet Upstream of Latimer Road

TABLE 15

FEDERAL EMERGENCY MANAGEMENT AGENCY
LOS ANGELES COUNTY, CALIFORNIA
AND INCORPORATED AREAS

FLOODWAY DATA

KAGEL CANYON - RUSTIC CANYON - WELDON CANYON

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:

Flood Insurance Zones

Zone A
Zone A is the flood insurance rate zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS 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 AE
Zone AE is the flood insurance rate zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

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

Zone AO
Zone AO is the flood insurance rate zone that corresponds to the areas of
1-percent annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone V
Zone V is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no Base Flood Elevations are shown within this zone.

Zone VE
Zone VE is the flood insurance rate zone that corresponds to the 1-percent annual chance coastal floodplains that have additional hazards associated with storm waves. 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 0.2-percent annual chance floodplain, areas within the 0.2-percent annual chance floodplain, areas of 1-percent annual chance flooding where average depths are less than 1 foot, areas of 1-percent annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent annual chance flood by levees. No BFEs or base flood depths are shown within this zone.

Zone D
Zone D is the flood insurance risk zone that corresponds to unstudied area where flood hazards are undetermined, but possible.

Mud flow mapping was also incorporated into the DFIRM as Zone D.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent annual chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 1- and 0.2-percent-annual-chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The countywide FIRM presents flooding information for the entire geographic area of Los Angeles County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the county identified as floodprone. The countywide FIRM also includes flood hazard information that was presented separately on Flood Boundary and Floodway Maps, where applicable. Historical data relating to the maps prepared for each community are presented in Table 16, "Community Map History."

7.0 OTHER STUDIES

Los Angeles County

A Flood Hazard Boundary Map for Los Angeles County was published in 1978. In most cases, Special Flood Hazard Areas shown on the Flood Hazard Boundary Map are either located in flood control facilities, are included as Special Flood Hazard Areas on the maps, or were eliminated as a result of this study. Differences in flooding limits can be attributed to the more detailed methods of analysis used in this study. In some instances, Special Flood Hazard Areas shown on the Flood Hazard Boundary Map were found to be adequate to portray approximate flooding limits. In the Malibu area, approximate boundaries have been extended in a few cases. This study supersedes the Flood Hazard Boundary Map for Los Angeles County.

Drainage deficiencies and historical flooding information, on file at the Los Angeles County Flood Control District, were reviewed in the course of the study.

The Flood Insurance Study for Ventura County, California, is in agreement with this study.

This study is in general agreement with the Flood Insurance Studies for San Bernardino County, California, and Orange County, California, with the exception of small approximate areas. These areas were determined to be areas of low development potential and, therefore, were considered insignificant.

City of Agoura Hills

This study was prepared from data used in the preparation of the Flood Insurance Study for Los Angeles County, California, published in December 1980 (Federal Emergency Management Agency, 1980). Currently, areas of Los Angeles County are being revised by FEMA and this study is in agreement with those revisions.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Agoura Hills, City of	March 4, 1986	None	March 4, 1986	December 18, 1986 August 3, 1998
Alhambra, City of*	June 28, 1974	None	None	None
Arcadia, City of	May 14, 1976	None	September 26, 2008	None
Artesia, City of*	June 28, 1974	None	None	None
Avalon, City of	October 8, 1976	None	September 29, 1978	November 1, 1985
Azusa, City of	June 14, 1974	None	September 26, 2008	None
Baldwin Park, City of*	June 28, 1974	None	May 26, 1978	None
Bell Gardens, City of	September 26, 2008	None	September 26, 2008	None
Bell, City of*	June 28, 1974	None	None	None
Bellflower, City of	June 28, 1974	None	July 6, 1998	None
Beverly Hills, City of*	December 11, 1979	None	None	None
Bradbury, City of	November 21, 1975	None	September 26, 2008	None
Burbank, City of	June 26, 1971	September 26, 1975	January 23, 1981	January 20, 1999

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

*Non-floodprone community

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Calabasas, City of	September 26, 2008	None	September 26, 2008	None
Carson, City of	January 14, 1977	None	July 6, 1998	None
Cerritos, City of	June 28, 1974	None	September 26, 2008	None
Claremont, City of	May 24, 1974	None	November 20, 2000	July 2, 2004
Commerce, City of	June 28, 1974	None	September 26, 2008	None
Compton, City of	June 28, 1974	None	July 6, 1998	None
Covina, City of	September 18, 1971	None	September 26, 2008	None
Cudahy, City of	September 26, 2008	None	September 26, 2008	None
Culver City, City of	June 28, 1974	October 31, 1975 September 3, 1976	February 1, 1980	None
Diamond Bar, City of	October 24, 1978 (Los Angeles County)	None	December 2, 1980 (Los Angeles County)	None
Downey, City of	July 6, 1998	None	July 6, 1998	None
Duarte, City of	September 26, 2008	None	September 26, 2008	None
El Monte, City of*	None	None	None	None

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

*Non-floodprone community

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
El Segundo, City of	October 31, 1975	None	September 26, 2008	None
Gardena, City of	December 5, 1975	None	July 6, 1998	None
Glendale, City of	March 10, 1972	None	September 26, 2008	None
Glendora, City of	April 20, 1972	None	September 26, 2008	None
Hawaiian Gardens, City of	September 25, 1970	None	None	None
Hawthorne, City of*	May 9, 1978	None	None	None
Hermosa Beach, City of	June 28, 1974	None	September 26, 2008	None
Hidden Hills, City of	April 23, 1976	None	September 7, 1984	November 21, 2001 January 19, 2006
Huntington Park, City of*	June 28, 1974	None	None	None
Industry, City of	June 16, 1972	None	September 26, 2008	None
Inglewood, City of*	October 17, 1972	None	None	None
Irwindale, City of*	June 28, 1974	None	None	None
La Canada Flintridge, City of	June 20, 1974	None	September 26, 2008	None

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

*Non-floodprone community

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
La Habra Heights, City of	September 26, 2008	None	September 26, 2008	None
La Mirada, City of	June 28, 1974	October 10, 1975 December 10, 1976	July 2, 1980	None
La Puente, City of*	October 3, 1975	None	None	None
La Verne, City of	June 14, 1974	None	September 26, 2008	None
Lakewood, City of	July 6, 1998	None	July 6, 1998	None
Lancaster, City of	September 11, 1979	None	January 6, 1982	None
Lawndale, City of*	June 28, 1974	None	None	None
Lomita, City of*	June 28, 1974	None	None	None
Long Beach, City of	July 26, 1974	July 11, 1978	September 15, 1983	July 6, 1998
Los Angeles, City of	December 13, 1977	April 8, 1980	December 2, 1980	February 4, 1987 July 6, 1998
Lynwood, City of	June 28, 1974	November 21, 1975	April 15, 1980	July 6, 1998
Malibu, City of	September 26, 2008	None	September 26, 2008	None
Manhattan Beach, City of	August 6, 1976	None	September 26, 2008	None

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

*Non-floodprone community

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Maywood, City of*	None	None	None	None
Monrovia, City of	April 23, 1976	None	September 26, 2008	None
Montebello, City of	June 28, 1974	December 19, 1975	March 18, 1980	None
Monterey Park, City of*	April 20, 1972	None	None	None
Norwalk, City of	September 26, 2008	None	September 26, 2008	None
Palmdale, City of	October 18, 1974	December 24, 1976	January 6, 1982	June 18, 1987 March 30, 1998
Palos Verdes Estates, City of	May 17, 1974	None	September 7, 1984	November 21, 2001 July 2, 2004
Paramount, City of	March 31, 1972	July 1, 1974 May 2, 1975	July 6, 1998	None
Pasadena, City of	May 2, 1972	None	September 26, 2008	None
Pico Rivera, City of	June 28, 1974	None	July 6, 1998	None
Pomona, City of	June 28, 1974	None	September 26, 2008	None
Rancho Palos Verdes, City of	January 28, 1977	None	September 26, 2008	None

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

*Non-floodprone community

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Redondo Beach, City of	June 28, 1974	May 21, 1976	September 15, 1983	None
Rolling Hills Estates, City of*	June 28, 1974	None	None	None
Rolling Hills, City of	June 28, 1974	None	September 26, 2008	None
Rosemead, City of	June 28, 1974	None	September 26, 2008	None
San Dimas, City of	June 28, 1974	None	April 1, 1977	June 2, 1978
San Fernando, City of*	None	None	None	None
San Gabriel, City of*	None	None	None	None
San Marino, City of*	None	None	None	None
Santa Clarita, City of	October 24, 1978	None	December 2, 1980	September 29, 1989
Santa Fe Springs, City of	June 28, 1974	October 3, 1975	April 15, 1980	None
Santa Monica, City of	July 26, 1974	None	September 26, 2008	None
Sierra Madre, City of	May 25, 1973	None	September 26, 2008	None

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

*Non-floodprone community

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Signal Hill, City of*	June 28, 1974	None	None	None
South El Monte, City of*	June 21, 1974	None	None	None
South Gate, City of	July 6, 1998	None	July 6, 1998	None
South Pasadena, City of*	April 18, 1974	None	None	None
Temple City , City of	September 26, 2008	None	September 26, 2008	None
Torrance, City of	August 2, 1974	December 5, 1975	December 18, 1979	None
Vernon, City of*	None	None	None	None
Walnut, City of	July 16, 1976	None	September 26, 2008	None
West Covina, City of	December 2, 2004	None	December 2, 2004	None
West Hollywood, City of	June 18, 1987	None	June 18, 1987	None
Westlake Village, City of	September 26, 2008	None	September 26, 2008	None
Whittier, City of	June 28, 1974	December 12, 1975	January 16, 1981	None
Los Angeles County (Unincorporated Areas)	October 24, 1978	None	December 2, 1980	November 15, 1985 July 6, 1998 March 30, 1998

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

City of Avalon

A Flood Hazard Boundary Map for the City of Avalon was published in 1976. This study supersedes the Flood Hazard Boundary Map.

This study supersedes the 1978 Flood Insurance Study for Avalon.

In 1973, a U.S. Geological Survey Map of Flood-Prone Areas for Santa Catalina Island East was compiled. The flooding shown on that map is approximate and is superseded by this study.

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

Cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Long Beach, Lynwood, Paramount, Pico Rivera, South Gate

The USACE developed overflow maps for this study area during their Los Angeles County Drainage Area study. Their maps indicate a large floodplain associated with the Los Angeles River and Rio Hondo of that time period. Both flood control channels have been significantly upgraded since the time of study, and the floodplain maps contained herein supersede that study.

City of Burbank

The Los Angeles District of the U.S. Army Corps of Engineers prepared a Flood Insurance Study for Burbank. Due to the use of completely different criteria, discharges arrived at in this Flood Insurance Study for flooding of the 1-percent annual chance flood event are significantly greater than those in the U.S. Army Corps of Engineers study. In addition, Flood Insurance Studies for the unincorporated areas of Los Angeles County and the incorporated City of Los Angeles have been completed. These studies will be in complete agreement with this Flood Insurance Study. A Flood Hazard Boundary Map for the City of Burbank was published by the Federal Insurance Administration on September 26, 1975. Flooding shown on this map conforms to flooding delineated in this study. Minor differences can be attributed to the more detailed methods of analysis used in this study.

City of Culver City

A Flood Hazard Boundary Map for Culver City was published by the Federal Insurance Administration on September 3, 1976. Flooding shown on the Flood Hazard Boundary Map conforms to flooding delineated in this study. Minor differences can be attributed to the more detailed methods of analysis used in this study.

The U.S. Army Corps of Engineers, Los Angeles District, has undertaken an analysis of the Ballona Creek Channel watershed. Their file data includes (1) discharge-frequency curves for the stream gage at Sawtelle Boulevard; (2) channel and bridge capacities; and (3) the magnitude of the 1-percent annual chance frequency flood for various locations along Ballona Creek Channel. The discharge-frequency curves for Ballona Creek Channel were used to evaluate Ballona Creek Channel. The Los Angeles County Flood Control District's findings concur with the U.S. Army Corps of Engineers' results that Ballona Creek Channel has adequate capacity to convey the 1-percent annual chance frequency discharge.

City of La Mirada

A Flood Hazard Boundary Map for the City of La Mirada was published by the Federal Insurance Administration on December 10, 1976. Flooding shown on the Flood Hazard Boundary Map conforms to flooding delineated in this study. Minor differences between the flooding shown on the previous map and the results of this study can be attributed to the more detailed methods of analysis used for this study.

Flood Insurance Studies were prepared for the contiguous Cities of Buena Park, Fullerton, La Habra, and Santa Fe Springs as well as for the unincorporated areas of Orange County, California. These studies are in general agreement with this study.

Drainage deficiencies and historical flooding information are on file at the Los Angeles County Flood Control District, and were reviewed in the course of the study.

Cities of Lancaster and Palmdale

A Flood Hazard Boundary Map for Palmdale was published by the Federal Insurance Administration on' December 24, 1976. Flooding shown on the Flood Hazard Boundary Map conforms to flooding delineated in this study. Differences can be attributed to the more detailed topographic data and extensive field reviews used in this study. Therefore, the Flood Hazard Boundary Map for Lancaster and Palmdale is superseded by this Flood Insurance Study.

The U.S. Army Corps of Engineers, Los Angeles District, has investigated the Antelope Valley watersheds. Their report includes discharge-frequency curves for the stream gages on Little Rock and Big Rock Washes and the magnitude of the 1-percent annual chance frequency flood for various locations throughout Antelope Valley. The discharge-frequency curves for Antelope Valley were used to evaluate the flood hazards in Palmdale. The report is in general agreement with this Flood Insurance Study.

City of Los Angeles

A Flood Hazard Boundary Map for the City of Los Angeles was published on December 13, 1977. The Special Flood Hazard Areas shown on the Flood Hazard Boundary Map are located in flood-control facilities, are included as Special Flood Hazard Areas, or were eliminated as a result of this study. Minor differences in flooding limits can be attributed to the more detailed methods of analysis used in this study. Therefore, this study supersedes the Flood Hazard Boundary Map. This study also supersedes two unpublished reports by the U.S. Army Corps of Engineers dated May 1971 and June 1971.

The USACE developed overflow maps for this study area during their Los Angeles County Drainage Area study. Their maps indicate a large floodplain associated with the Los Angeles River and Rio Hondo of that time period. Both flood control channels have been significantly upgraded since the time of study, and the floodplain maps contained herein supersede that study.

City of Montebello

A Flood Hazard Boundary Map for the City of Montebello was published by the FIA on December 19, 1975. Flooding shown on the Flood Hazard Boundary Map conforms to flooding delineated in the original study. Minor differences between the flooding shown on the Flood Hazard Boundary Map and the results of the original study can be attributed to the more detailed methods used in the original study.

The USACE developed overflow maps for this study area during their Los Angeles County Drainage Area study. Their maps indicate a large floodplain associated with the Los Angeles River and Rio Hondo of that time period. Both flood control channels have been significantly upgraded since the time of study, and the floodplain maps contained herein supersede that study.

City of Redondo Beach

This study supersedes the existing Flood Hazard Boundary Map for the City of Redondo Beach, California.

City of Santa Fe Springs

A Flood Hazard Boundary Map for the City of Santa Fe Springs was published by the Federal Insurance Administration on June 28, 1974. The special flood hazard areas shown on that map are either located in

the flood control facilities or are identified on the map. Minor differences in flooding limits can be attributed to the more detailed methods of analysis used in this study.

The Los Angeles County Flood Control District has, on file, information relating to drainage deficiencies and historical flooding in Santa Fe Springs. This information was used in preparation of the present study and is, therefore, in agreement.

The Flood Insurance Studies for all communities bordering Santa Fe Springs were reviewed to ensure that this study is consistent with all other applicable studies.

City of Torrance

A Flood hazard Boundary Map for the City of Torrance was published by the Federal Insurance Administration on December 5, 1975. Flooding shown on the Flood Hazard Boundary Map conforms to flooding delineated in this study. Minor differences can be attributed to the more detailed methods used in the current analysis.

Drainage deficiencies and historical flooding information on file at the Los Angeles County Flood Control District were reviewed during the course of the study.

City of West Hollywood

Since this Flood Insurance Study was prepared directly from the technical data presented in the Los Angeles County Flood Insurance Study and the Flood Insurance Study for the City of Los Angeles, all flood boundaries match.

City of Whittier

The Federal Insurance Administration has previously, published a Flood Hazard Boundary Map for Whittier. However, the present study represents a more detailed analysis.

Flood Insurance Studies have been published for the adjacent Cities of La Habra and Santa Fe Springs. In southwest Whittier, at the corporate limits of Santa Fe Springs, 1-percent annual chance shallow flooding does not exceed the crown, or centerline, of Mulberry Drive. The results of this study are in agreement with the Flood Insurance Studies prepared for these communities.

Toups Corporation supplied hydrologic data and 1-percent annual chance flood boundaries for La Mirada Creek. This information was used in the analysis of La Mirada Creek as it passes through Whittier. The study contractor's findings of flooding of La Mirada Creek are in agreement with information furnished by Toups Corporation.

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Los Angeles County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS Reports, FHBMs, FBFMs, and FIRMs for all of the incorporated and unincorporated jurisdictions within Los Angeles County.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting FEMA, Region IX, Federal Insurance and Mitigation Administration, 1111 Broadway, Suite 1200, Oakland, California 94607-4052.

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FLOOD INSURANCE STUDY

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

VOLUME 3 OF 4

Community Name	Community Number	Community Name	Community Number	Community Number	Community Name	Community Number	Community Number
LOS ANGELES COUNTY, UNINCORPORATED AREAS	065043	DIAMOND BAR, CITY OF	060741	LAWNDALE, CITY OF*	060134	SAN DIMAS, CITY OF	060154
AGOURA HILLS, CITY OF	065072	DOWNEY, CITY OF	060645	LOMITA, CITY OF*	060135	SAN FERNANDO, CITY OF*	060628
ALHAMBRA, CITY OF*	060095	DUARTE, CITY OF	065026	LONG BEACH, CITY OF	060136	SAN GABRIEL, CITY OF*	065055
ARCADIA, CITY OF	065014	EL MONTE, CITY OF*	060658	LOS ANGELES, CITY OF	060137	SAN MARINO, CITY OF*	065057
ARTESIA, CITY OF*	060097	EL SEGUNDO, CITY OF	060118	LYNWOOD, CITY OF	060635	SANTA CLARITA, CITY OF	060729
AVALON, CITY OF	060098	GARDENA, CITY OF	060119	MALIBU, CITY OF	060745	SANTA FE SPRINGS, CITY OF	060158
AZUSA, CITY OF	065015	GLENDALE, CITY OF	065030	MANHATTAN BEACH, CITY OF	060138	SANTA MONICA, CITY OF	060159
BALDWIN PARK, CITY OF*	060100	GLENDORA, CITY OF	065031	MAYWOOD, CITY OF*	060651	SIERRA MADRE, CITY OF	065059
BELL GARDENS, CITY OF	060656	HAWAIIAN GARDENS, CITY OF*	065032	MONROVIA, CITY OF	065046	SIGNAL HILL, CITY OF*	060161
BELL, CITY OF*	060101	HAWTHORNE, CITY OF*	060123	MONTEBELLO, CITY OF	060141	SOUTH EL MONTE, CITY OF*	060162
BELLFLOWER, CITY OF	060102	HERMOSA BEACH, CITY OF	060124	MONTEREY PARK, CITY OF*	065047	SOUTH GATE, CITY OF	060163
BEVERLY HILLS, CITY OF*	060655	HIDDEN HILLS, CITY OF	060125	NORWALK, CITY OF	060652	SOUTH PASADENA, CITY OF*	065061
BRADBURY, CITY OF	065017	HUNTINGTON PARK, CITY OF*	060126	PALMDALE, CITY OF	060144	TEMPLE CITY, CITY OF	060653
BURBANK, CITY OF	065018	INDUSTRY, CITY OF	065035	PALOS VERDES ESTATES, CITY OF	060145	TORRANCE, CITY OF	060165
CALABASAS, CITY OF	060749	INGLEWOOD, CITY OF*	065036	PARAMOUNT, CITY OF	065049	VERNON, CITY OF*	060166
CARSON, CITY OF	060107	IRWINDALE, CITY OF*	060129	PASADENA, CITY OF	065050	WALNUT, CITY OF	065069
CERRITOS, CITY OF	060108	LA CANADA FLINTRIDGE, CITY OF	060669	PICO RIVERA, CITY OF	060148	WEST COVINA, CITY OF	060666
CLAREMONT, CITY OF	060109	LA HABRA HEIGHTS, CITY OF	060701	POMONA, CITY OF	060149	WEST HOLLYWOOD, CITY OF	060720
COMMERCE, CITY OF	060110	LA MIRADA, CITY OF	060131	RANCHO PALOS VERDES, CITY OF	060464	WESTLAKE VILLAGE, CITY OF	060744
COMPTON, CITY OF	060111	LA PUENTE, CITY OF*	065039	REDONDO BEACH, CITY OF	060150	WHITTIER, CITY OF	060169
COVINA, CITY OF	065024	LA VERNE, CITY OF	060133	ROLLING HILLS ESTATES, CITY OF*	065054		
CUDAHY, CITY OF	060657	LAKEWOOD, CITY OF	060130	ROLLING HILLS, CITY OF	060151		
CULVER CITY, CITY OF	060114	LANCASTER, CITY OF	060672	ROSEMEAD, CITY OF	060153		

*Non-floodprone communities

September 26, 2008

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
06037CV003A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Selected Flood Insurance Rate Map (FIRM) panels for the community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map (FBFM) panels (e.g. floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X (Shaded)
C	X (Unshaded)

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Countywide FIS Effective Date: September 26, 2008

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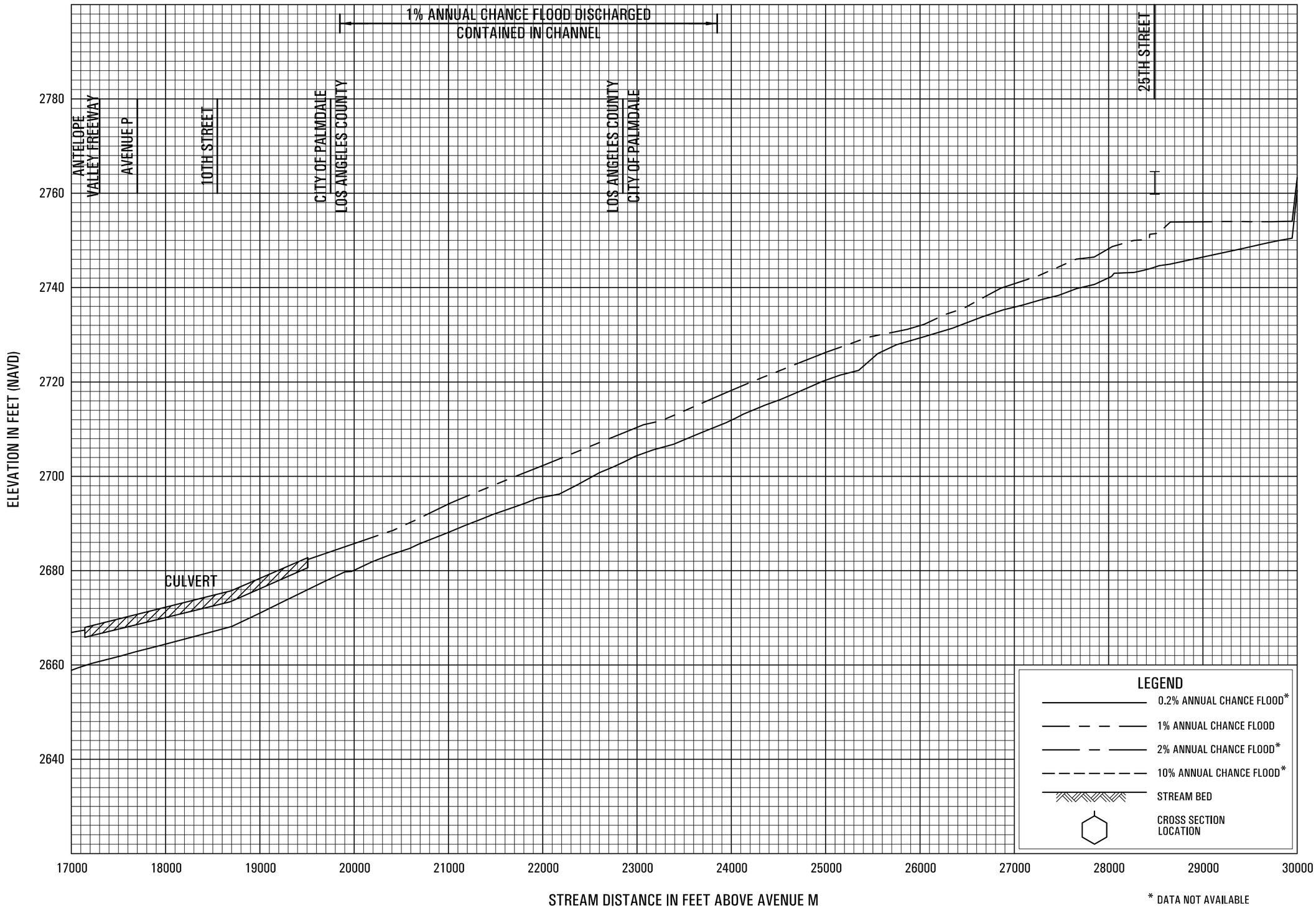
PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index

Flood Insurance Rate Map



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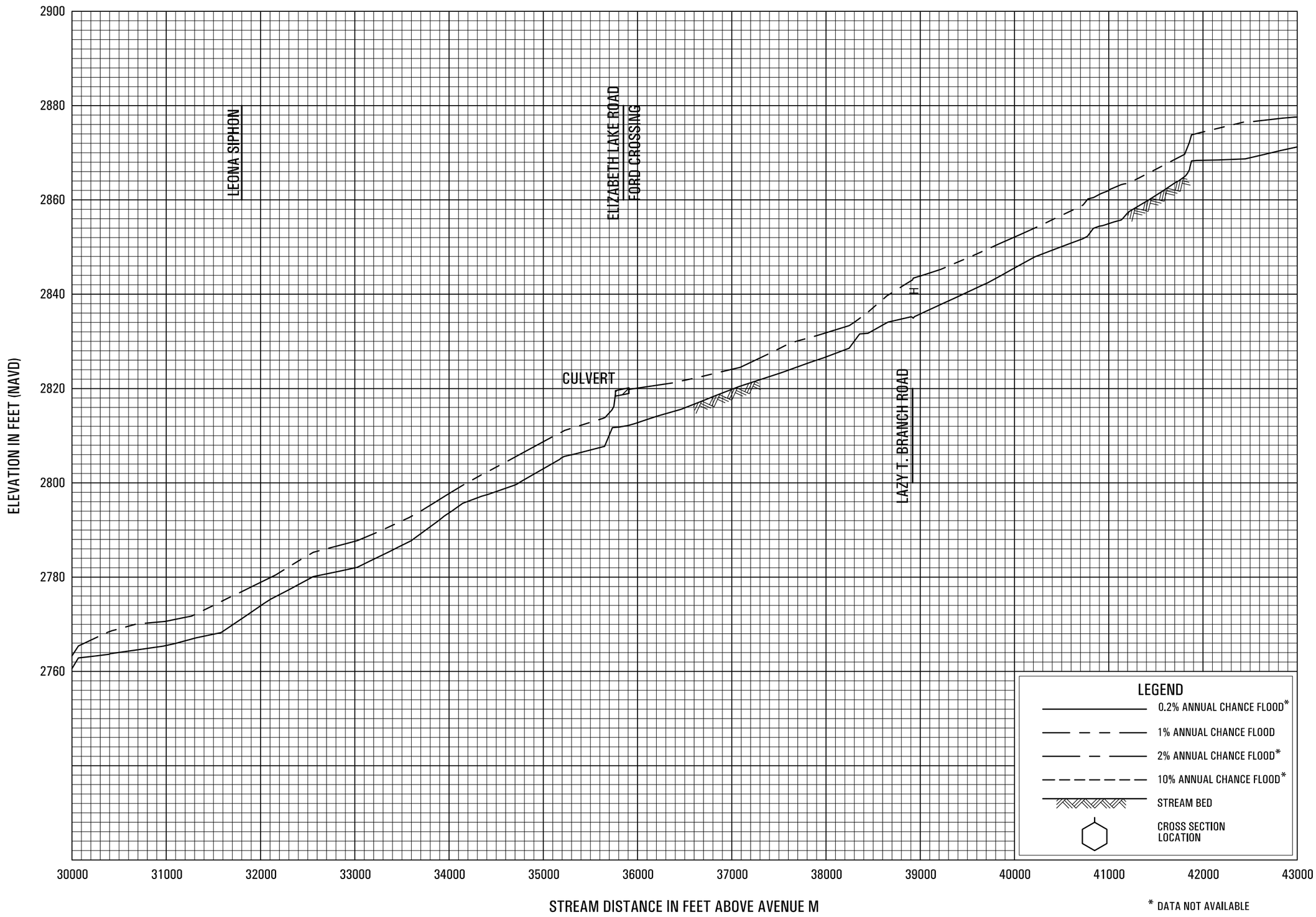
FLOOD PROFILES

AMARGOSA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



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AMARGOSA CREEK

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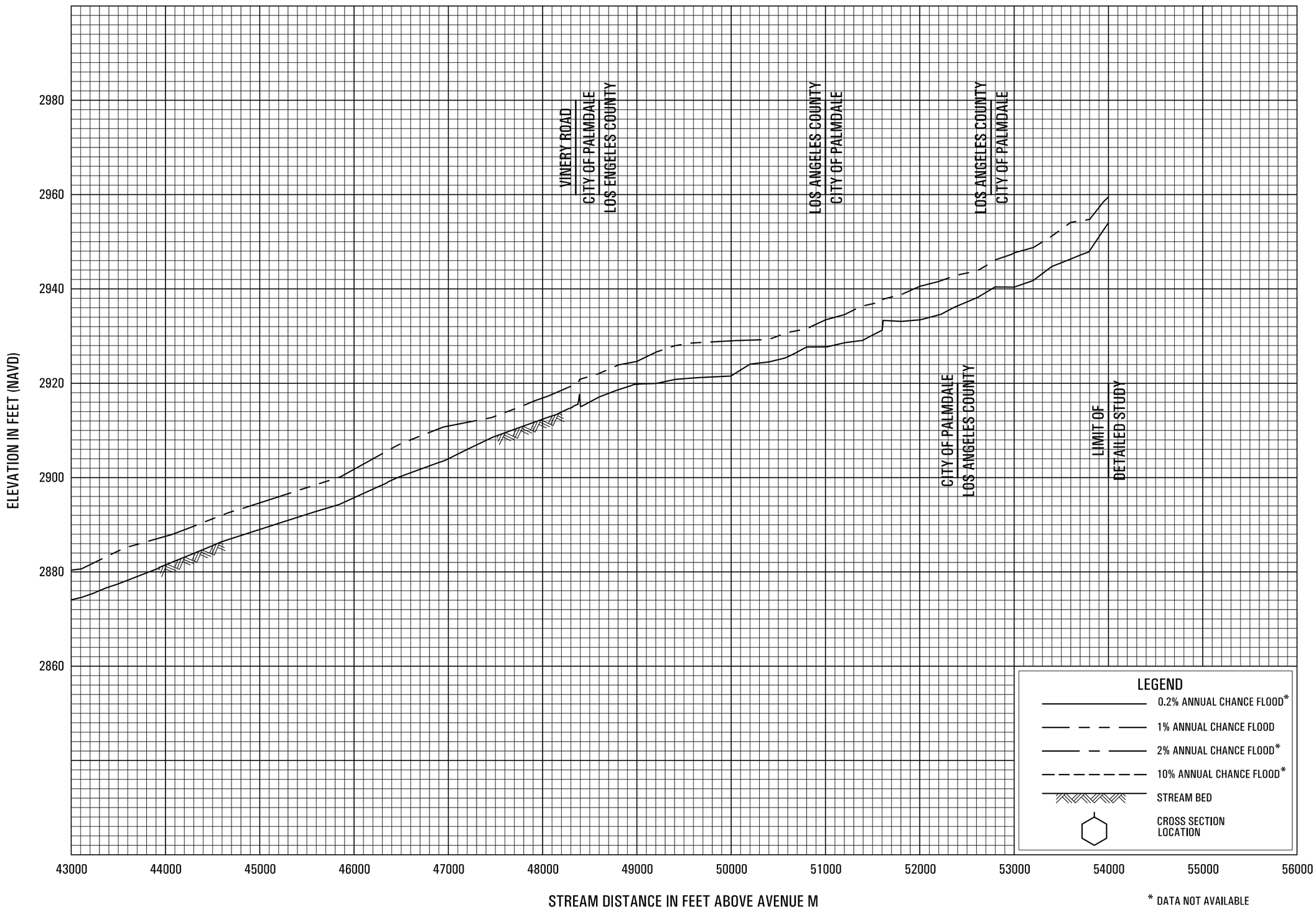

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AMARGOSA CREEK

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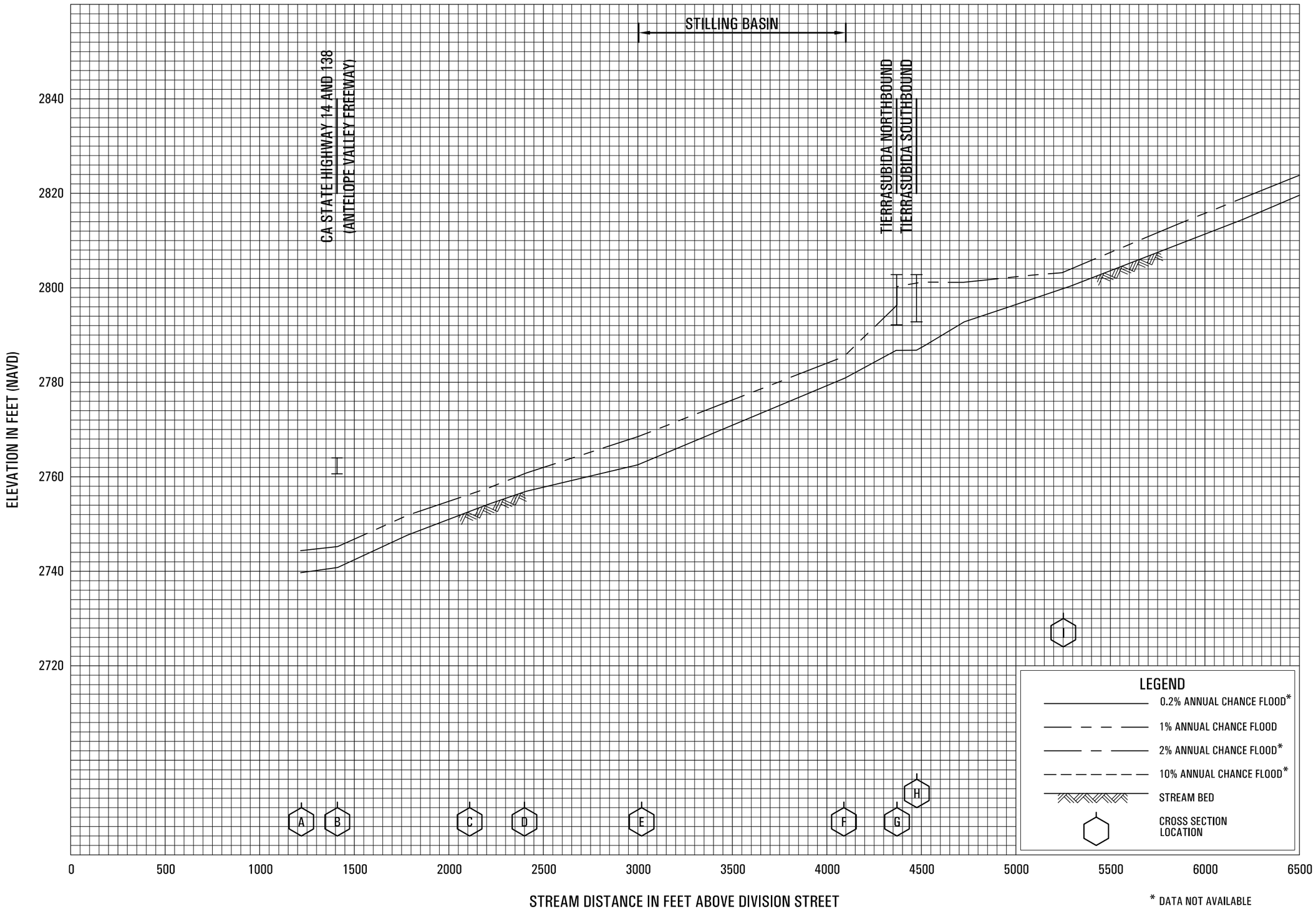

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ANAVERDE CREEK

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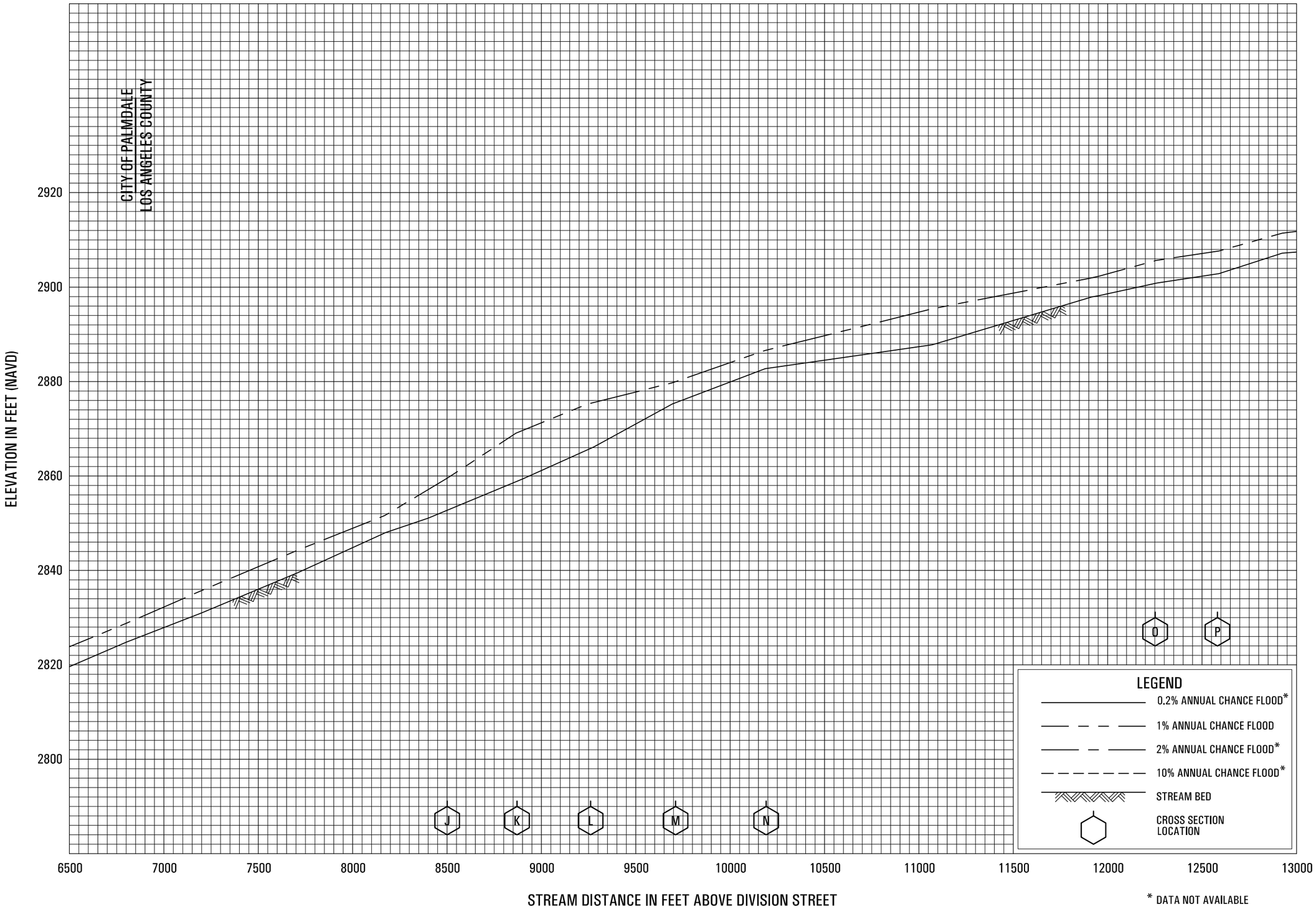

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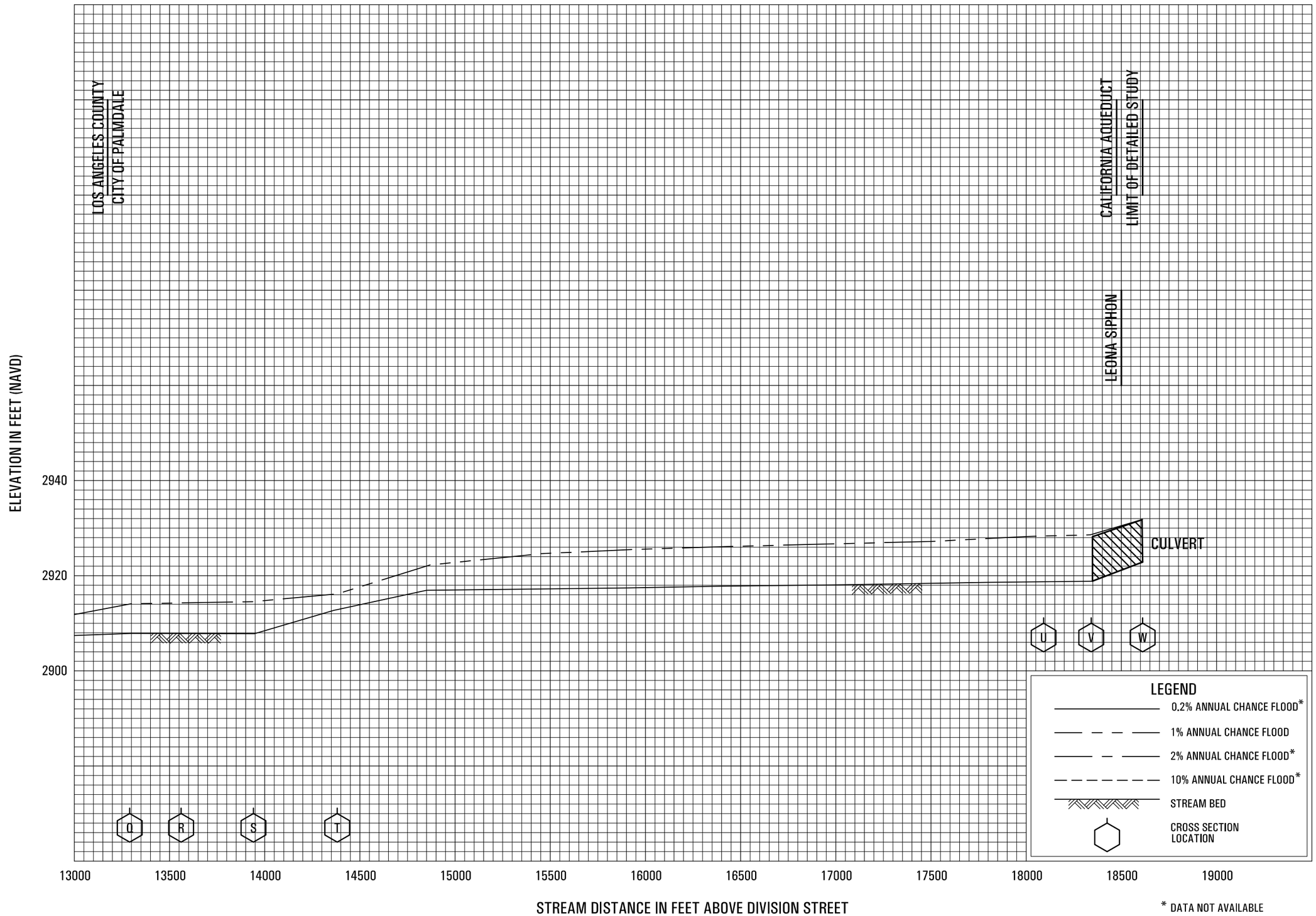

FLOOD PROFILES

ANAVERDE CREEK

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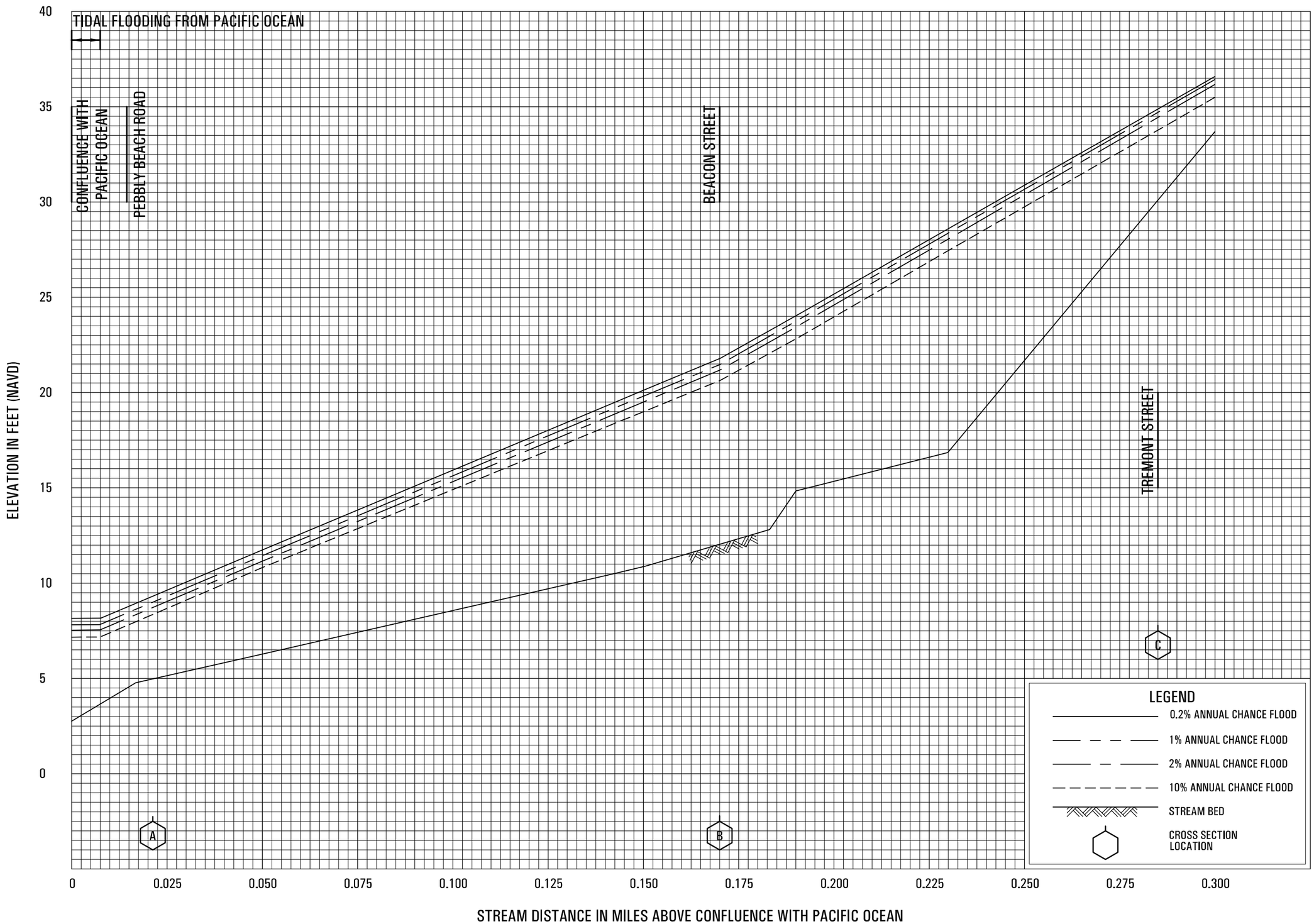

FLOOD PROFILES

AVALON CANYON

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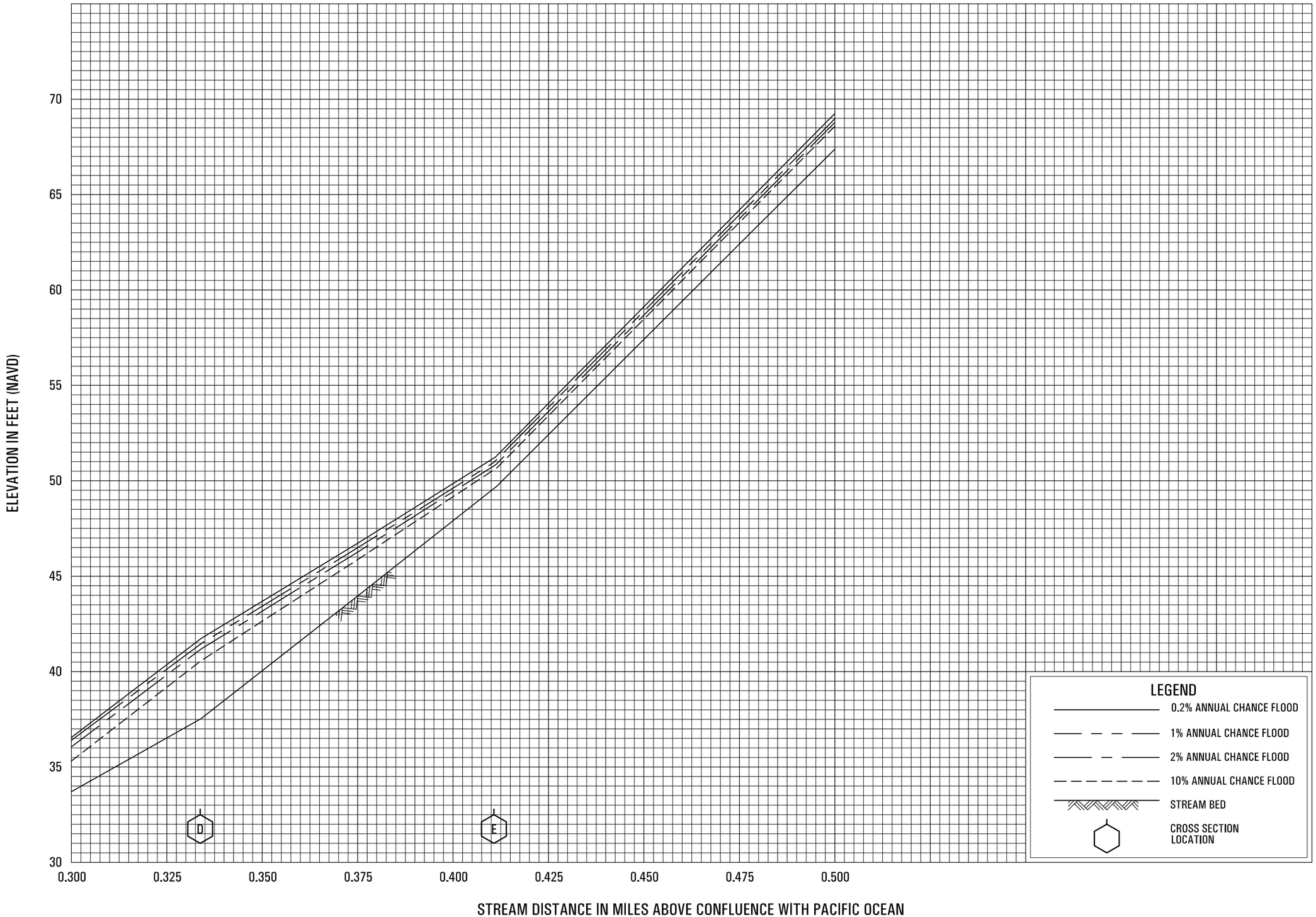

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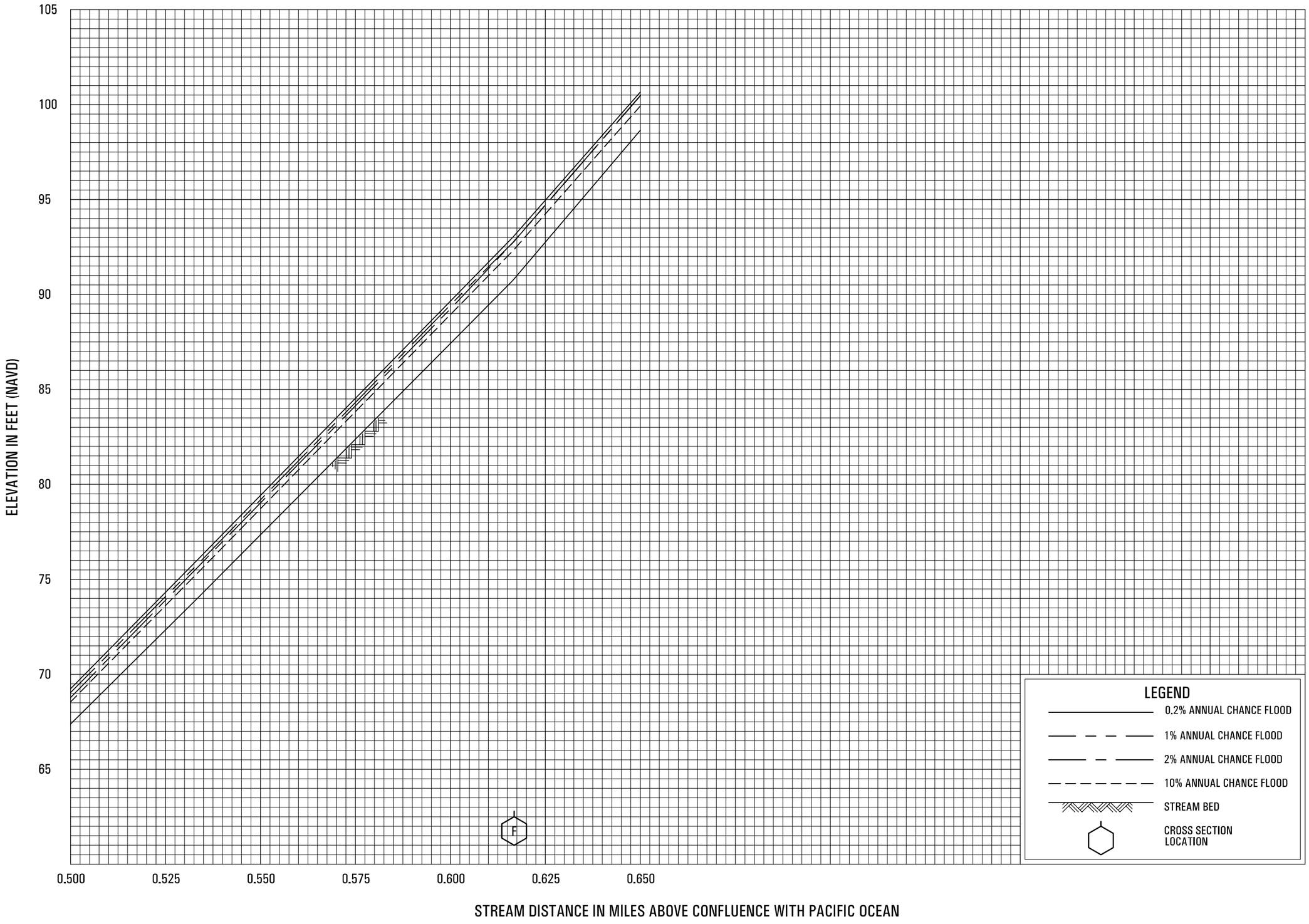

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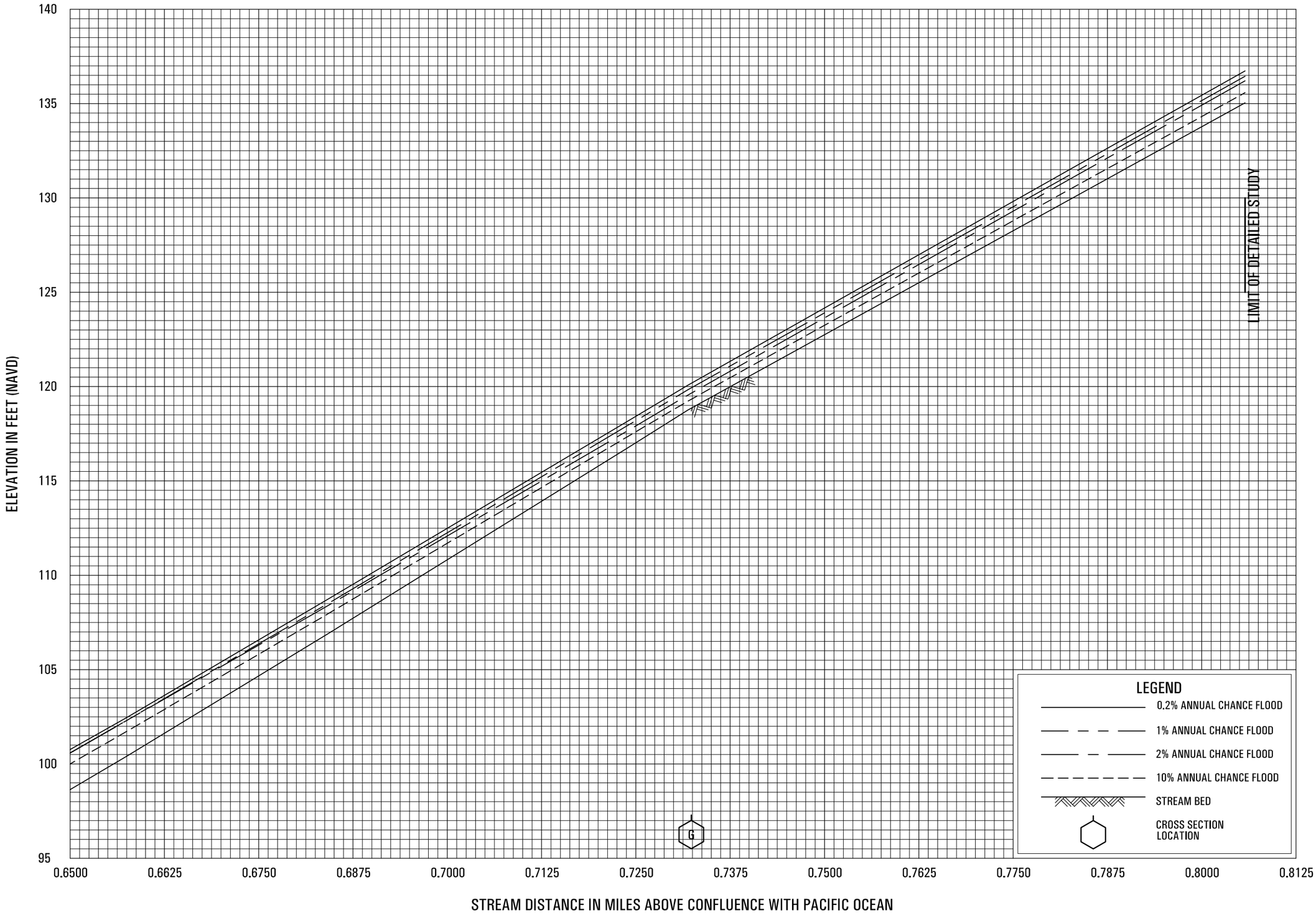

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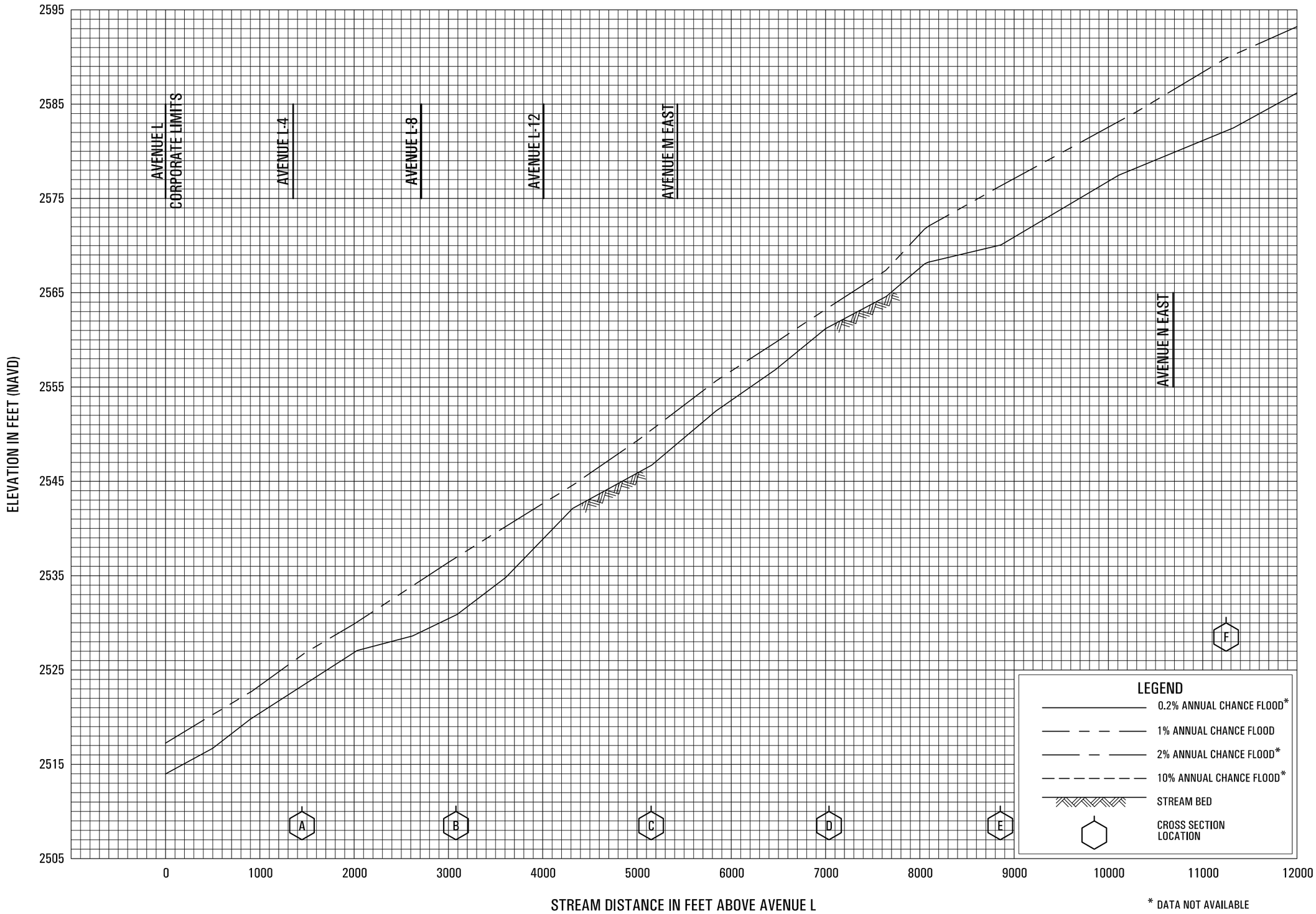

FLOOD PROFILES

BIG ROCK WASH

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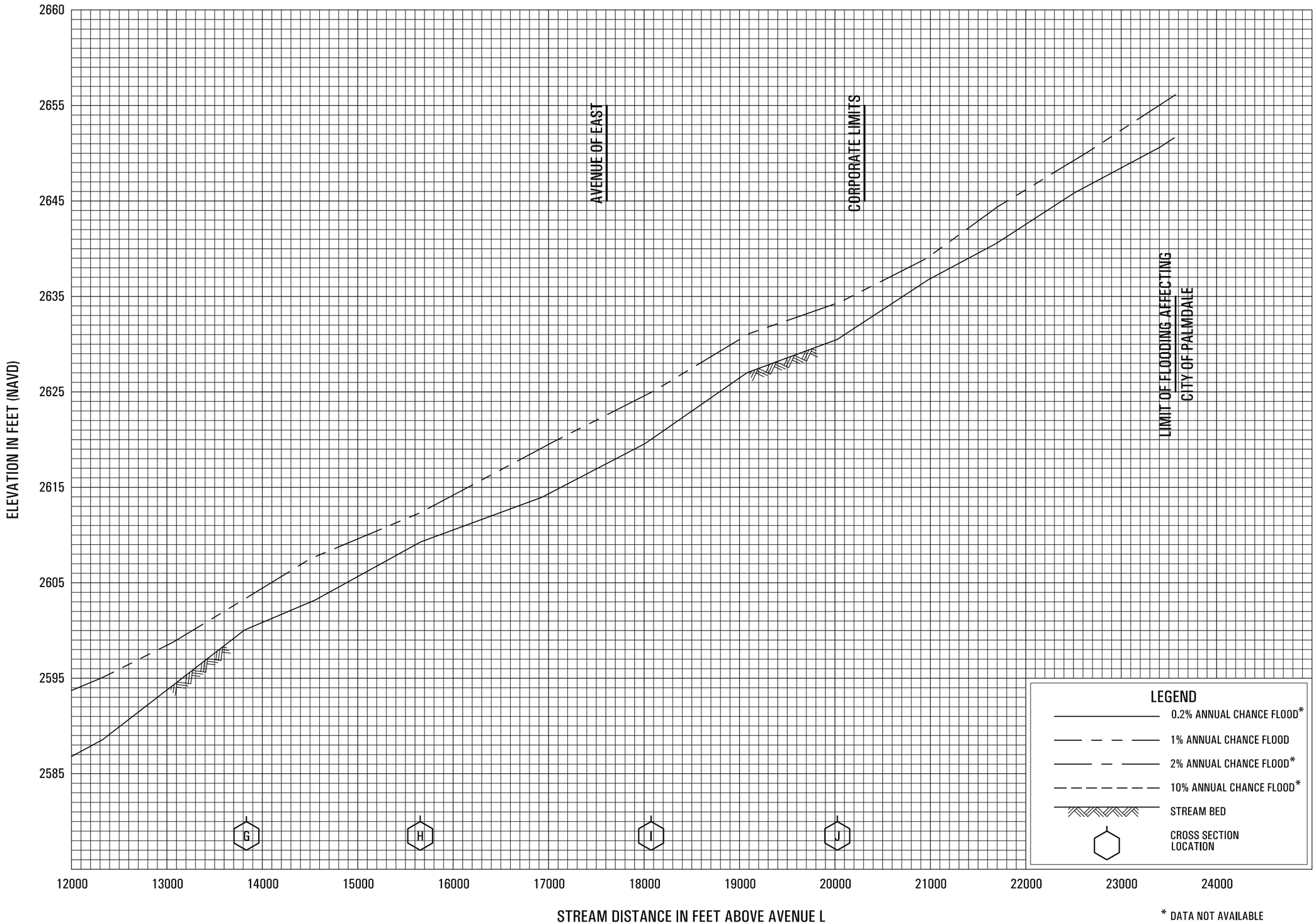

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FLOOD PROFILES

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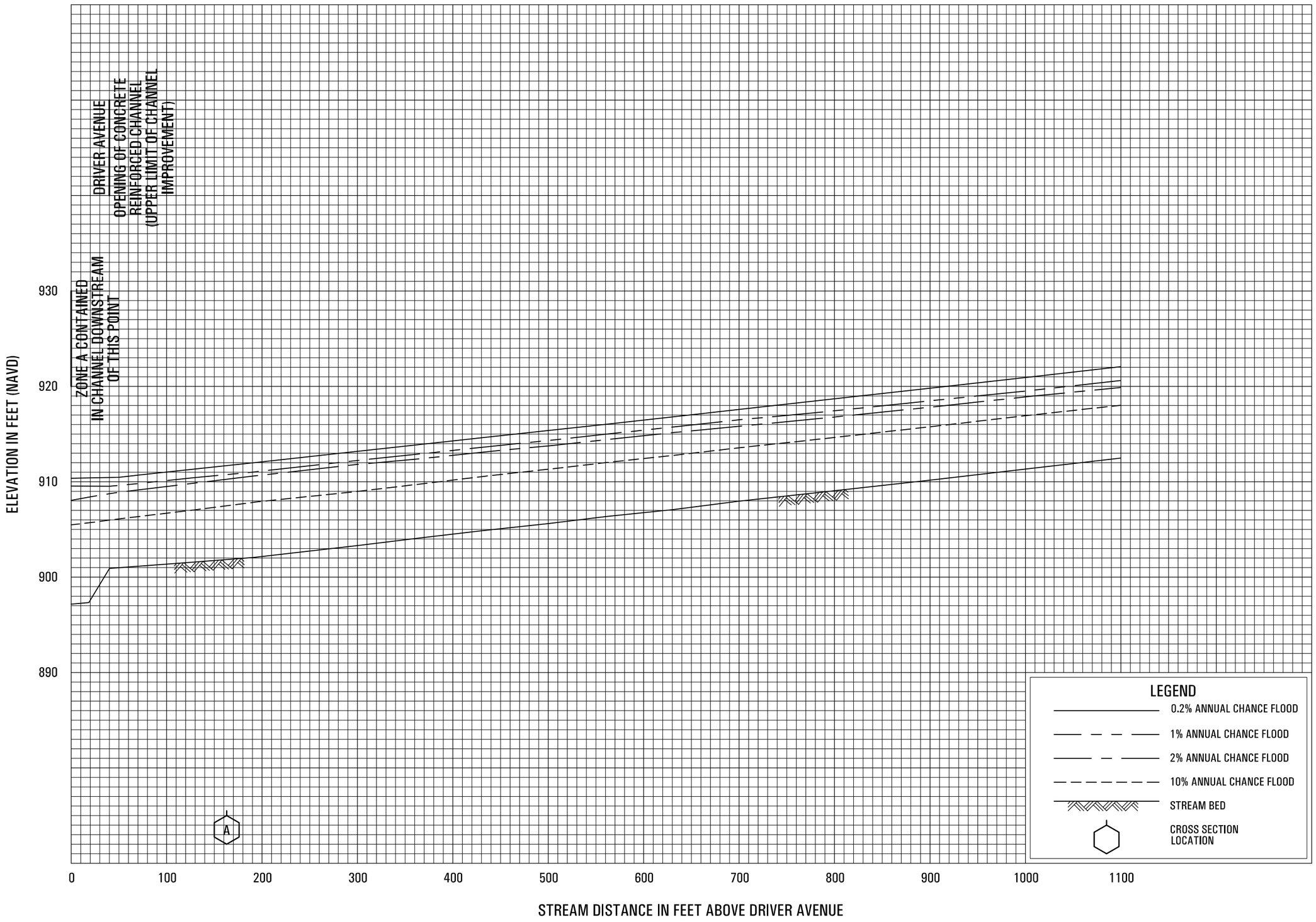

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CHESEBORO CREEK

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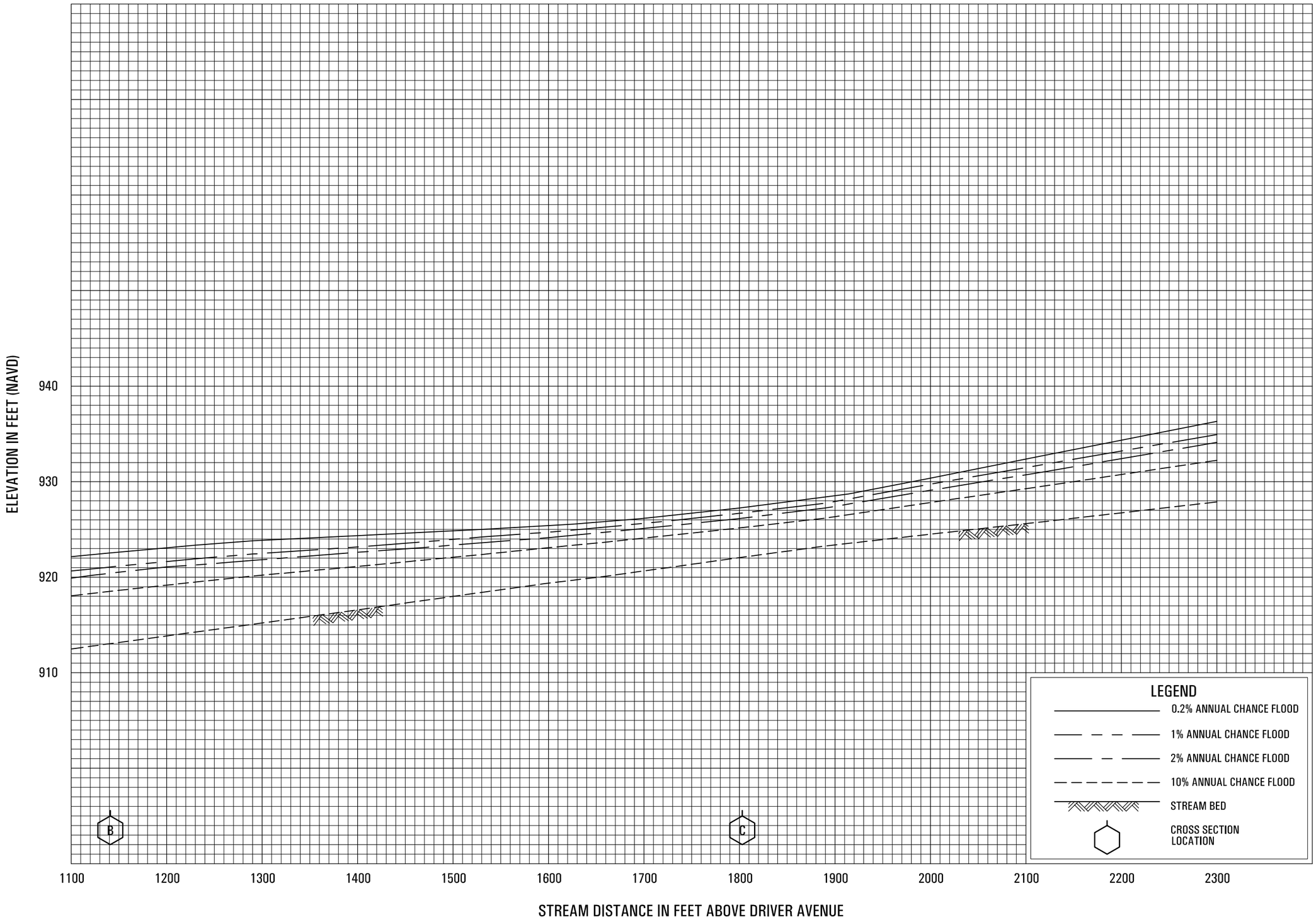

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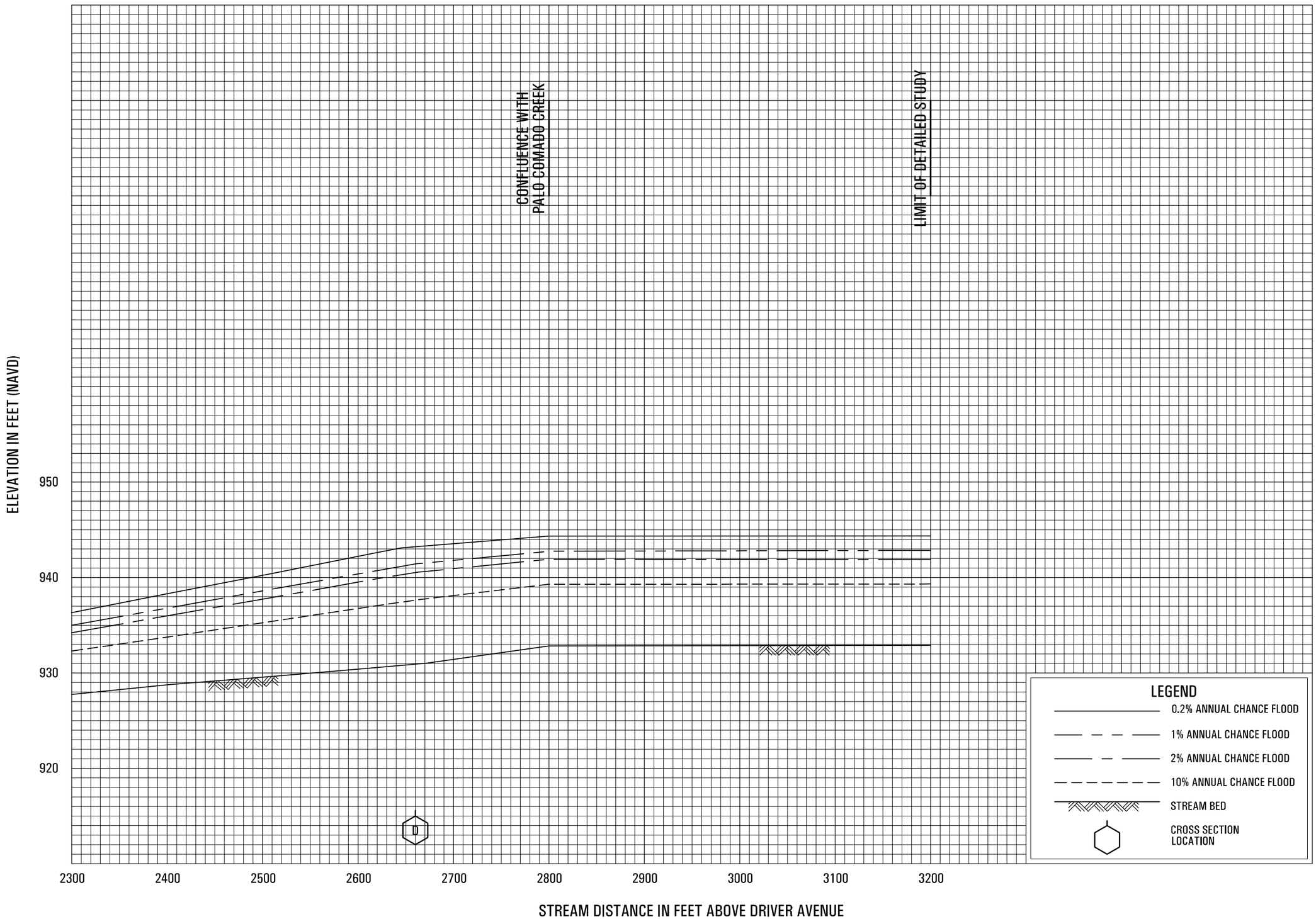

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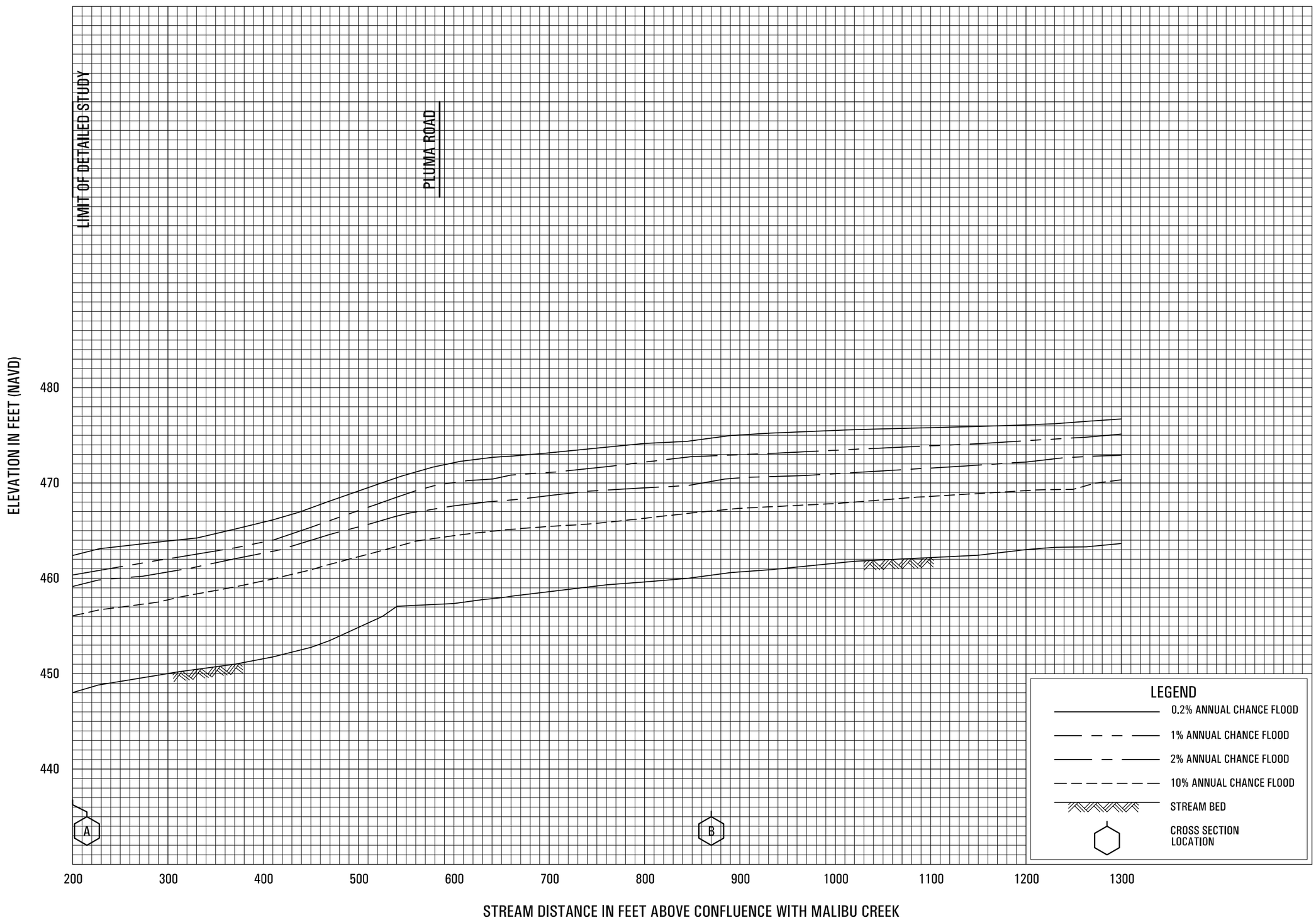

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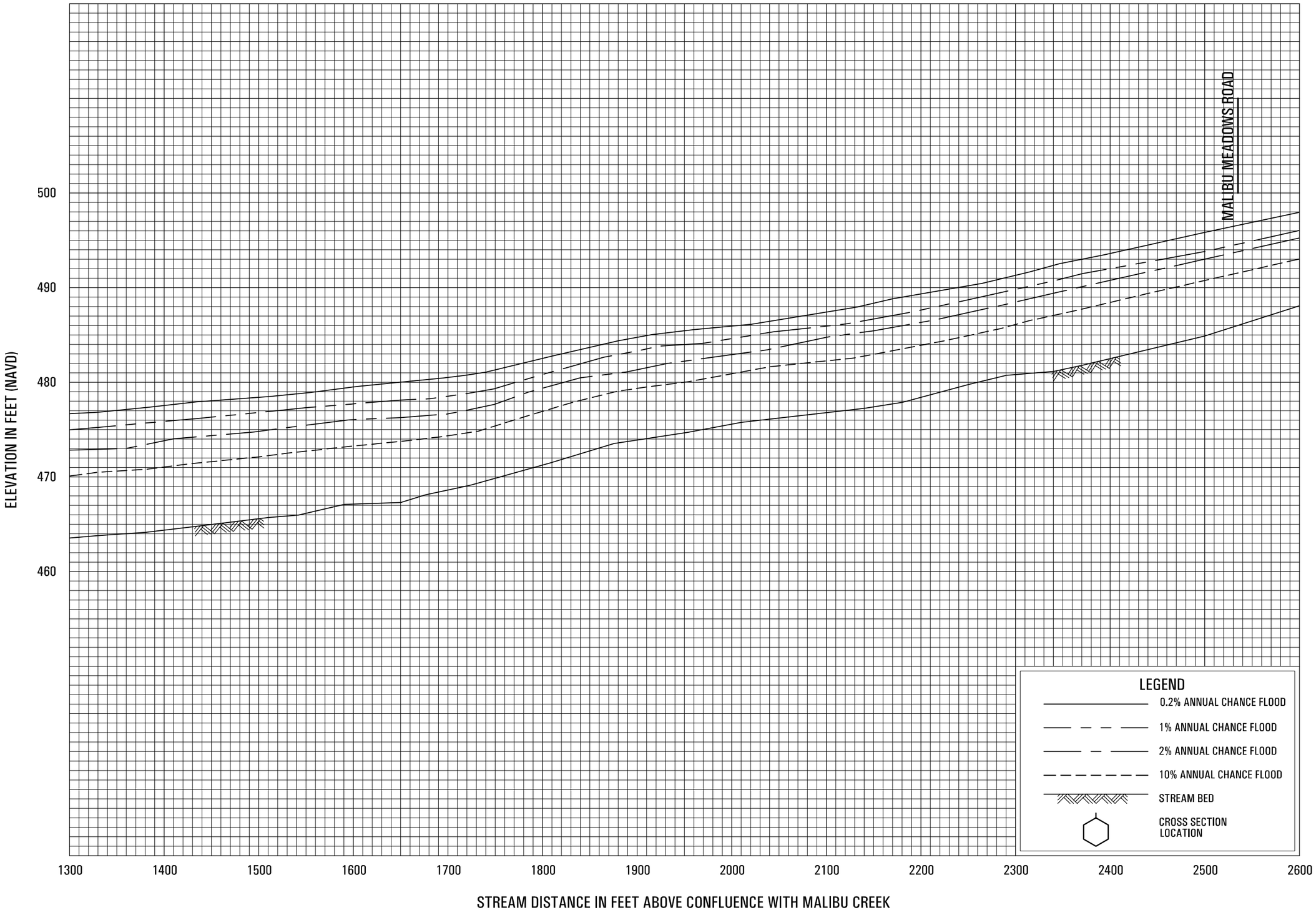

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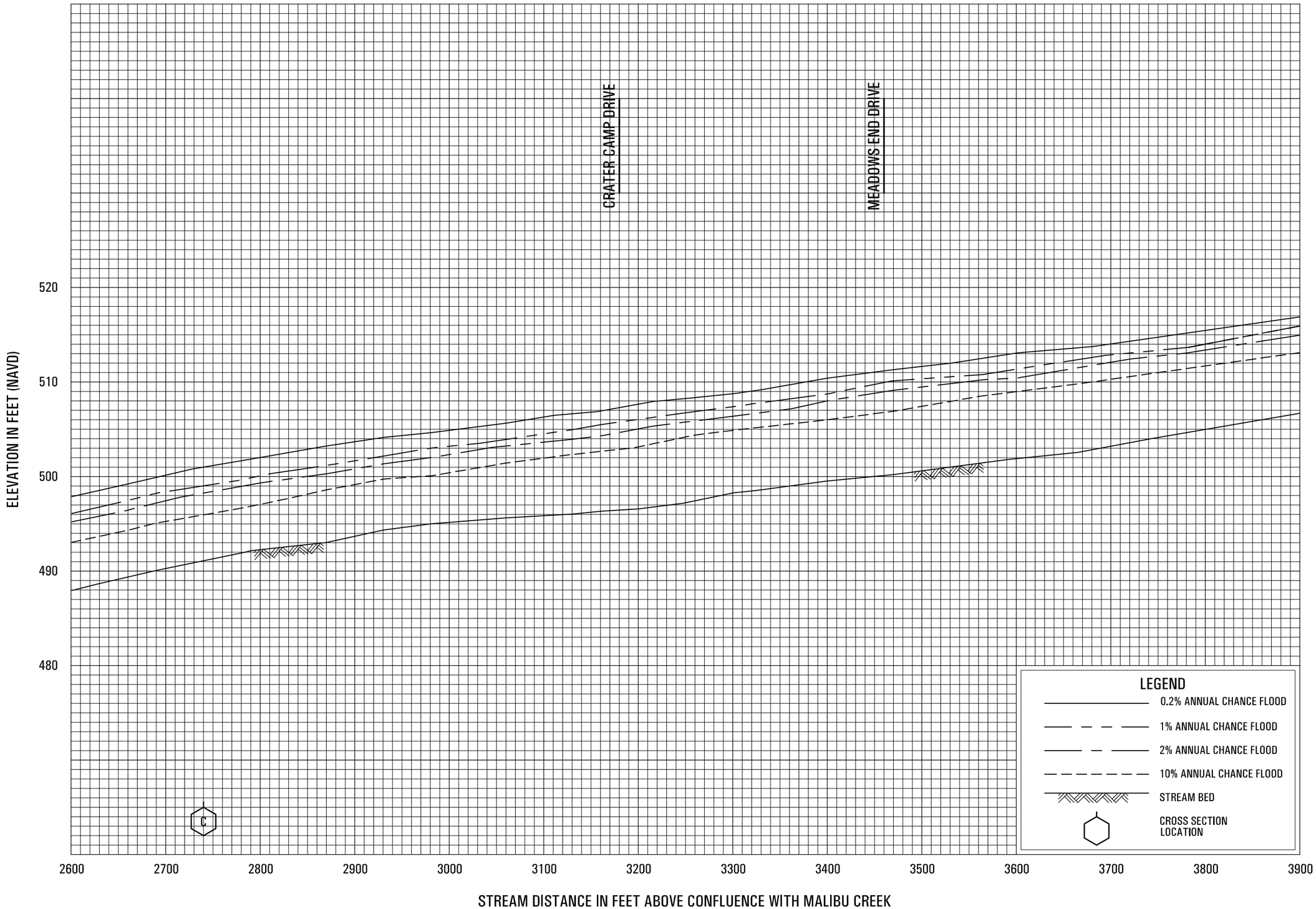

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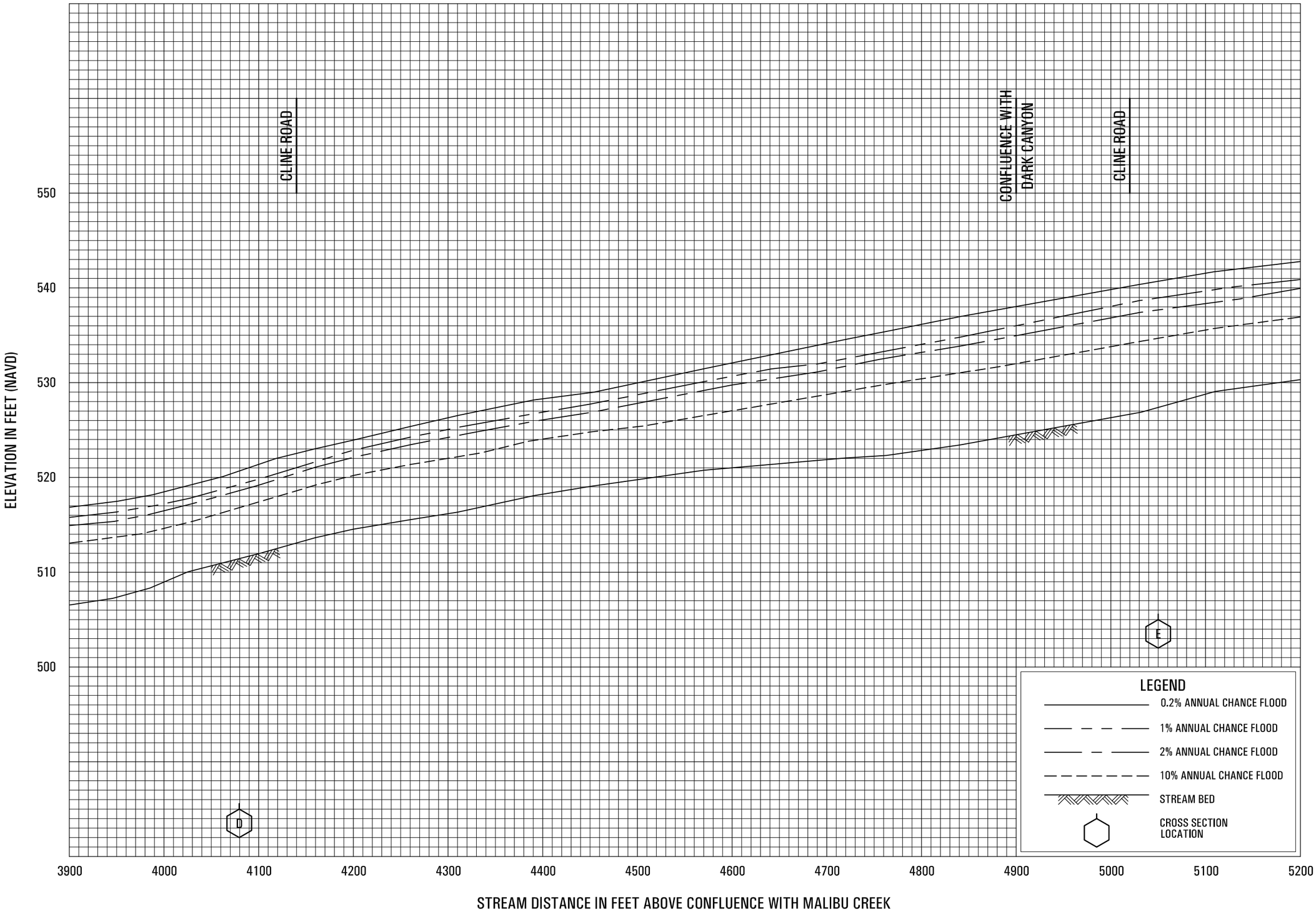

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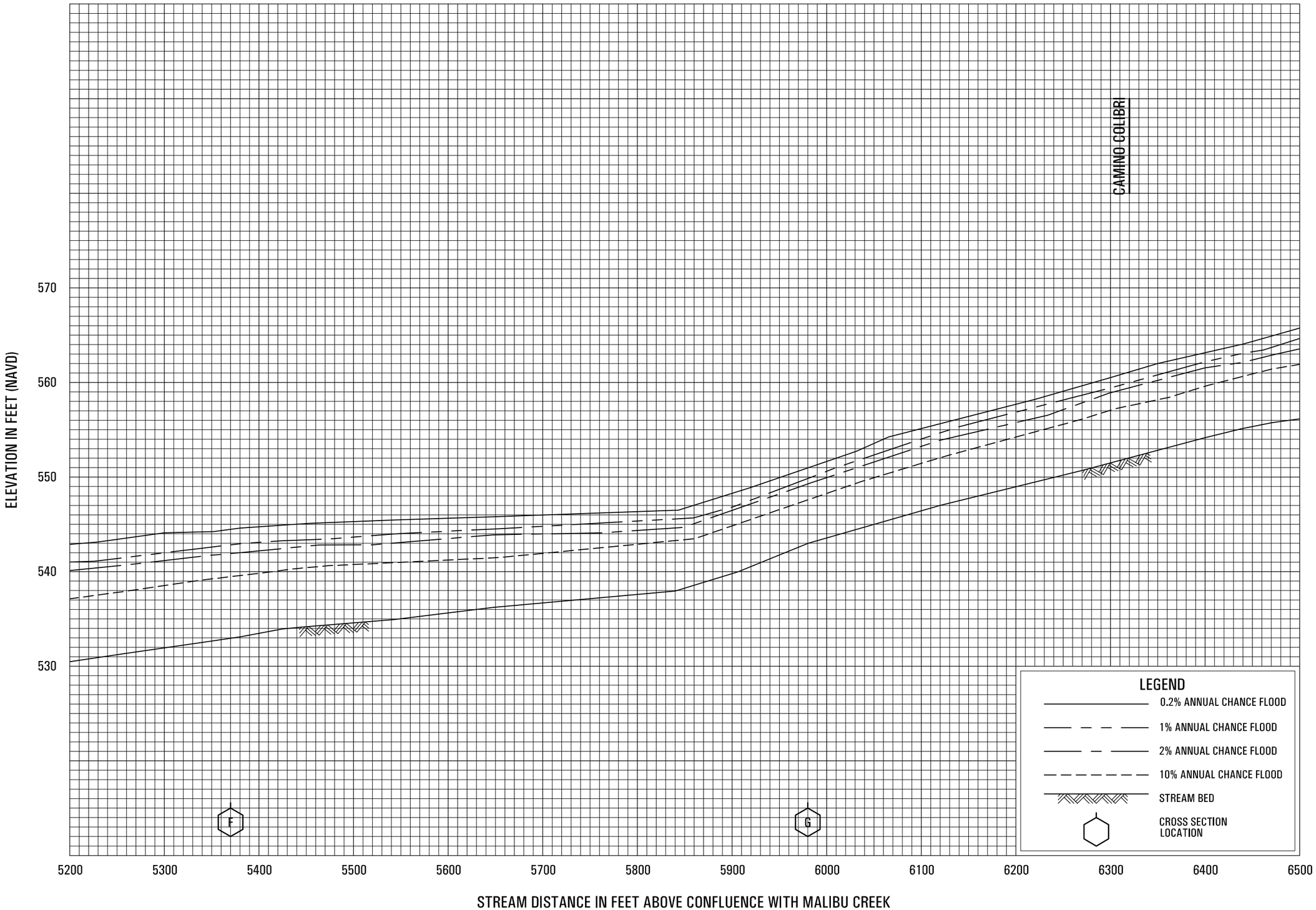

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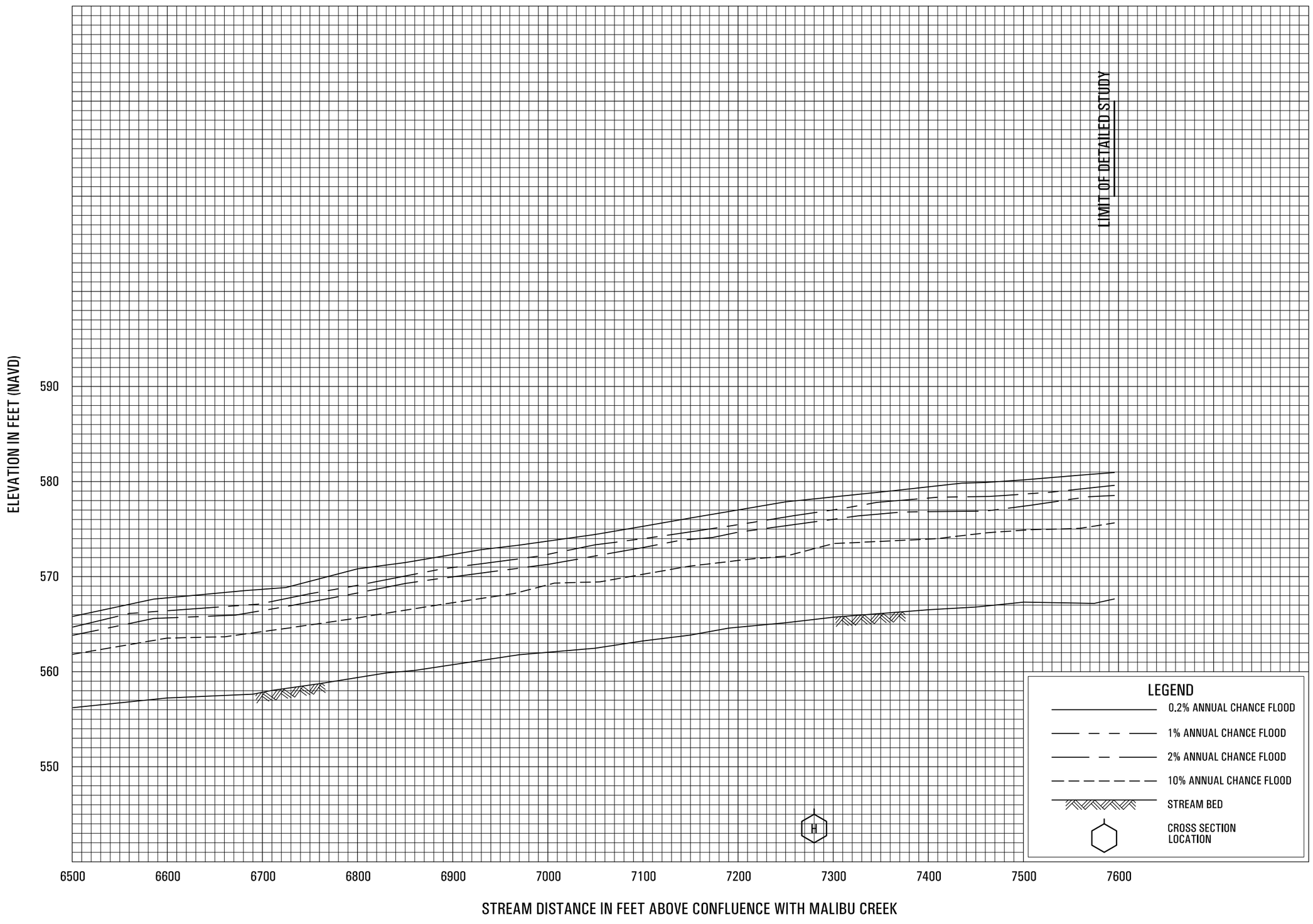

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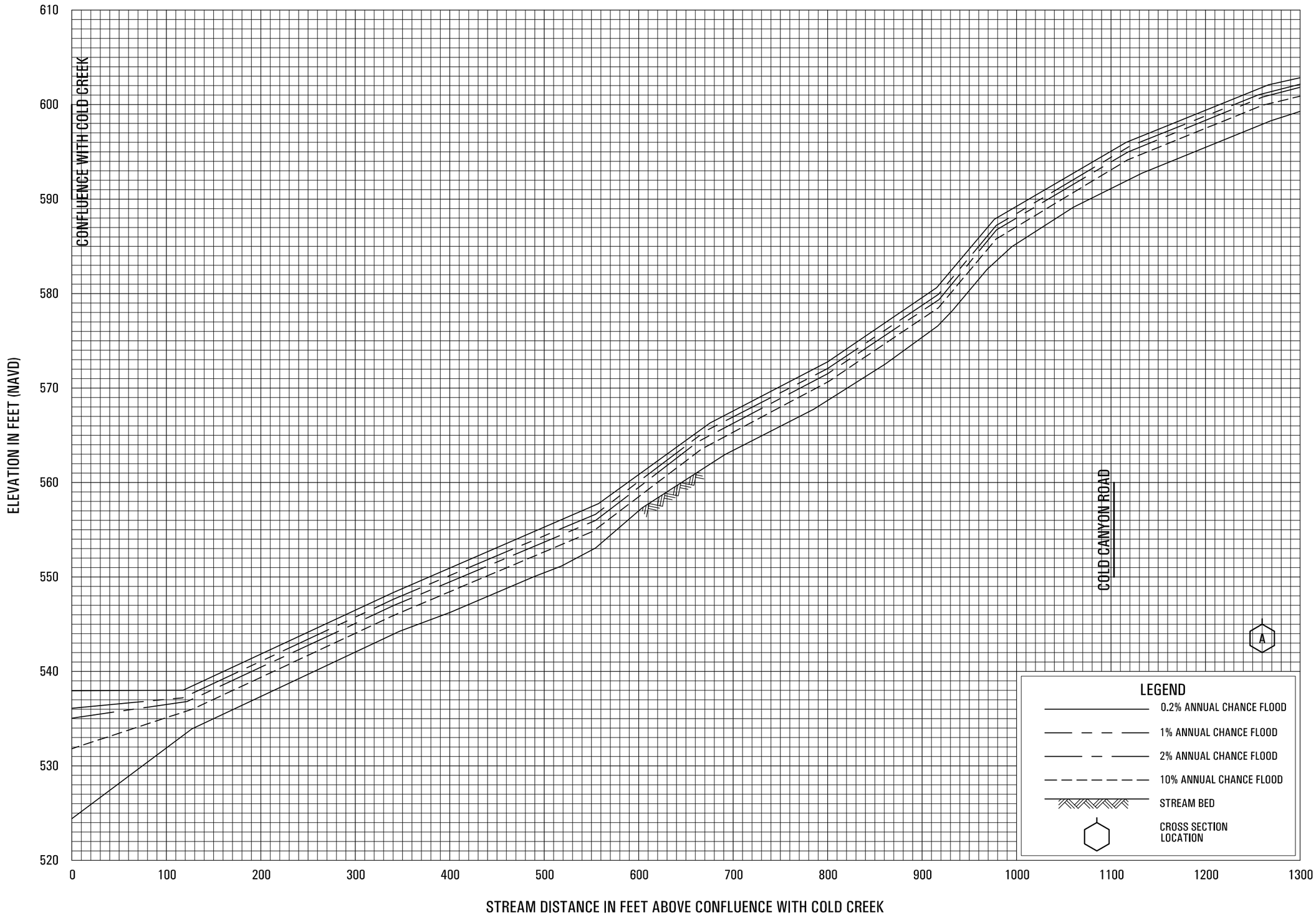

FLOOD PROFILES

DARK CANYON

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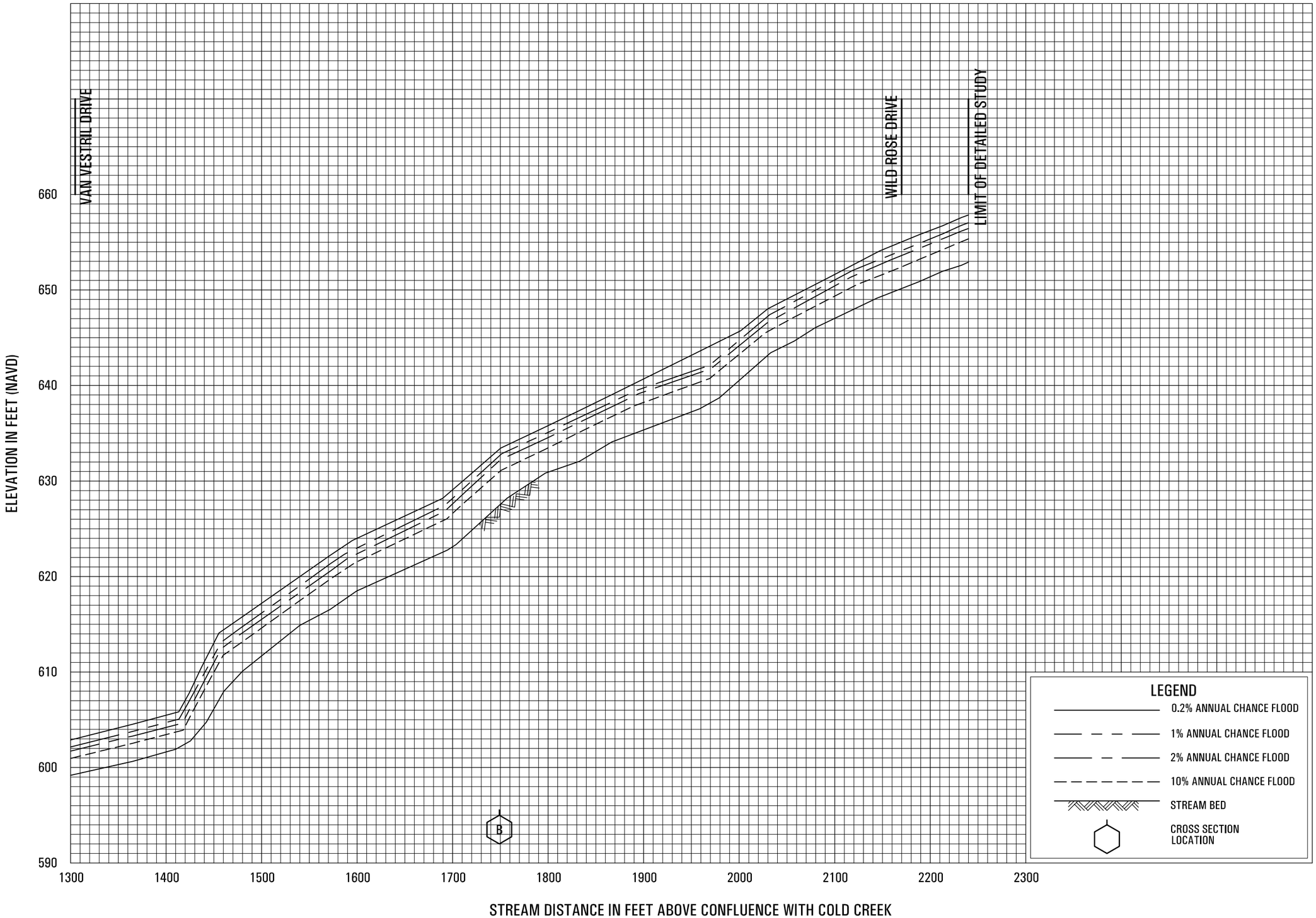

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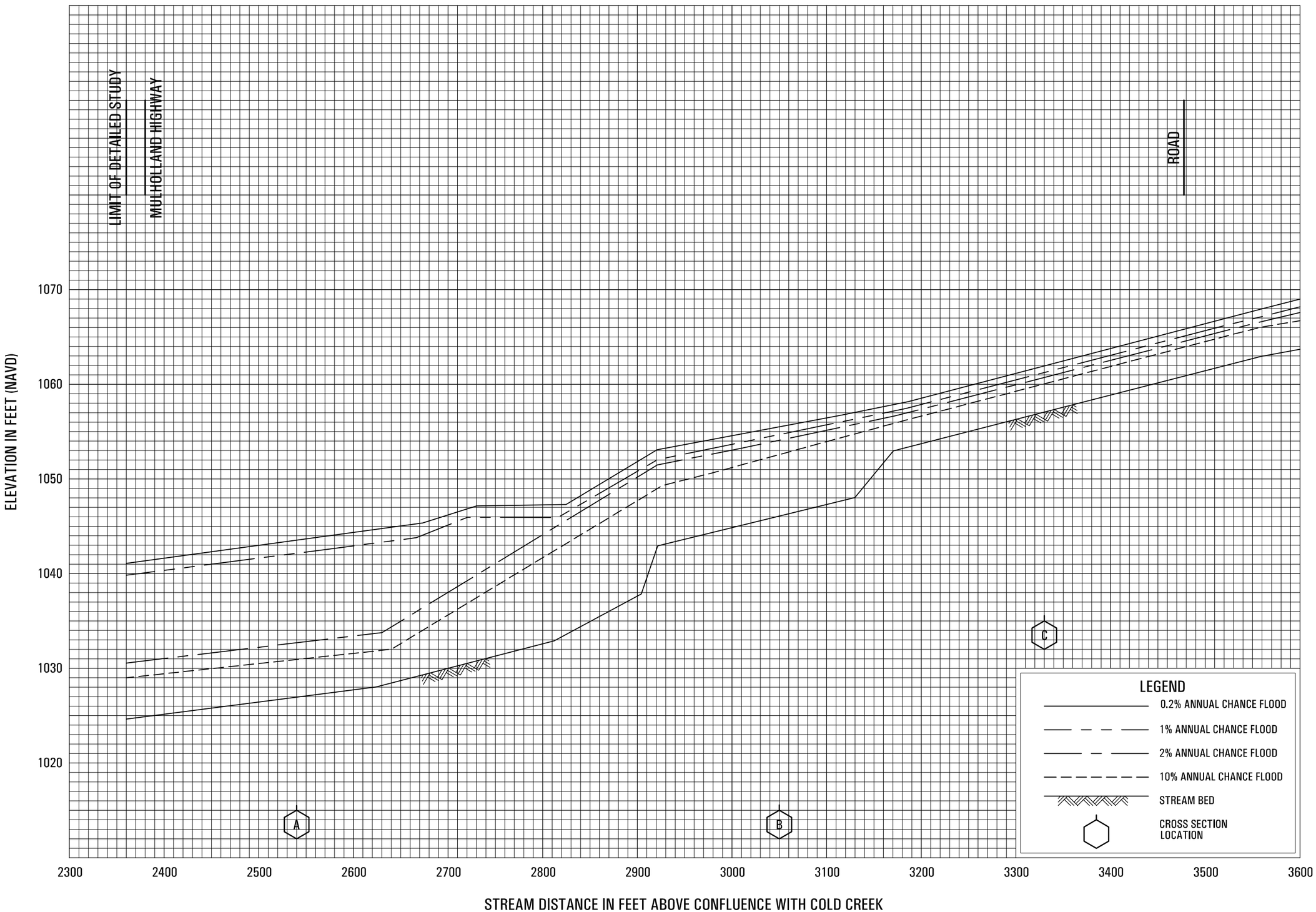

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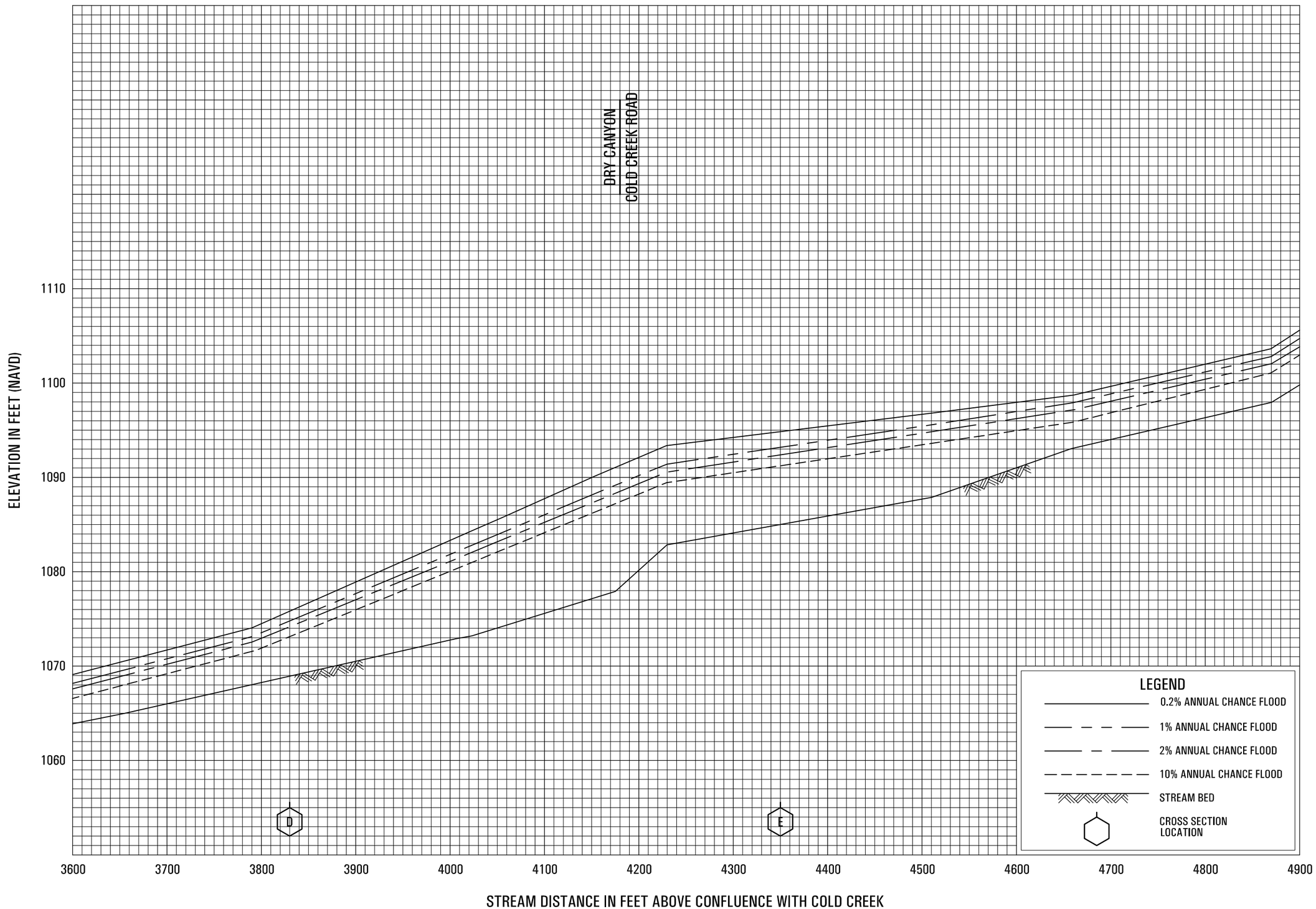

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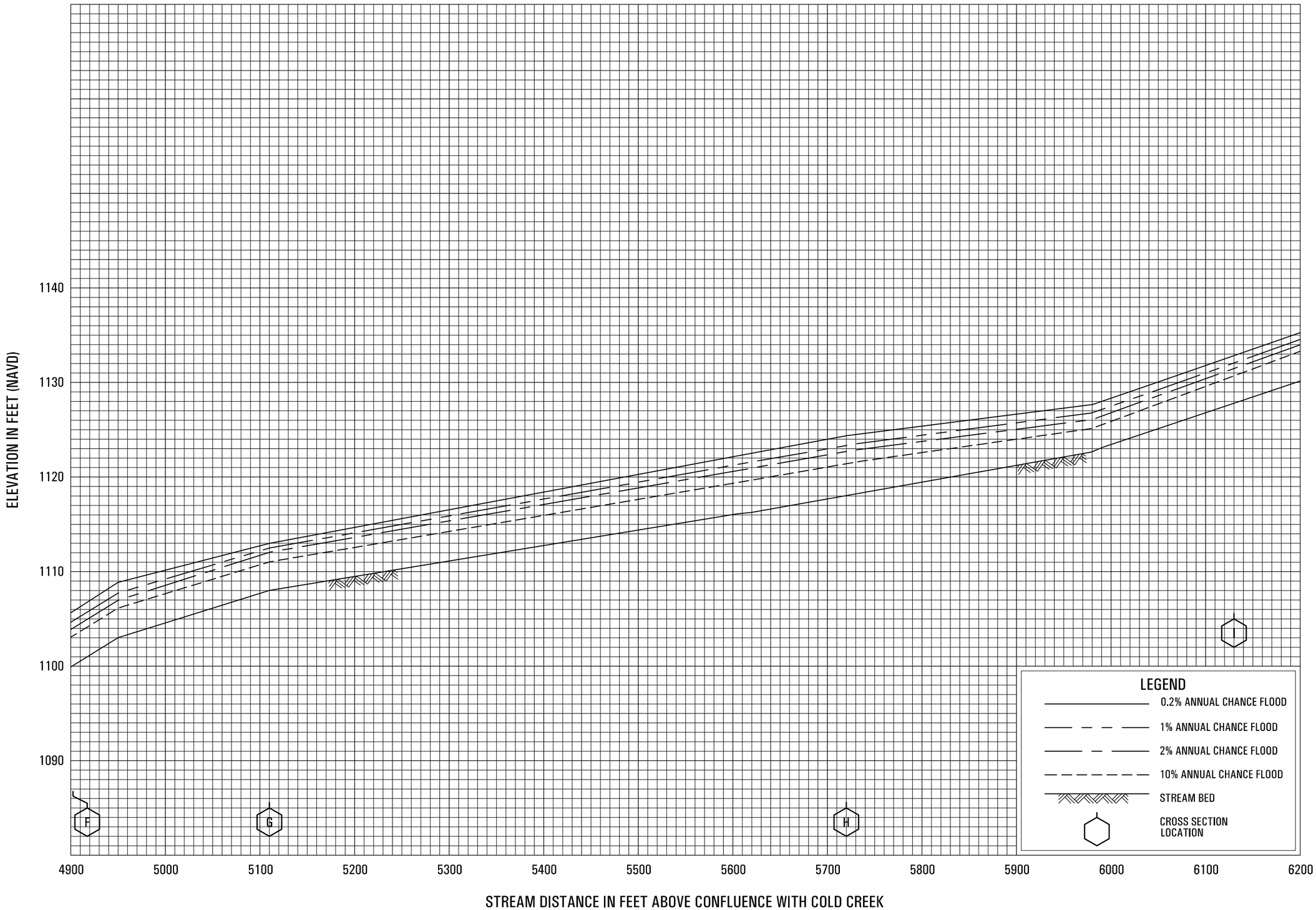

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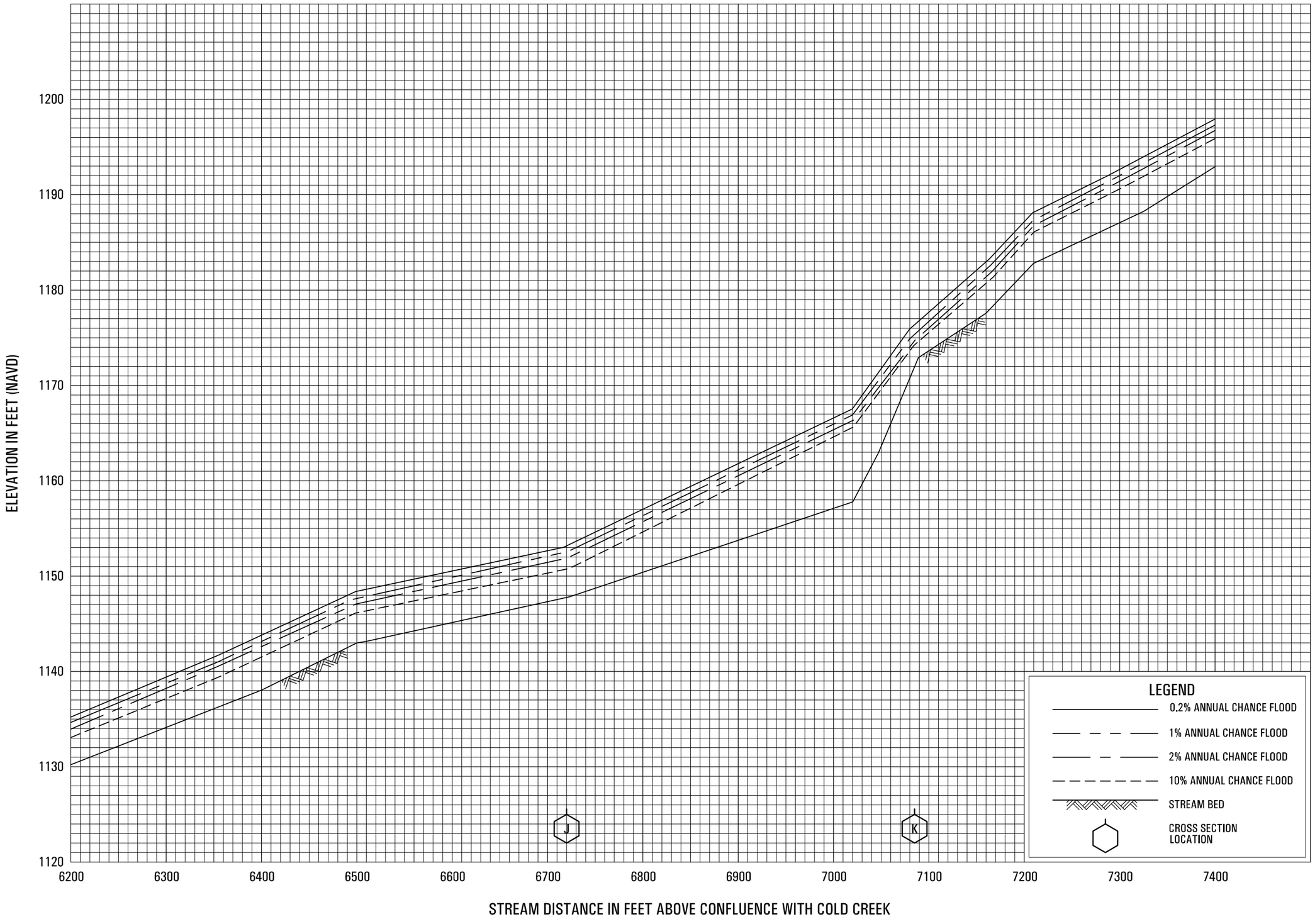

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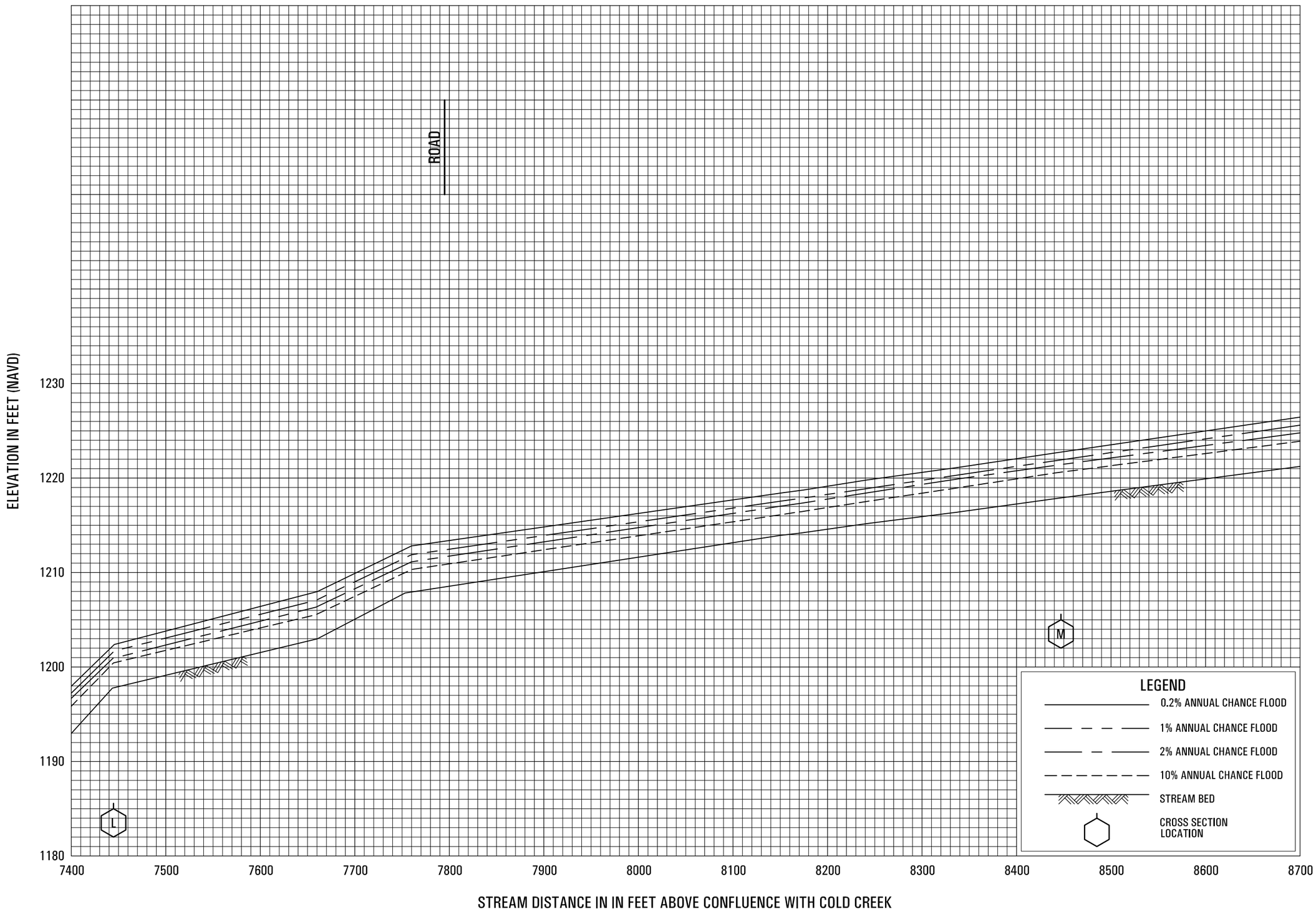

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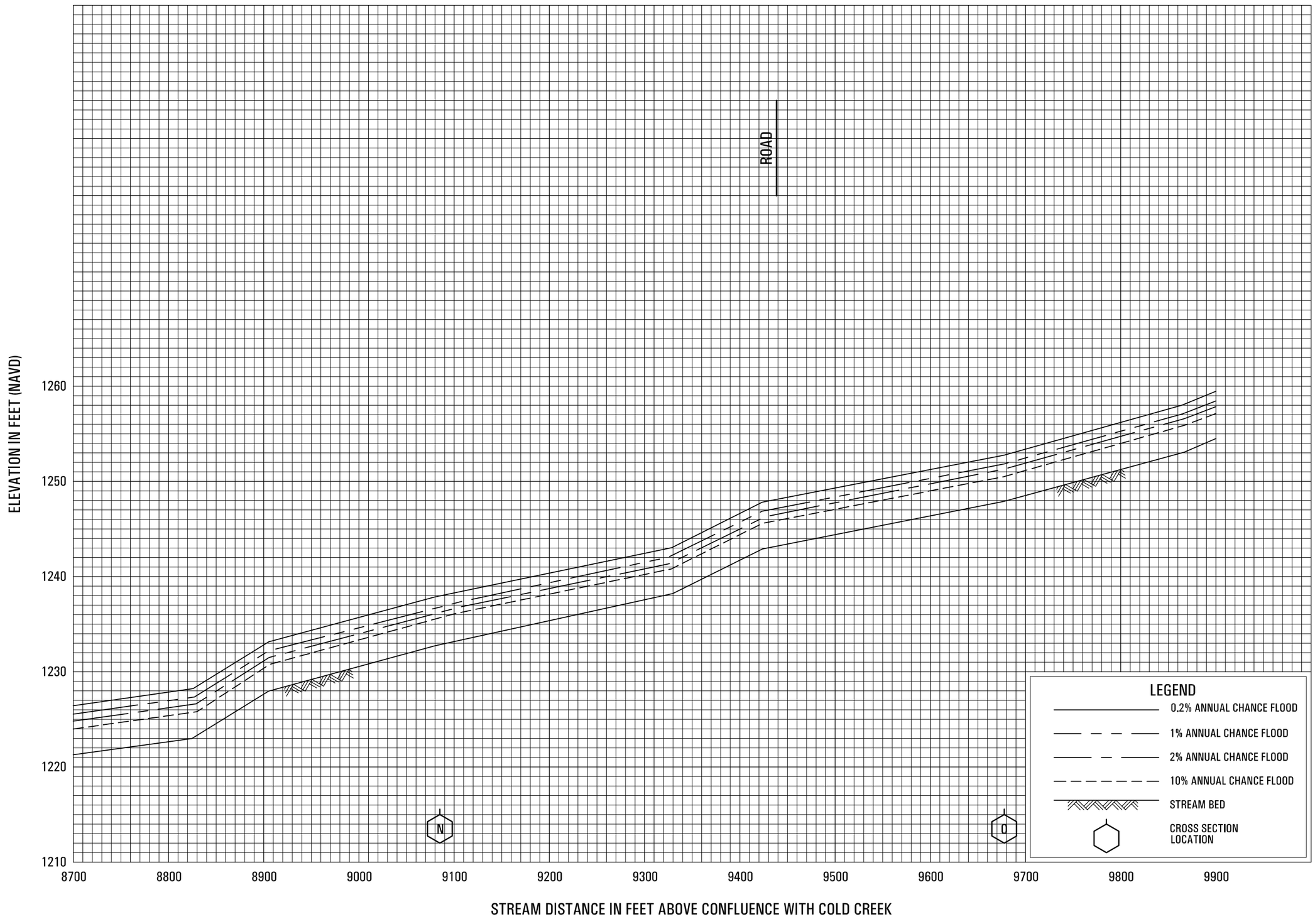

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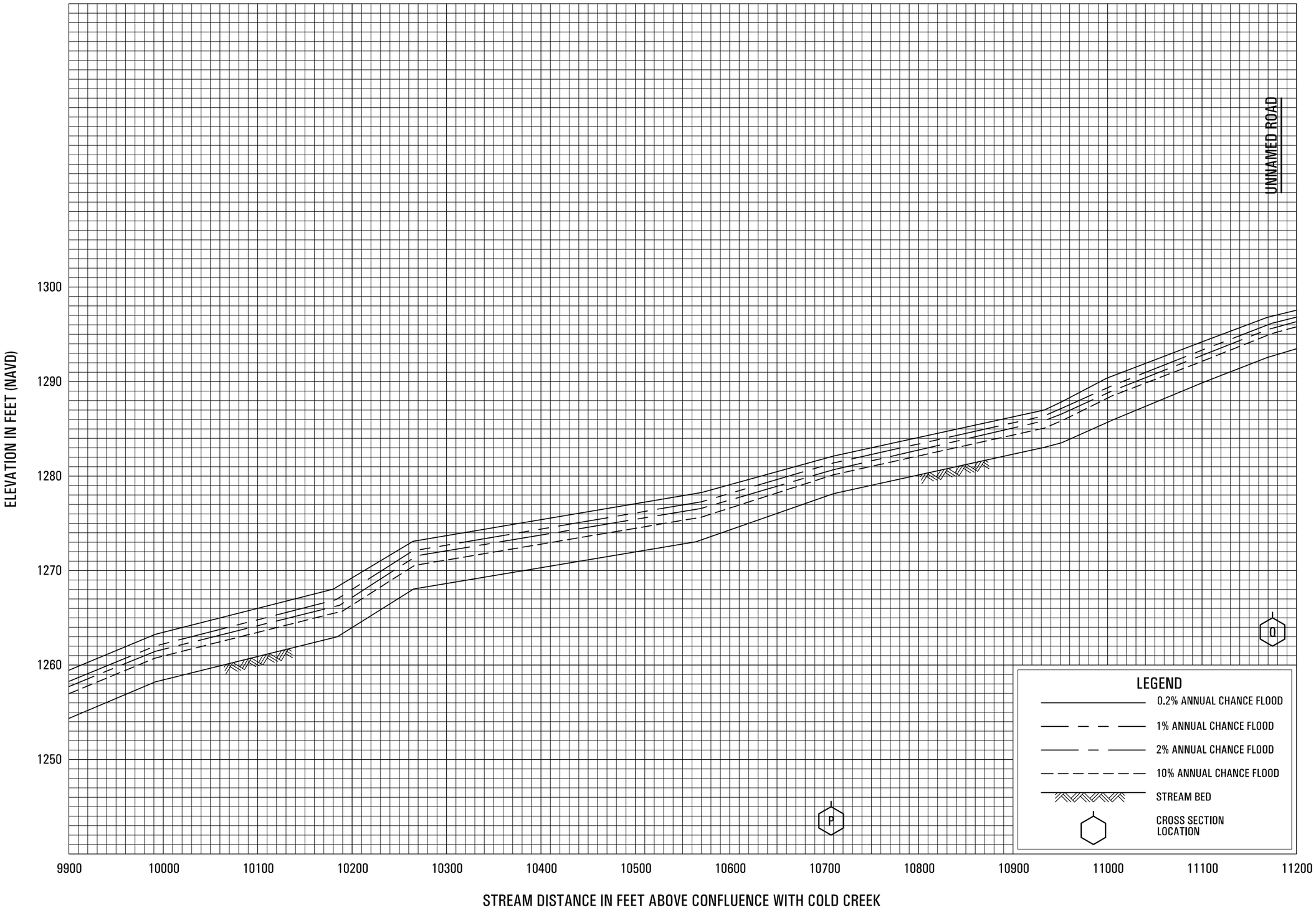
DRY CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



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DRY CANYON

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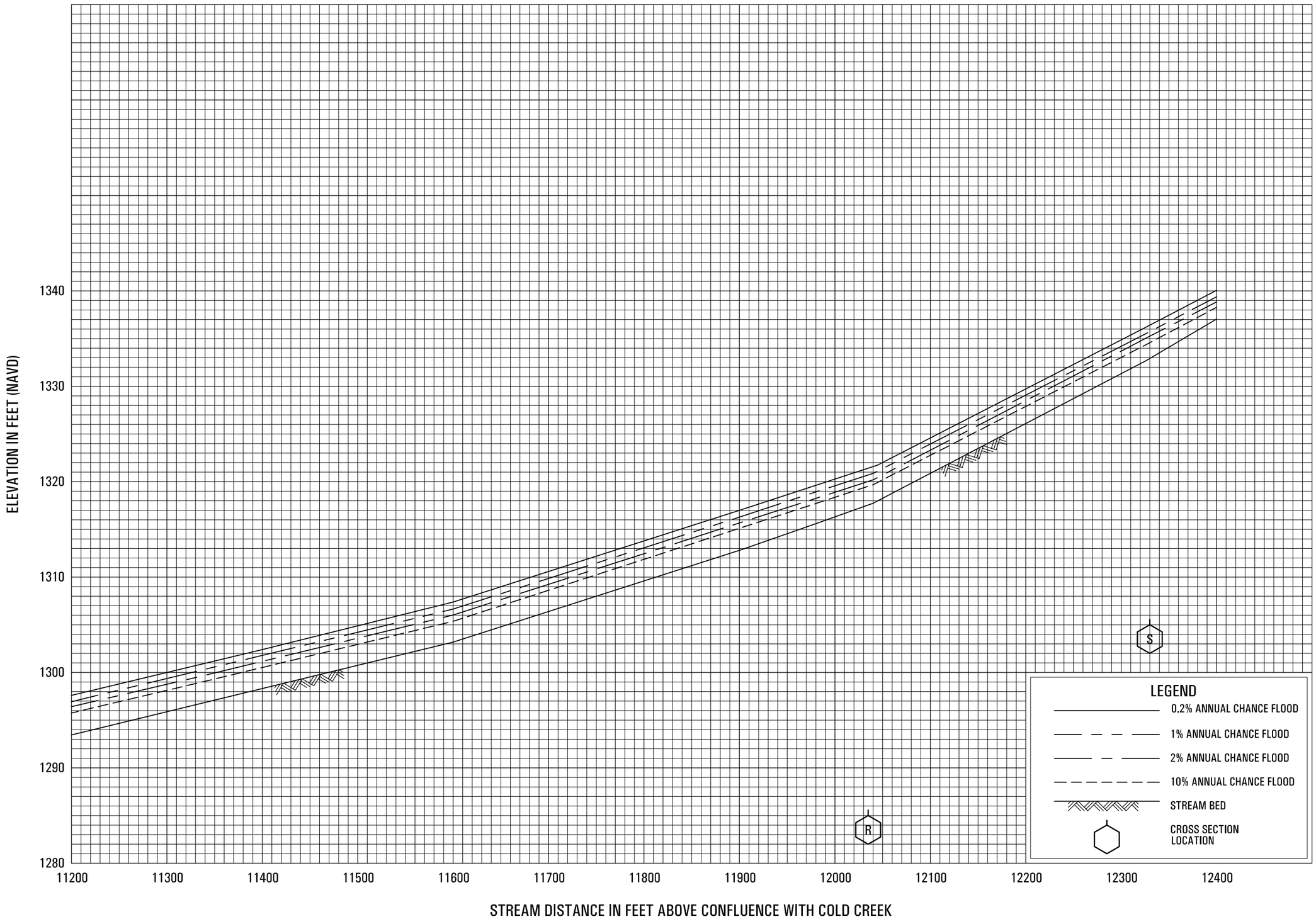
LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



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LOS ANGELES COUNTY, CA

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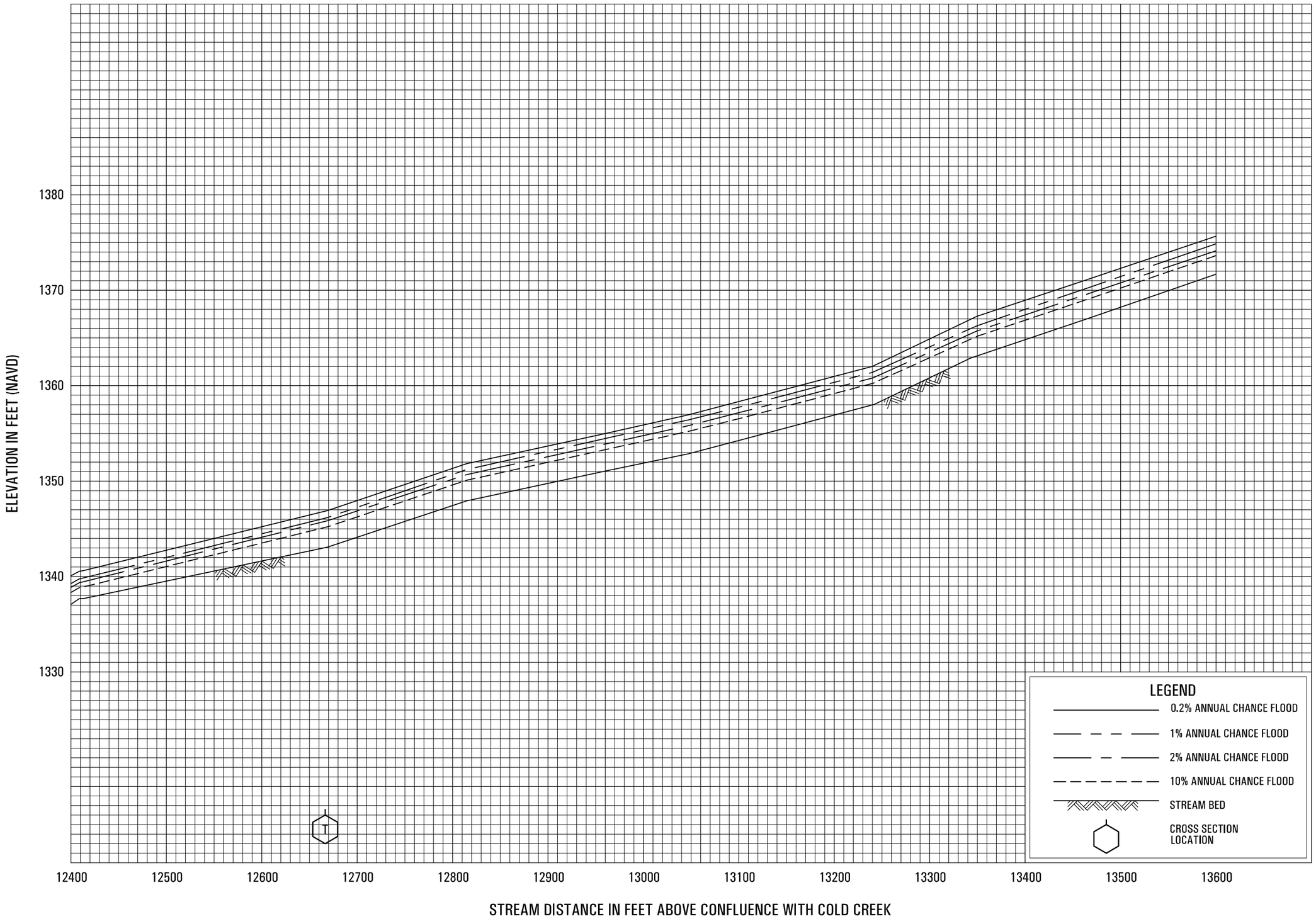

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LOS ANGELES COUNTY, CA

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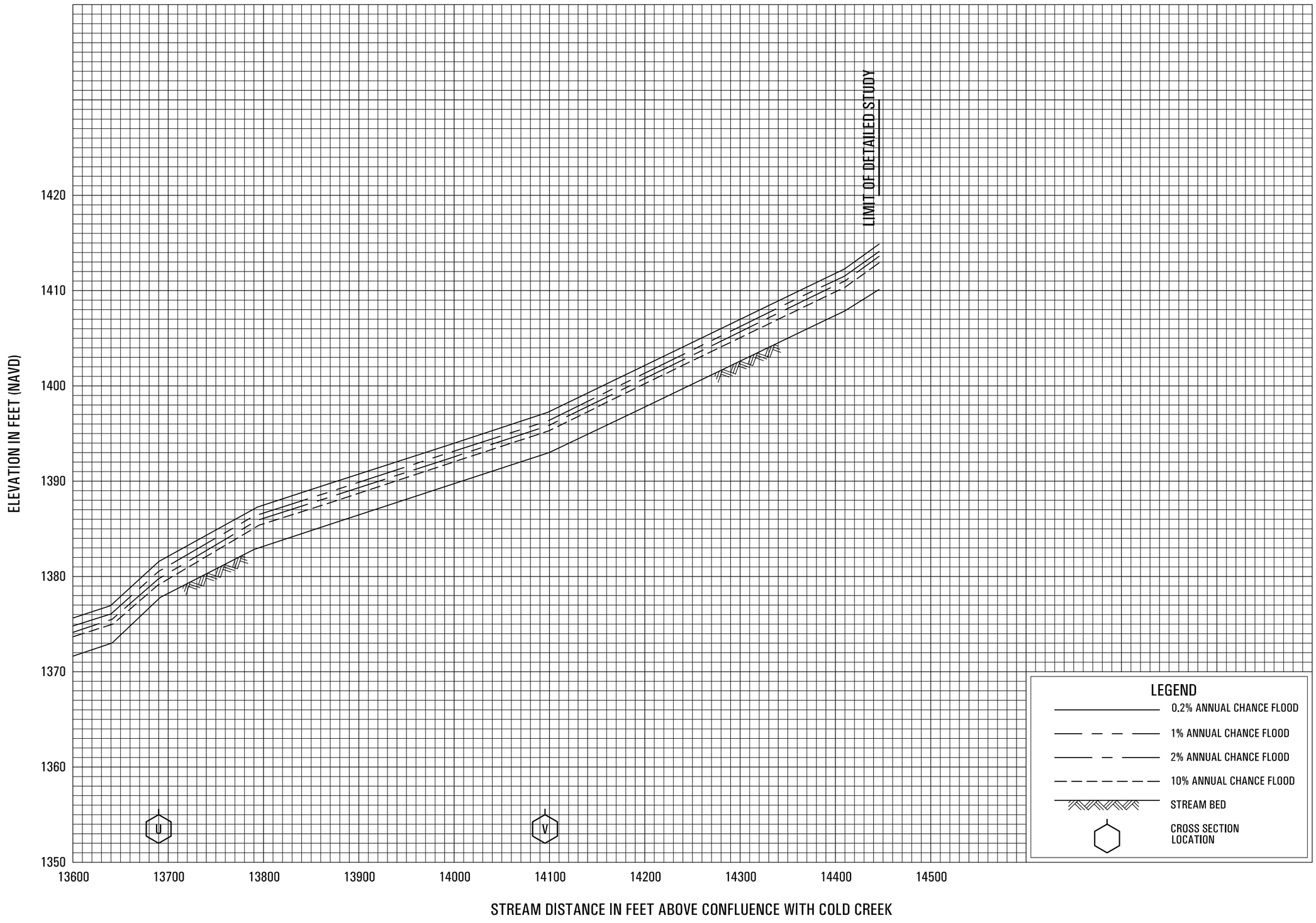

FLOOD PROFILES

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LOS ANGELES COUNTY, CA

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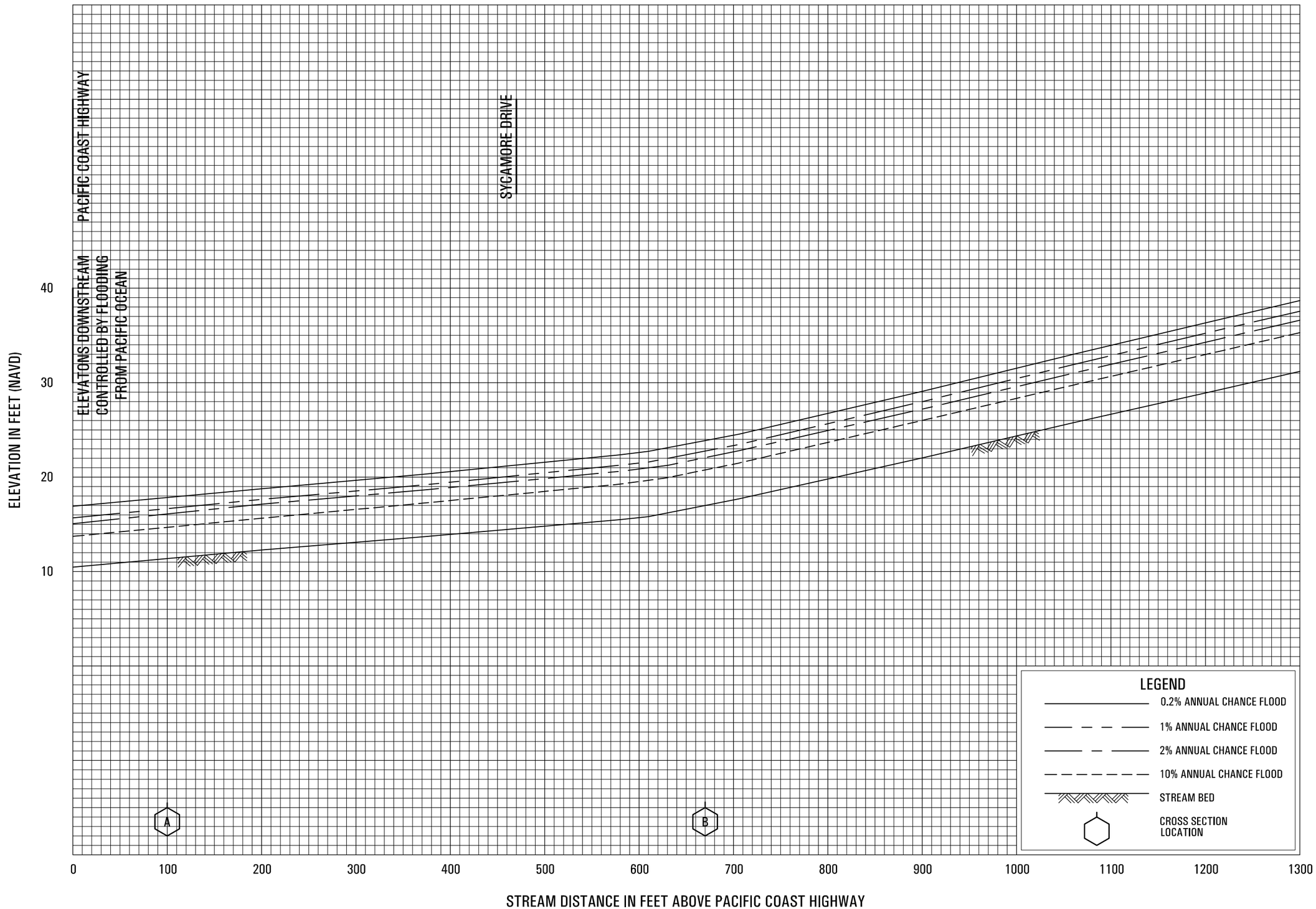

FLOOD PROFILES

ESCONDIDO CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

FLOOD PROFILES

ESCONDIDO CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

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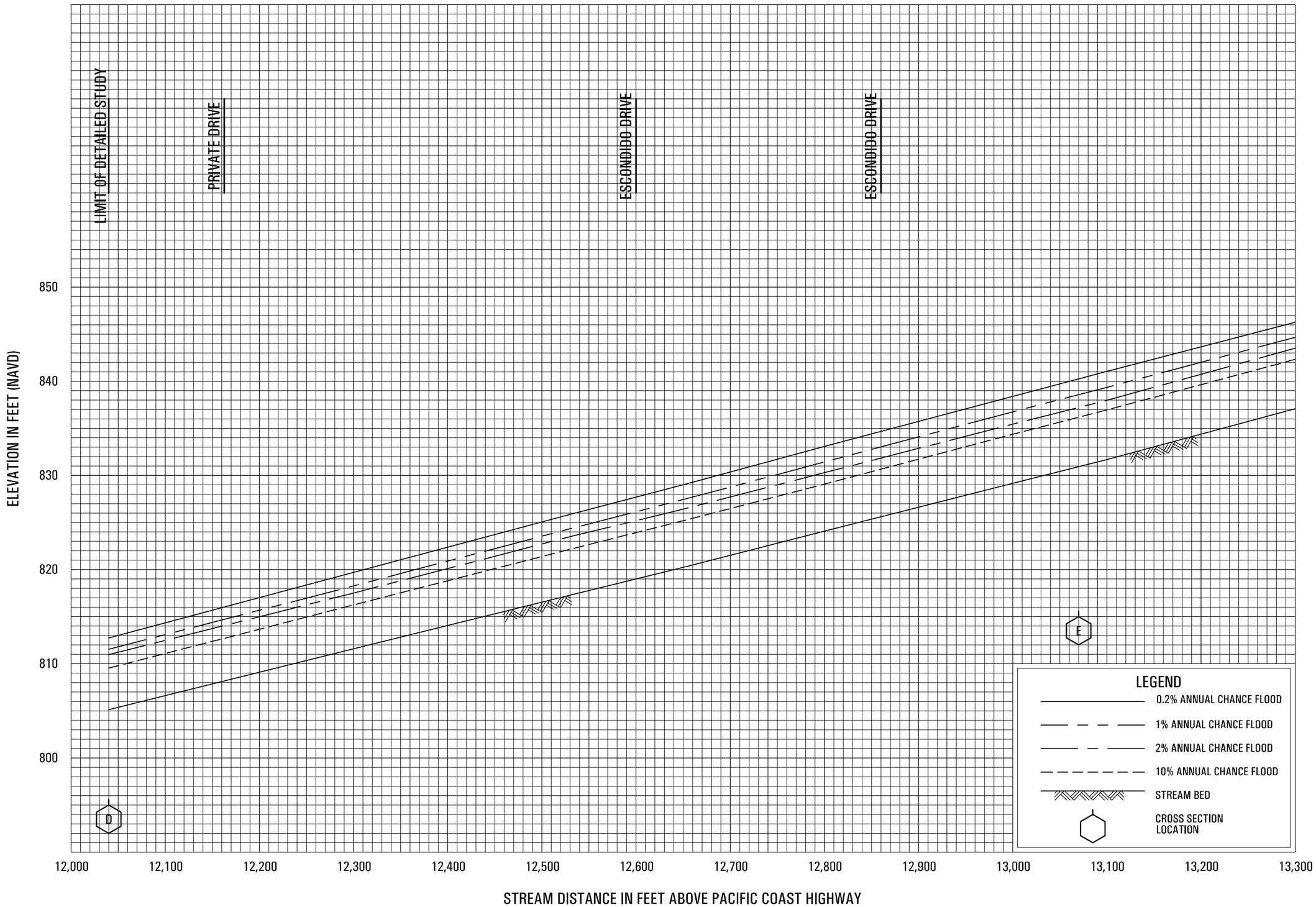

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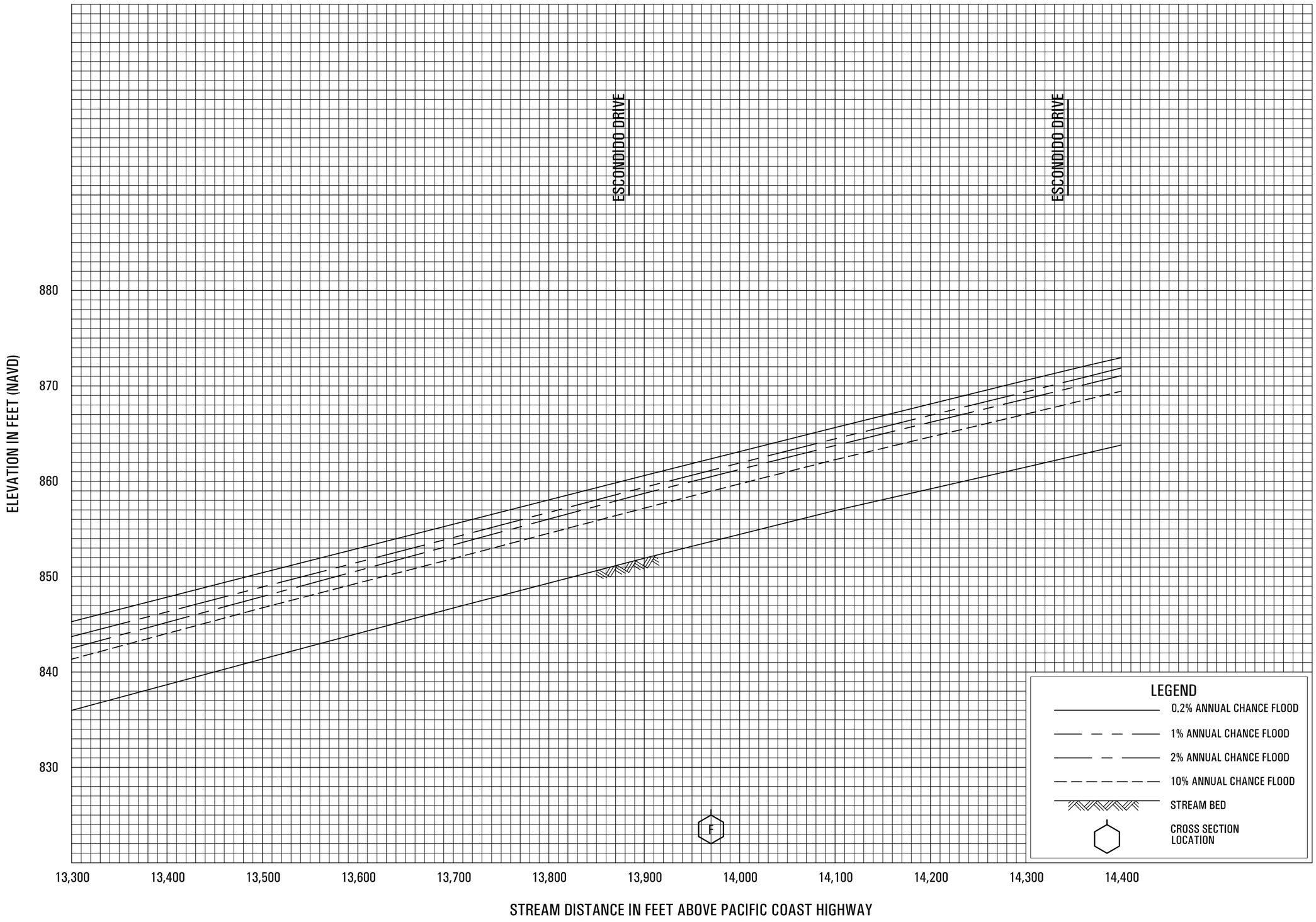

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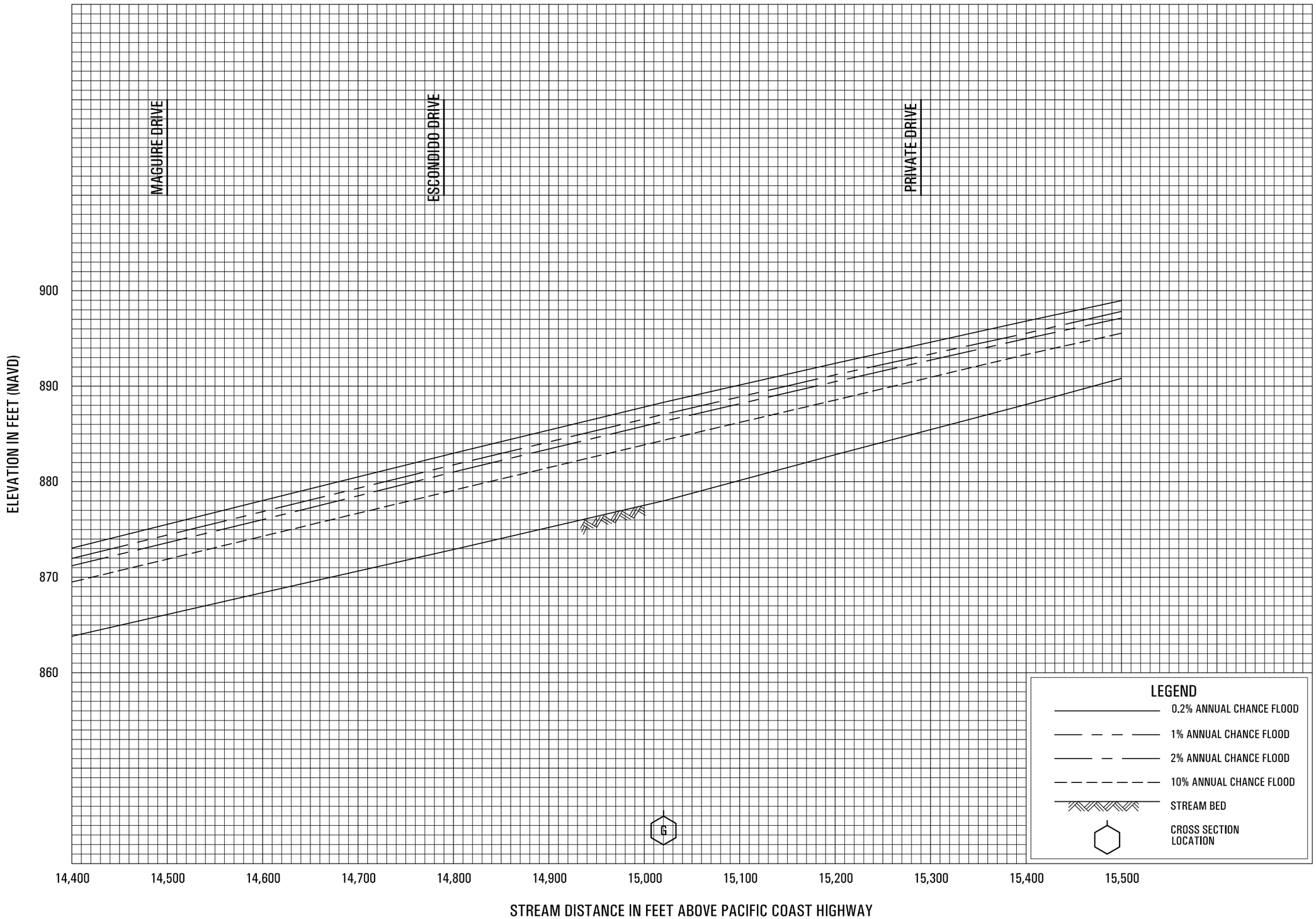

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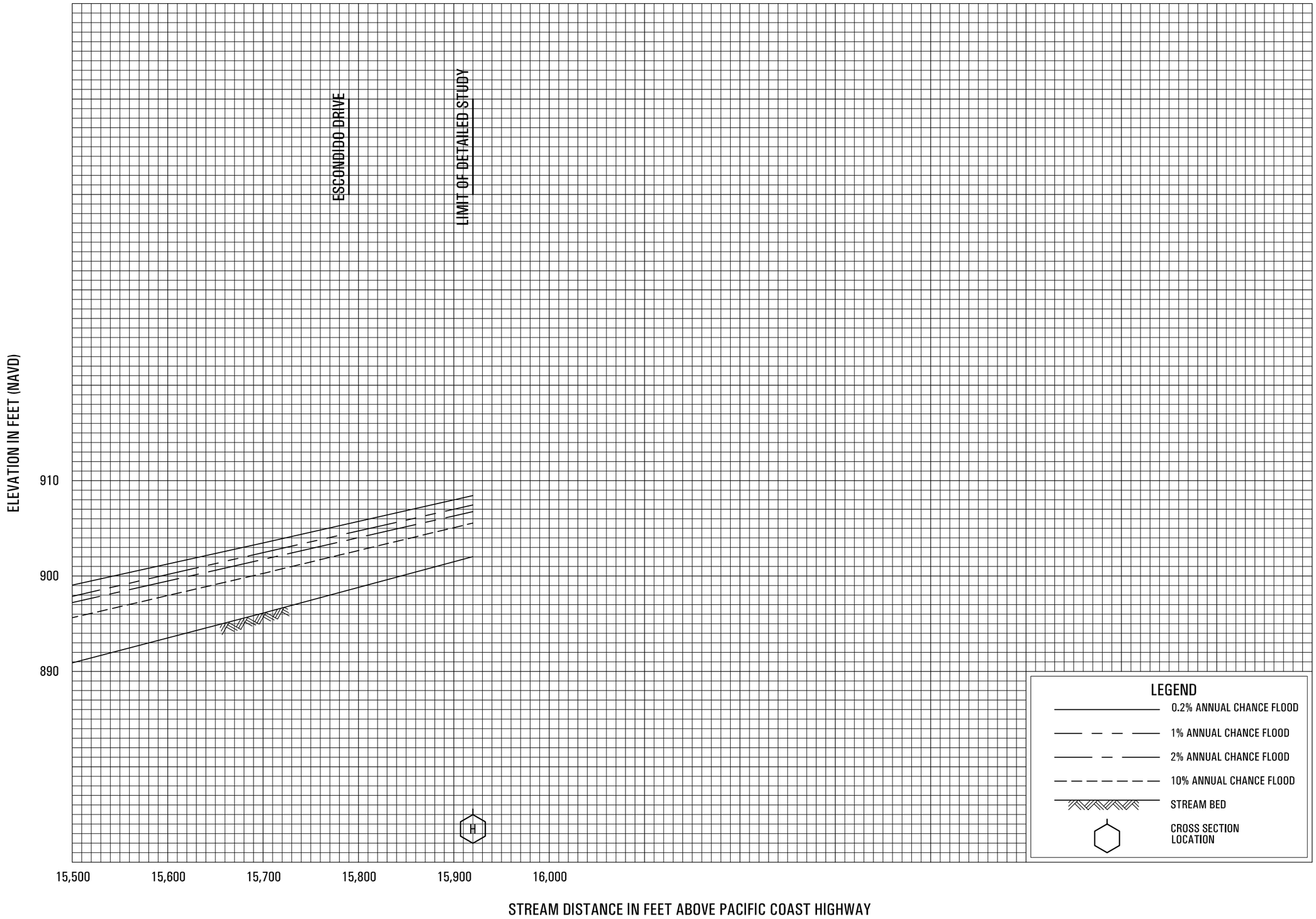

FLOOD PROFILES

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LOS ANGELES COUNTY, CA

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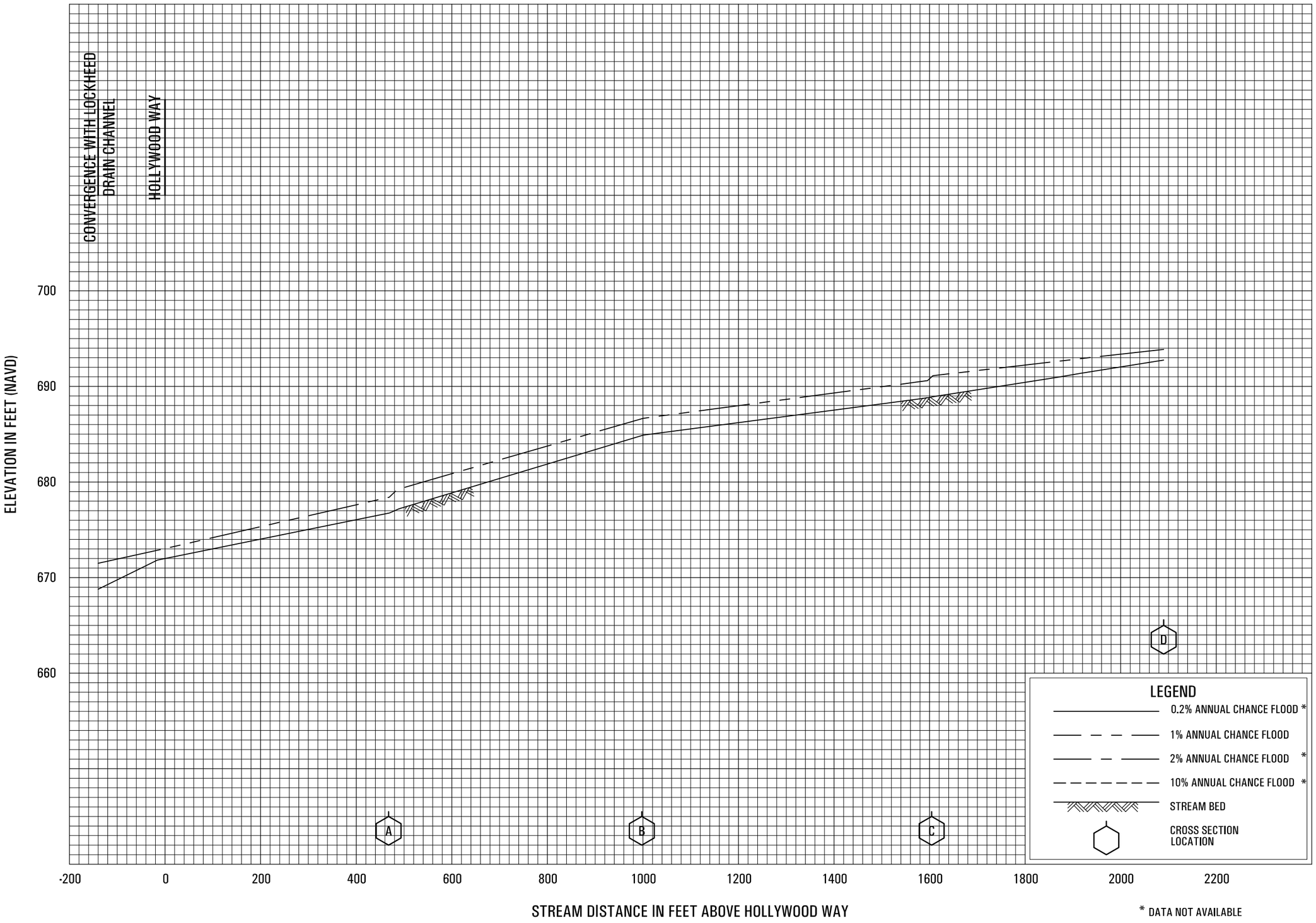


FLOOD PROFILES

FLOW ALONG EMPIRE AVENUE

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

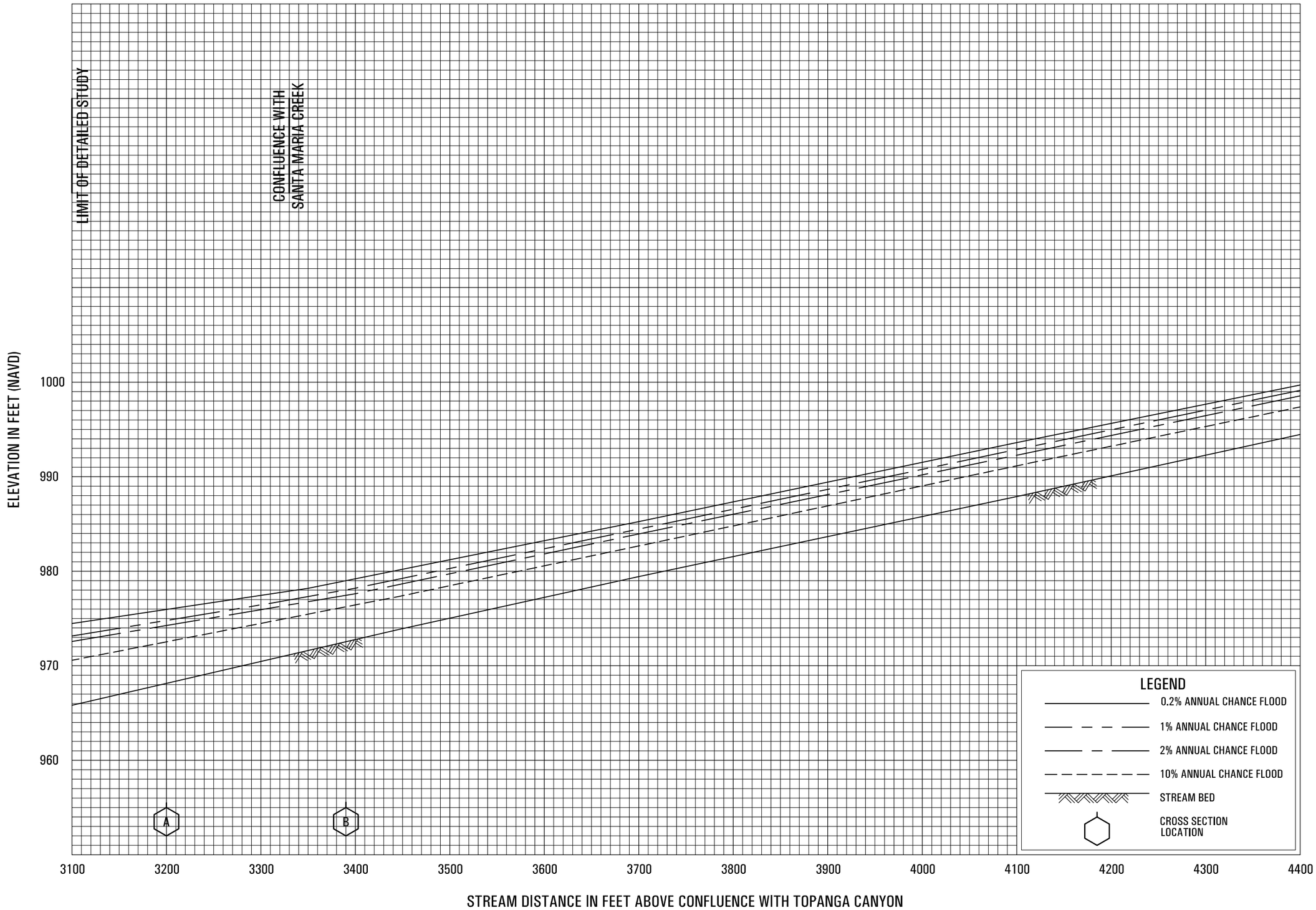
FLOOD PROFILES

FLOWLINE NO.1

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



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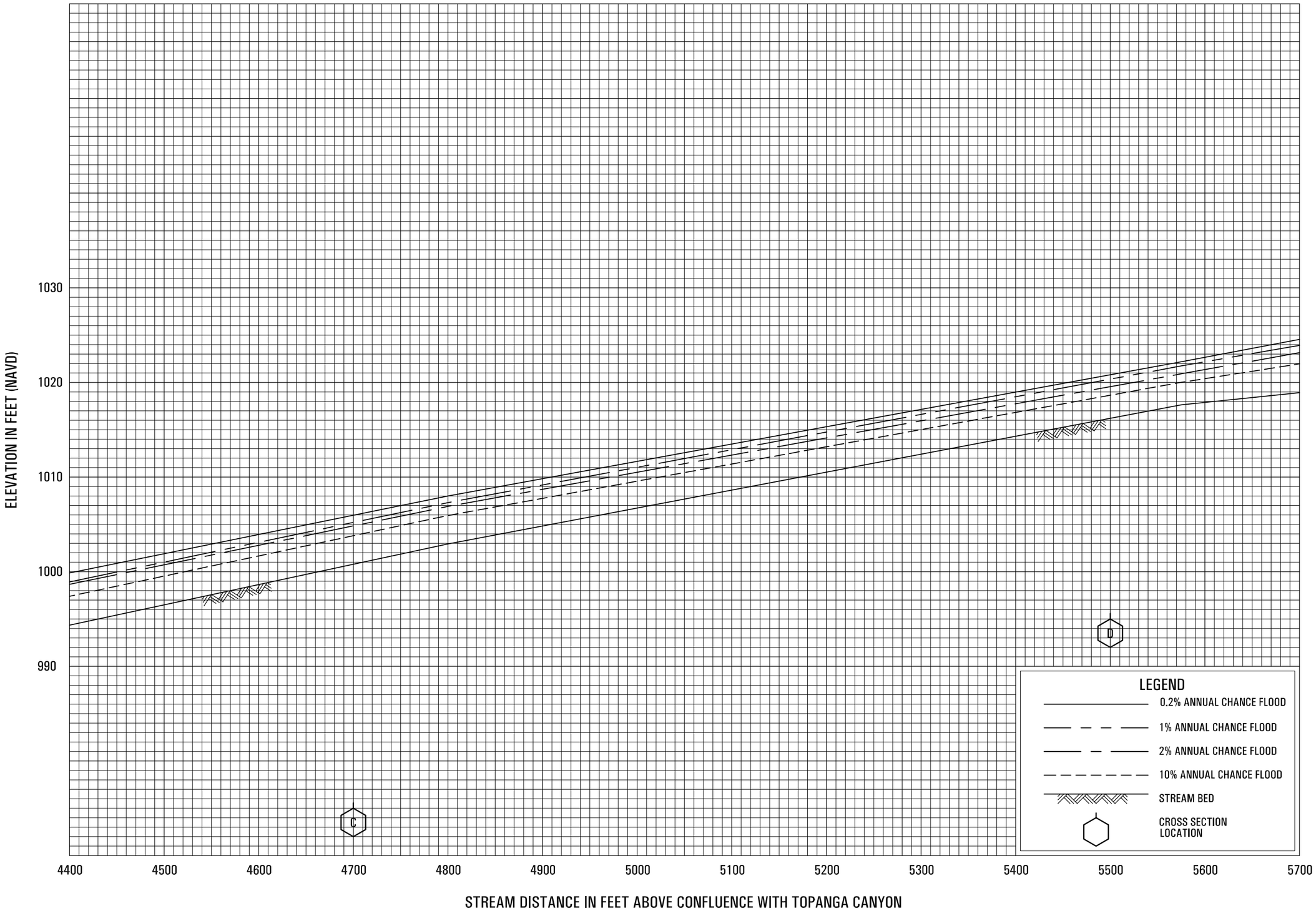
GARAPITO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

GARAPITO CREEK

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LOS ANGELES COUNTY, CA

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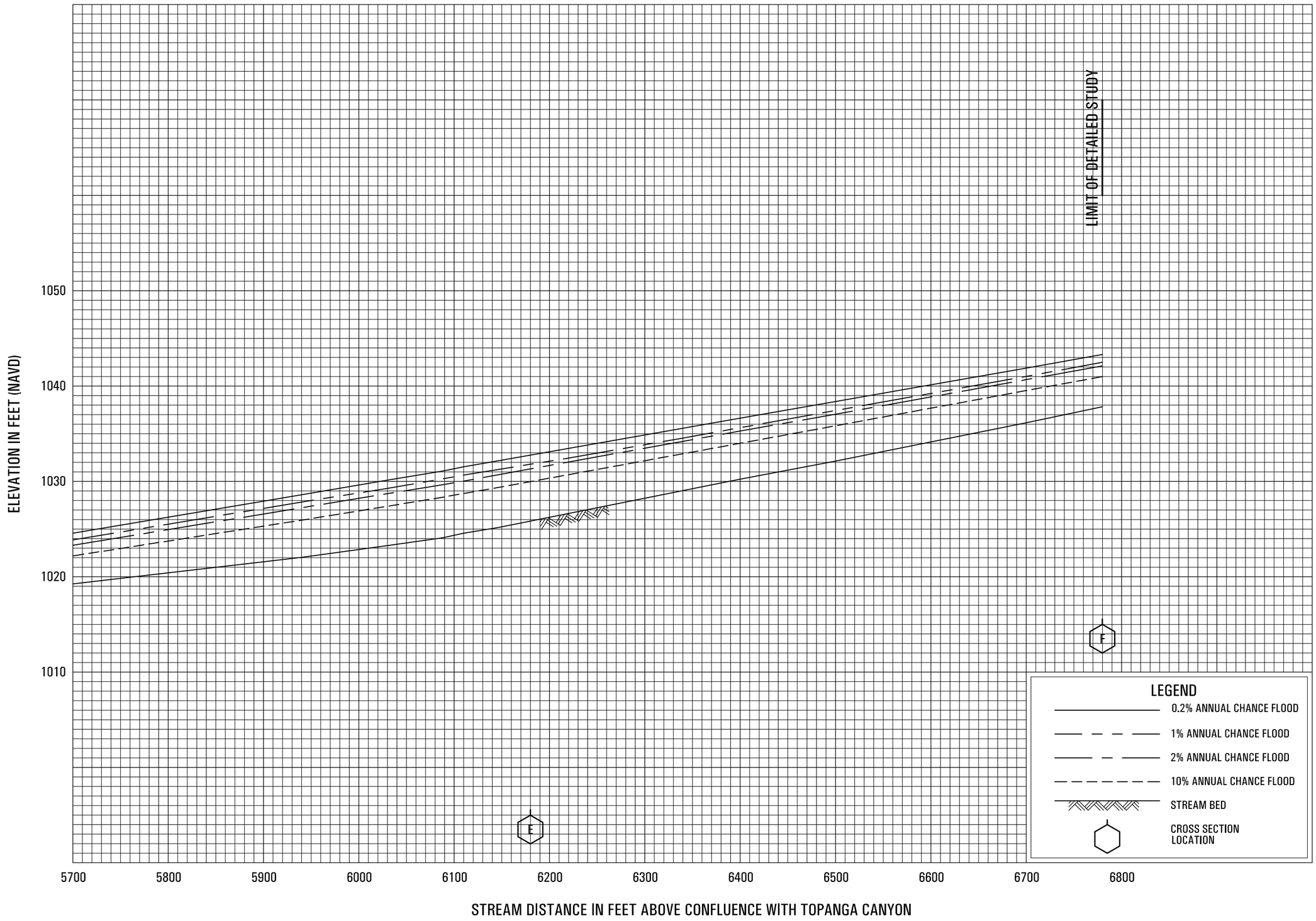

FLOOD PROFILES

GARAPITO CREEK

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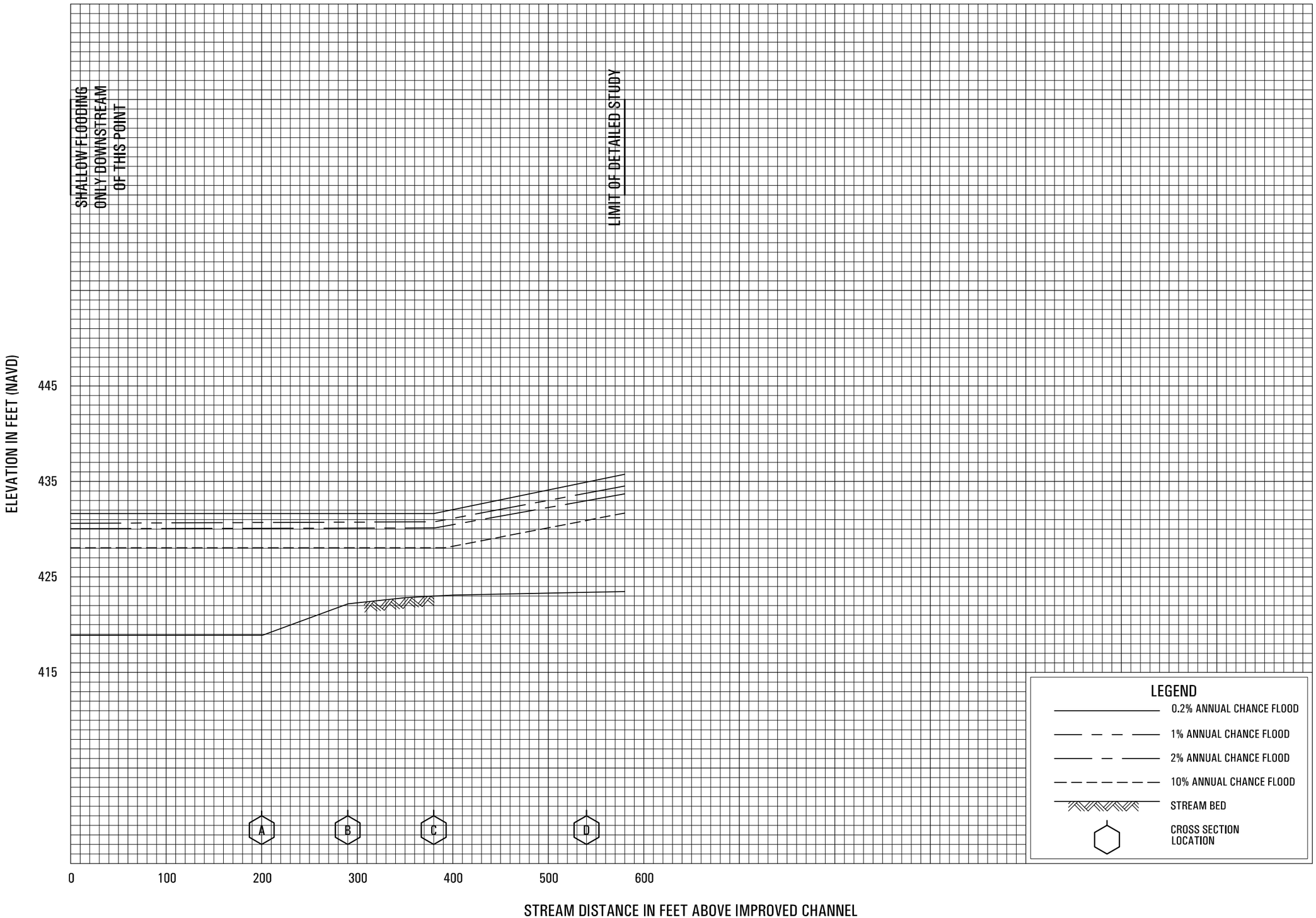
LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

HACIENDA CREEK

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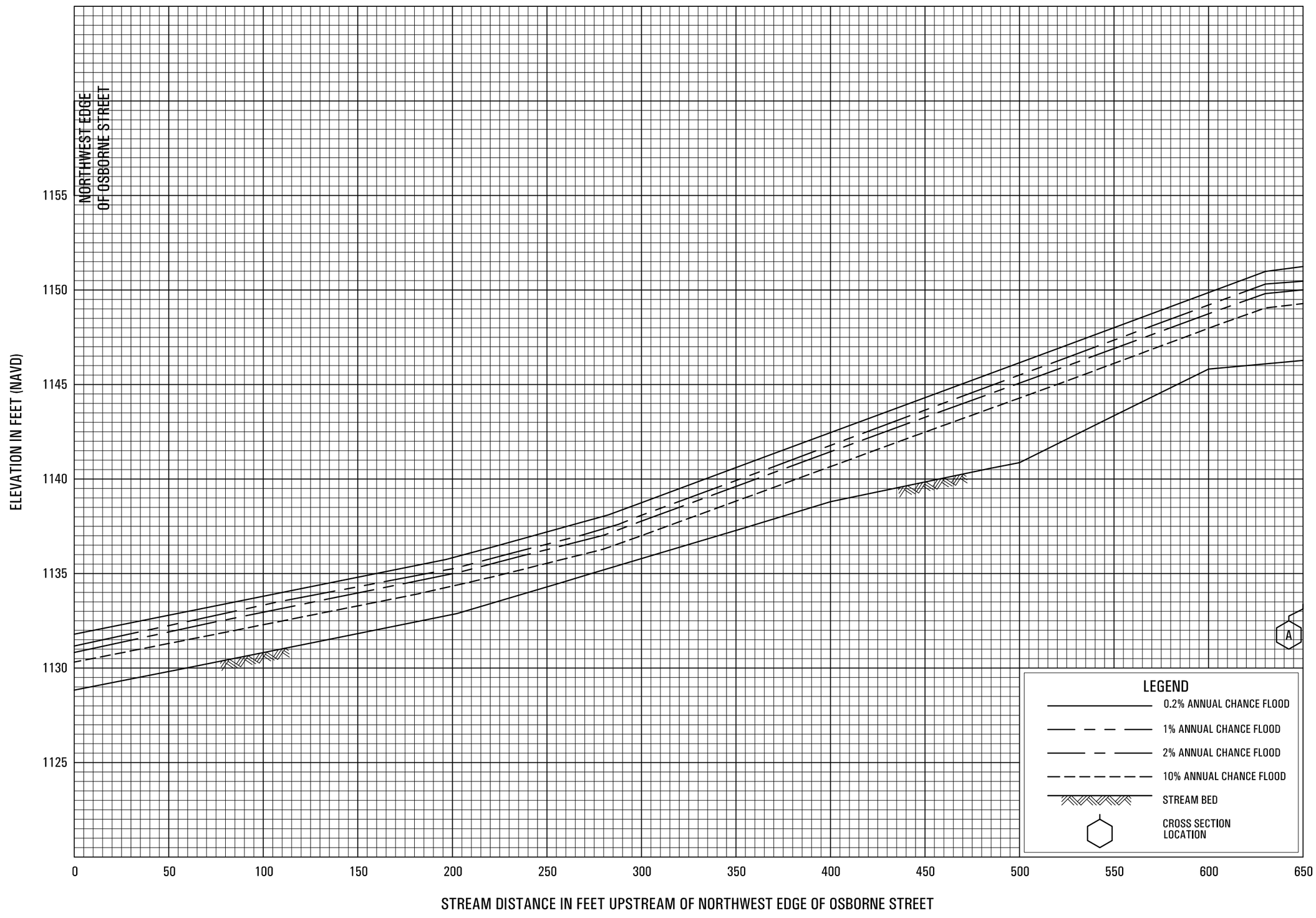


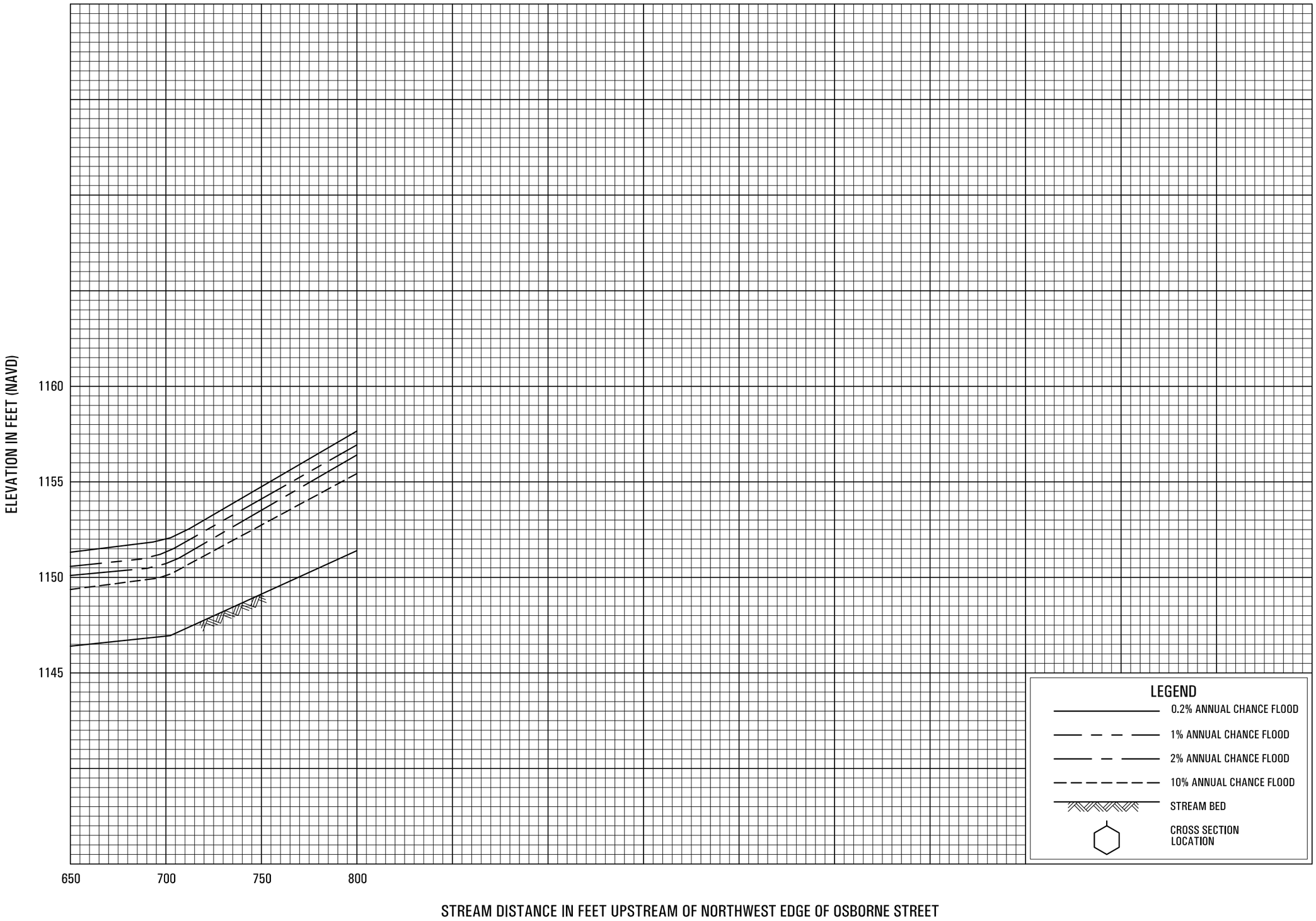
FLOOD PROFILES

KAGEL CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

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LOS ANGELES COUNTY, CA

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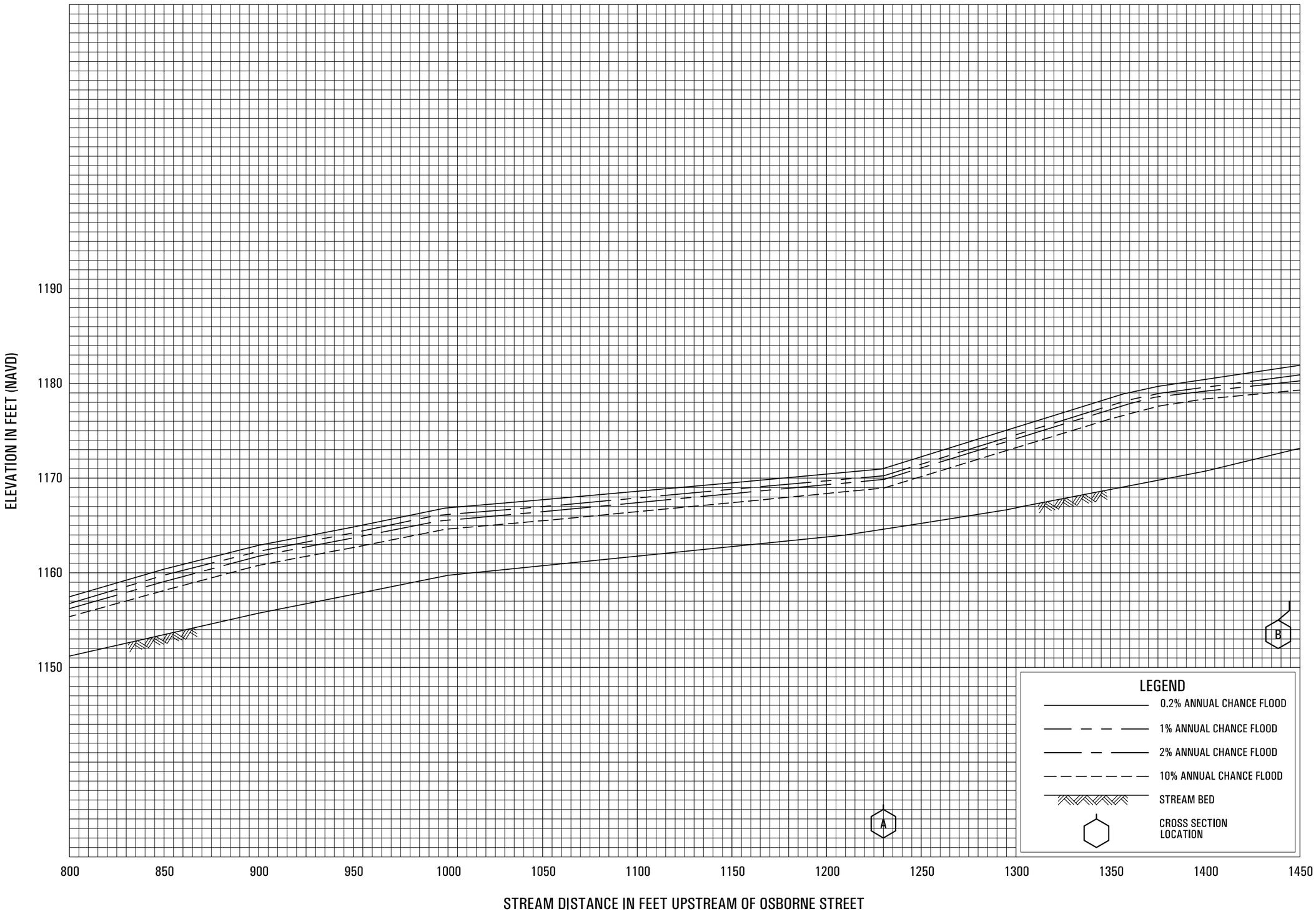

FLOOD PROFILES

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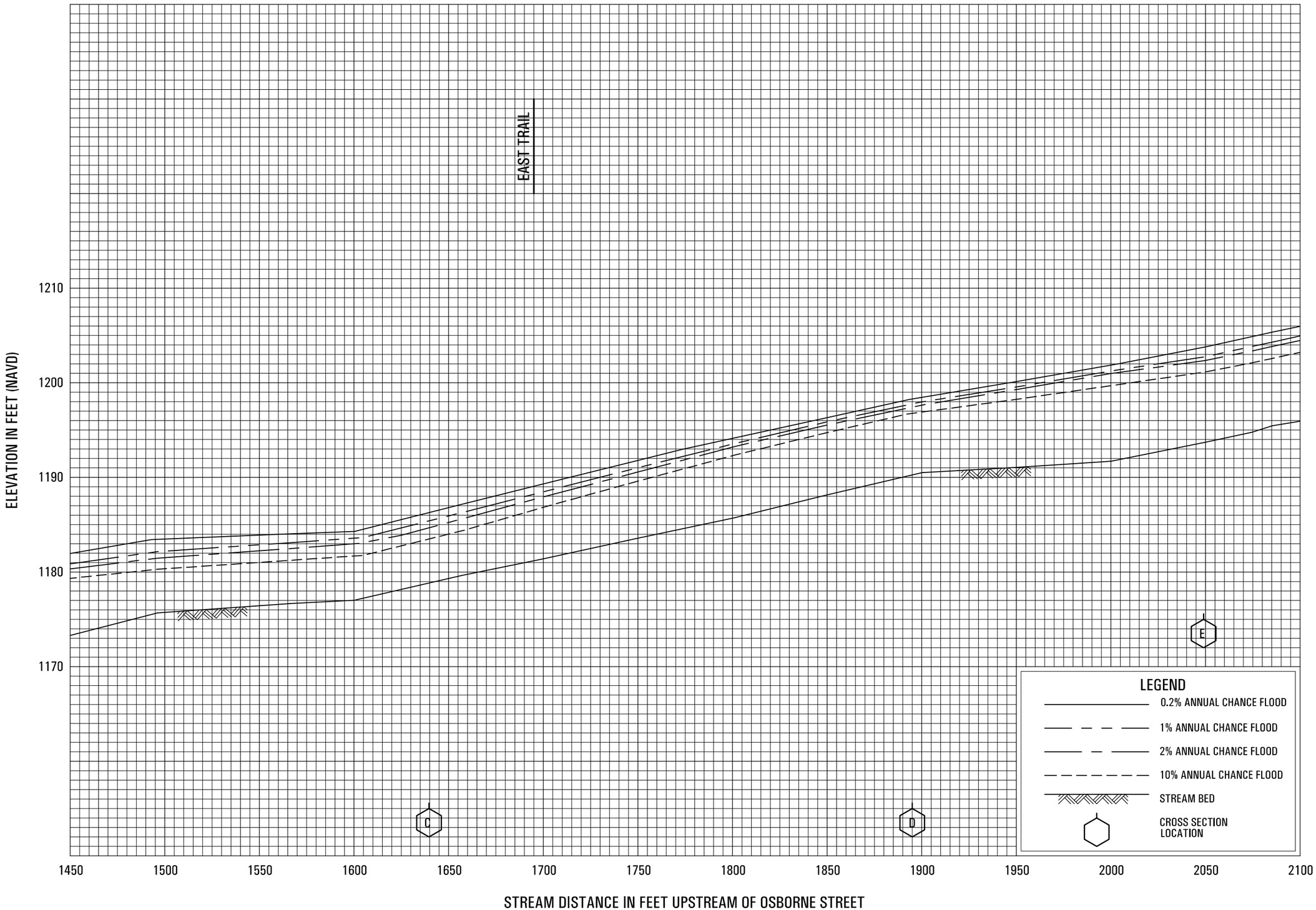

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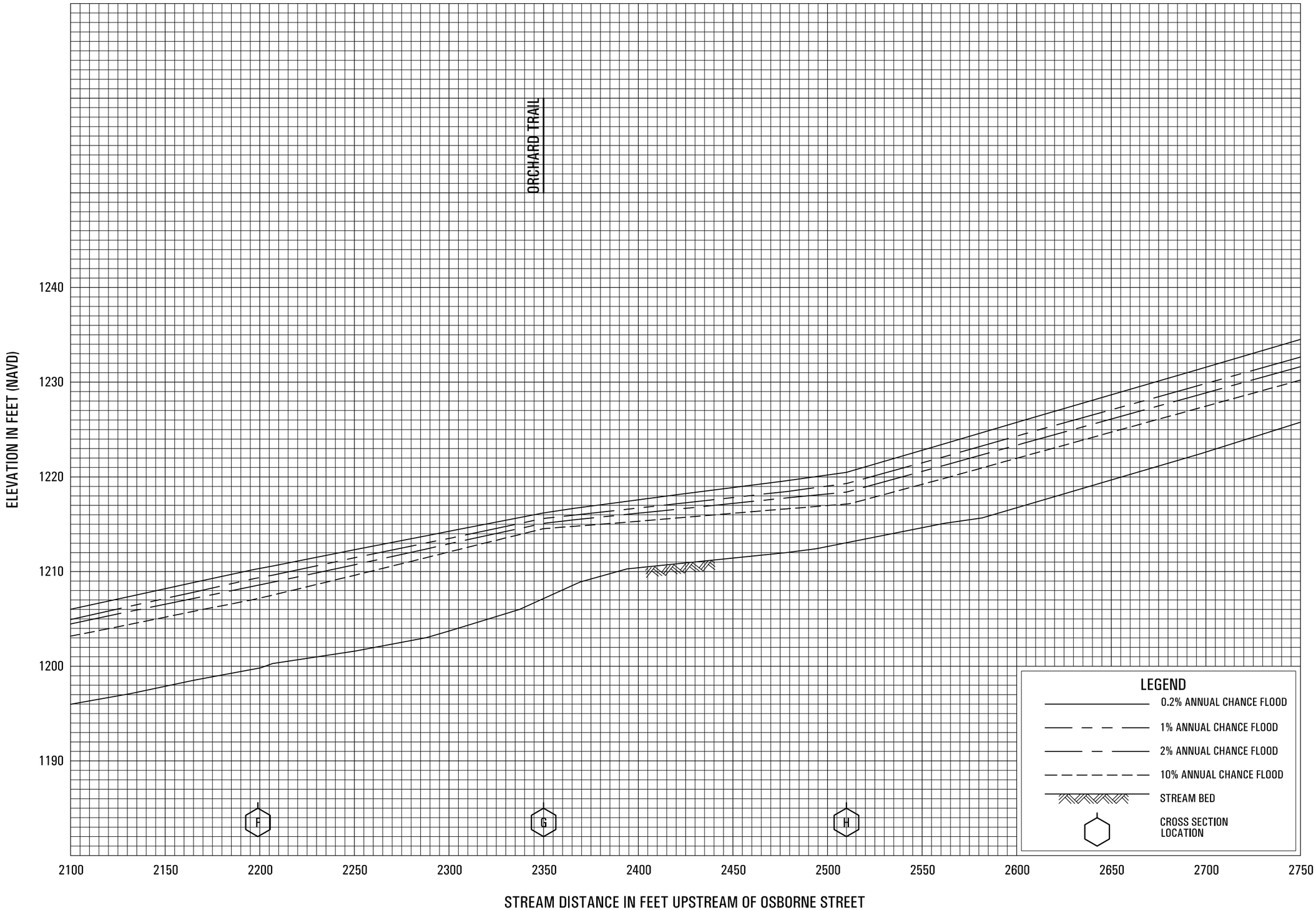

FLOOD PROFILES

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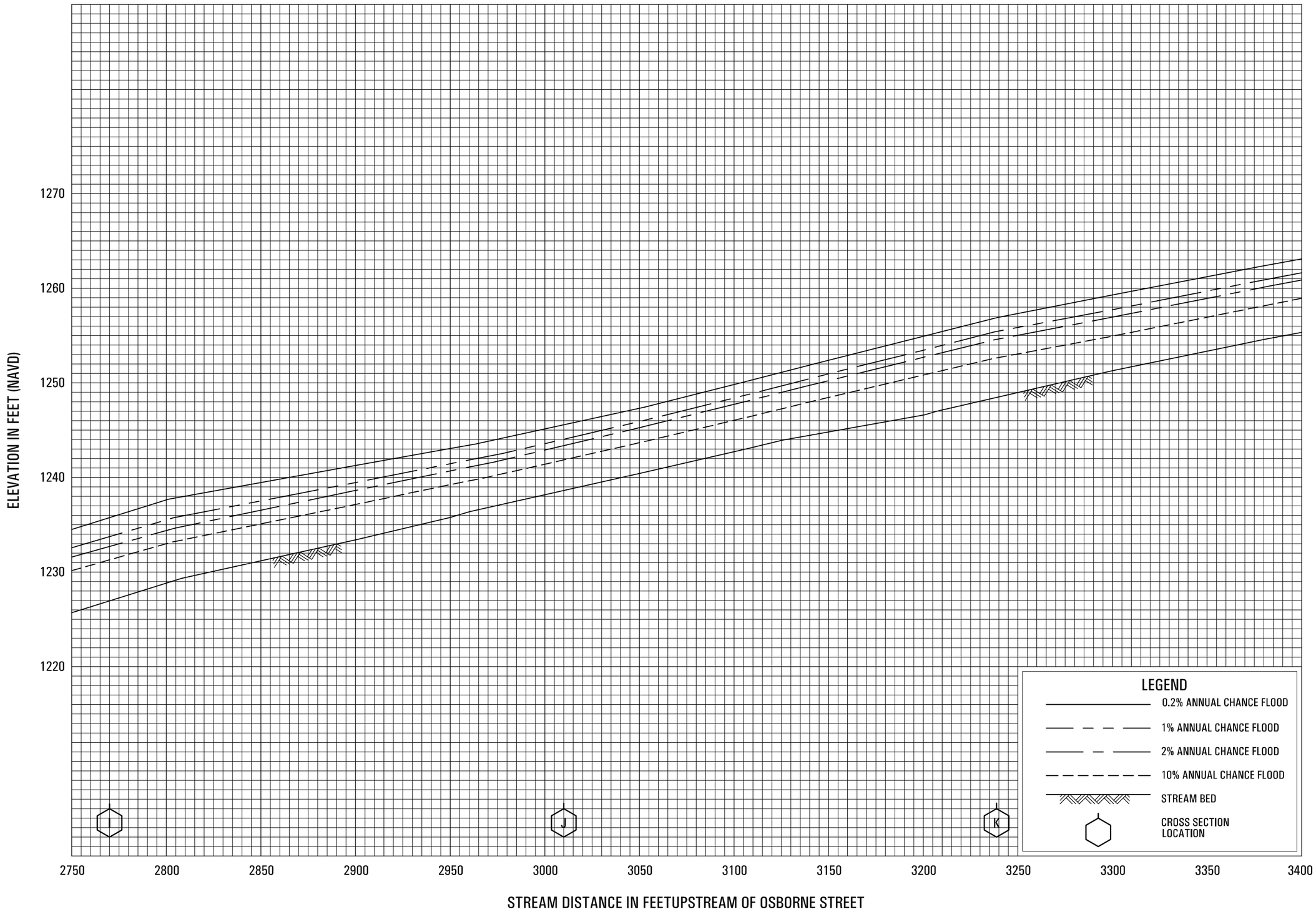

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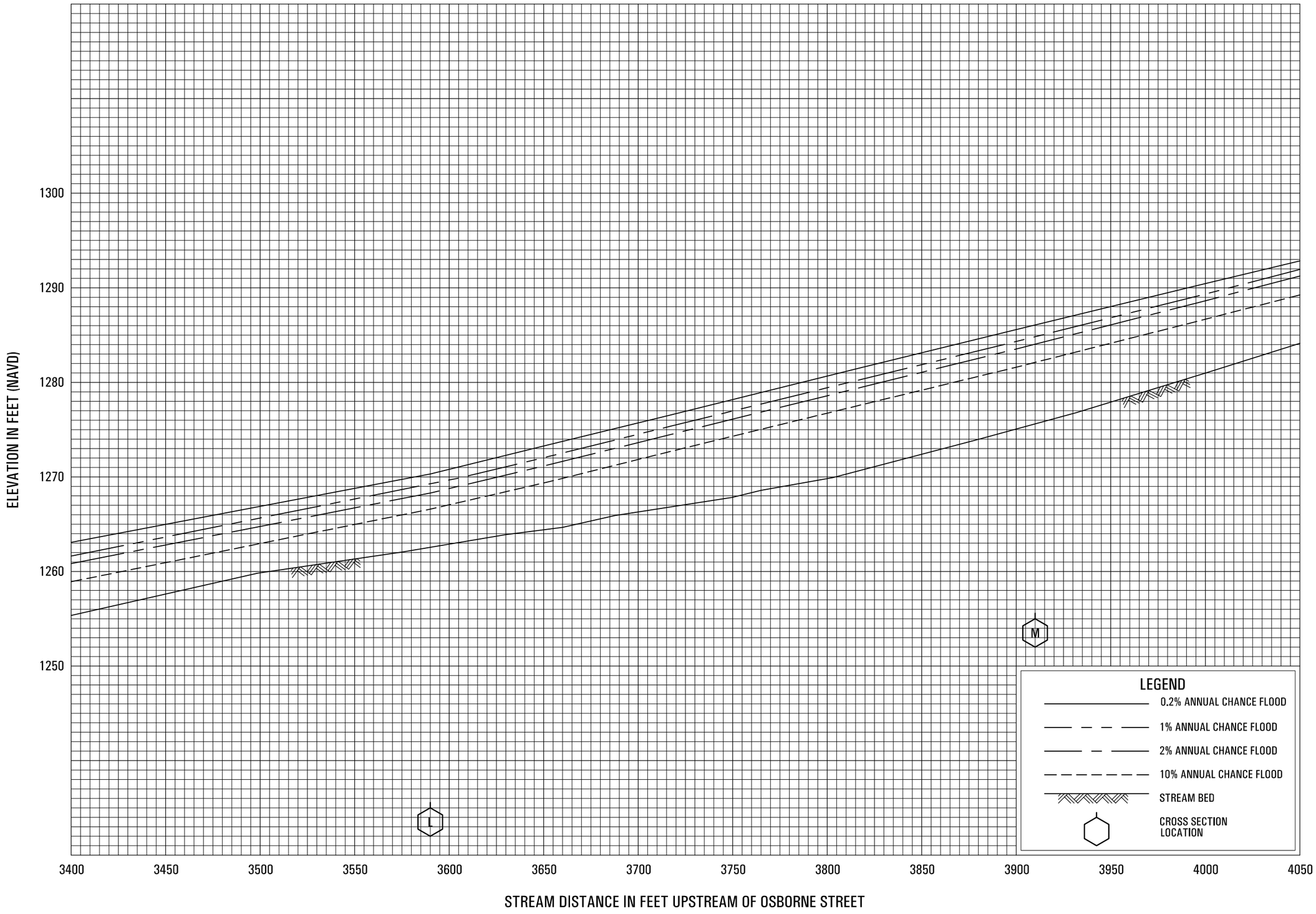

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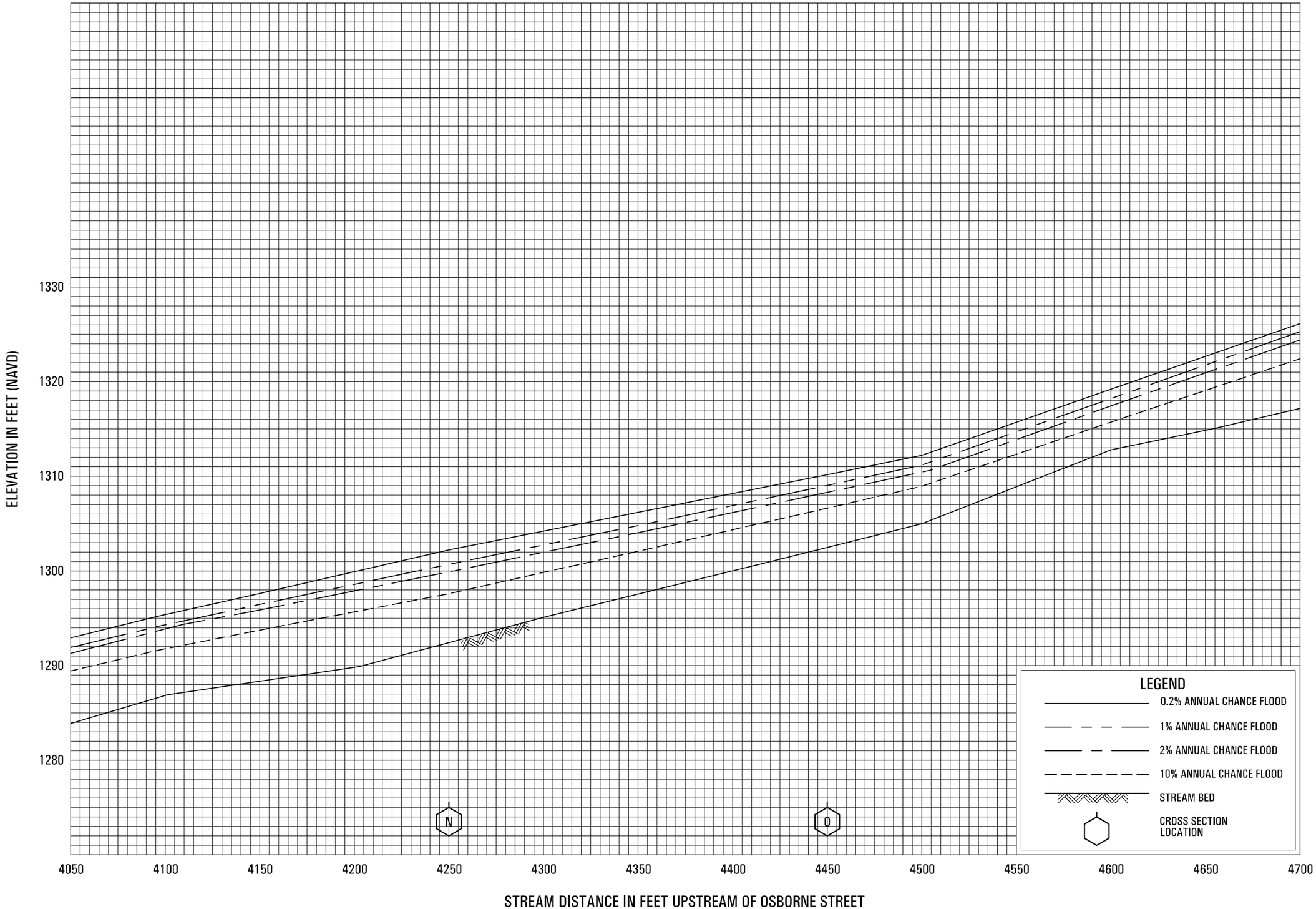

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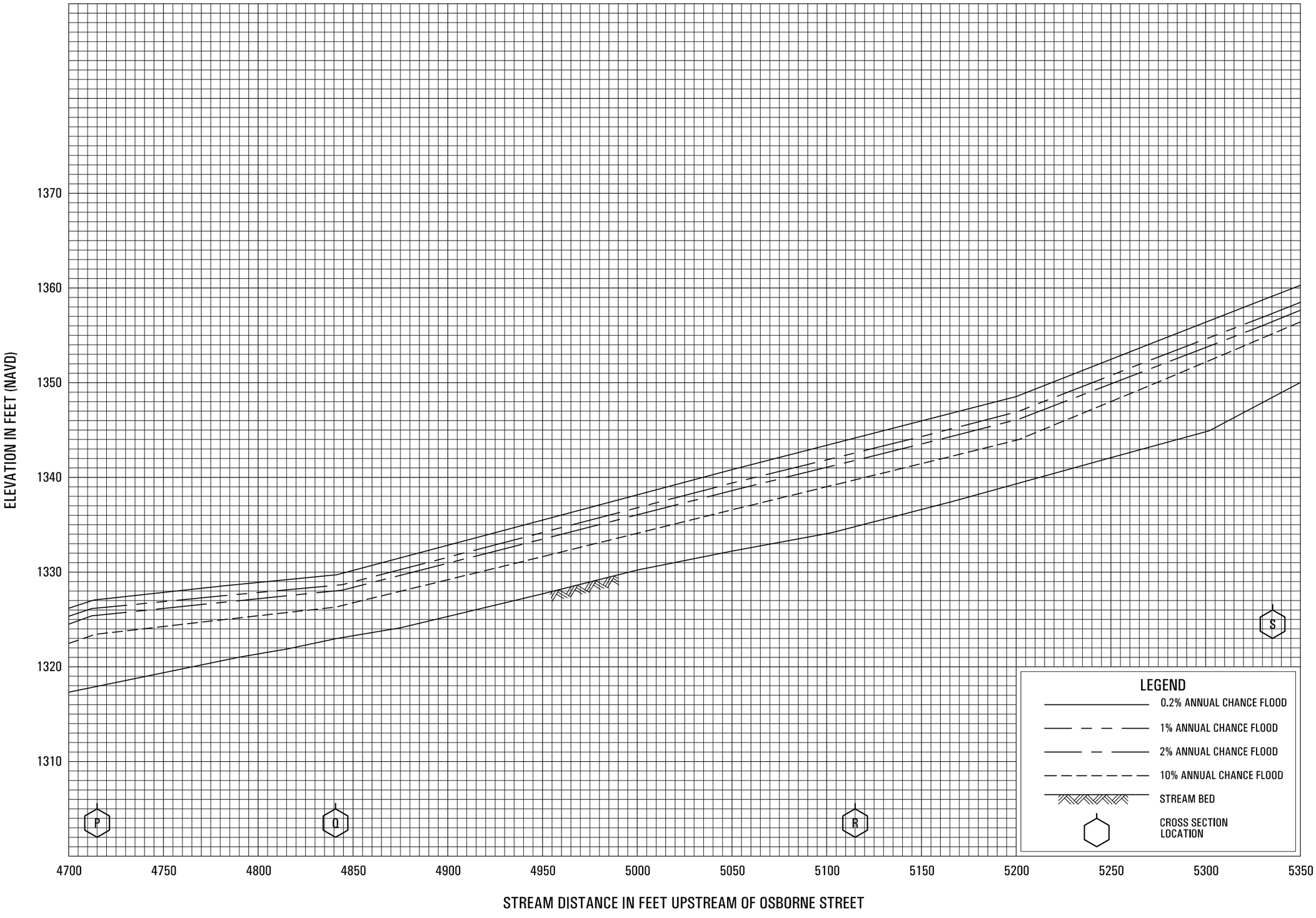

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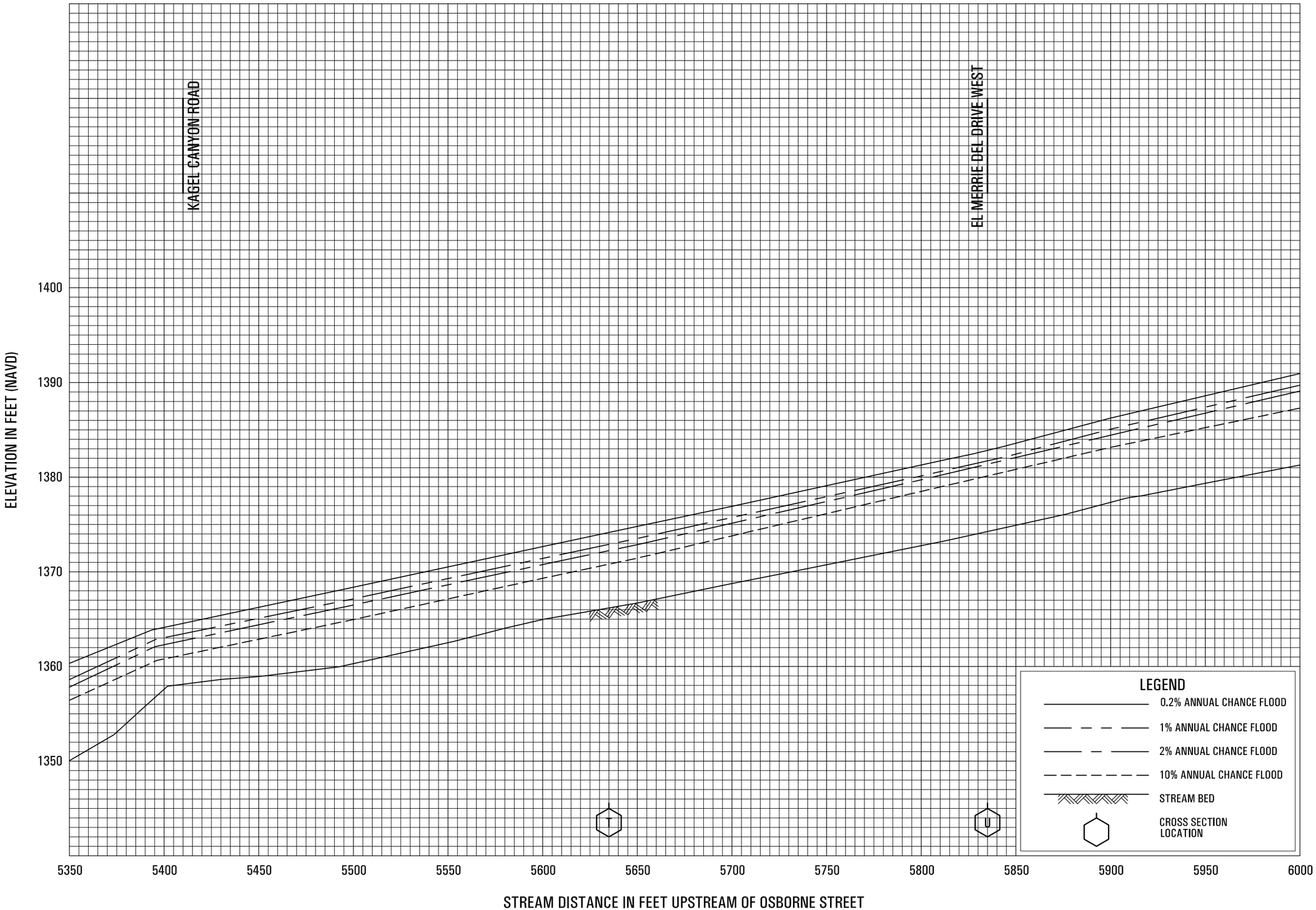

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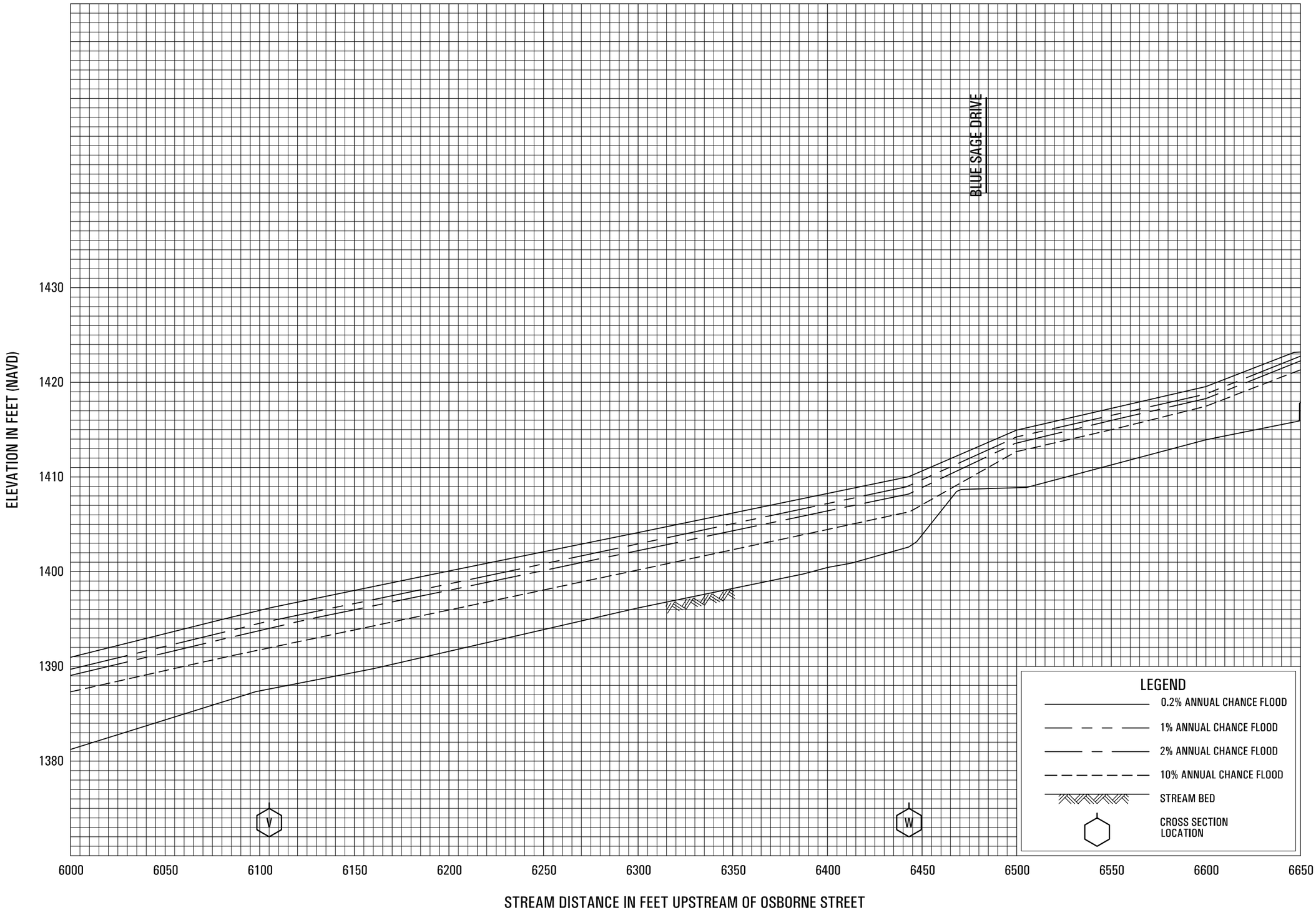

FLOOD PROFILES

KAGEL CANYON

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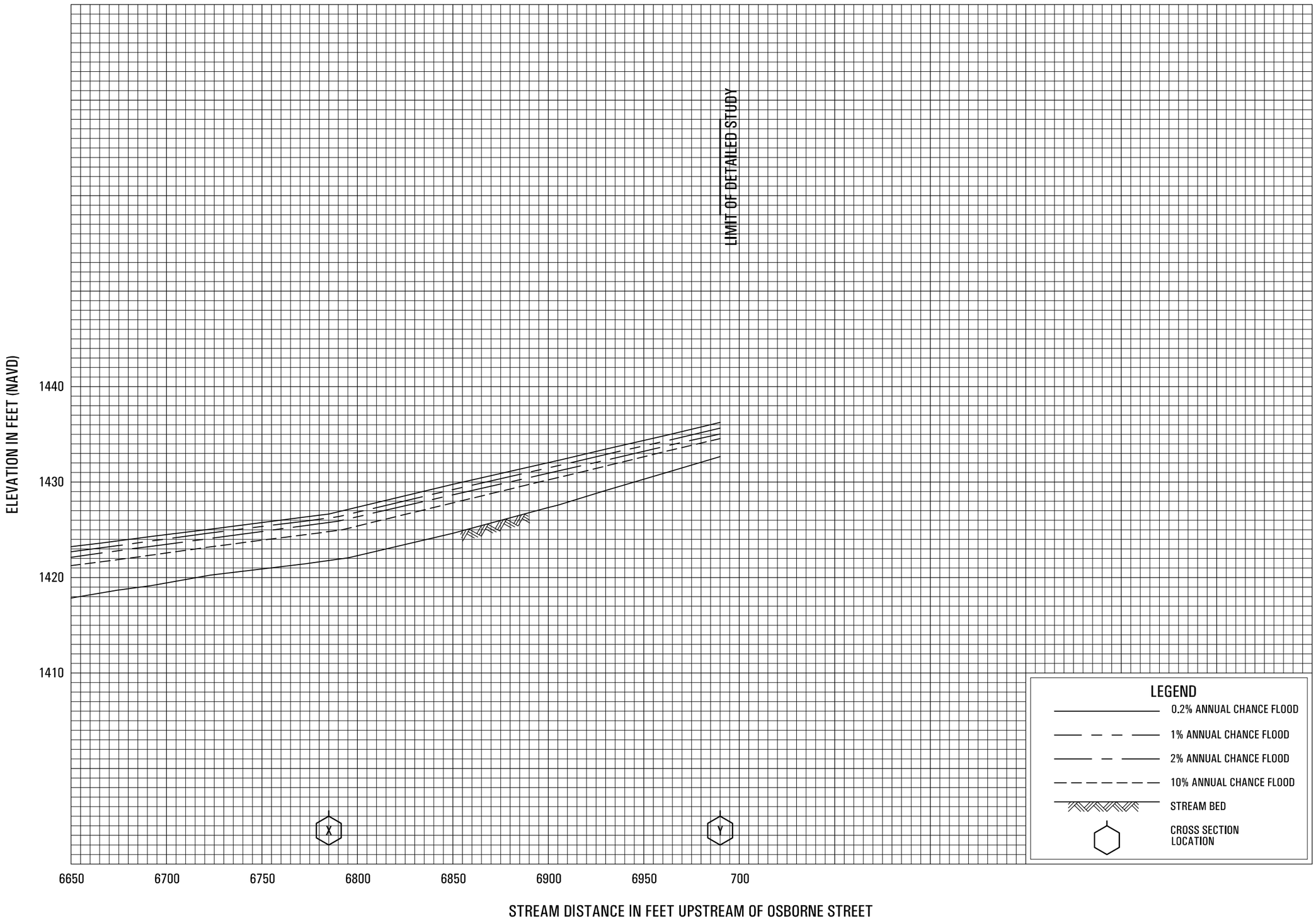

FLOOD PROFILES

KAGEL CANYON

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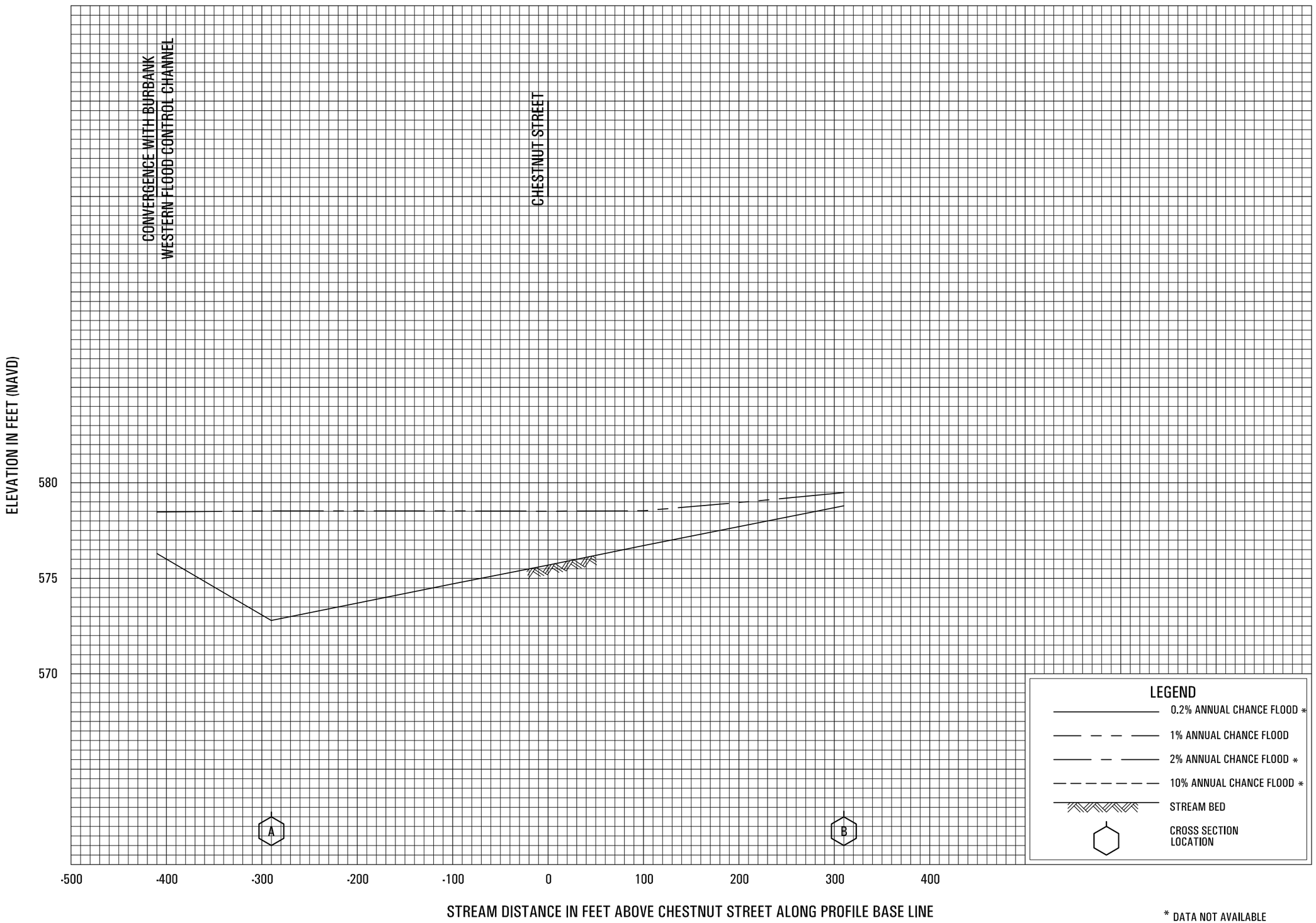

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FLOOD PROFILES

LAKE STREET OVERFLOW

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LOS ANGELES COUNTY, CA

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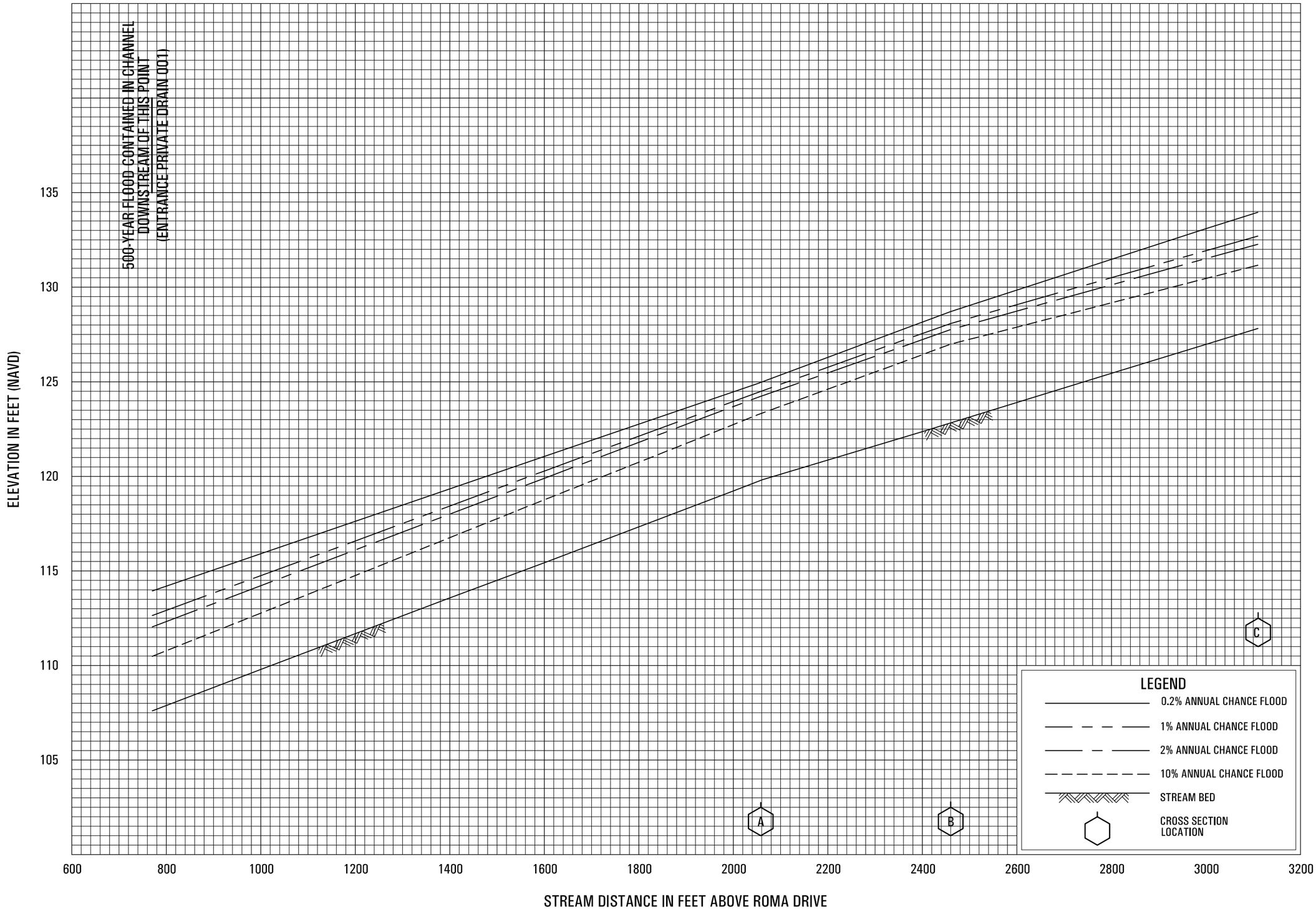


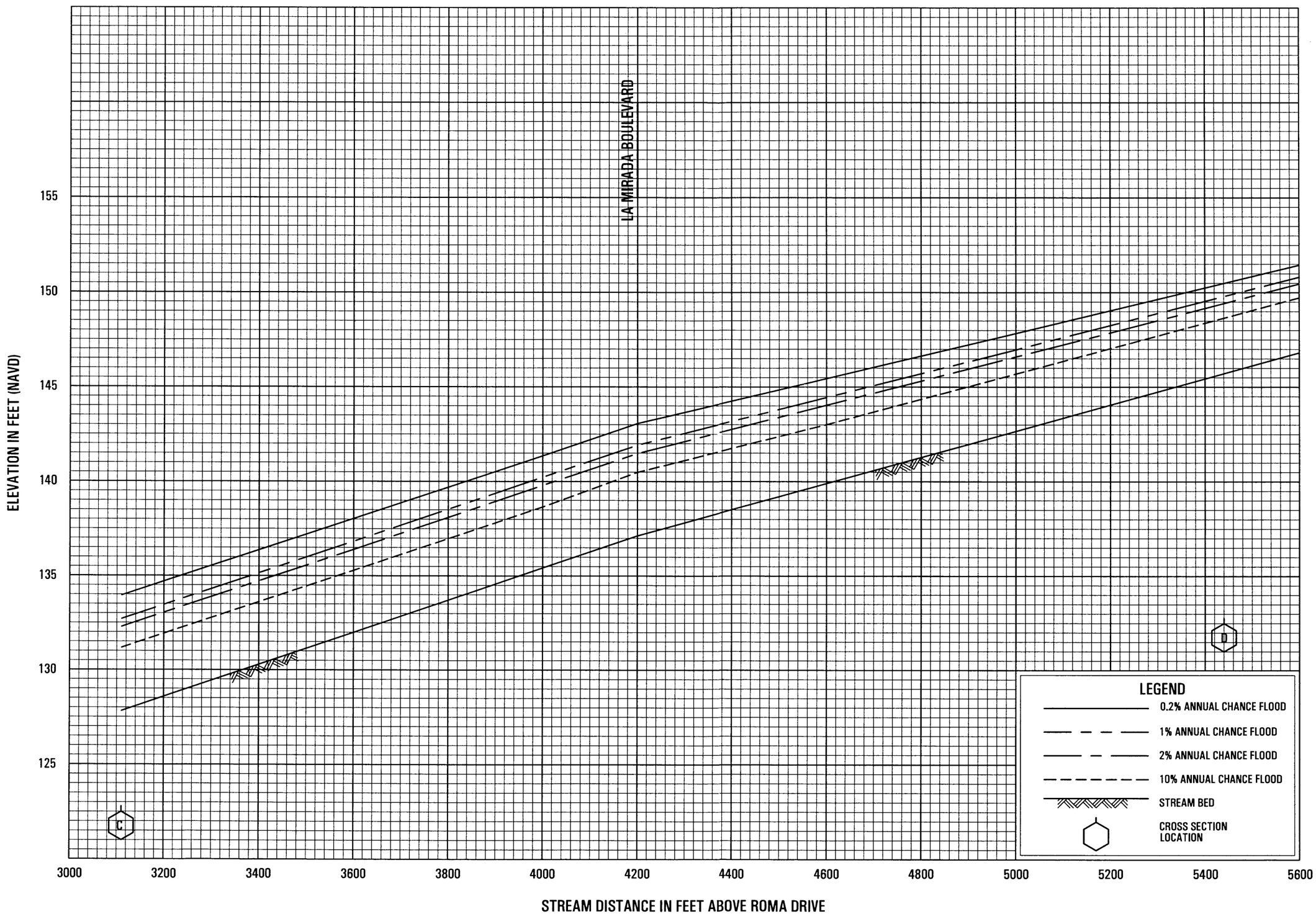
FLOOD PROFILES

LA MIRADA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



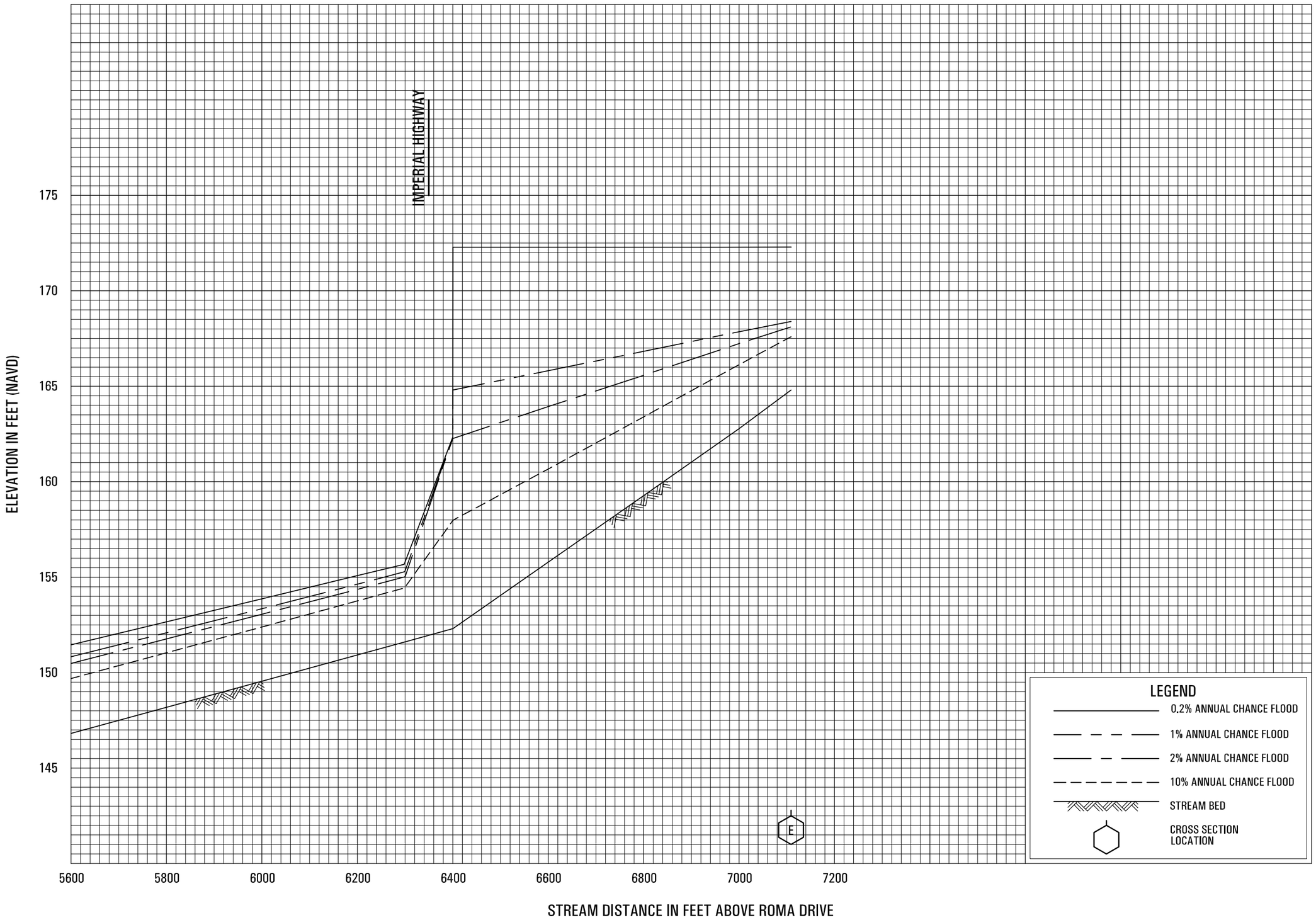
FLOOD PROFILES

LA MIRADA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

LA MIRADA CREEK

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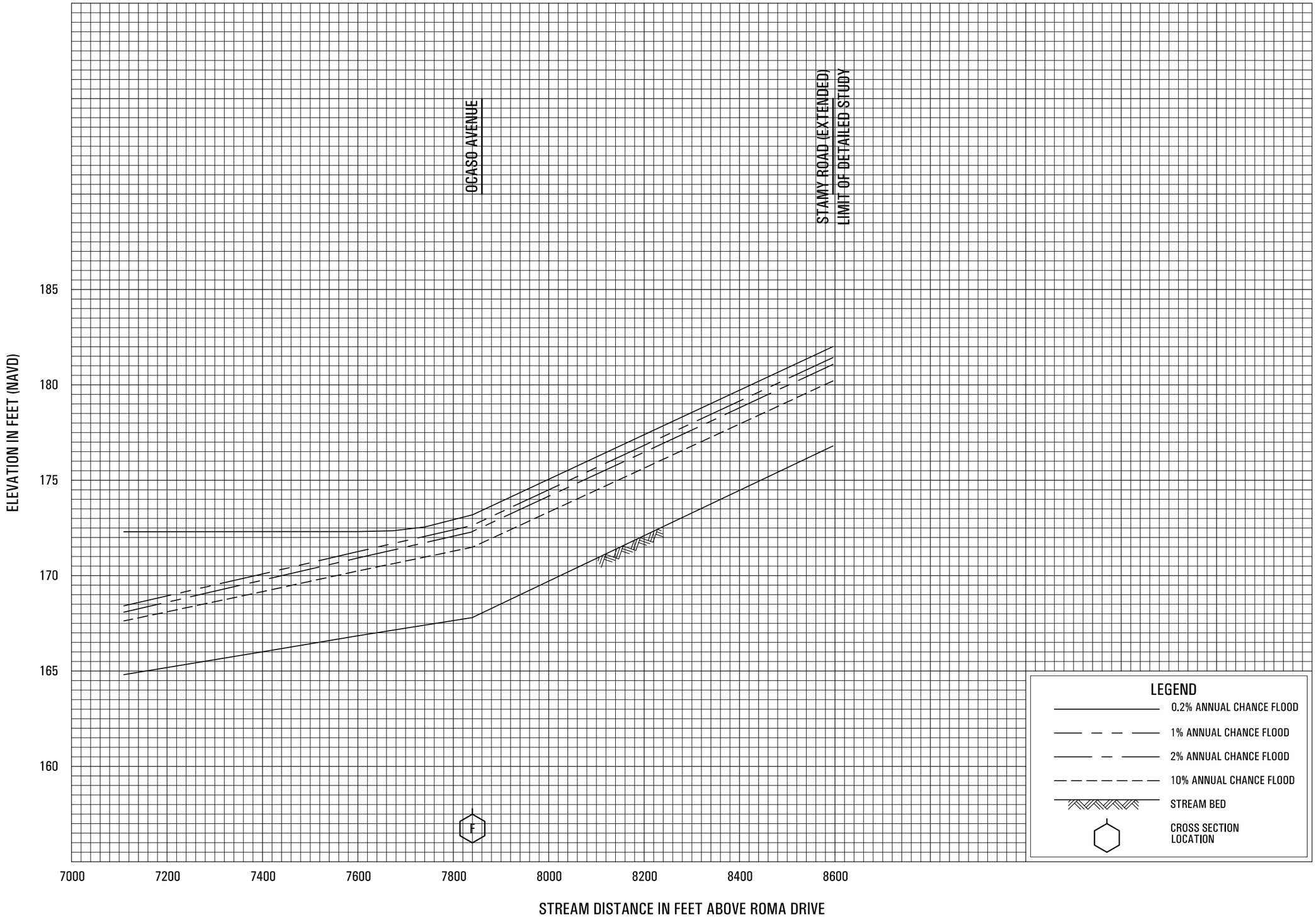

FLOOD PROFILES

LA MIRADA CREEK

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LOS ANGELES COUNTY, CA

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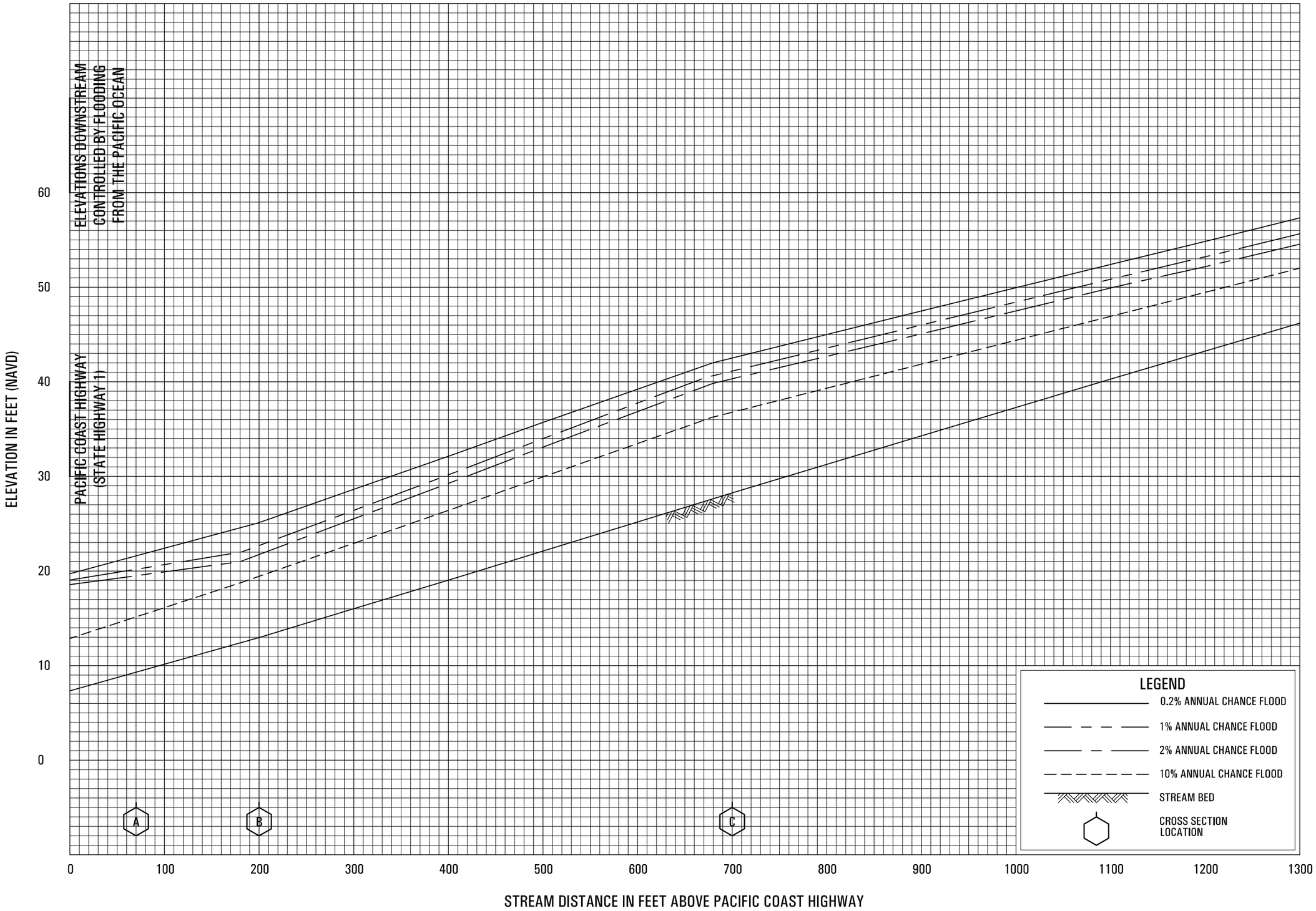

FLOOD PROFILES

LAS FLORES CANYON

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LOS ANGELES COUNTY, CA

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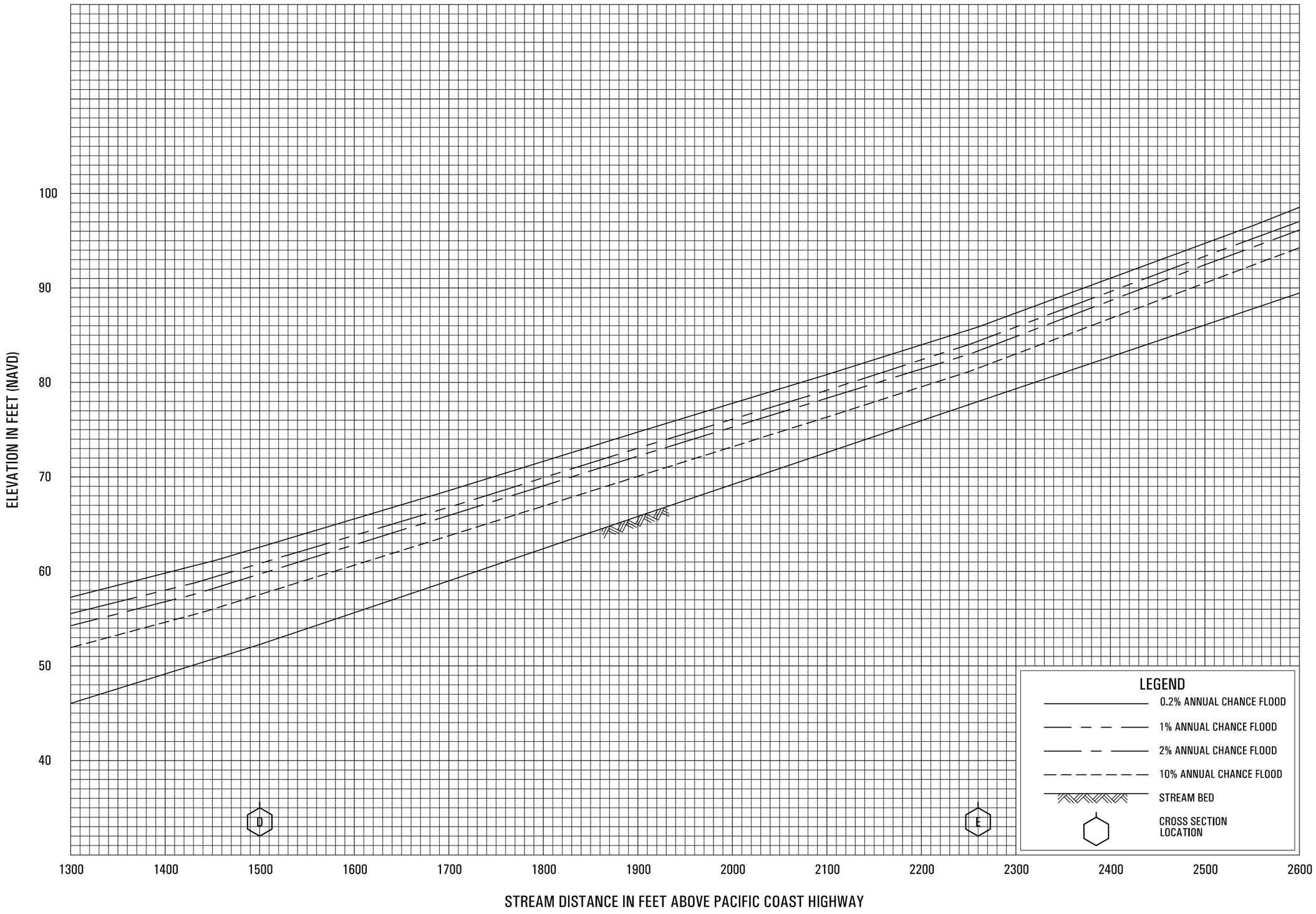

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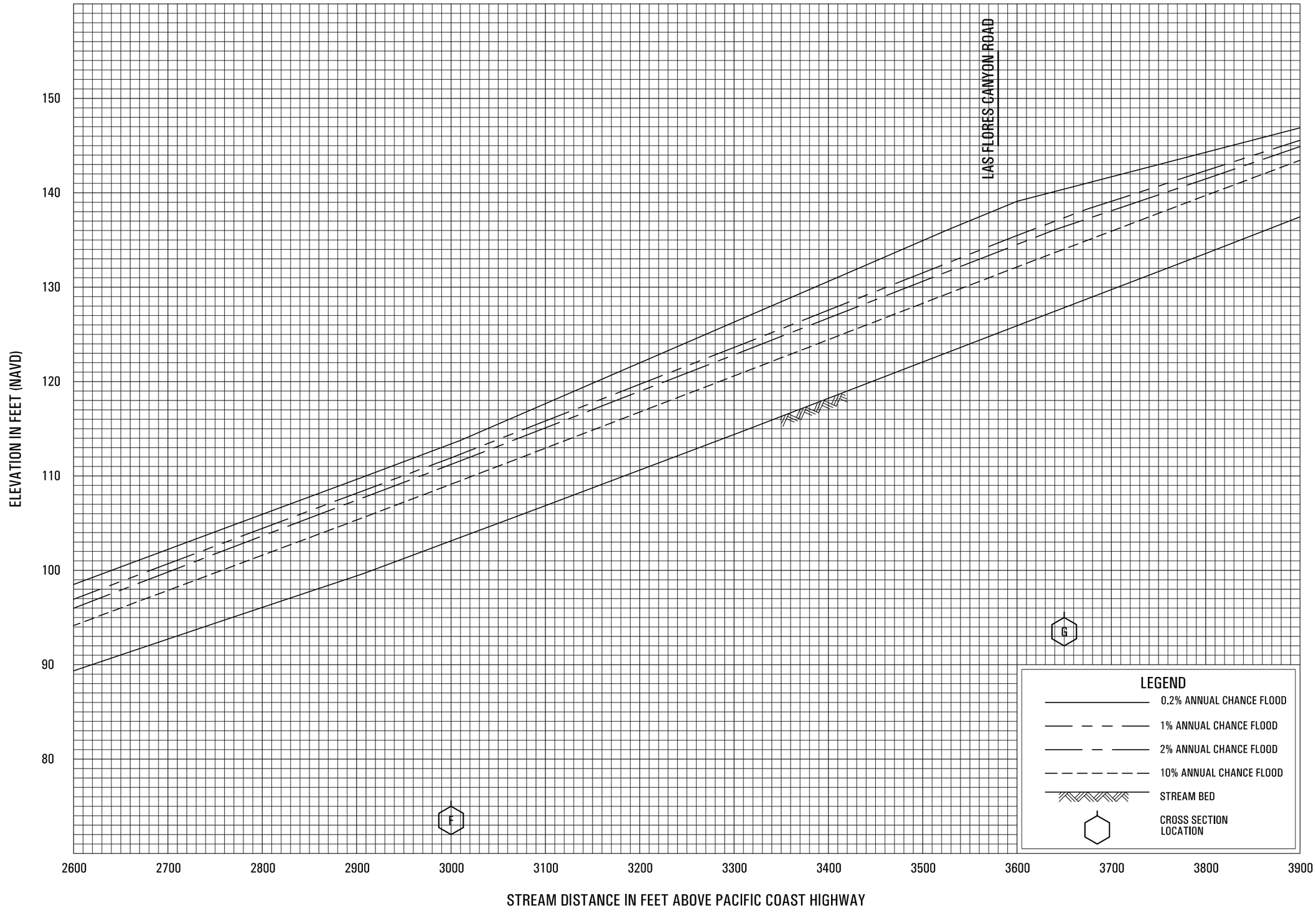

FLOOD PROFILES

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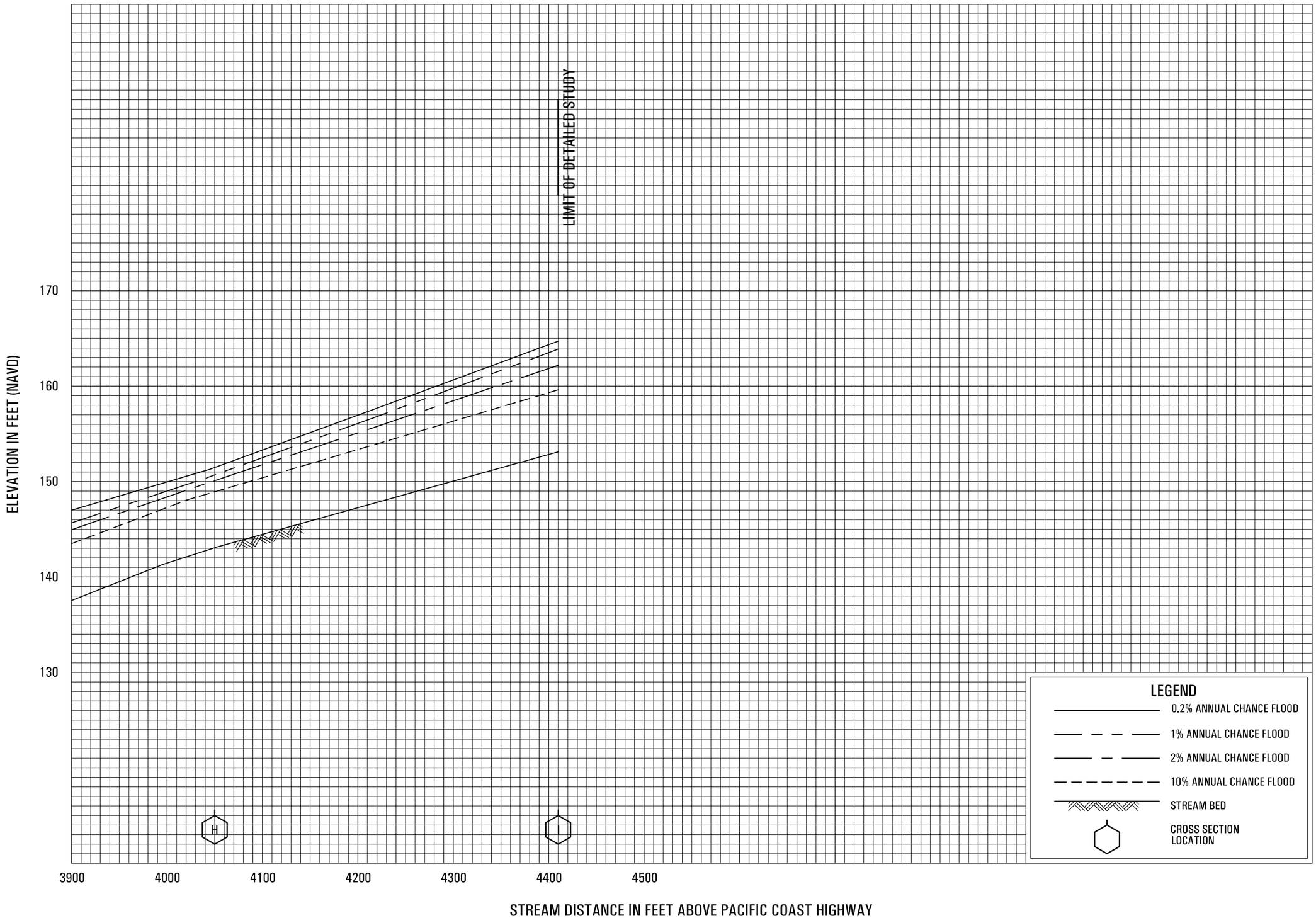

FLOOD PROFILES

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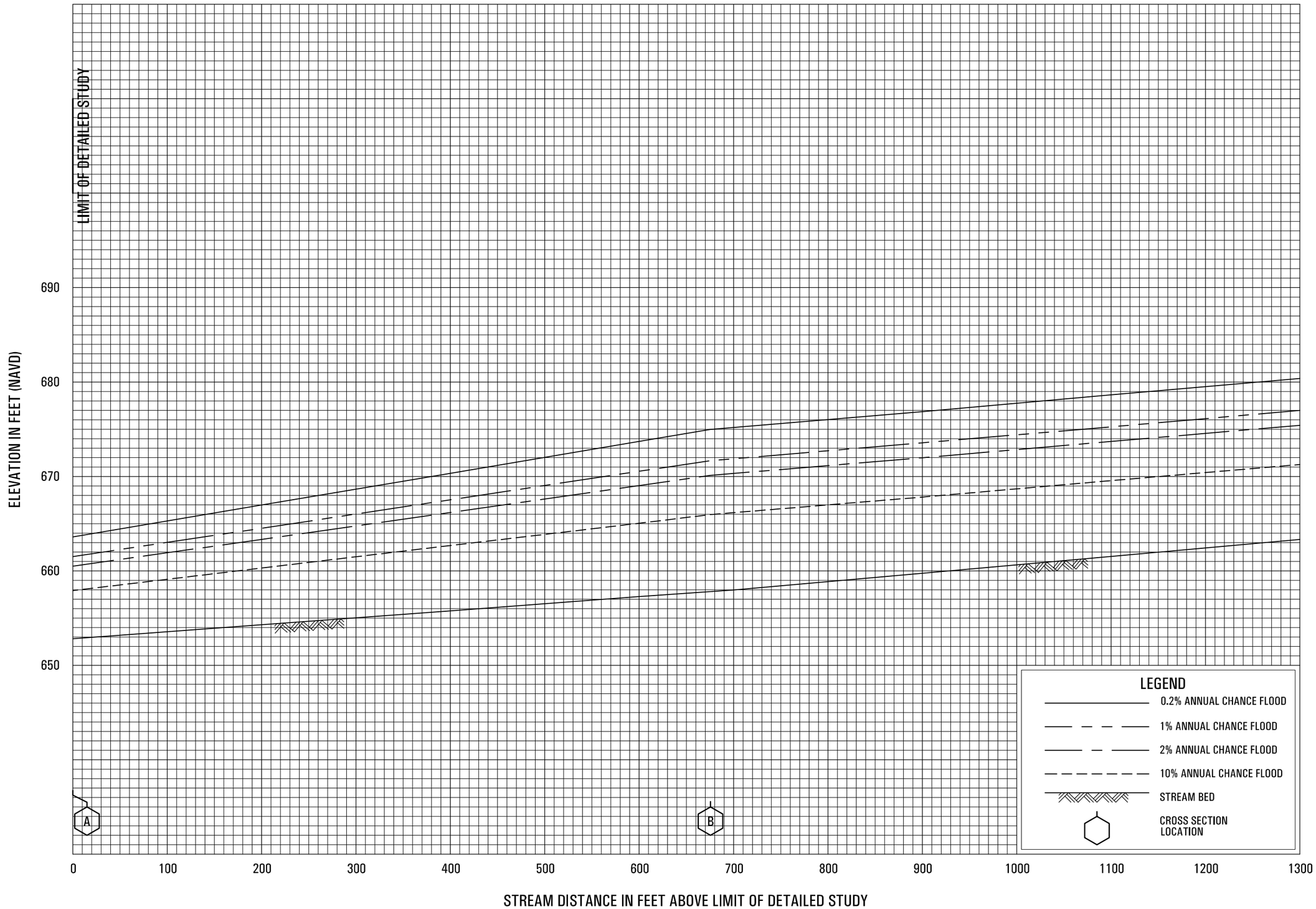

FLOOD PROFILES

LAS VIRGENES CREEK

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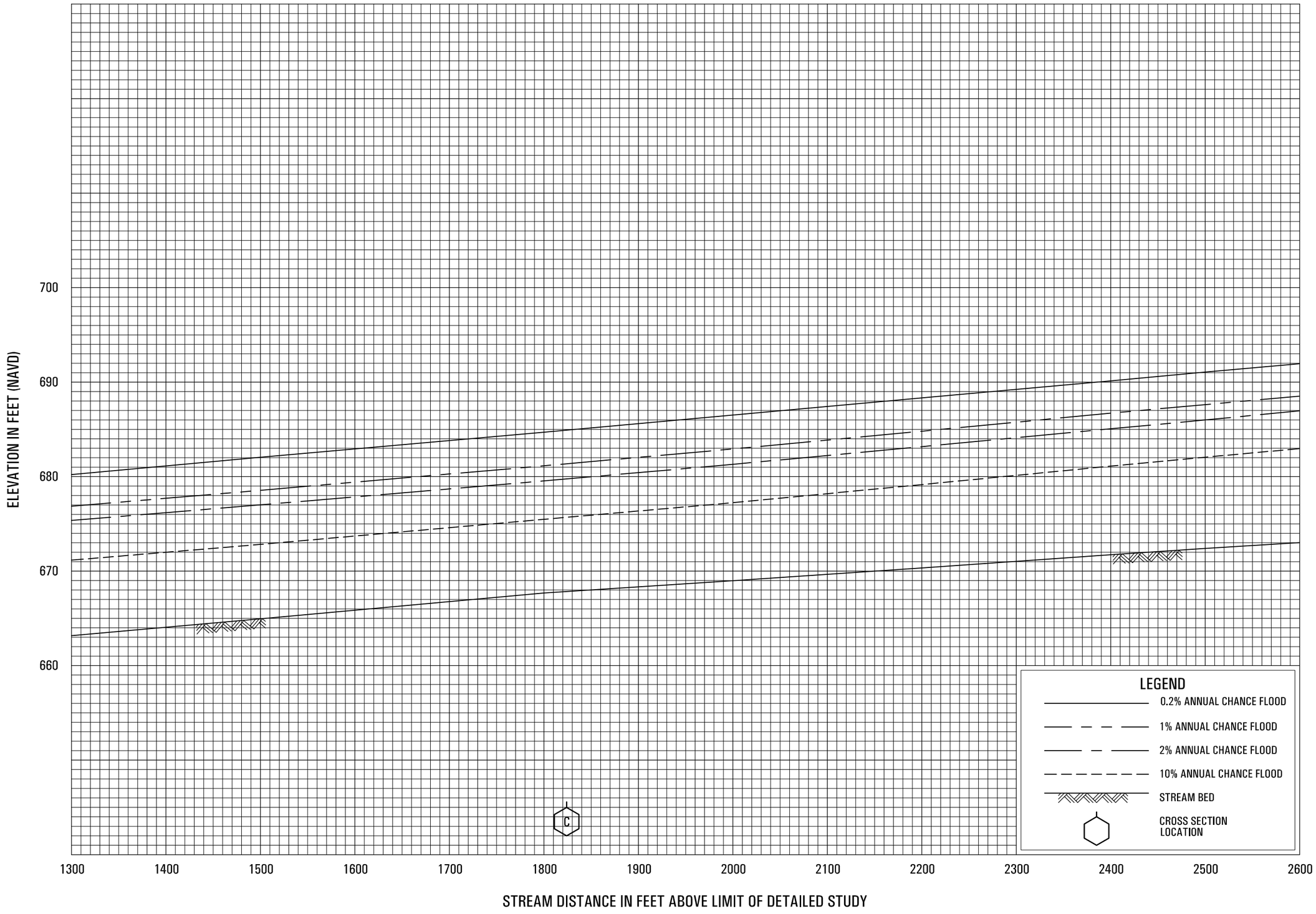

FLOOD PROFILES

LAS VIRGENES CREEK

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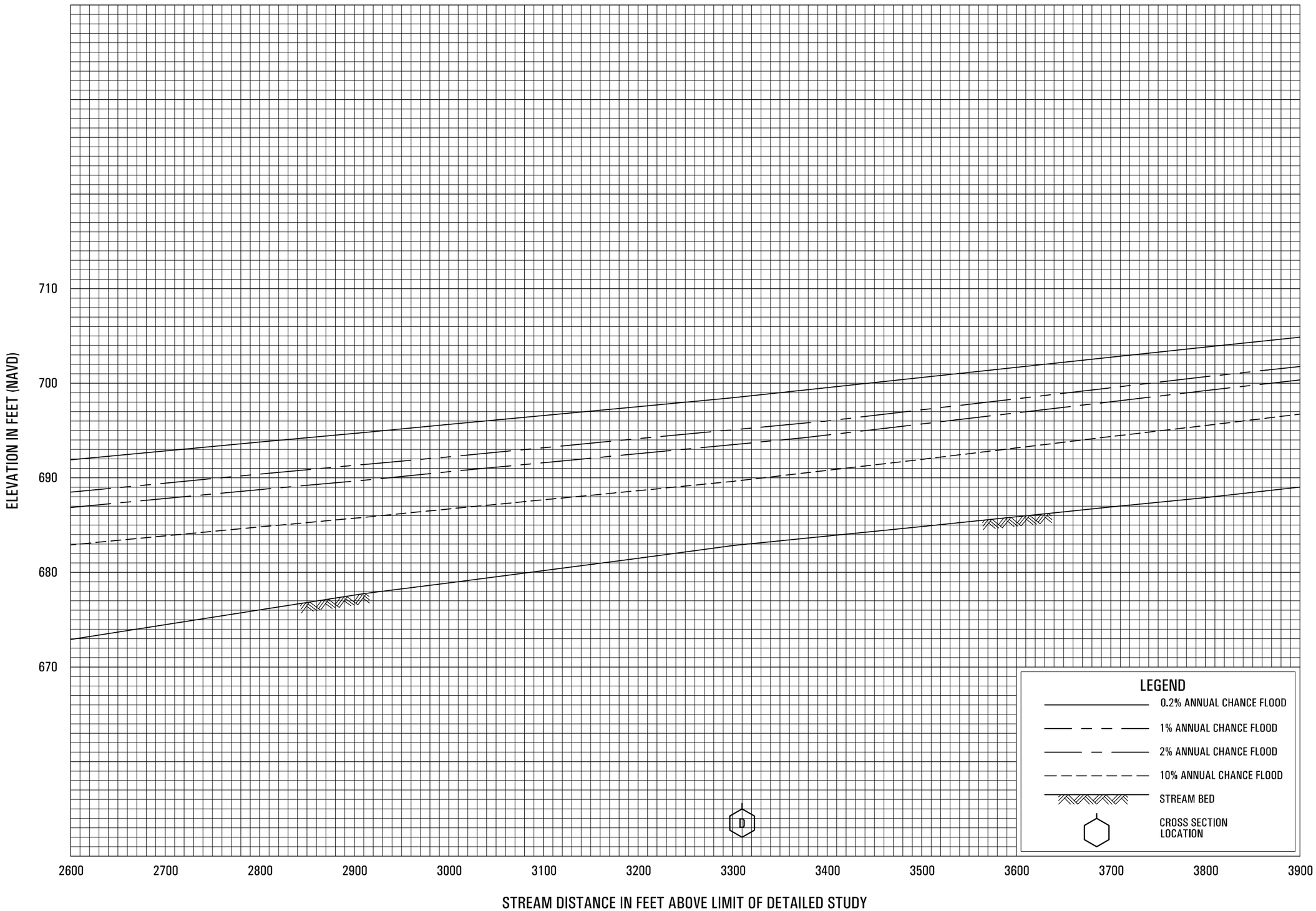

FLOOD PROFILES

LAS VIRGENES CREEK

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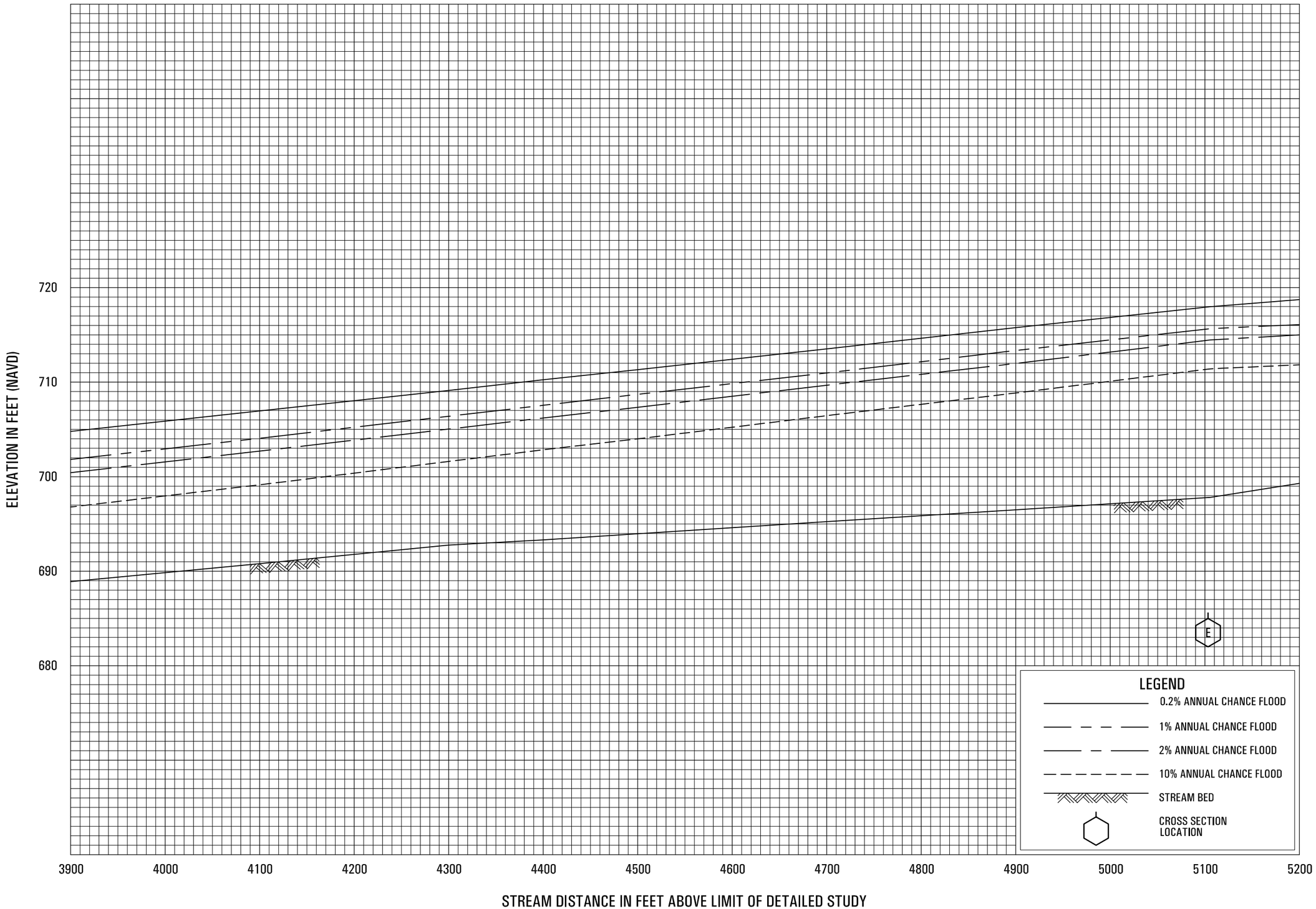

FLOOD PROFILES

LAS VIRGENES CREEK

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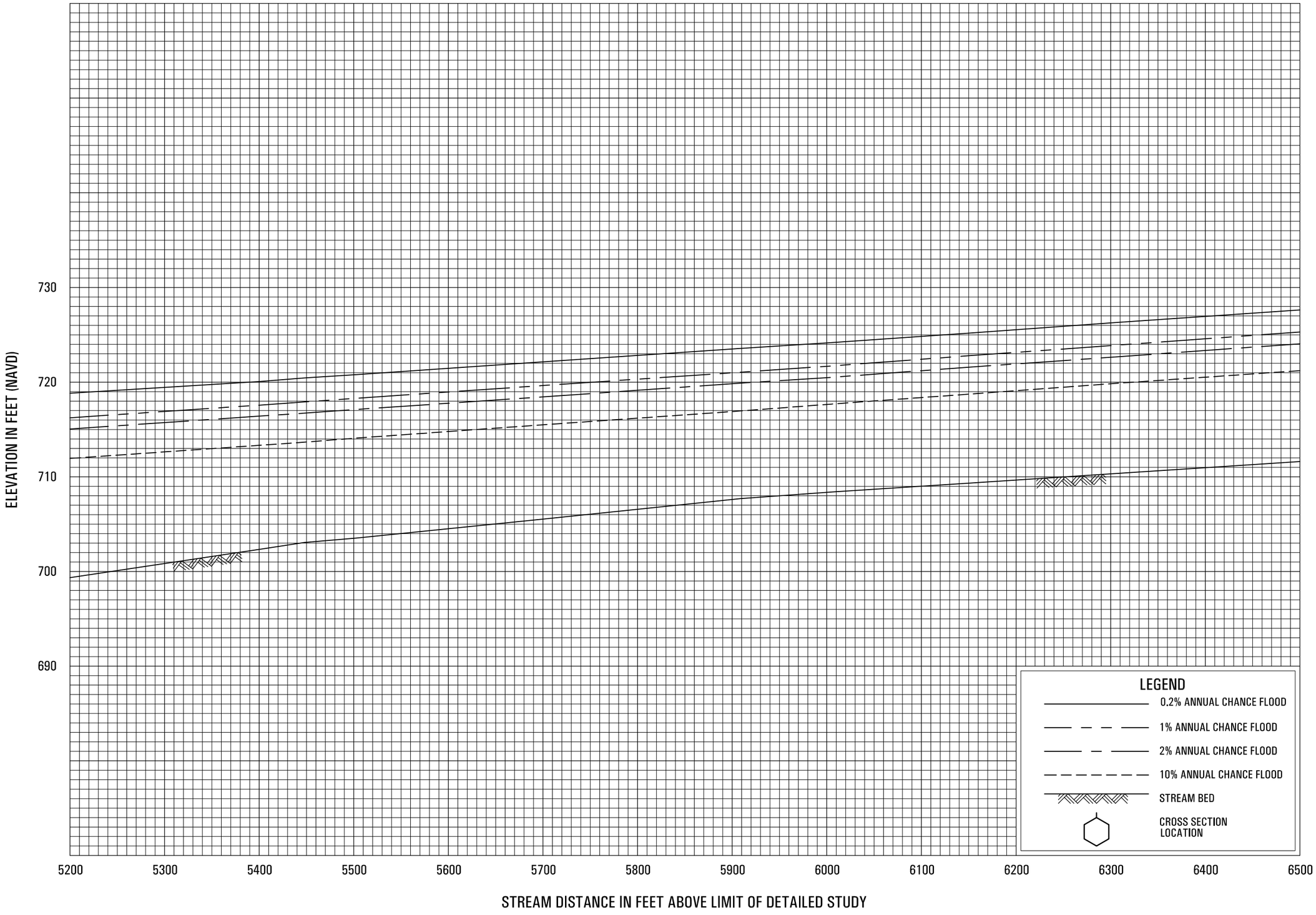

FLOOD PROFILES

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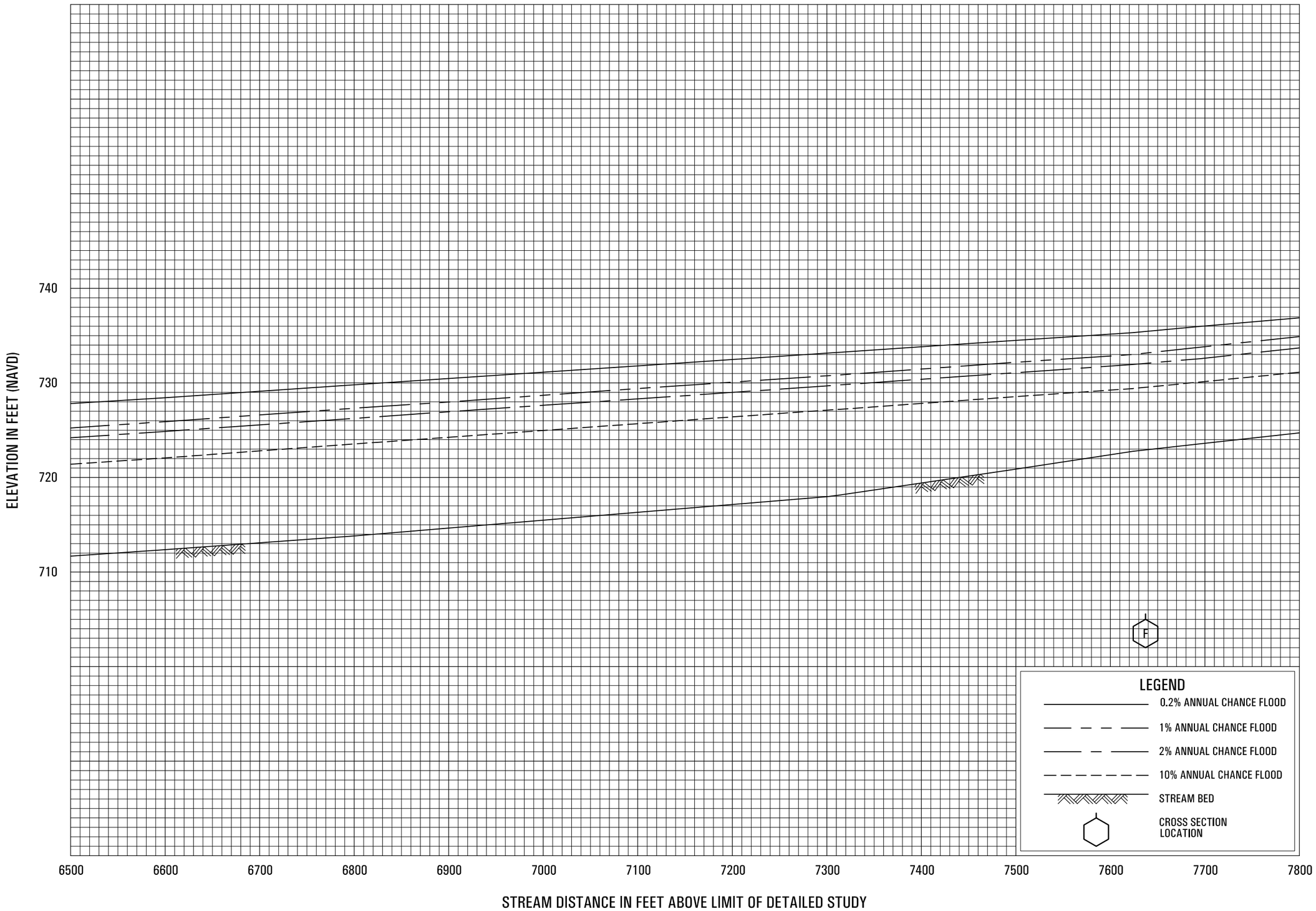

FLOOD PROFILES

LAS VIRGENES CREEK

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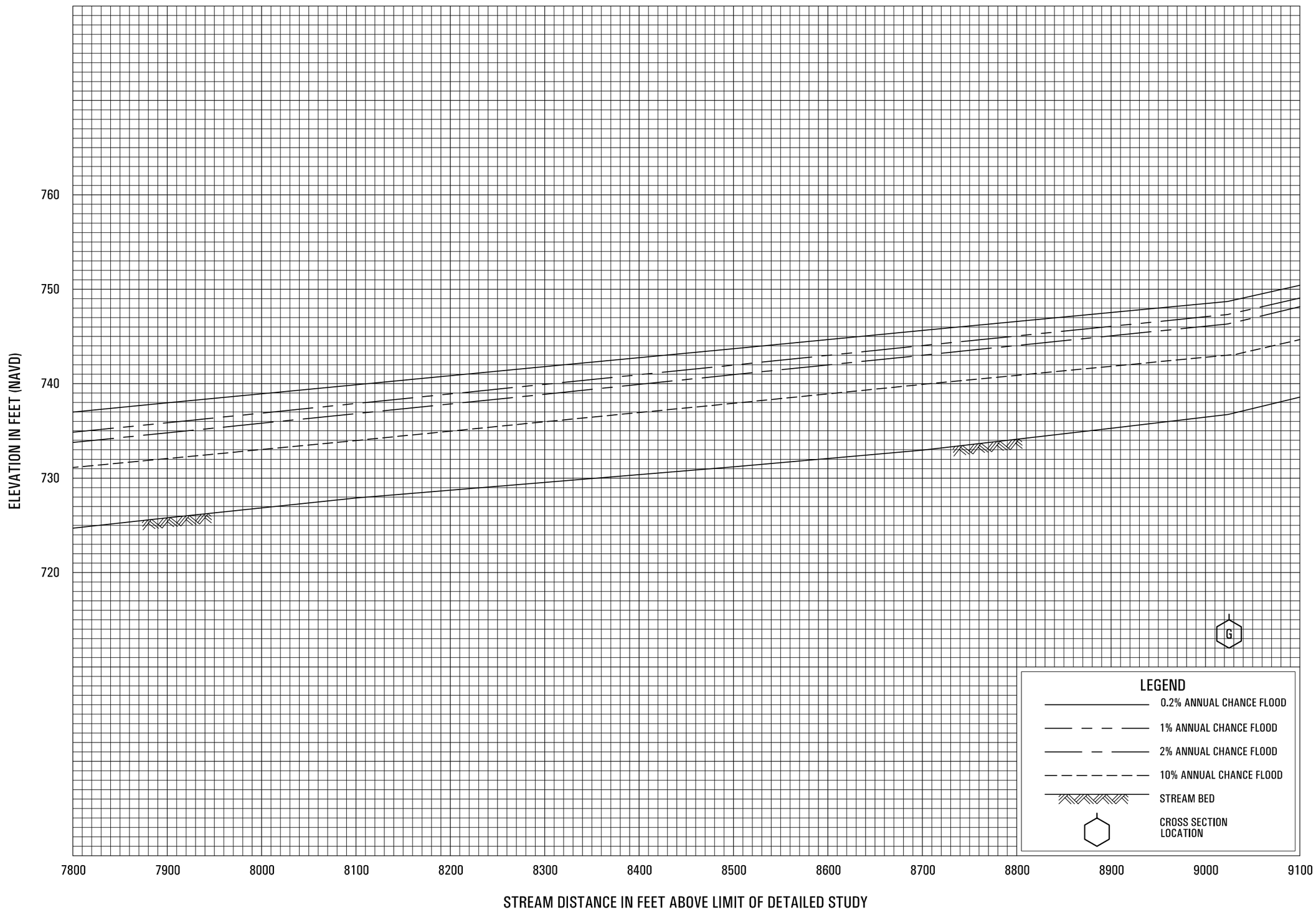

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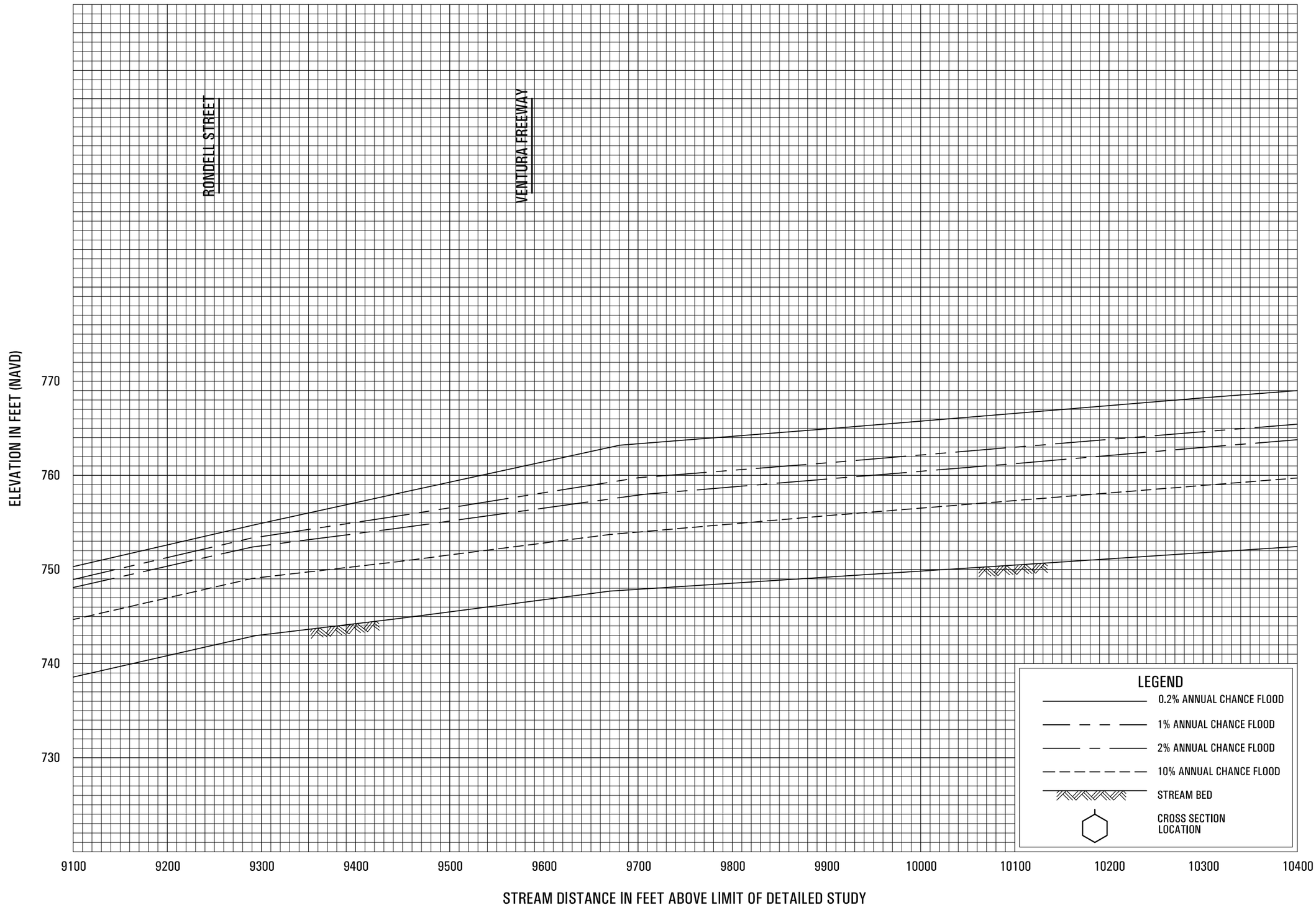

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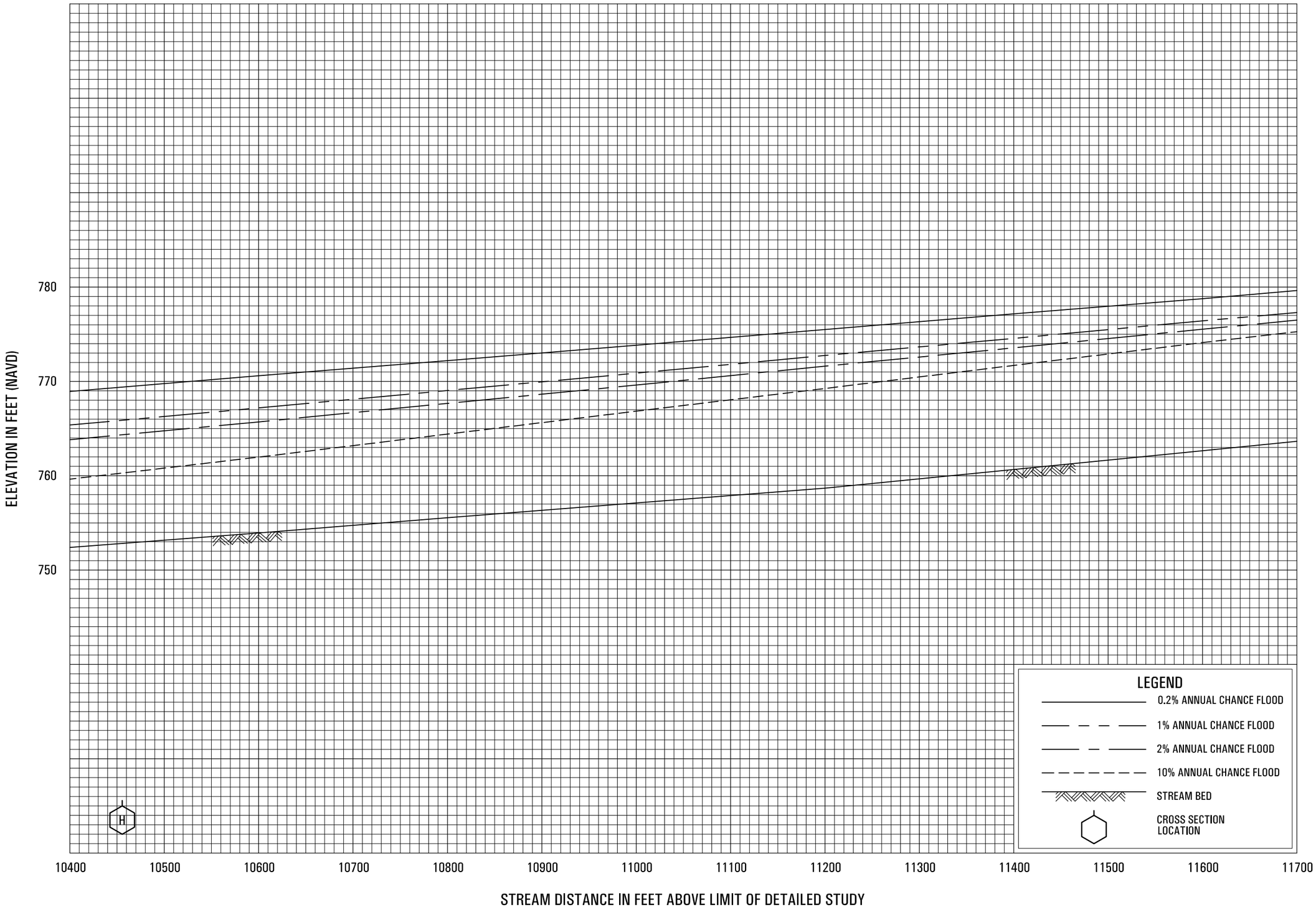

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LOS ANGELES COUNTY, CA

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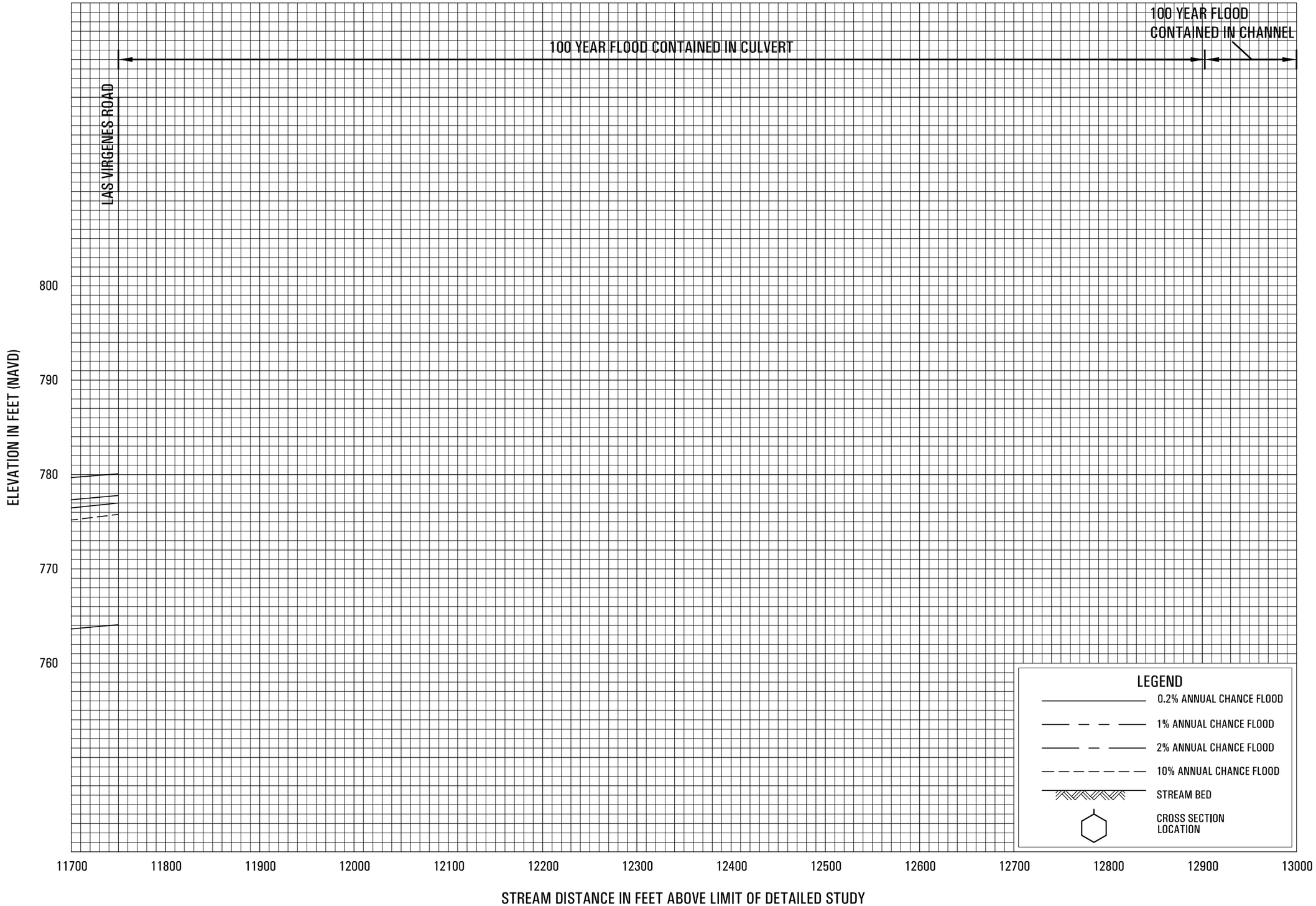


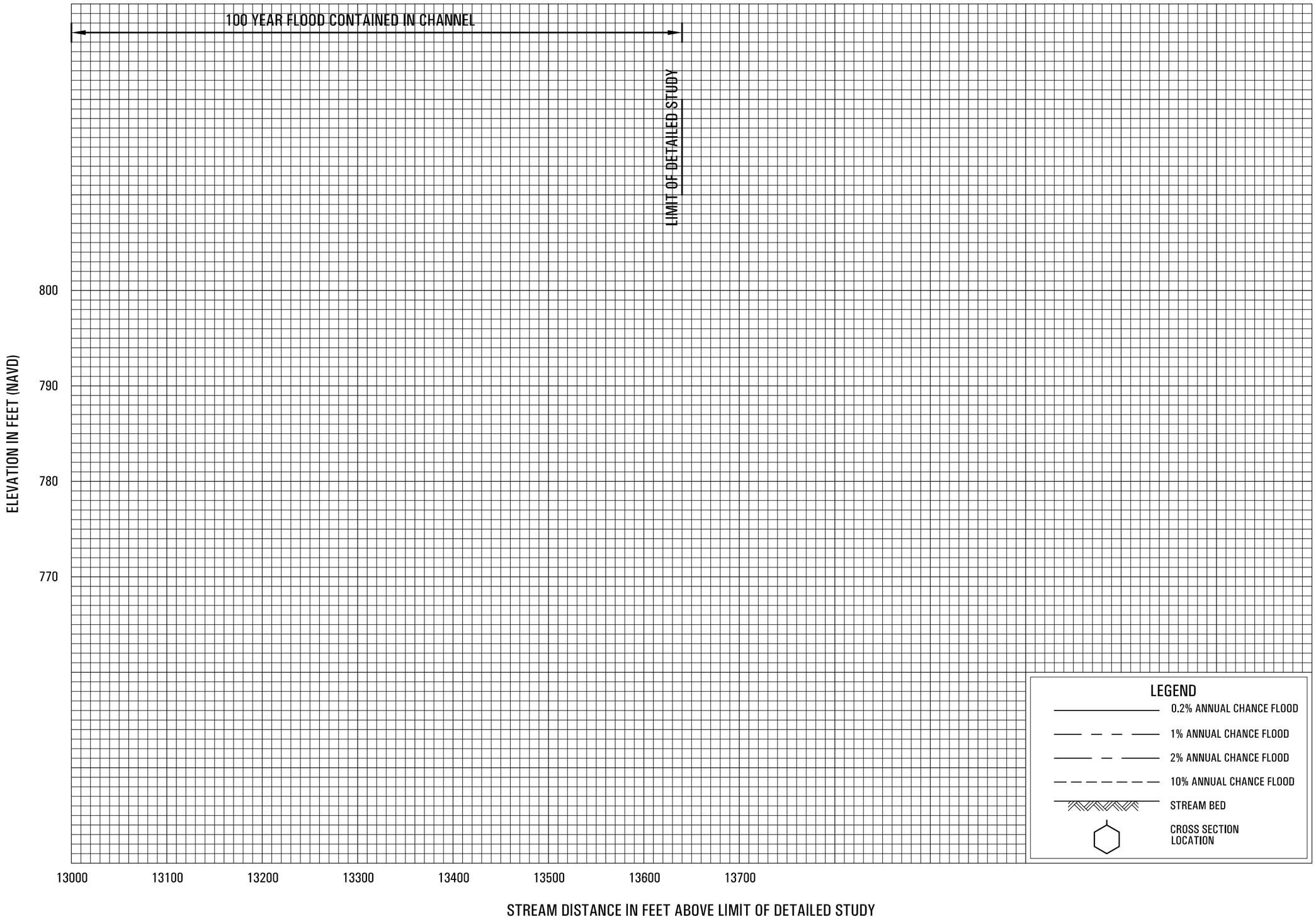
FLOOD PROFILES

LAS VIRGENES CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



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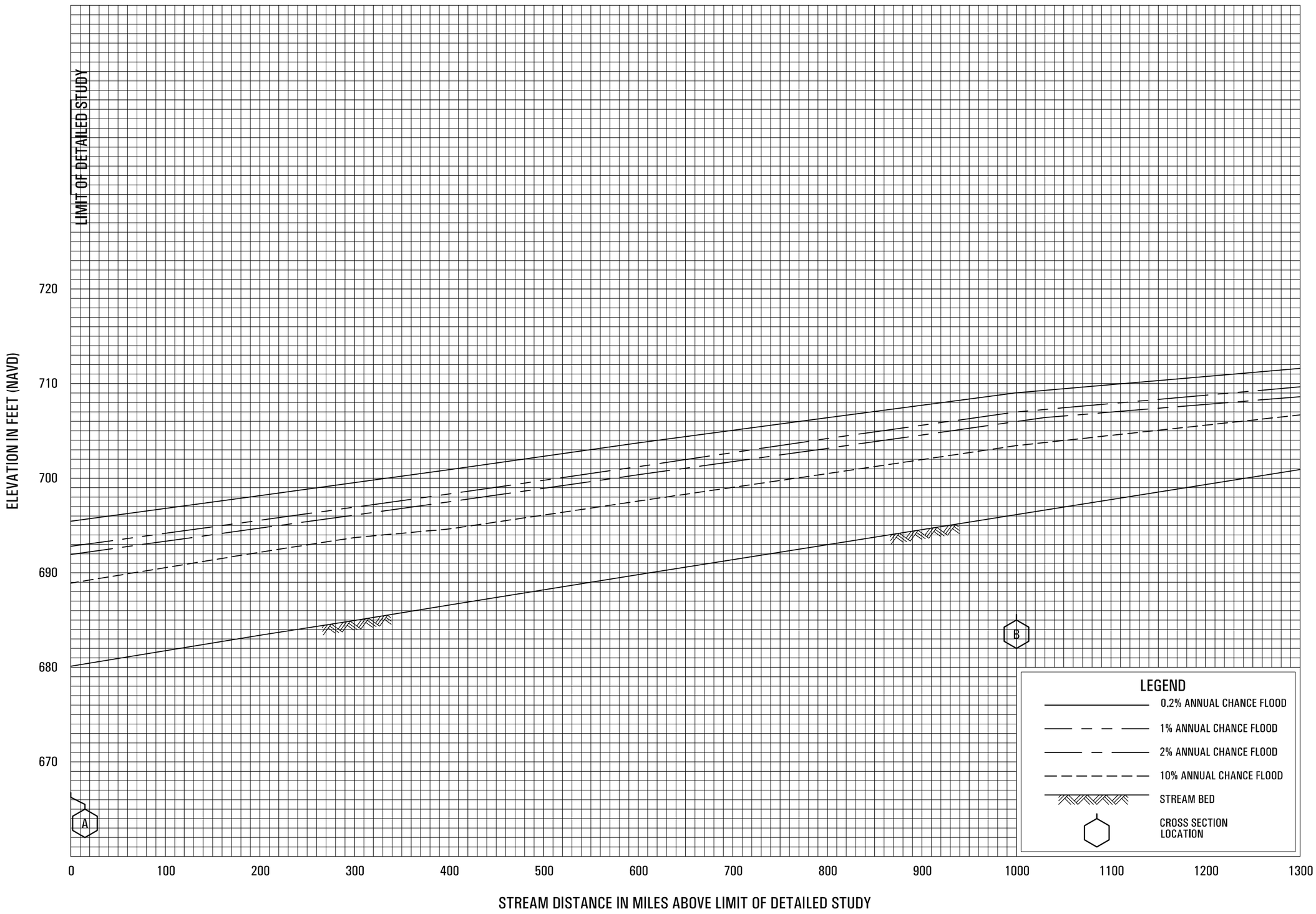

FLOOD PROFILES

LIBERTY CANYON

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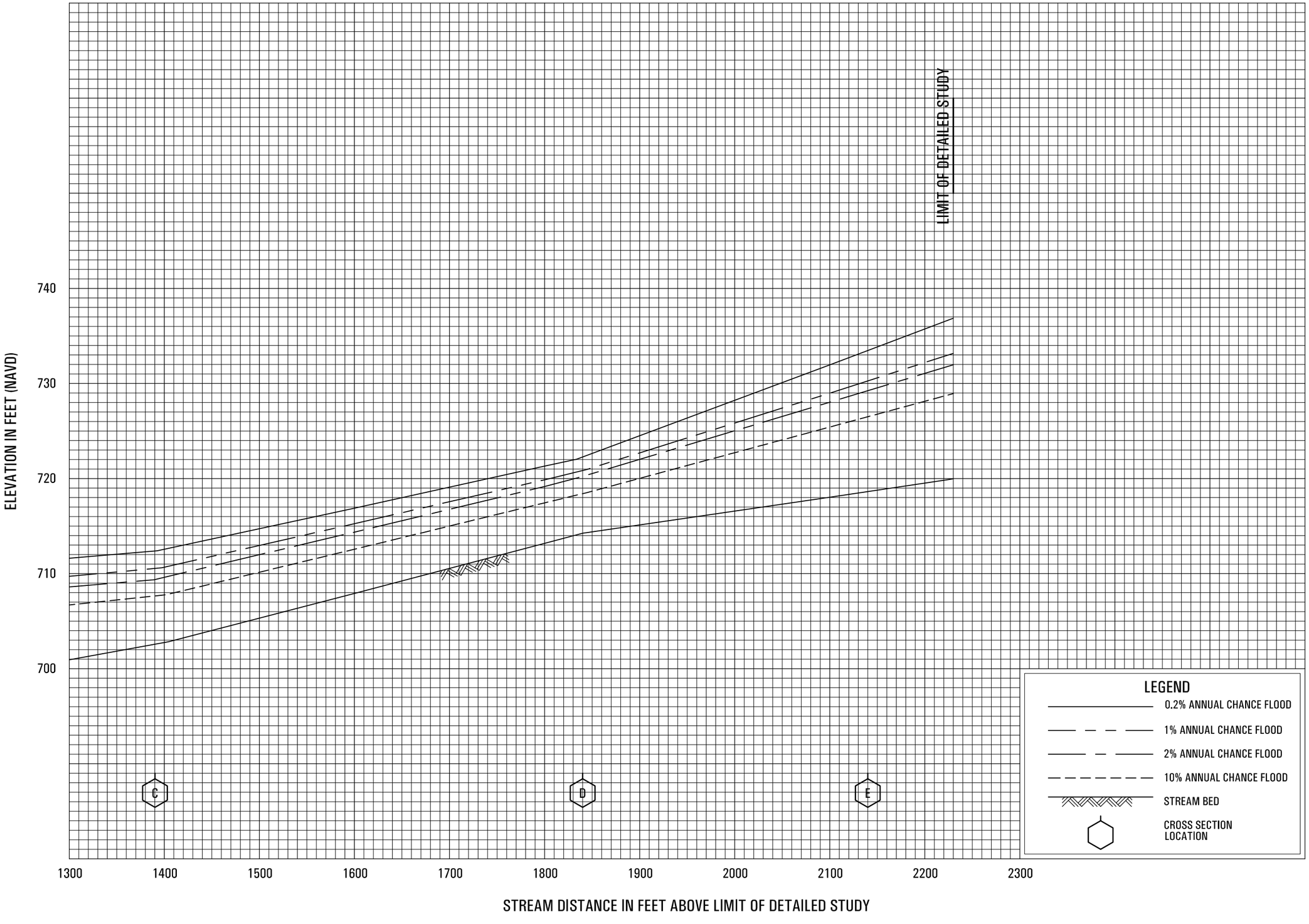

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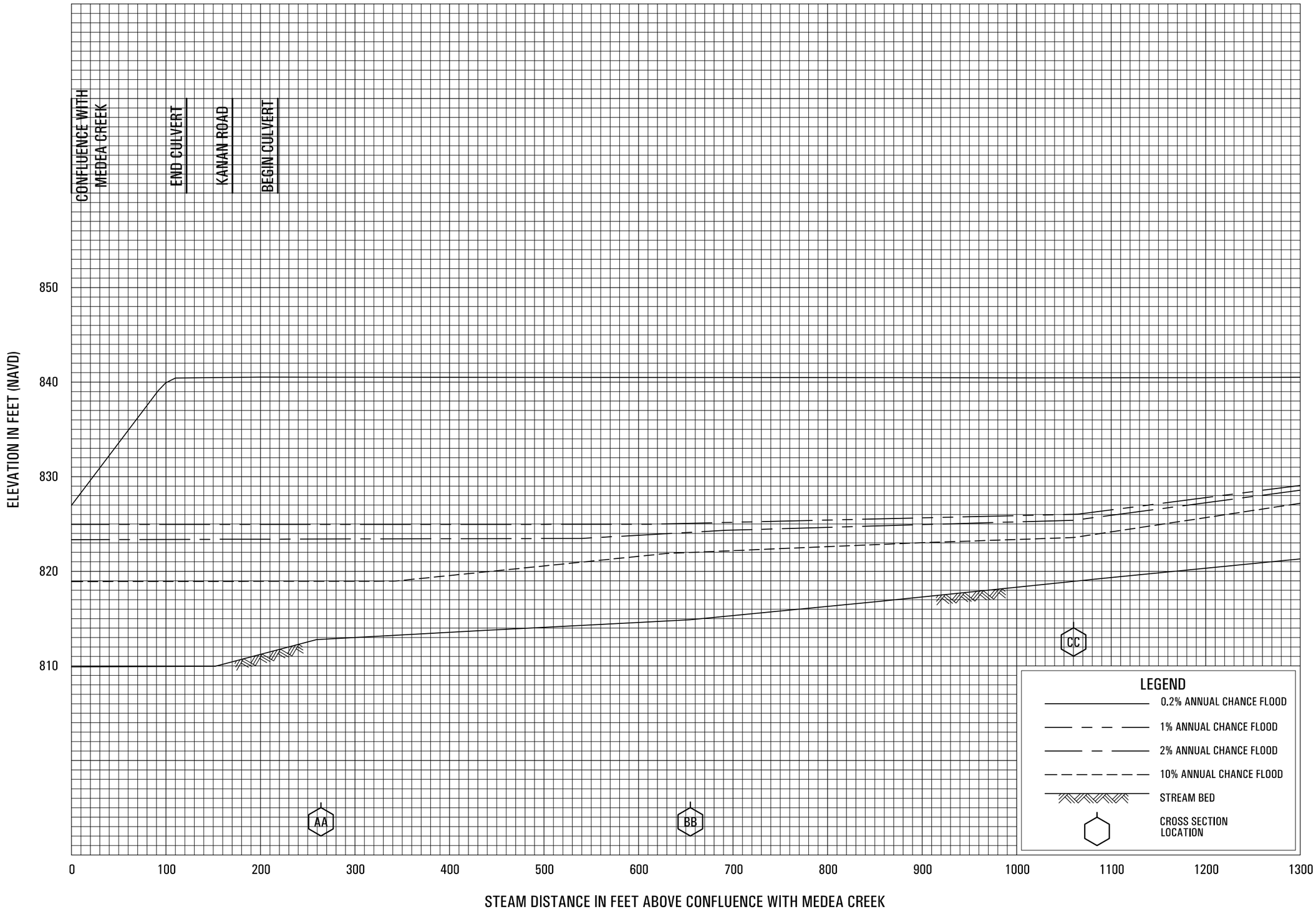

FLOOD PROFILES

LINDERO CANYON ABOVE CONFLUENCE WITH MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

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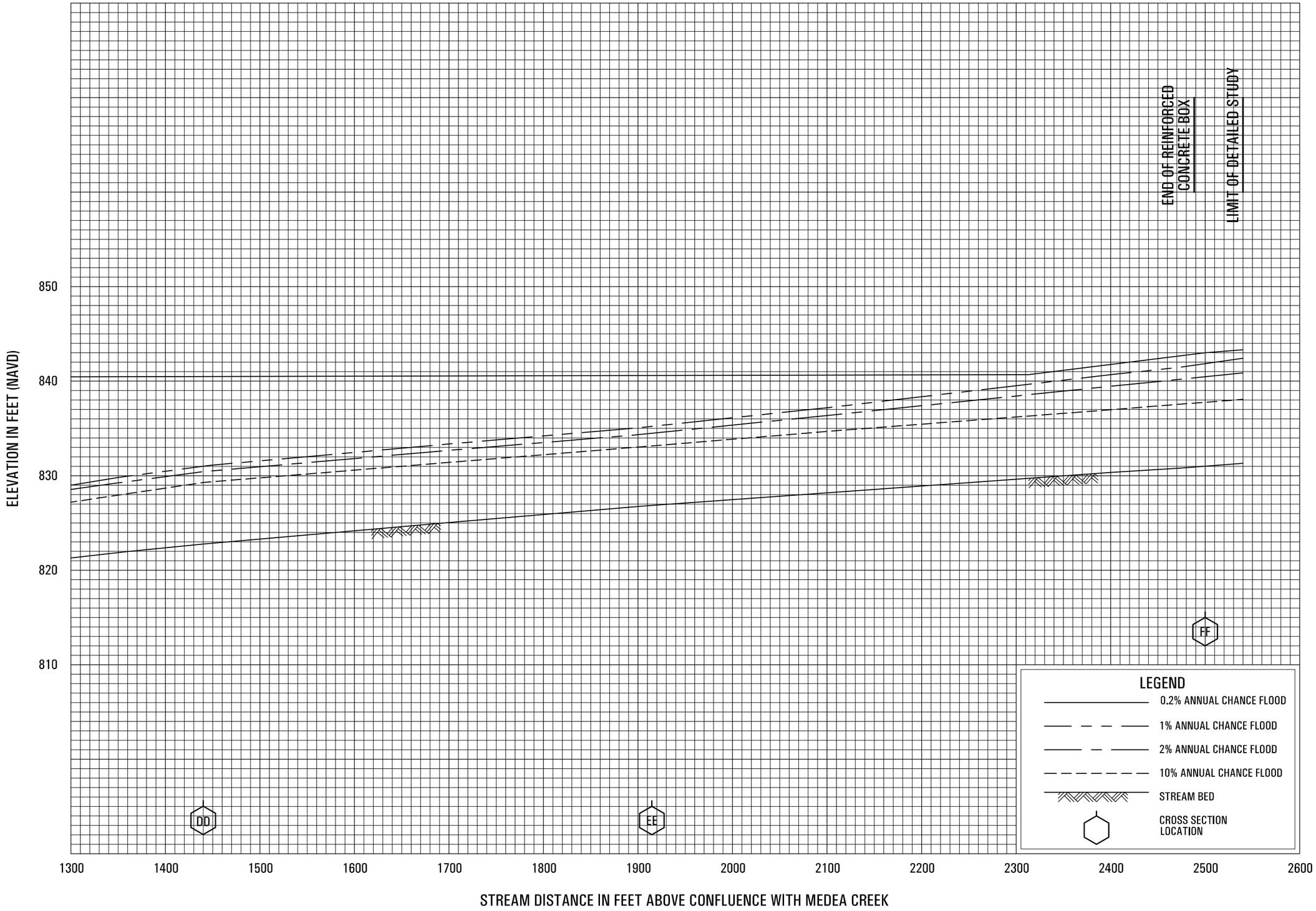

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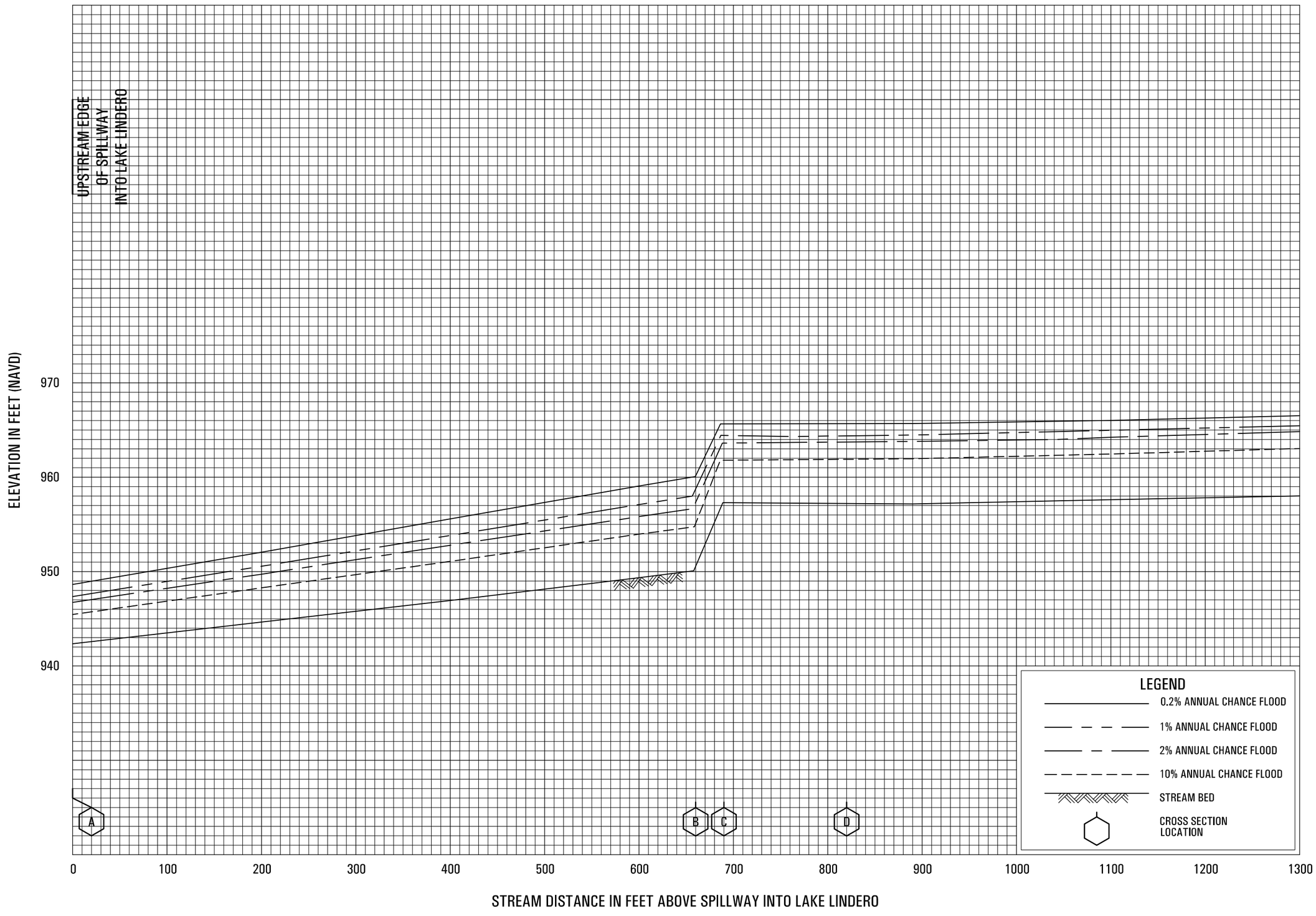

FLOOD PROFILES

LINDERO CANYON ABOVE LAKE LINDERO

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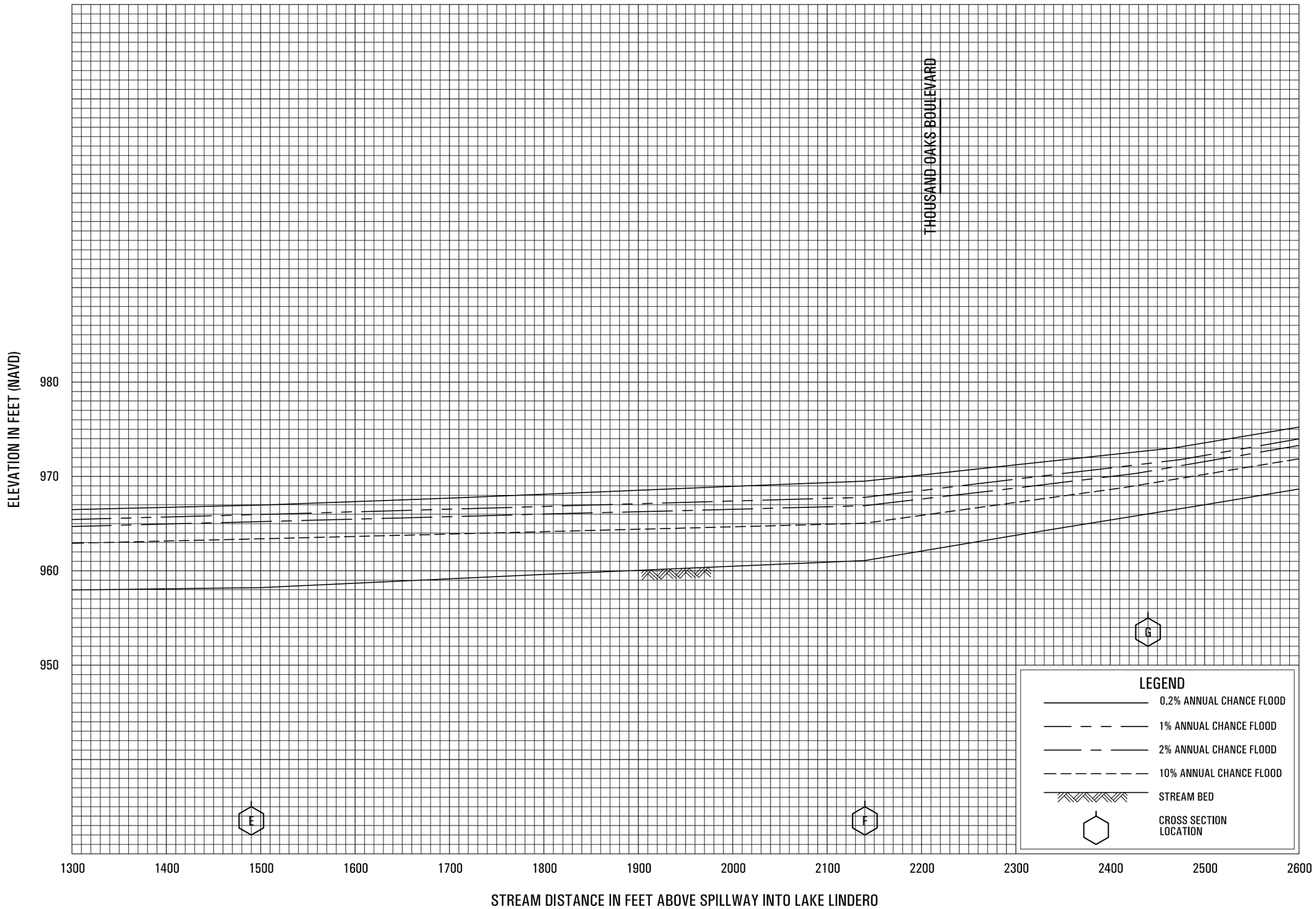

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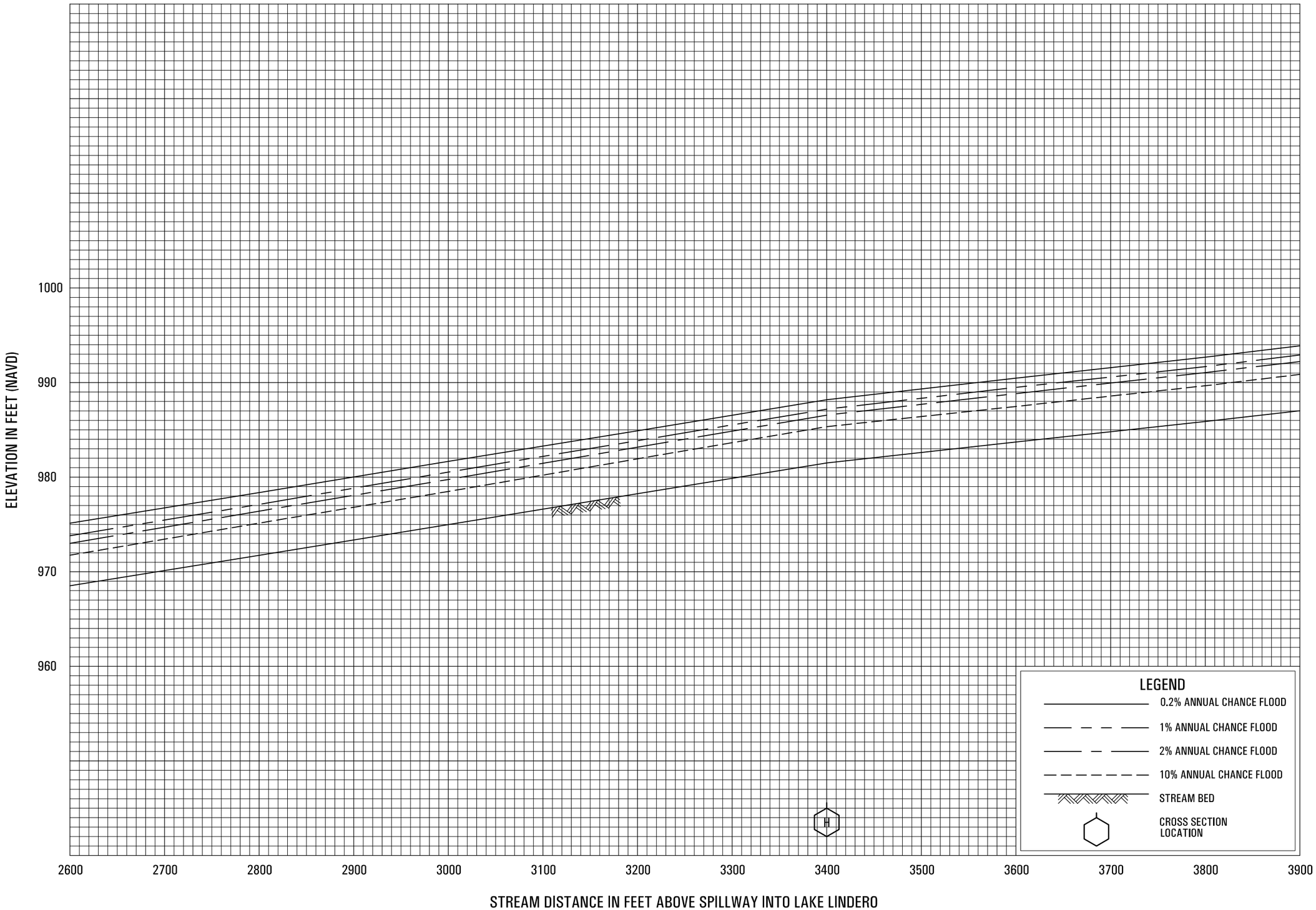

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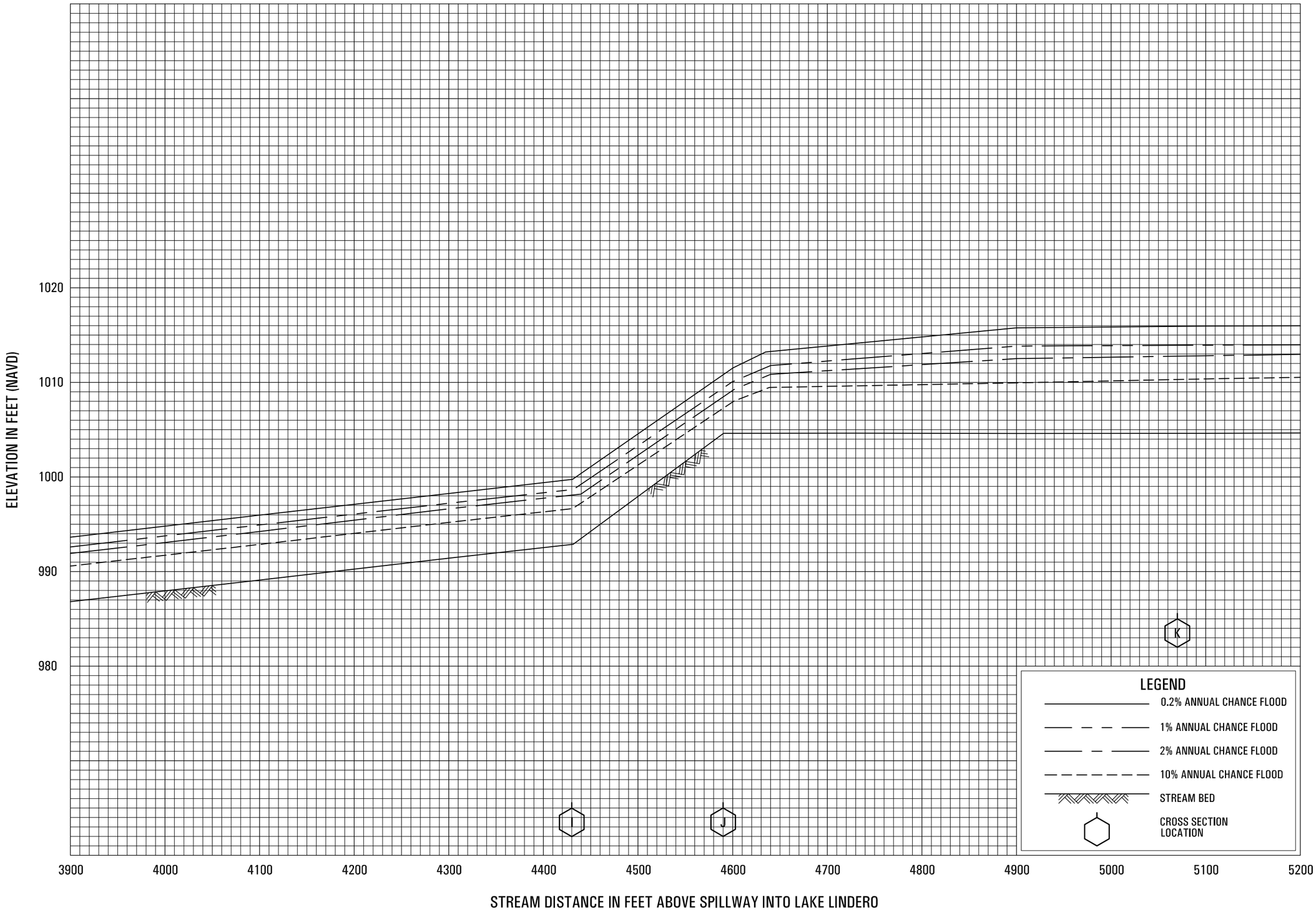

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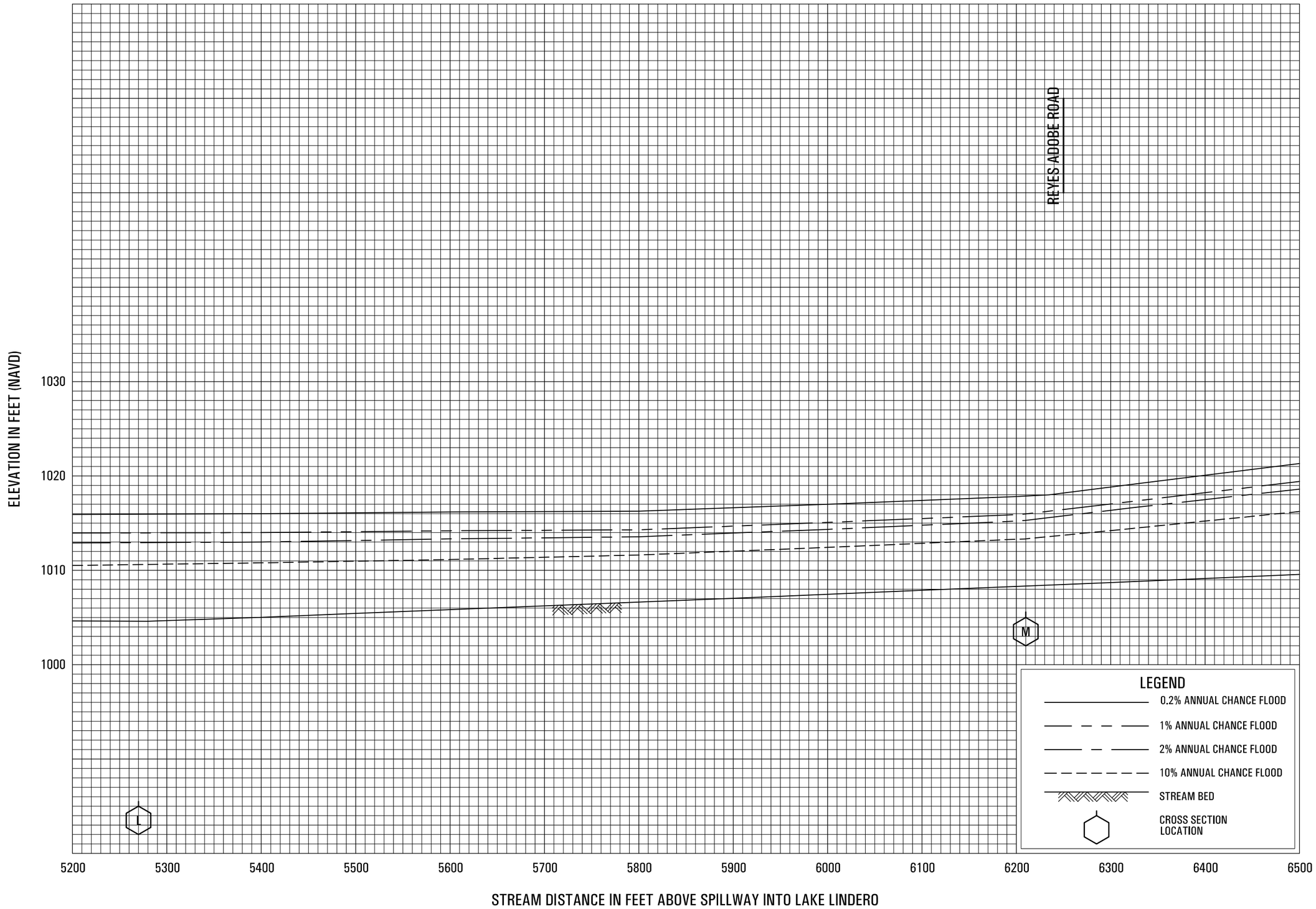

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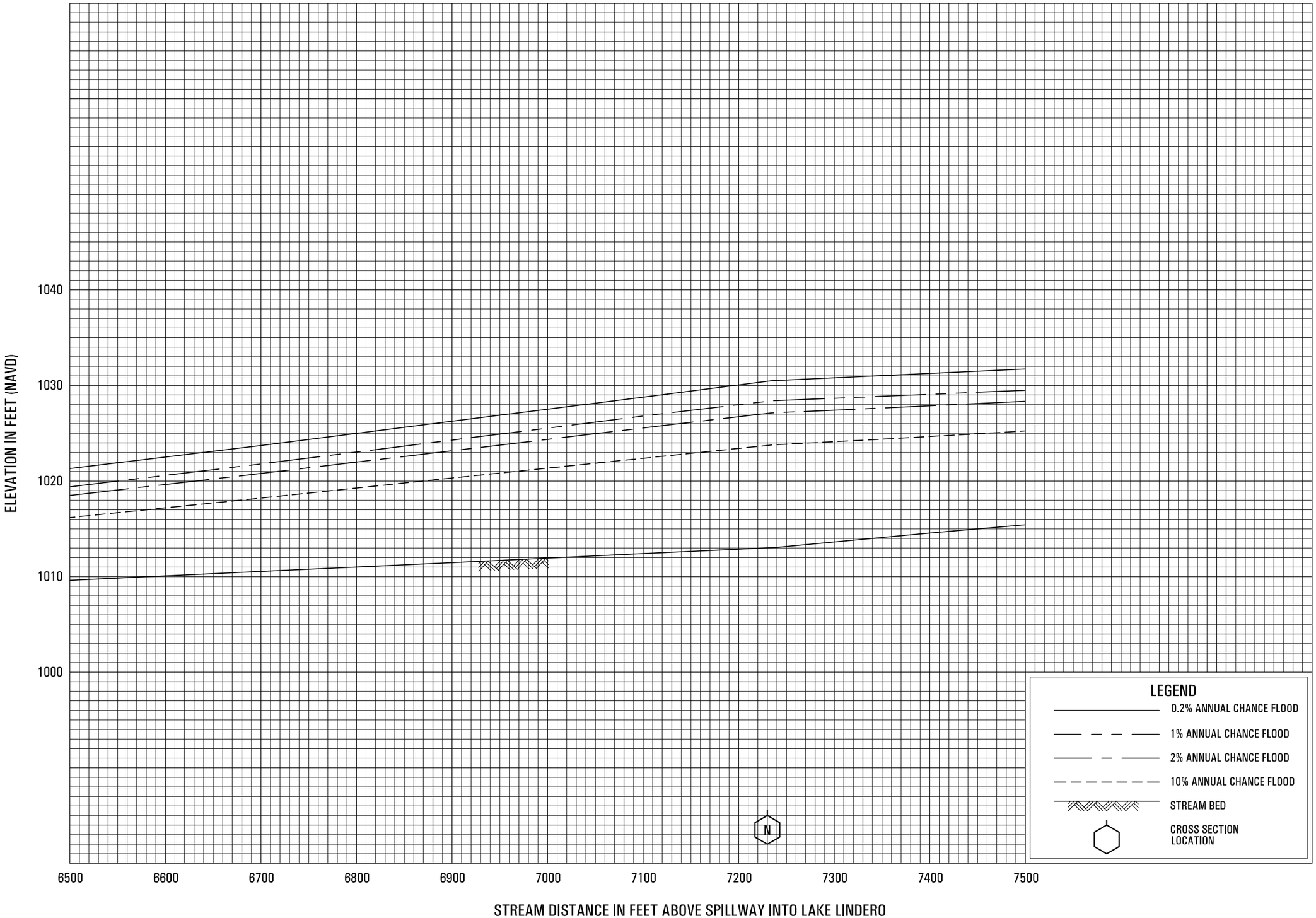

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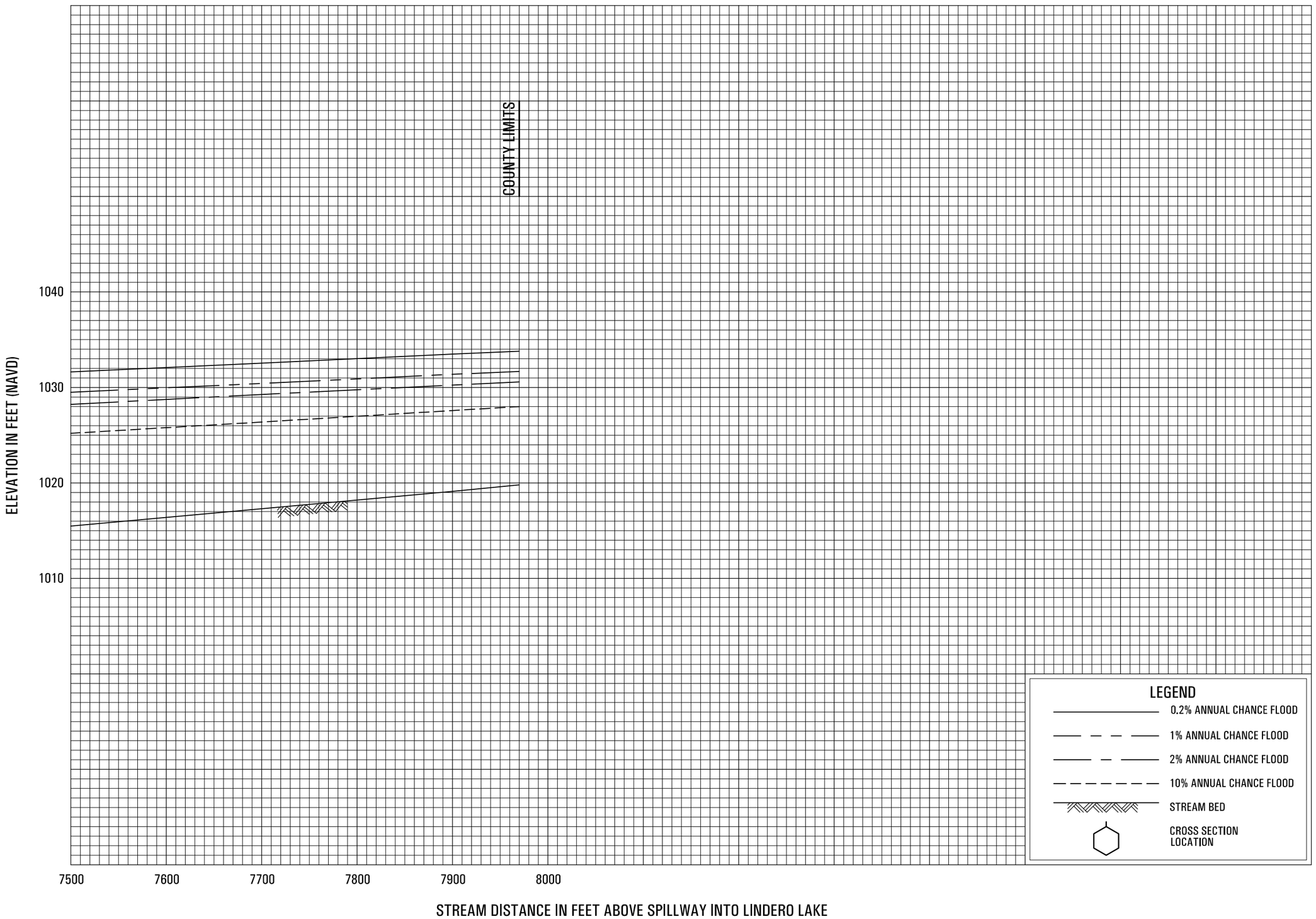

FLOOD PROFILES

LINDERO CANYON SPILLWAY AT LINDERO

FEDERAL EMERGENCY MANAGEMENT AGENCY

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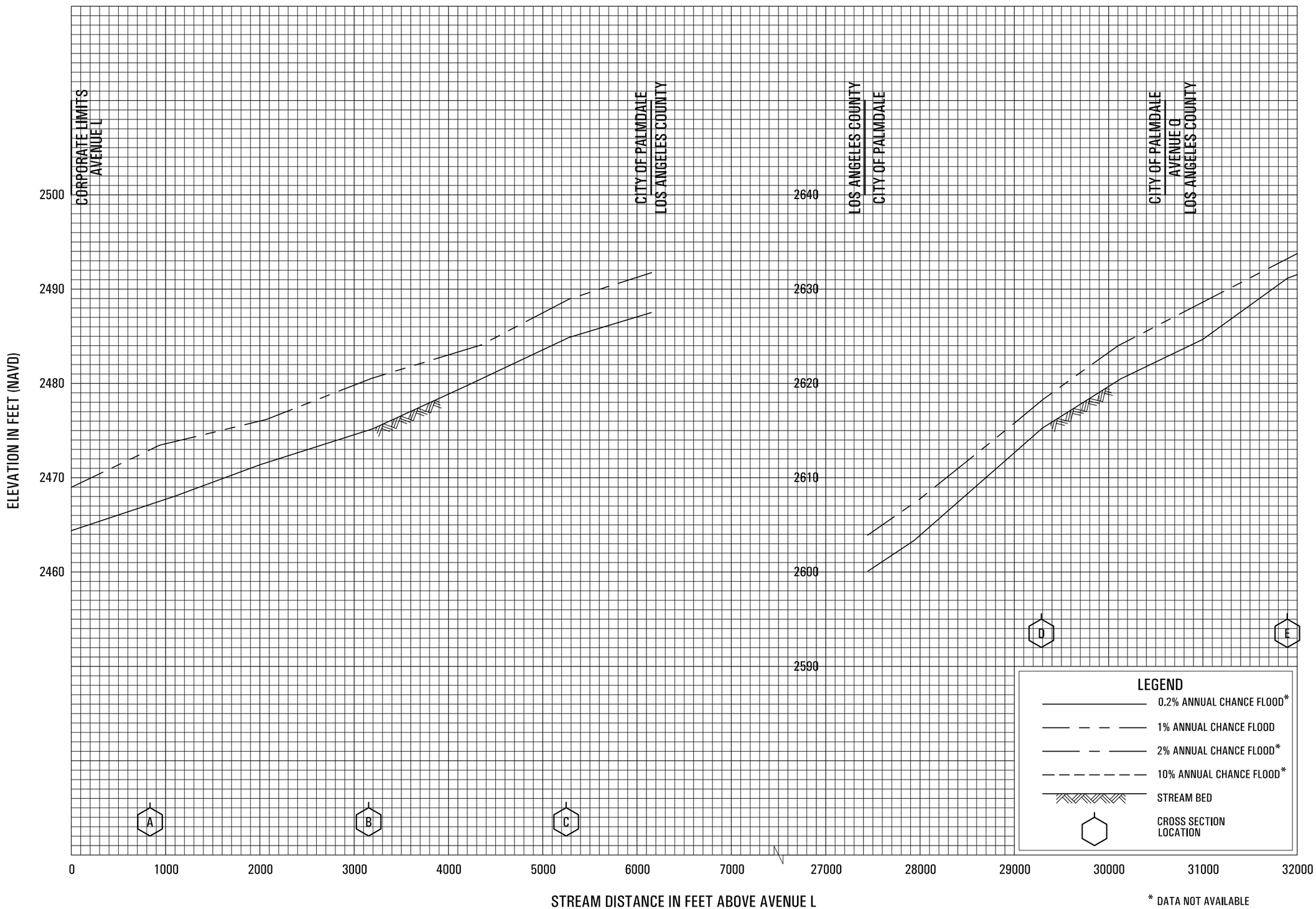

FLOOD PROFILES

LITTLE ROCK WASH - PROFILE A

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LOS ANGELES COUNTY, CA

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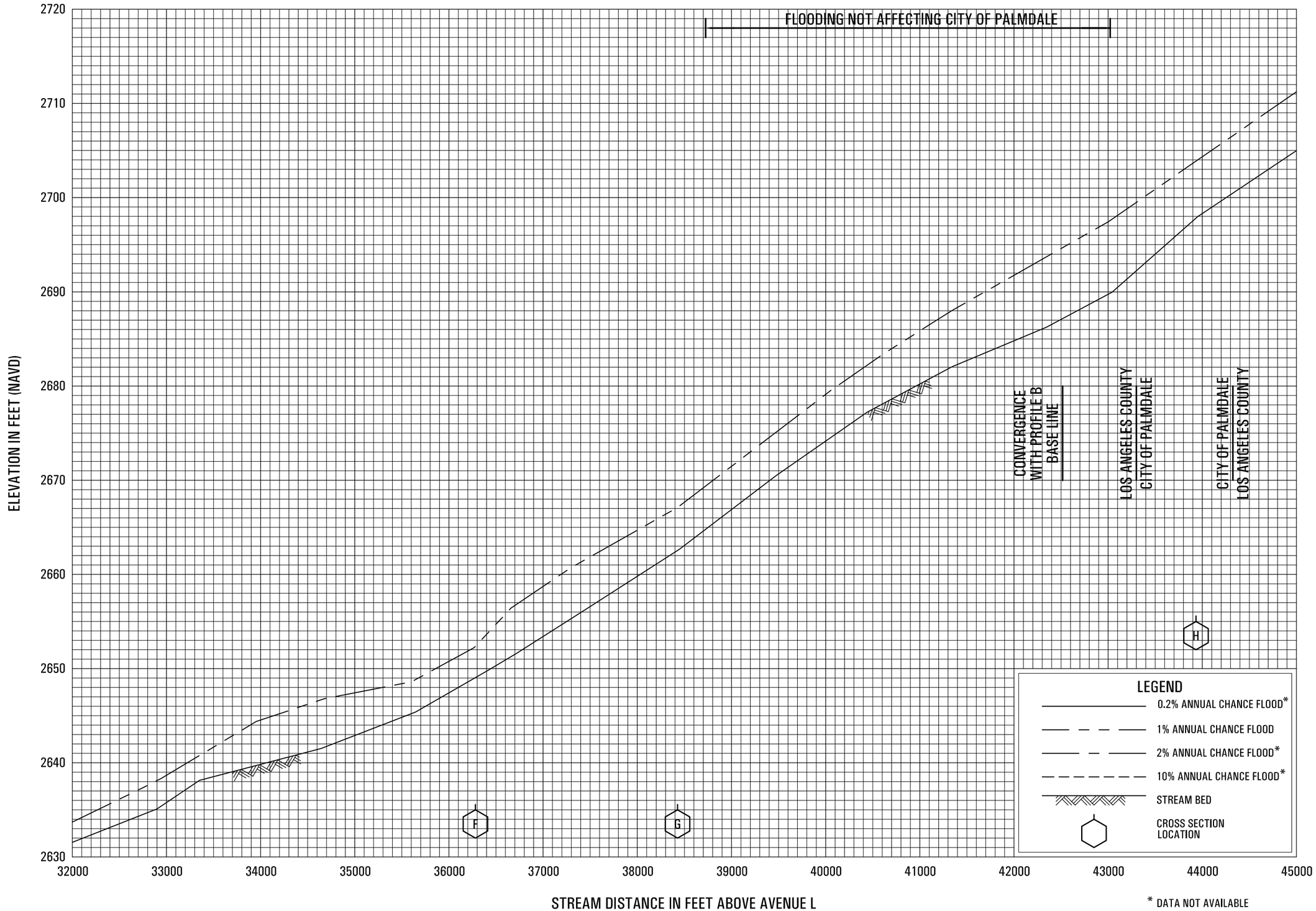

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FLOOD PROFILES

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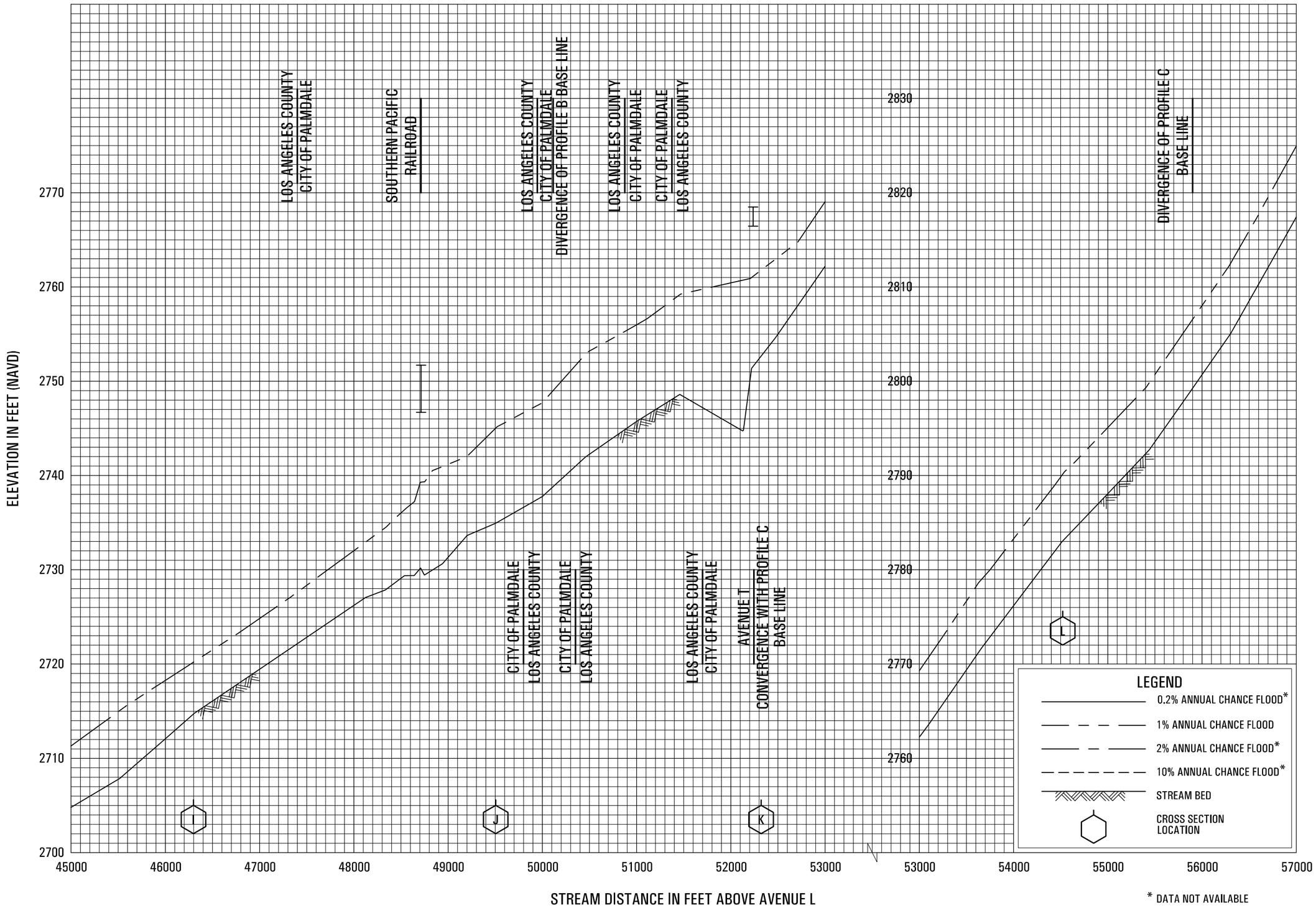

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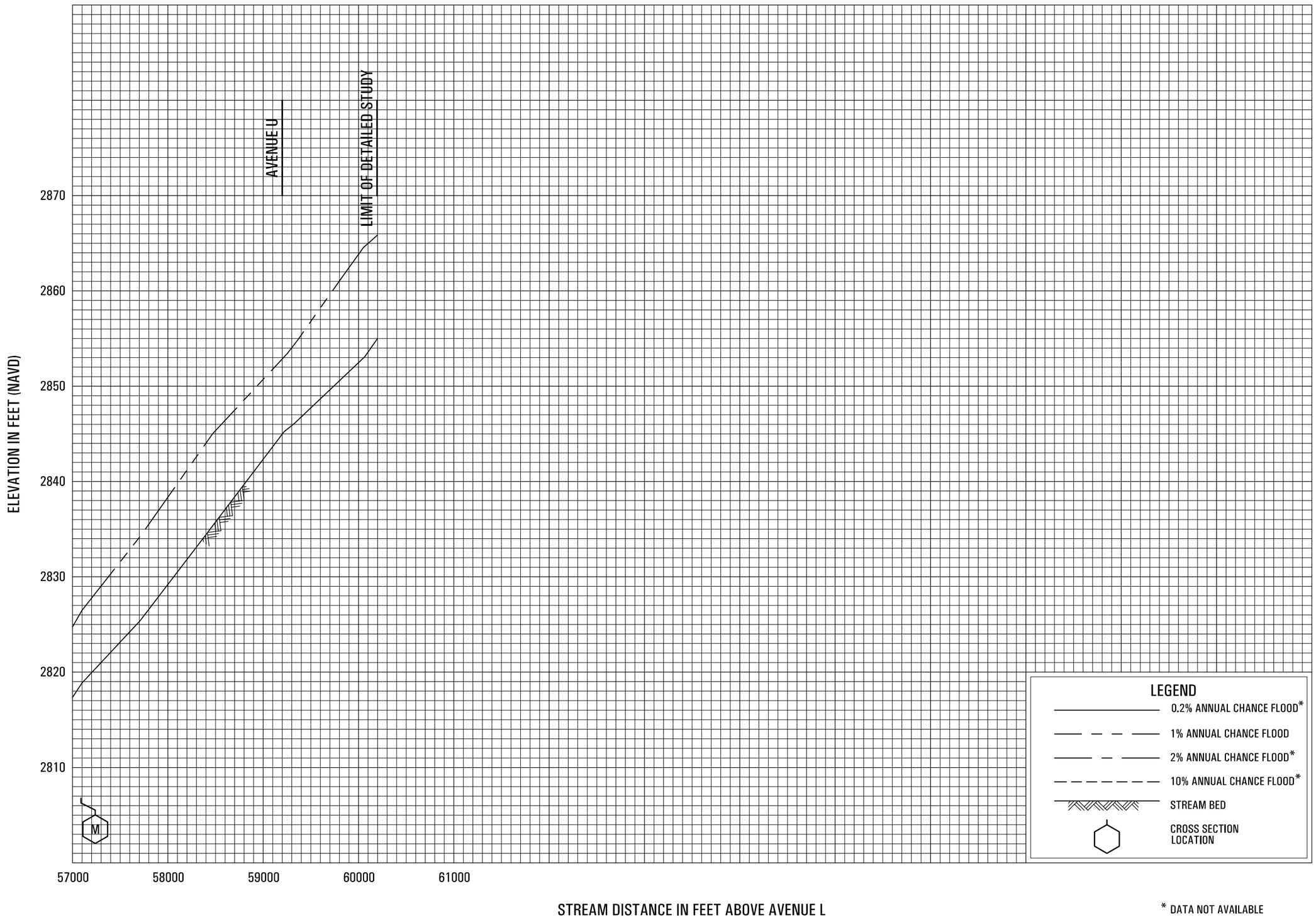

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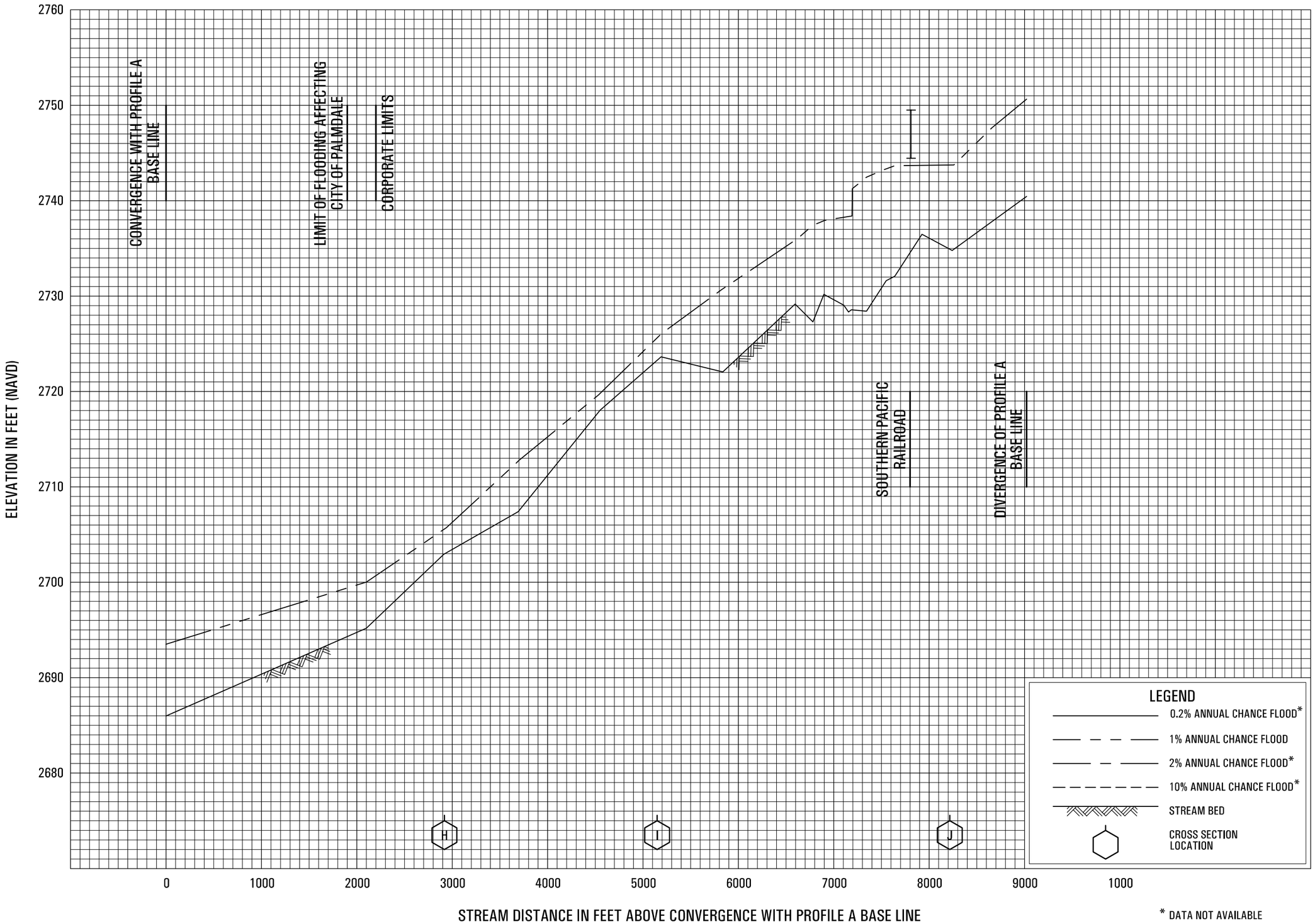

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FLOOD PROFILES

LITTLE ROCK WASH - PROFILE B

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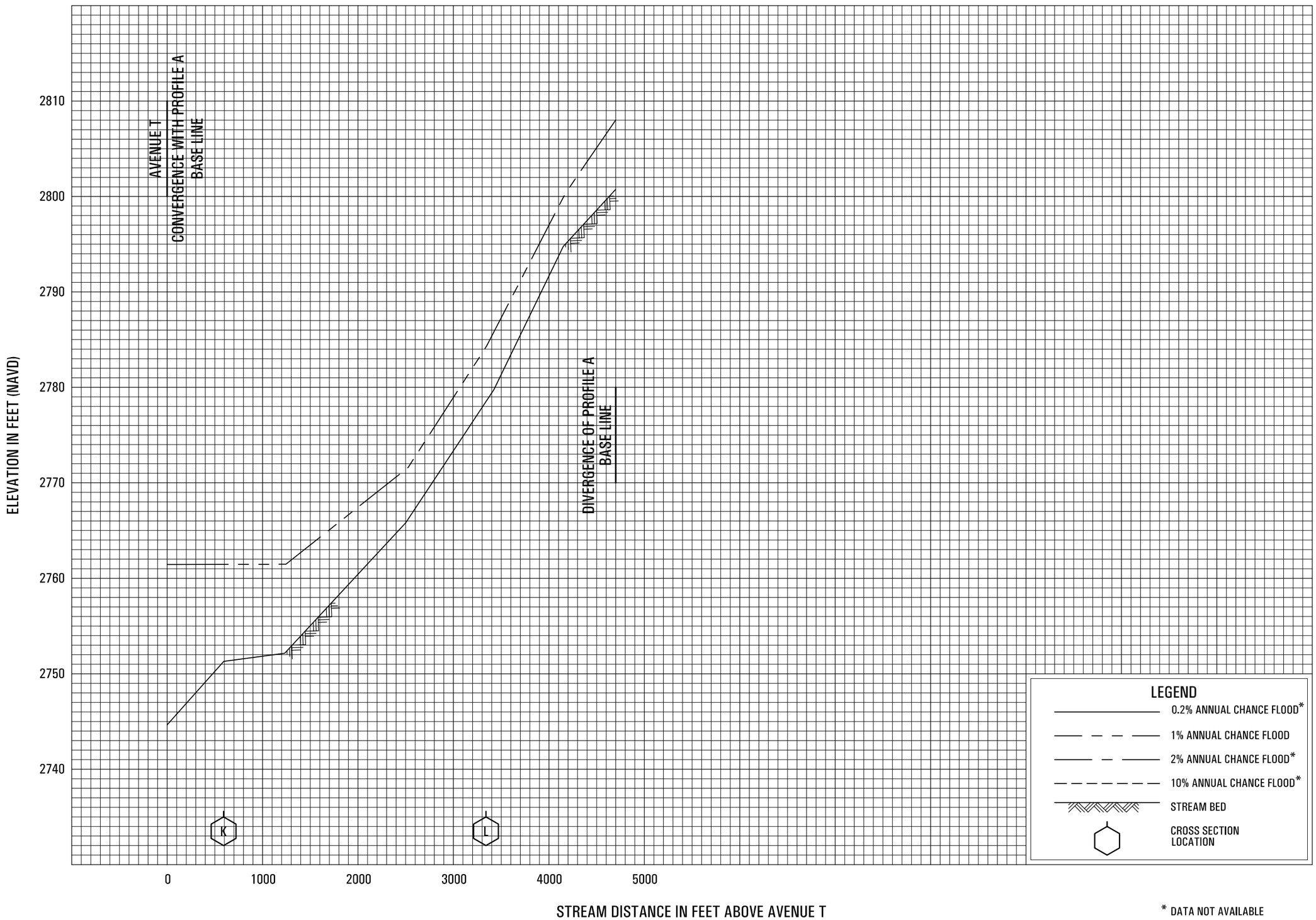

FLOOD PROFILES

LITTLE ROCK WASH - PROFILE C

FEDERAL EMERGENCY MANAGEMENT AGENCY

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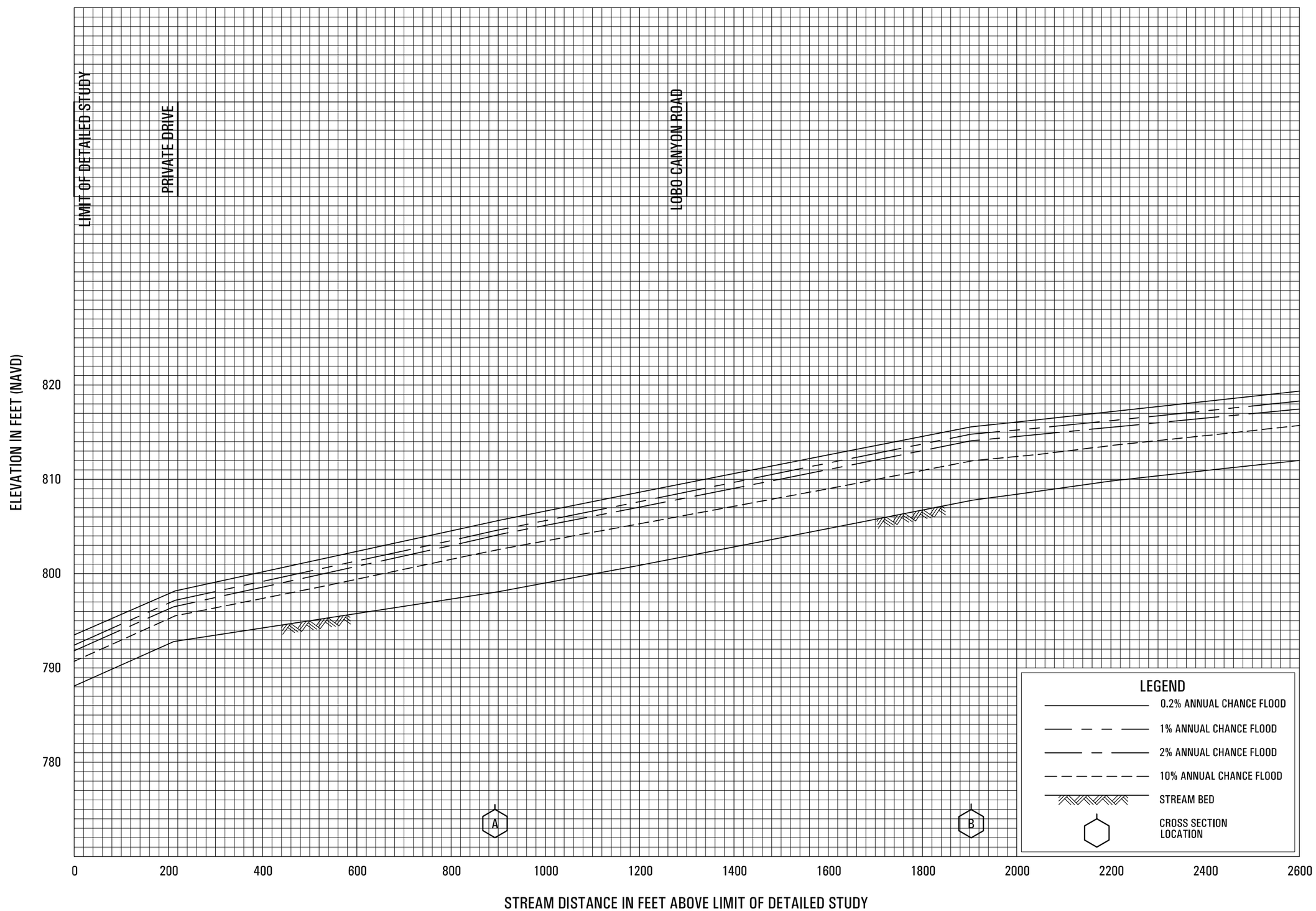

FLOOD PROFILES

LOBO CANYON

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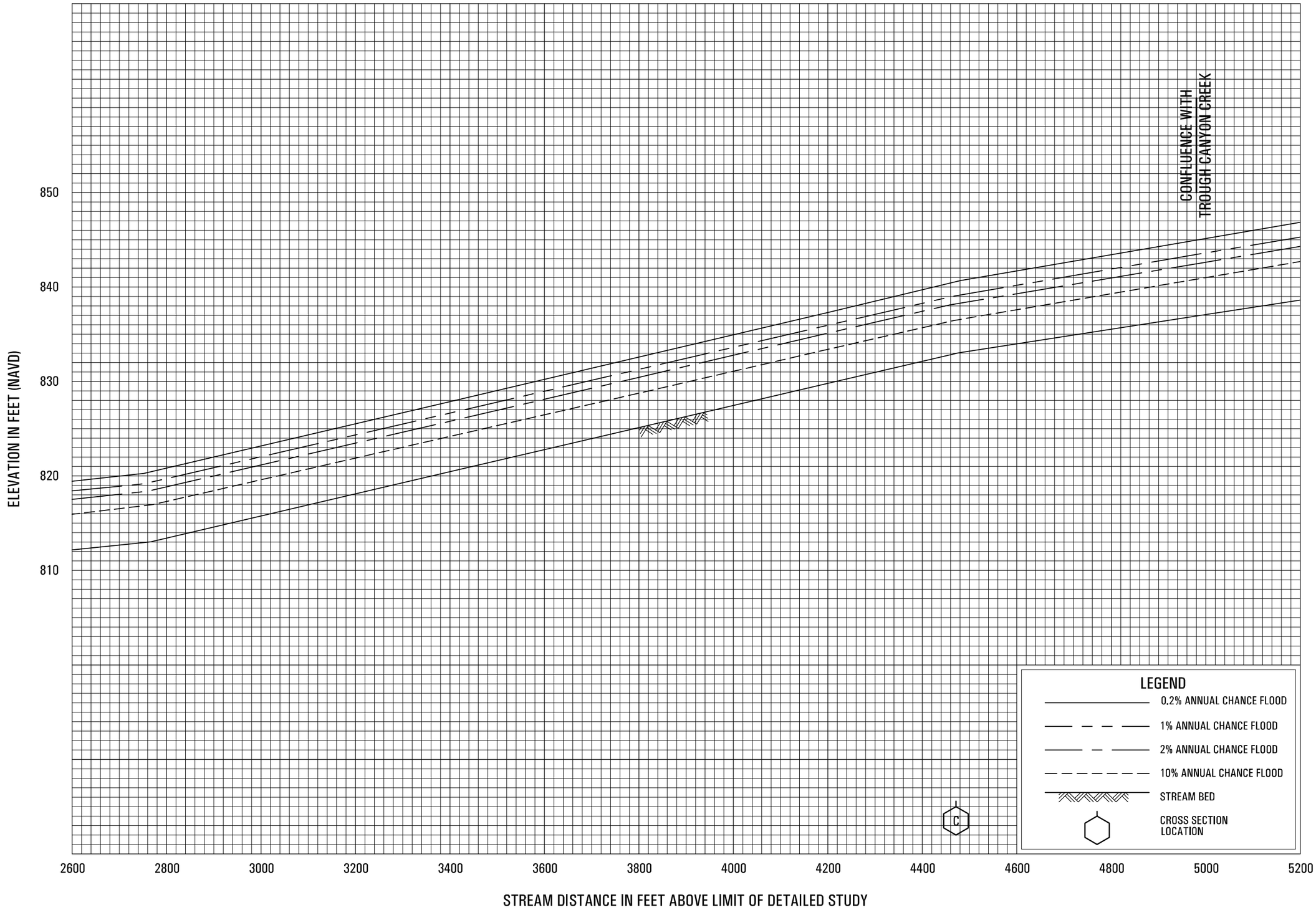

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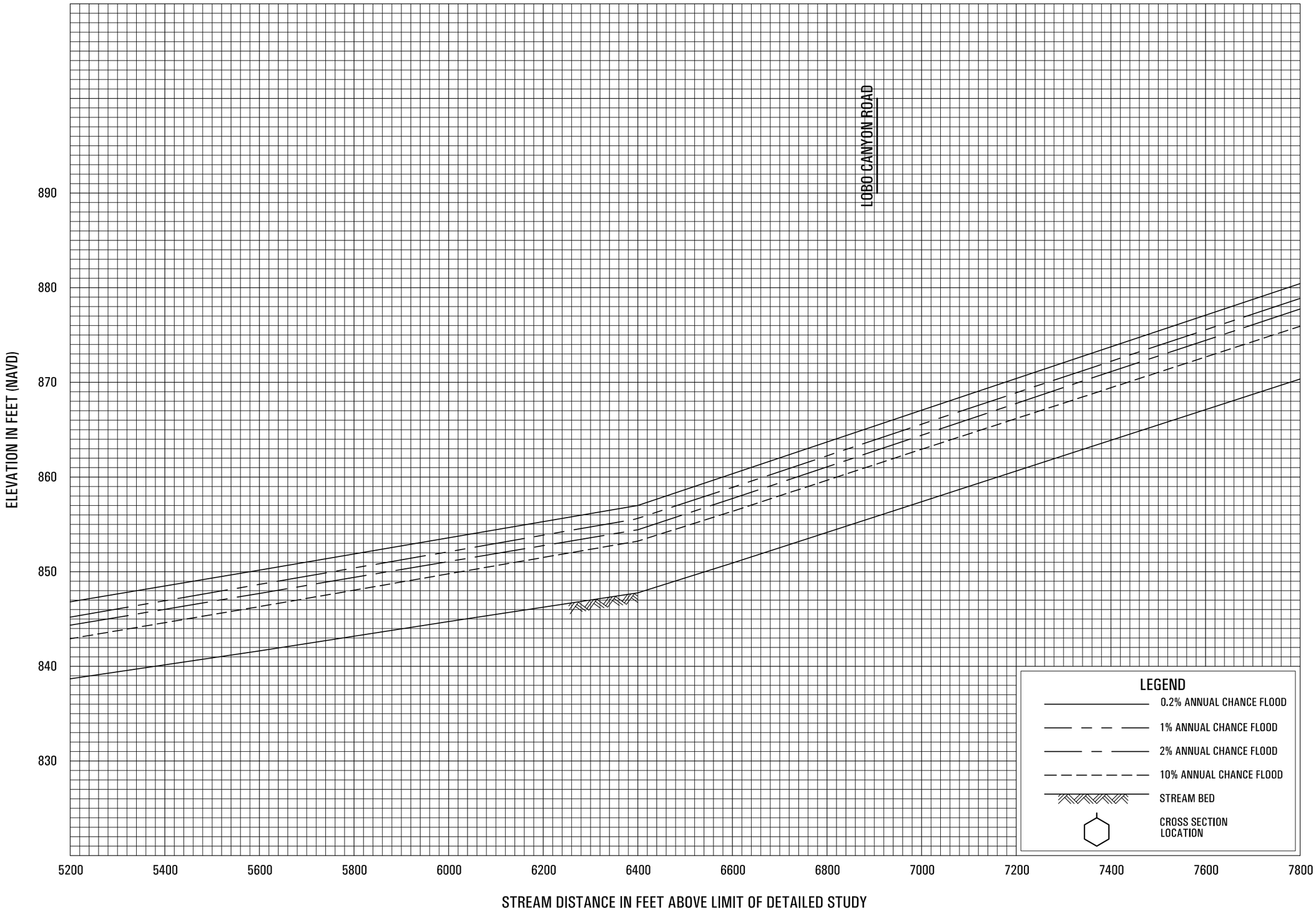

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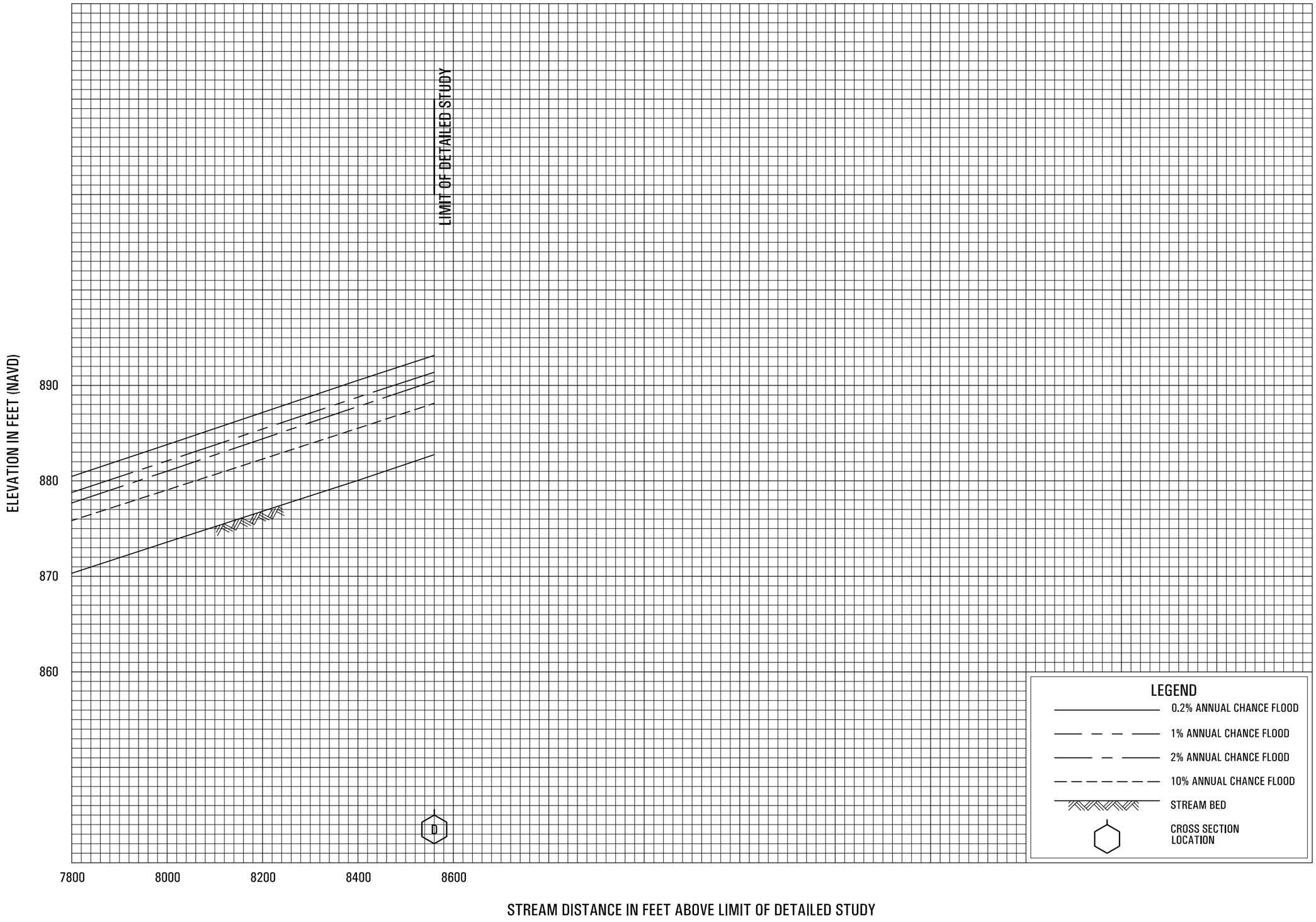

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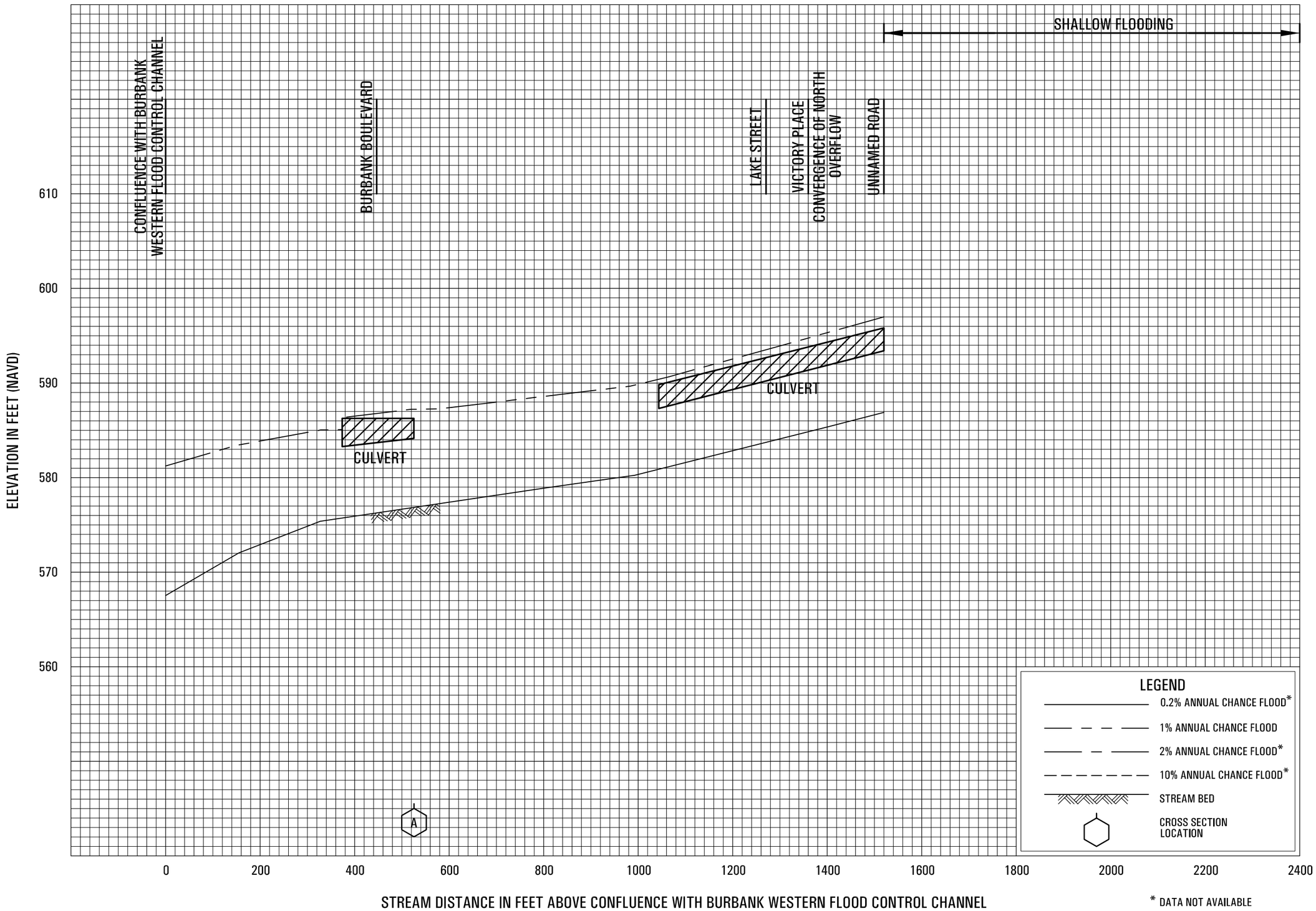

* DATA NOT AVAILABLE

FLOOD PROFILES

LOCKHEED DRAIN CHANNEL

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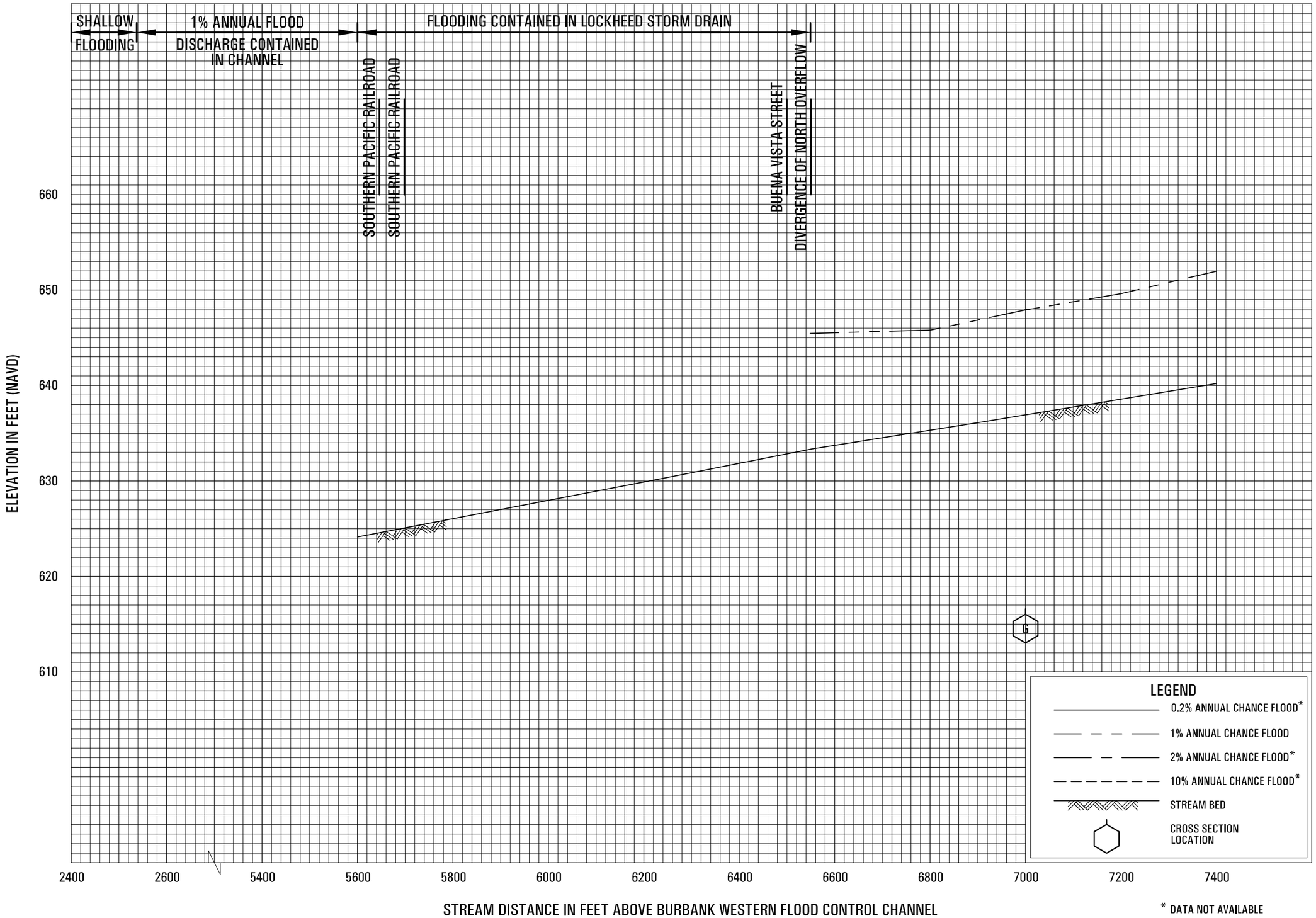

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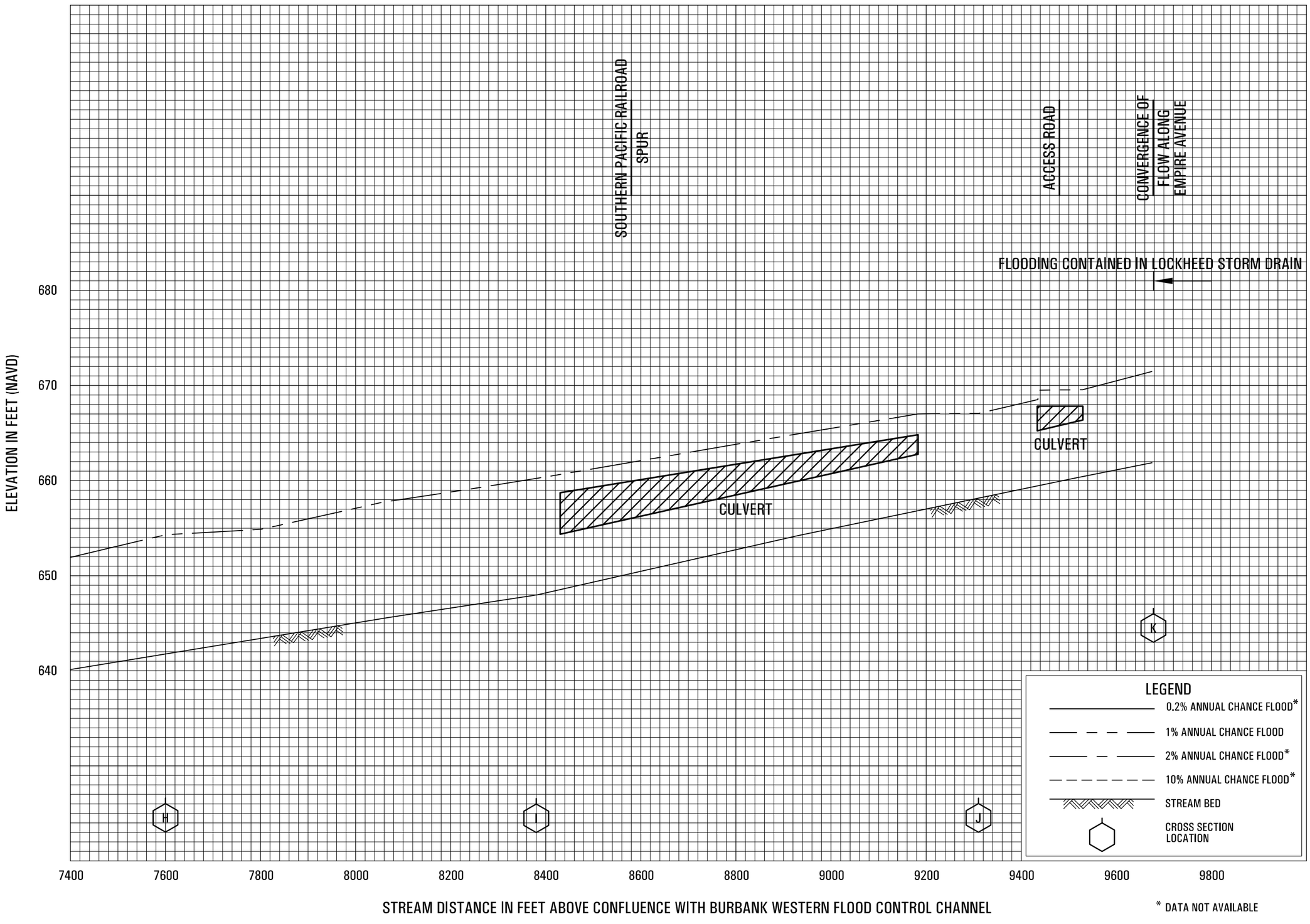

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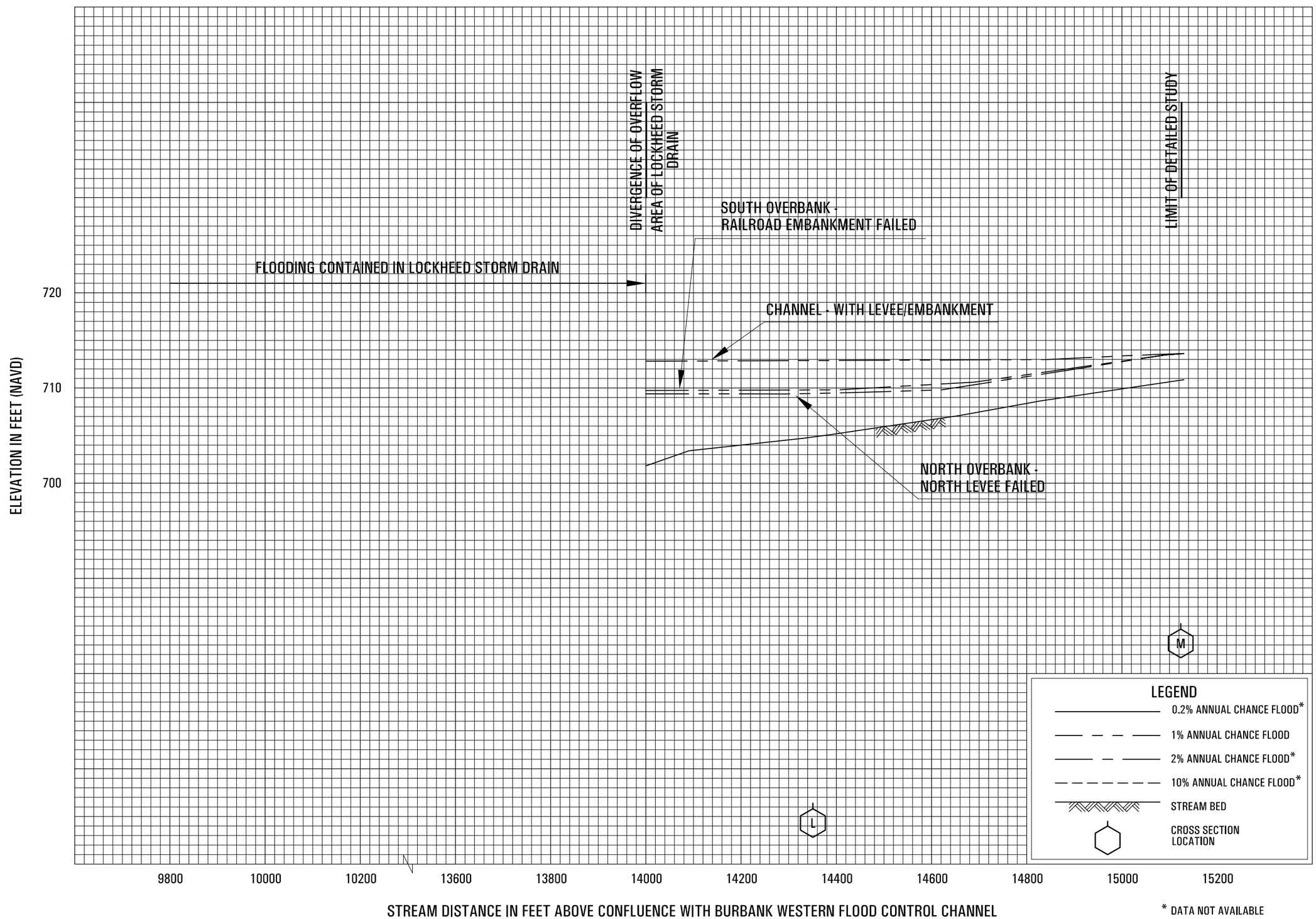

FLOOD PROFILES

LOCKHEED DRAIN CHANNEL

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

FLOOD INSURANCE STUDY

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

VOLUME 4 OF 4

Community Name	Community Number	Community Name	Community Number	Community Number	Community Name	Community Number	Community Number
LOS ANGELES COUNTY, UNINCORPORATED AREAS	065043	DIAMOND BAR, CITY OF	060741	LAWNDALE, CITY OF*	060134	SAN DIMAS, CITY OF	060154
AGOURA HILLS, CITY OF	065072	DOWNEY, CITY OF	060645	LOMITA, CITY OF*	060135	SAN FERNANDO, CITY OF*	060628
ALHAMBRA, CITY OF*	060095	DUARTE, CITY OF	065026	LONG BEACH, CITY OF	060136	SAN GABRIEL, CITY OF*	065055
ARCADIA, CITY OF	065014	EL MONTE, CITY OF*	060658	LOS ANGELES, CITY OF	060137	SAN MARINO, CITY OF*	065057
ARTESIA, CITY OF*	060097	EL SEGUNDO, CITY OF	060118	LYNWOOD, CITY OF	060635	SANTA CLARITA, CITY OF	060729
AVALON, CITY OF	060098	GARDENA, CITY OF	060119	MALIBU, CITY OF	060745	SANTA FE SPRINGS, CITY OF	060158
AZUSA, CITY OF	065015	GLENDALE, CITY OF	065030	MANHATTAN BEACH, CITY OF	060138	SANTA MONICA, CITY OF	060159
BALDWIN PARK, CITY OF*	060100	GLENDORA, CITY OF	065031	MAYWOOD, CITY OF*	060651	SIERRA MADRE, CITY OF	065059
BELL GARDENS, CITY OF	060656	HAWAIIAN GARDENS, CITY OF*	065032	MONROVIA, CITY OF	065046	SIGNAL HILL, CITY OF*	060161
BELL, CITY OF*	060101	HAWTHORNE, CITY OF*	060123	MONTEBELLO, CITY OF	060141	SOUTH EL MONTE, CITY OF*	060162
BELLFLOWER, CITY OF	060102	HERMOSA BEACH, CITY OF	060124	MONTEREY PARK, CITY OF*	065047	SOUTH GATE, CITY OF	060163
BEVERLY HILLS, CITY OF*	060655	HIDDEN HILLS, CITY OF	060125	NORWALK, CITY OF	060652	SOUTH PASADENA, CITY OF*	065061
BRADBURY, CITY OF	065017	HUNTINGTON PARK, CITY OF*	060126	PALMDALE, CITY OF	060144	TEMPLE CITY, CITY OF	060653
BURBANK, CITY OF	065018	INDUSTRY, CITY OF	065035	PALOS VERDES ESTATES, CITY OF	060145	TORRANCE, CITY OF	060165
CALABASAS, CITY OF	060749	INGLEWOOD, CITY OF*	065036	PARAMOUNT, CITY OF	065049	VERNON, CITY OF*	060166
CARSON, CITY OF	060107	IRWINDALE, CITY OF*	060129	PASADENA, CITY OF	065050	WALNUT, CITY OF	065069
CERRITOS, CITY OF	060108	LA CANADA FLINTRIDGE, CITY OF	060669	PICO RIVERA, CITY OF	060148	WEST COVINA, CITY OF	060666
CLAREMONT, CITY OF	060109	LA HABRA HEIGHTS, CITY OF	060701	POMONA, CITY OF	060149	WEST HOLLYWOOD, CITY OF	060720
COMMERCE, CITY OF	060110	LA MIRADA, CITY OF	060131	RANCHO PALOS VERDES, CITY OF	060464	WESTLAKE VILLAGE, CITY OF	060744
COMPTON, CITY OF	060111	LA PUENTE, CITY OF*	065039	REDONDO BEACH, CITY OF	060150	WHITTIER, CITY OF	060169
COVINA, CITY OF	065024	LA VERNE, CITY OF	060133	ROLLING HILLS ESTATES, CITY OF*	065054		
CUDAHY, CITY OF	060657	LAKEWOOD, CITY OF	060130	ROLLING HILLS, CITY OF	060151		
CULVER CITY, CITY OF	060114	LANCASTER, CITY OF	060672	ROSEMEAD, CITY OF	060153		

*Non-floodprone communities

September 26, 2008

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
06037CV004A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Selected Flood Insurance Rate Map (FIRM) panels for the community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map (FBFM) panels (e.g. floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X (Shaded)
C	X (Unshaded)

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Countywide FIS Effective Date: September 26, 2008

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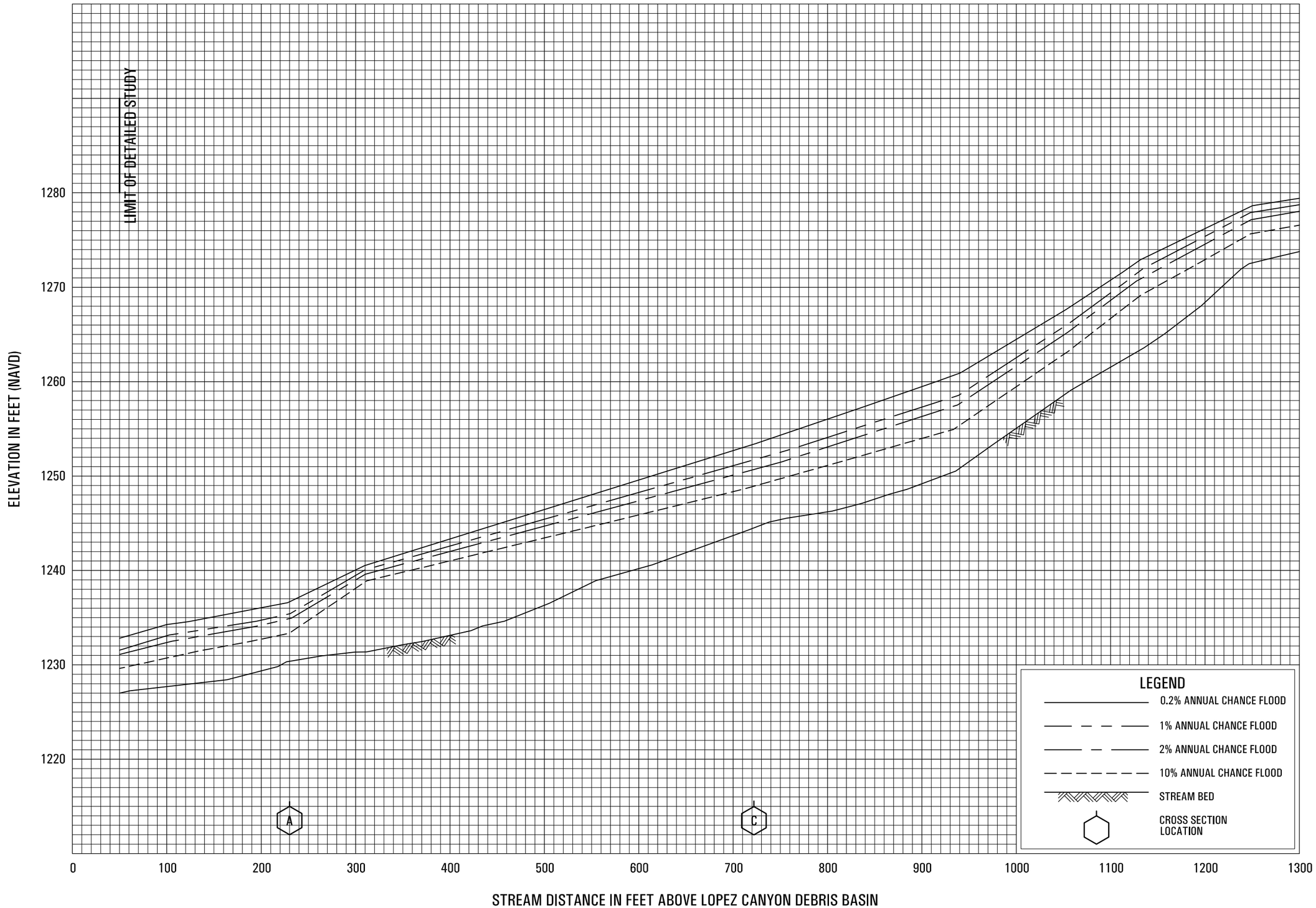
Flood Insurance Rate Map Index

Flood Insurance Rate Map



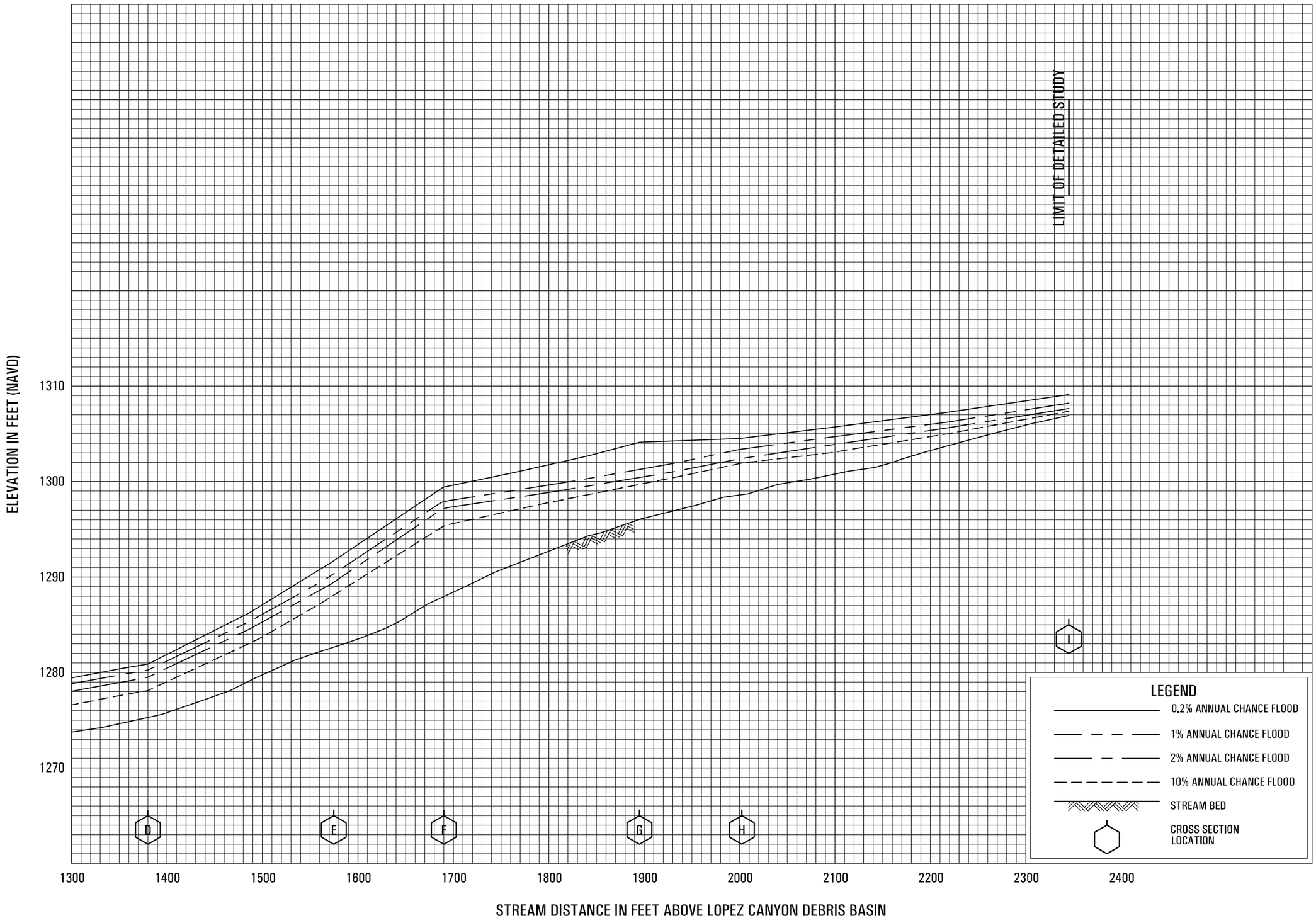
FLOOD PROFILES

LOPEZ CANYON CHANNEL

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



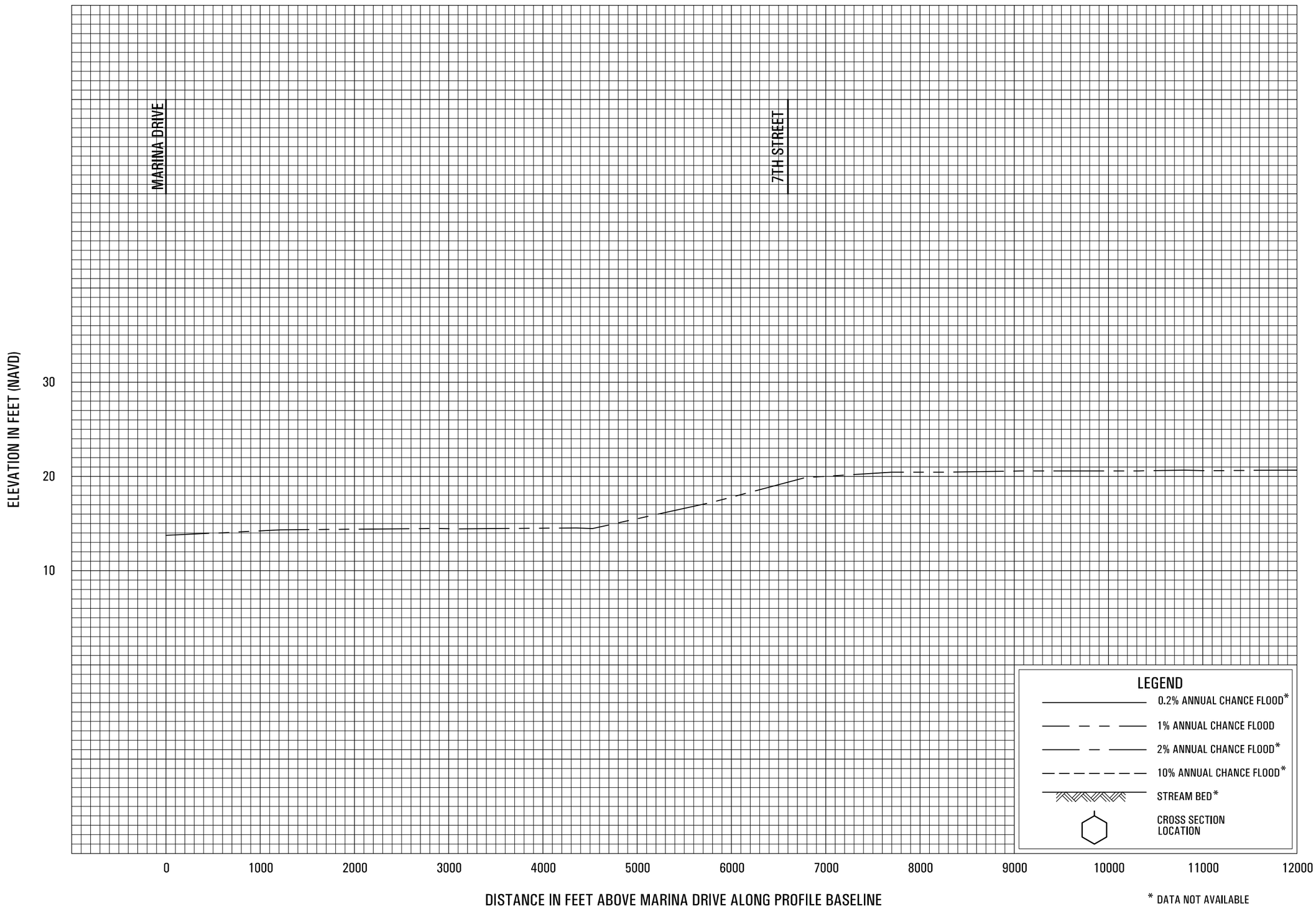
FLOOD PROFILES

LOPEZ CANYON CHANNEL

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



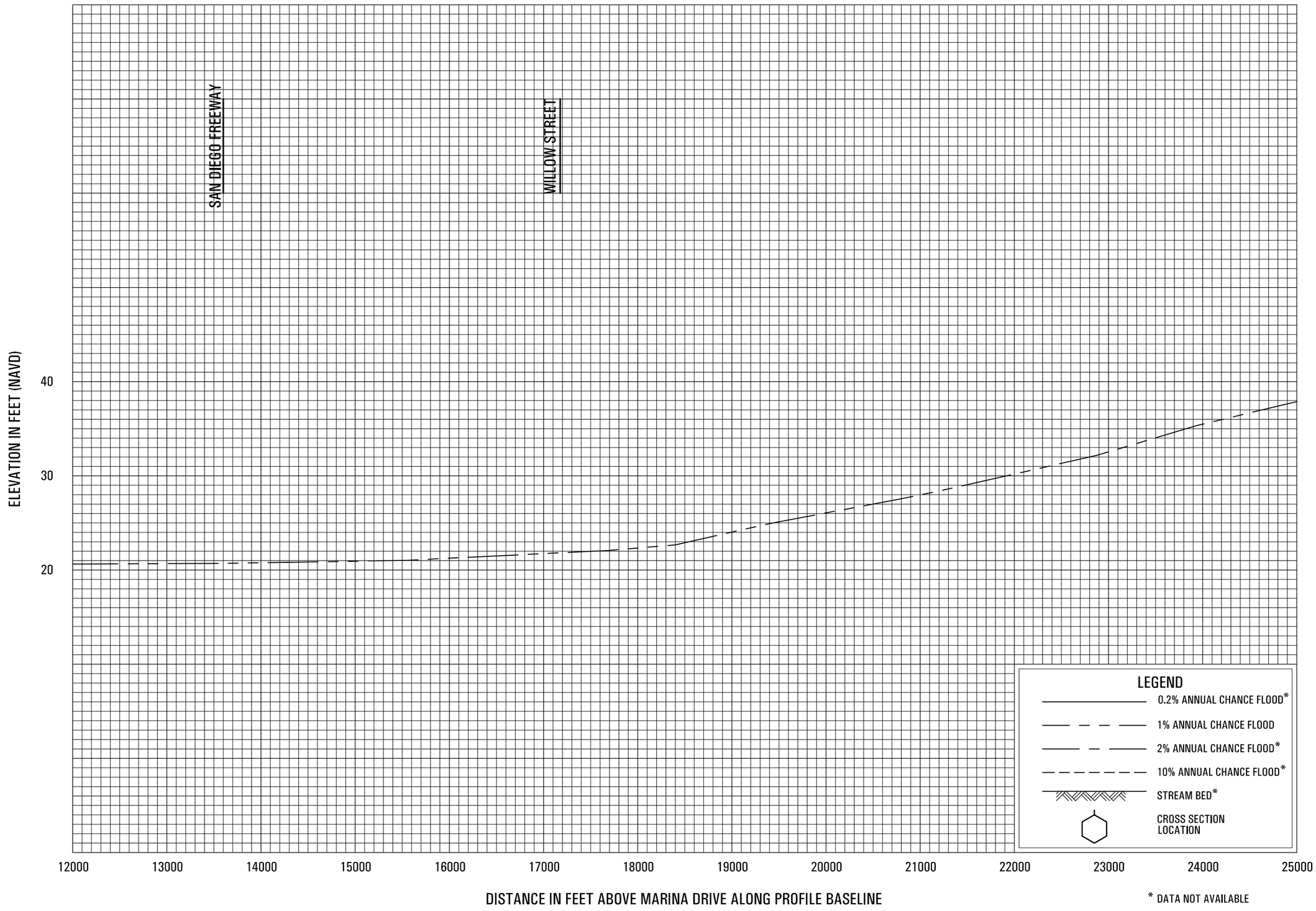
FLOOD PROFILES

LOS ANGELES RIVER LEFT OVERBANK PATH 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

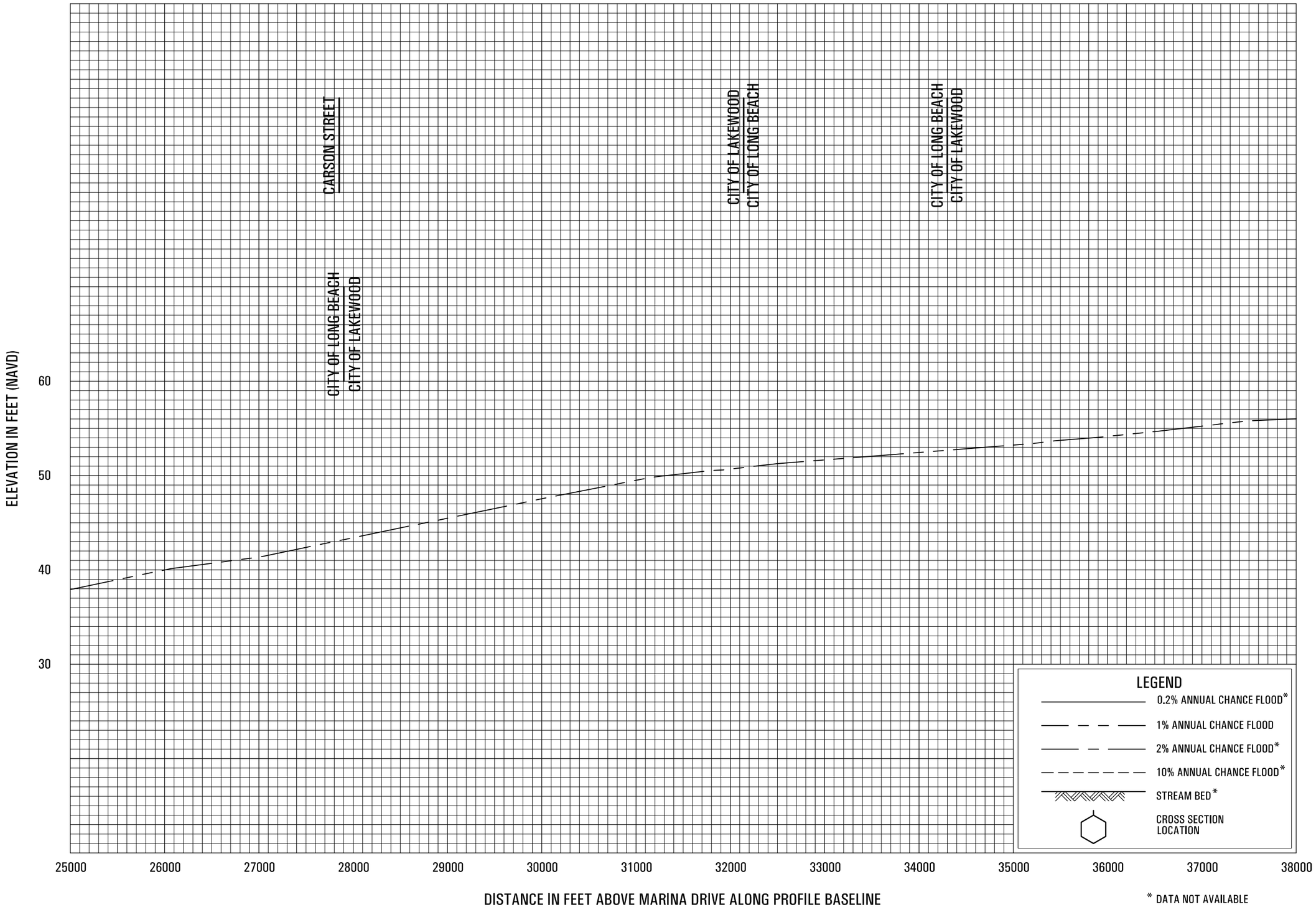
LOS ANGELES RIVER LEFT OVERBANK PATH 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

106P



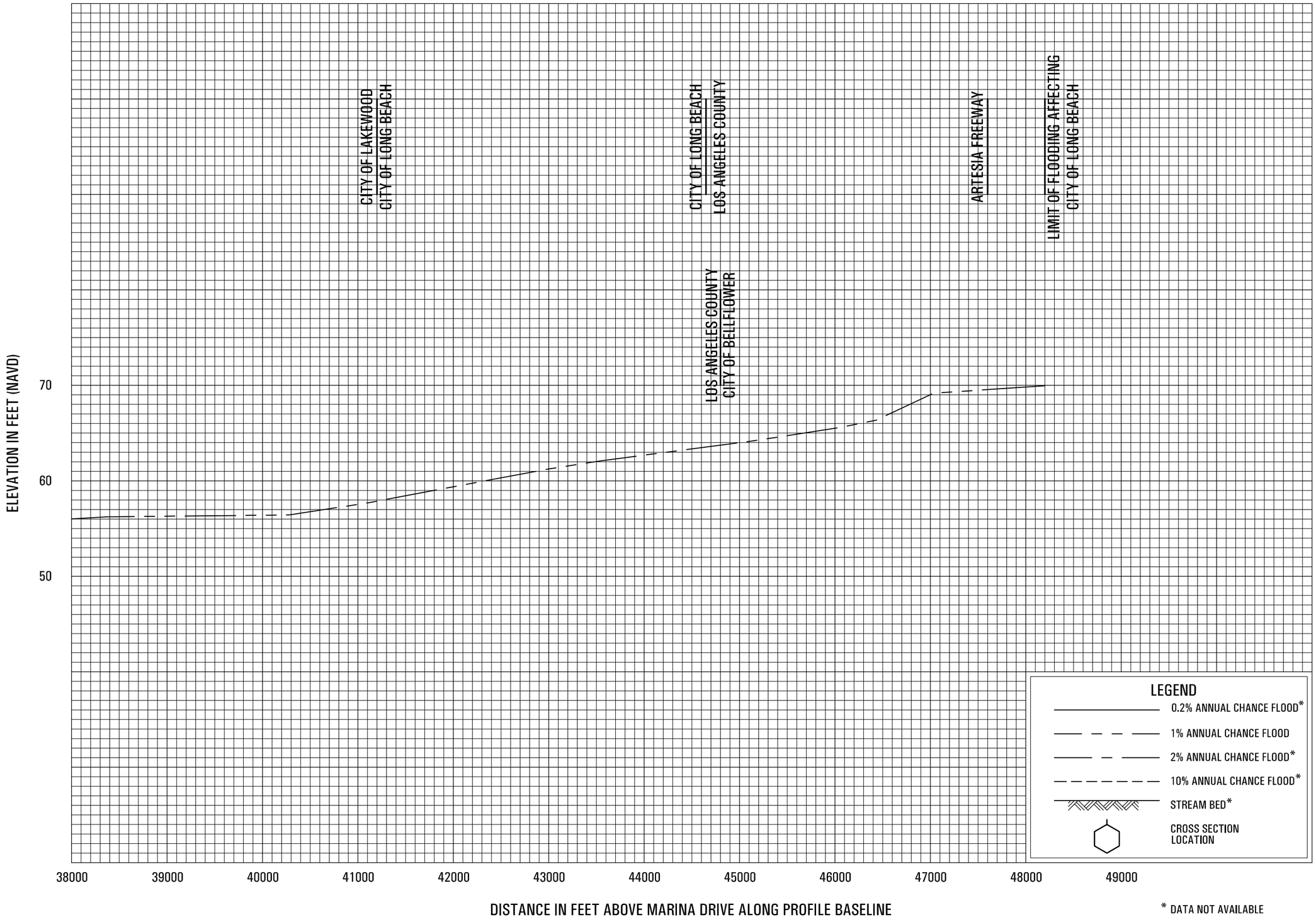
FLOOD PROFILES

LOS ANGELES RIVER LEFT OVERBANK PATH 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

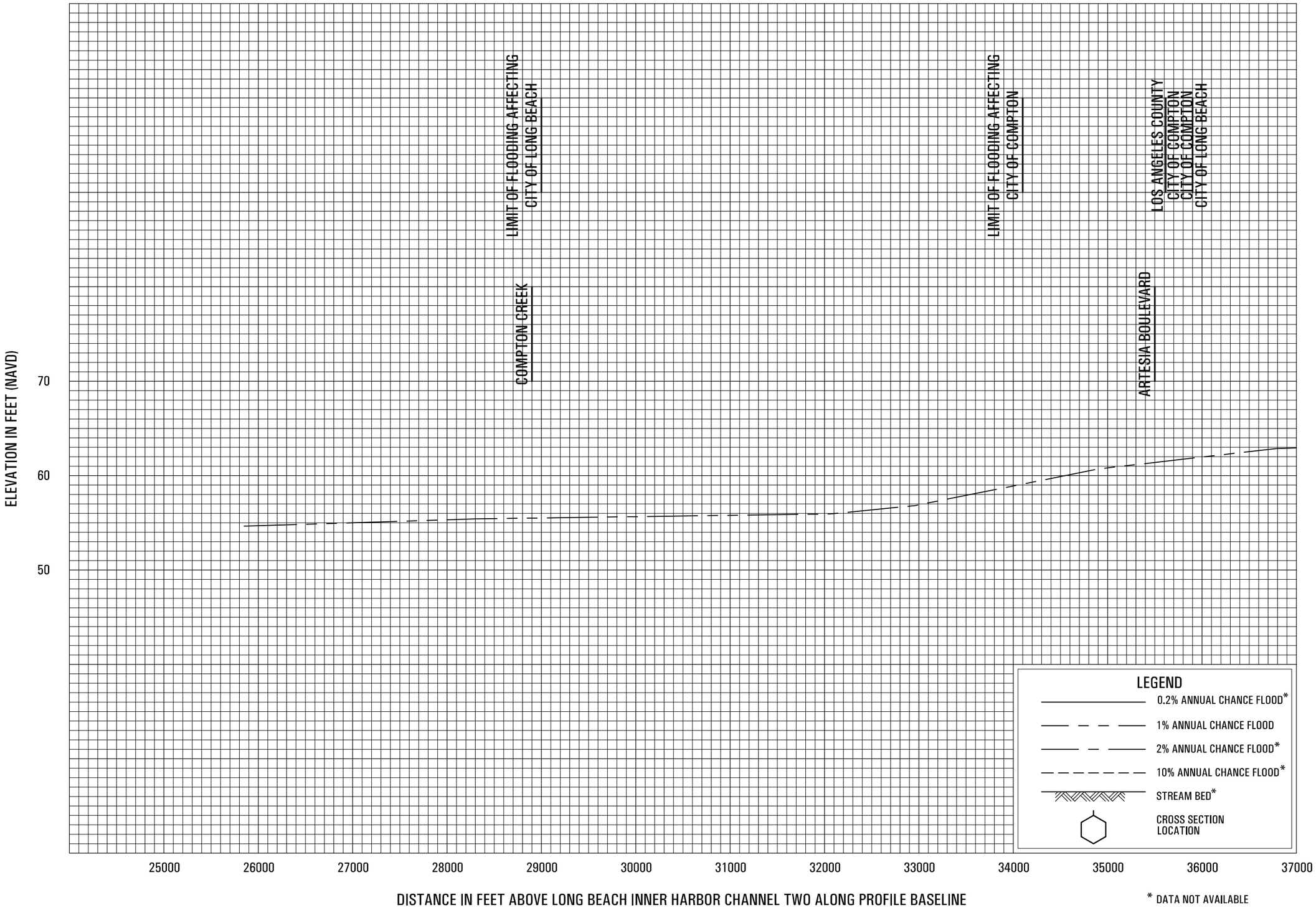
LOS ANGELES RIVER LEFT OVERBANK PATH 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

108P



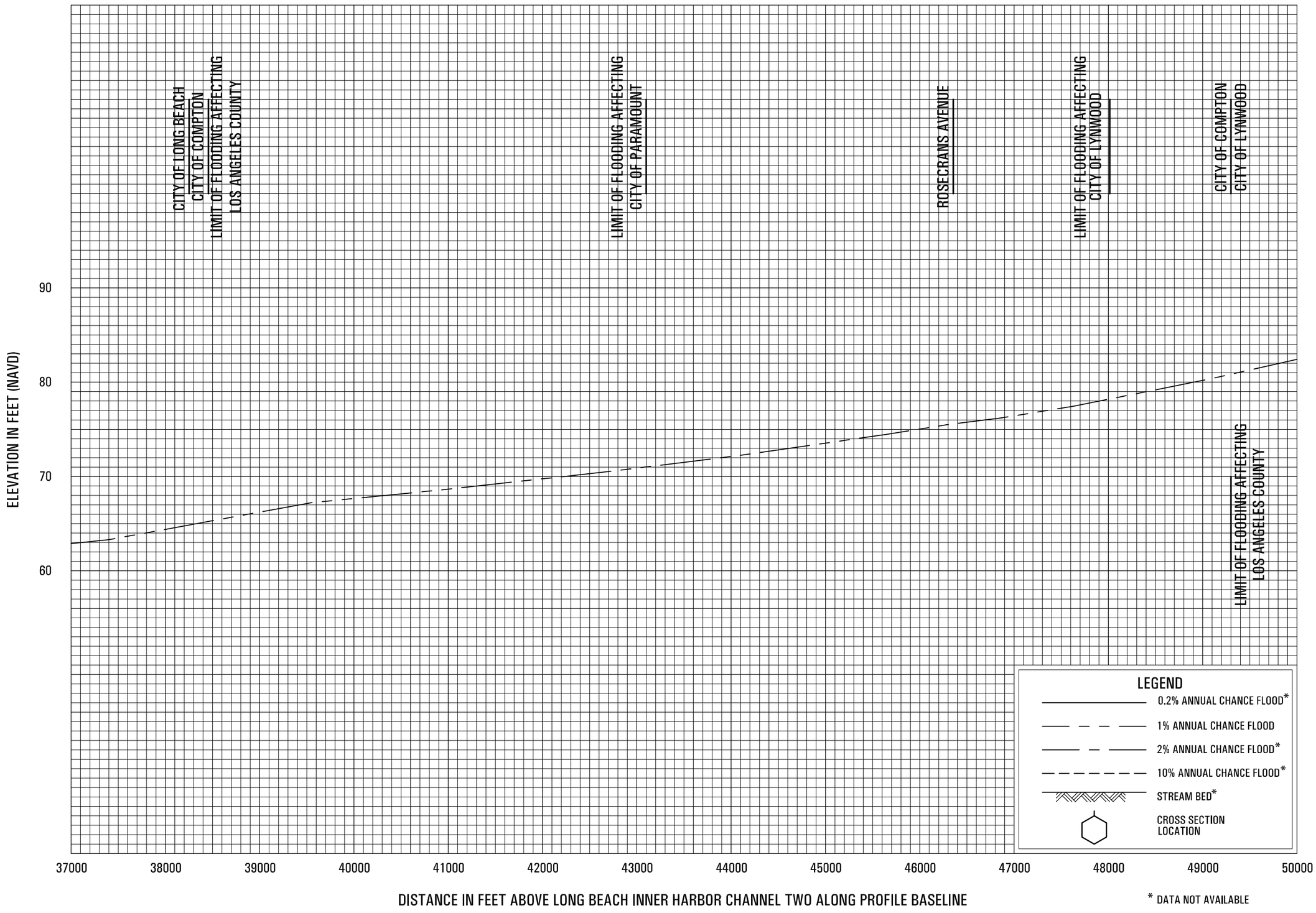
FLOOD PROFILES

LOS ANGELES RIVER RIGHT OVERBANK PATH 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



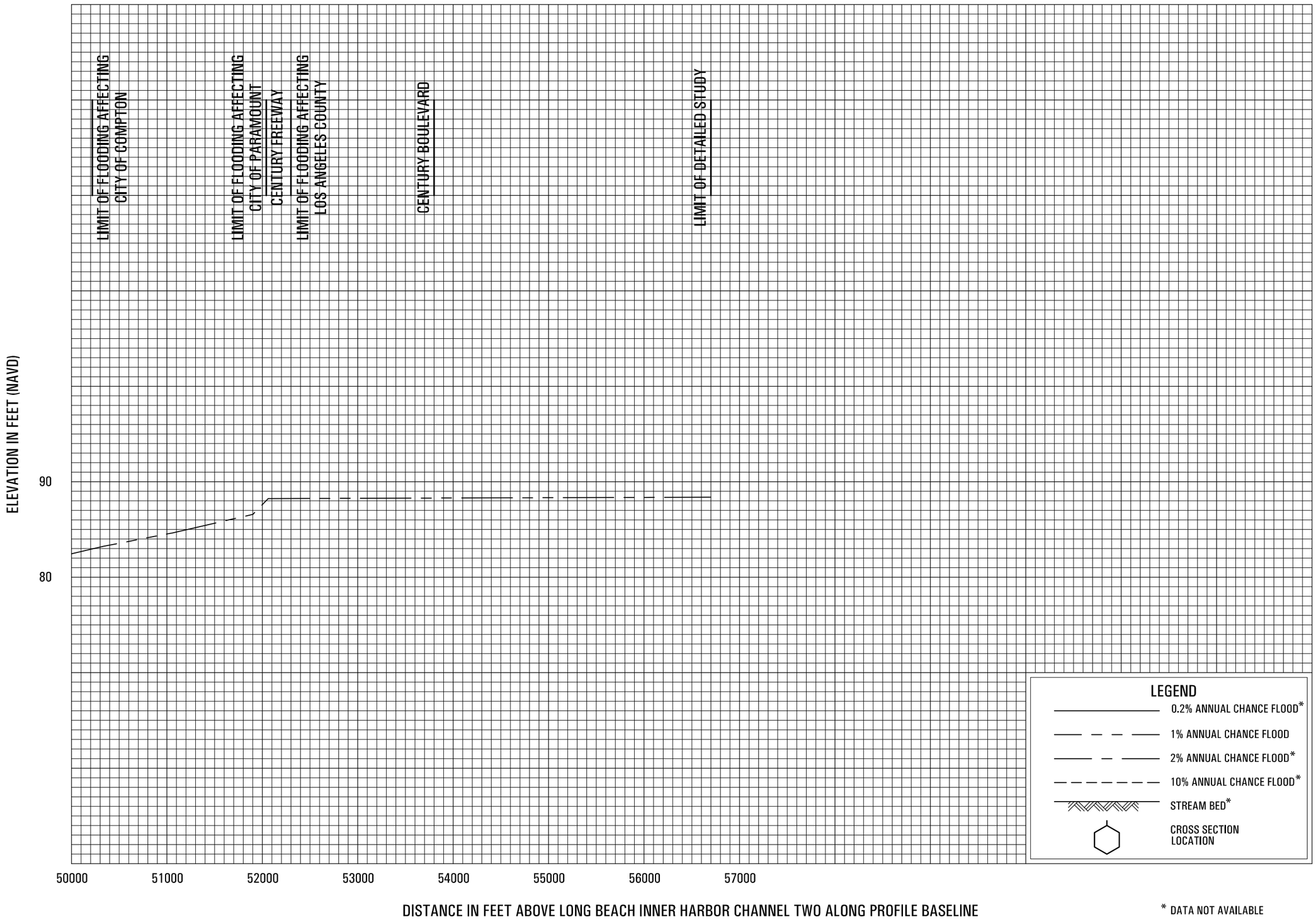
FLOOD PROFILES

LOS ANGELES RIVER RIGHT OVERBANK PATH 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



* DATA NOT AVAILABLE

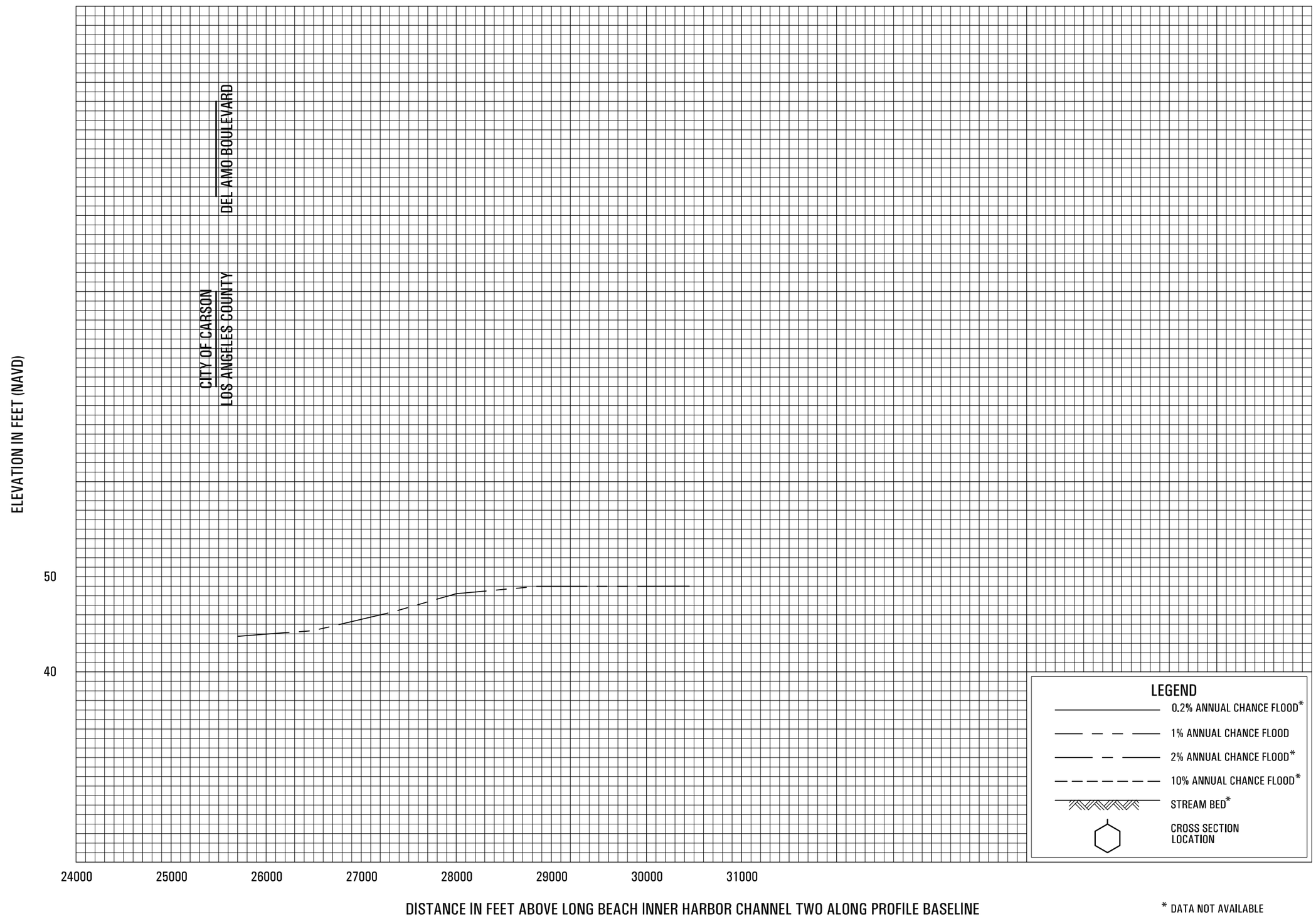
FLOOD PROFILES

LOS ANGELES RIVER RIGHT OVERBANK PATH 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

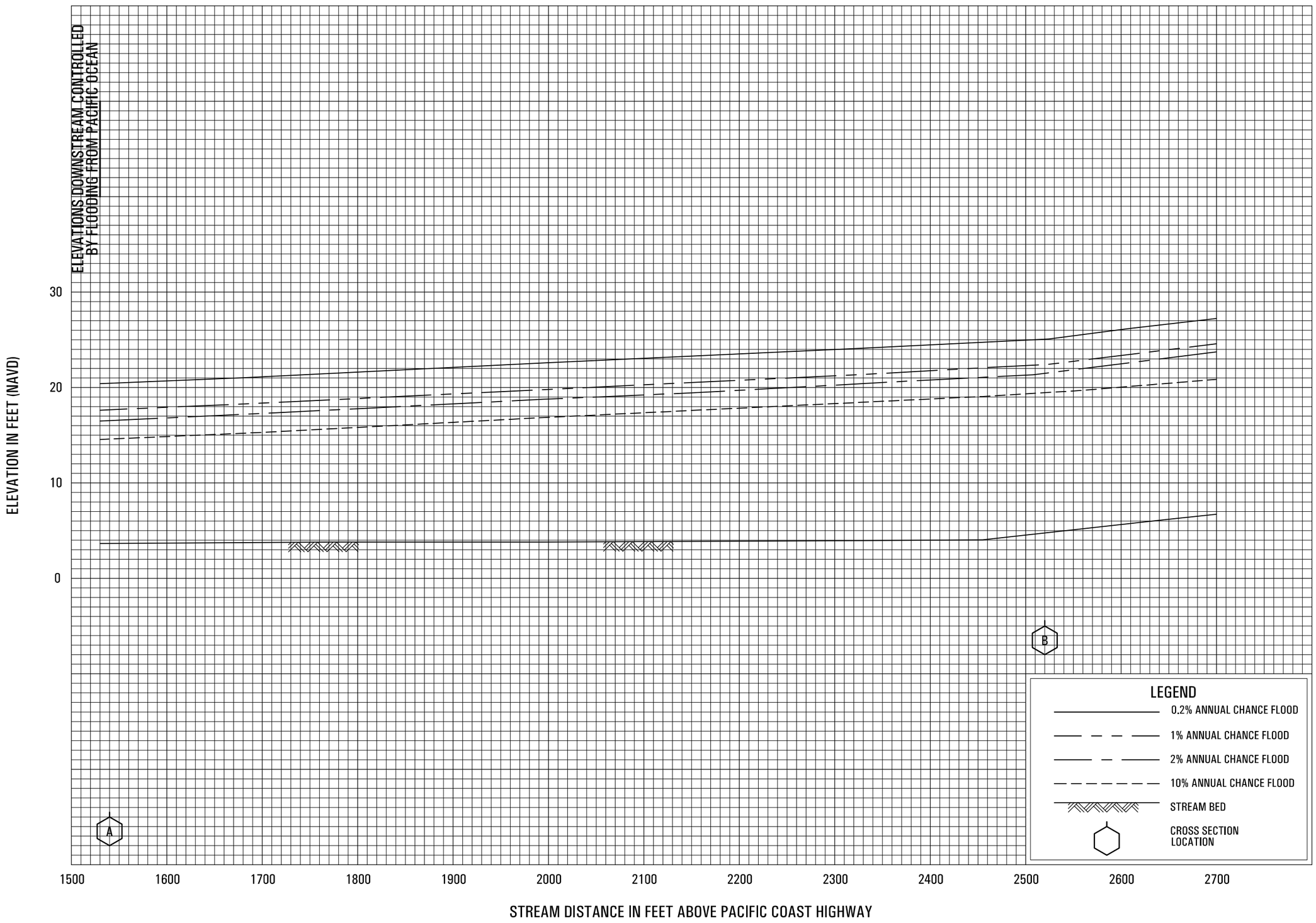
LOS ANGELES RIVER RIGHT OVERBANK PATH 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

112P



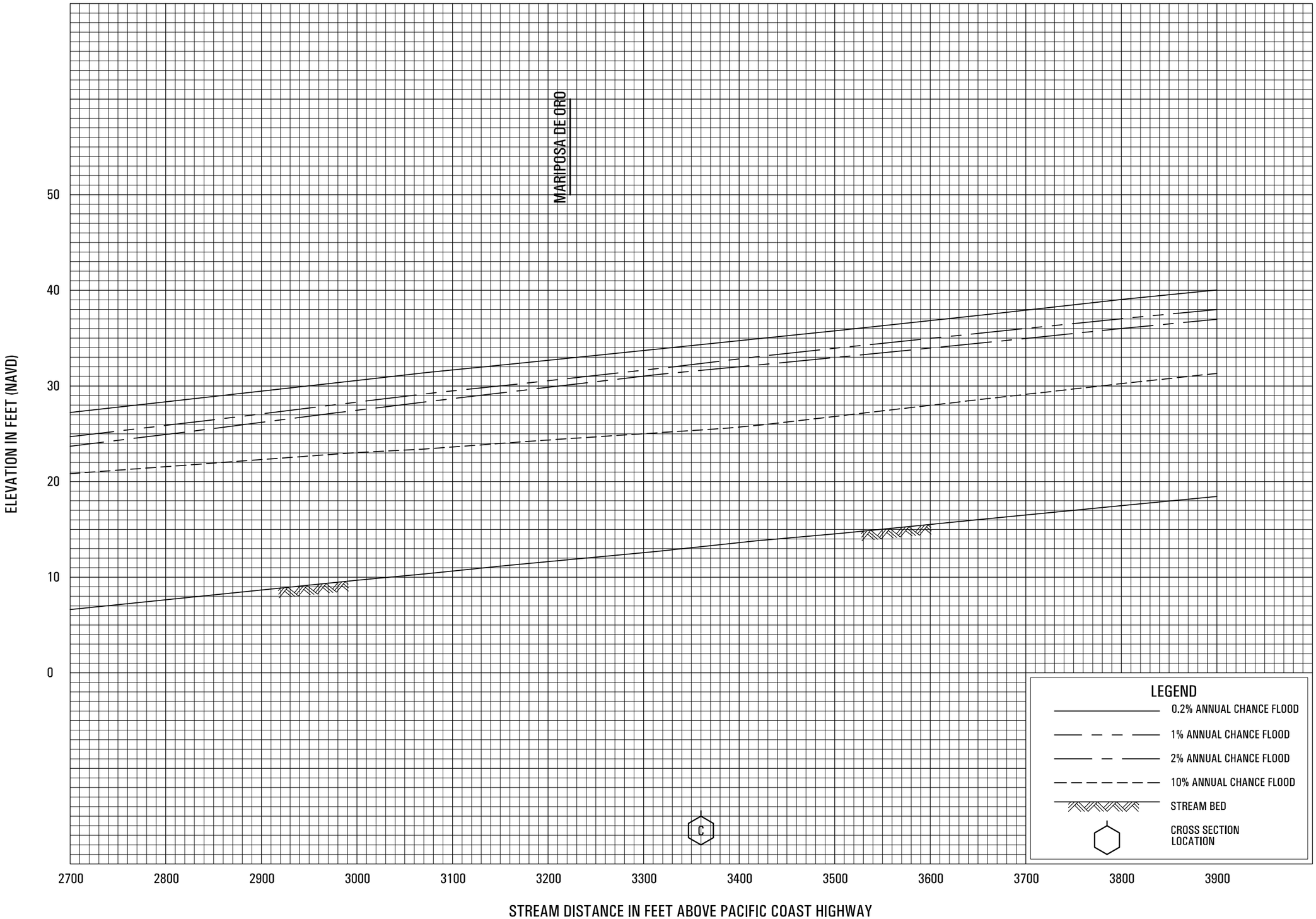
FLOOD PROFILES

MALIBU CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



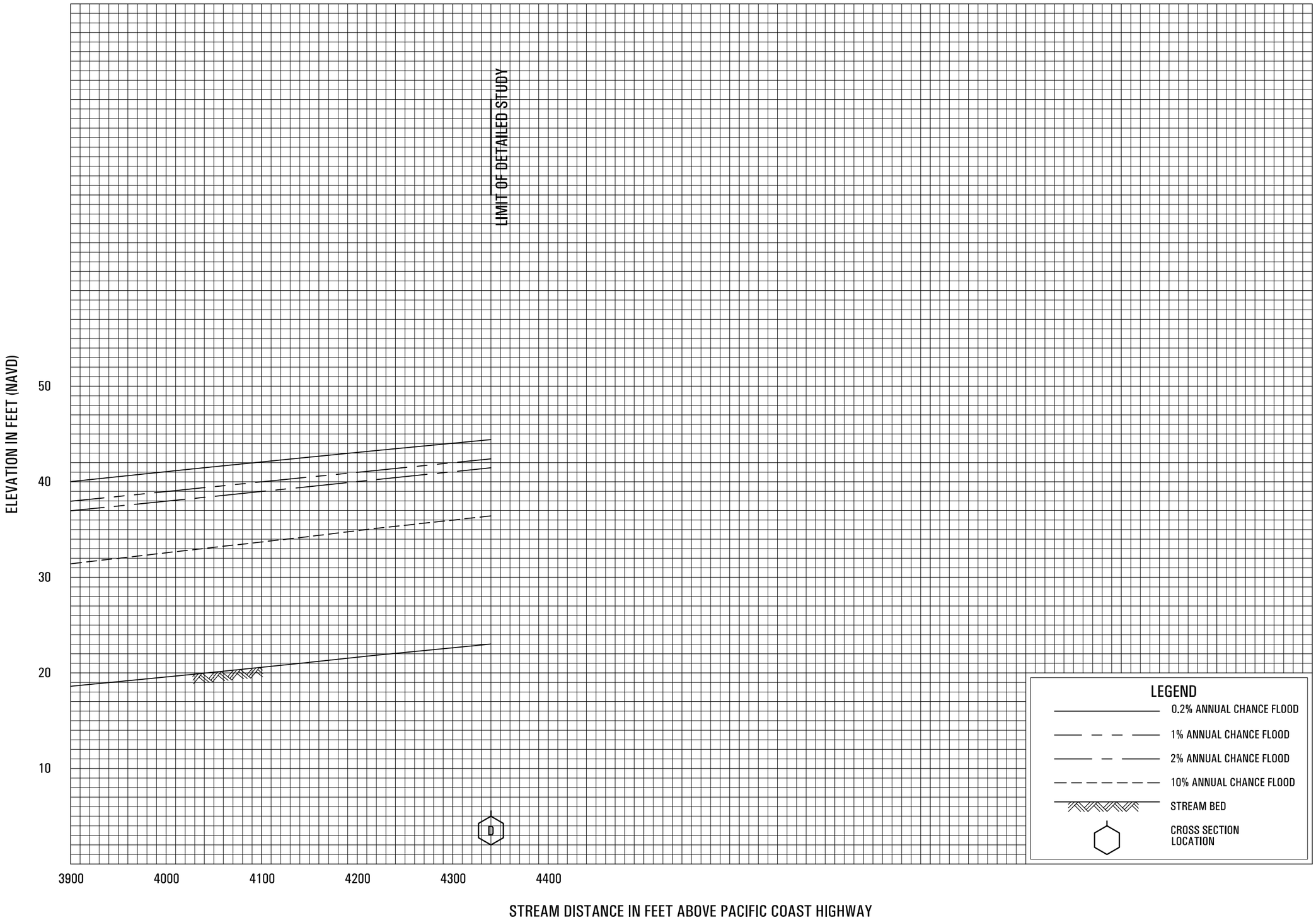
FLOOD PROFILES

MALIBU CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



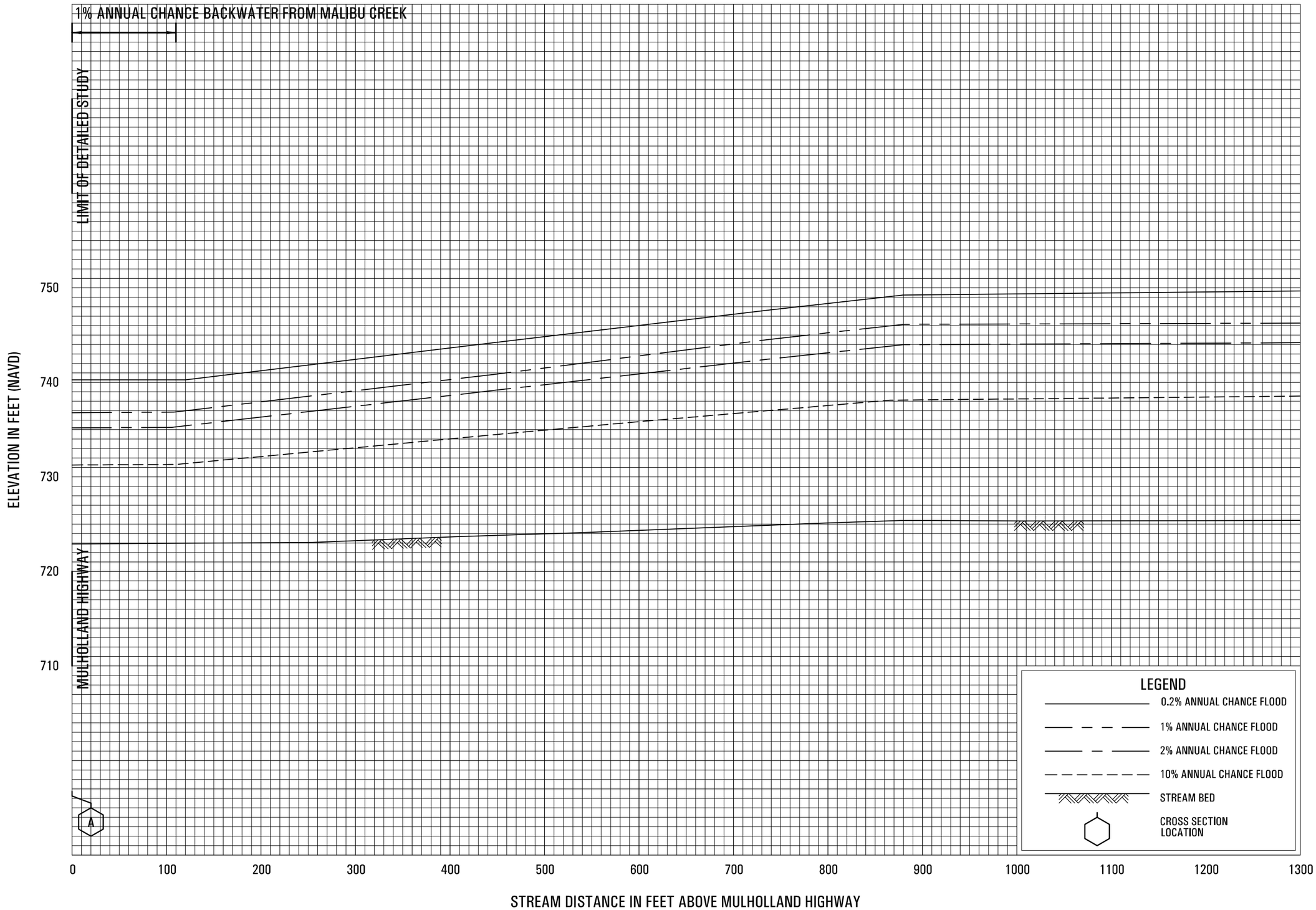
FLOOD PROFILES

MALIBU CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



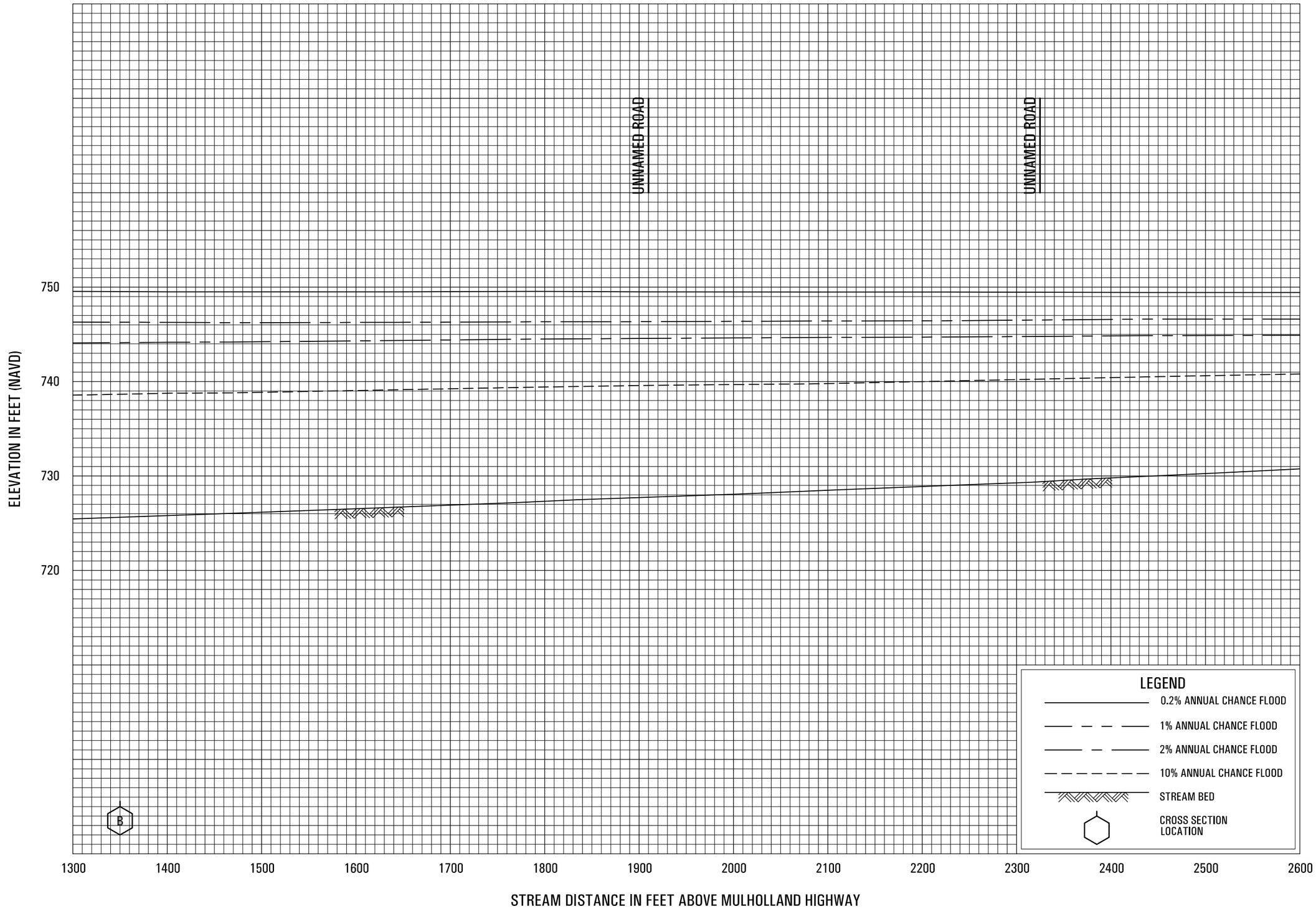
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



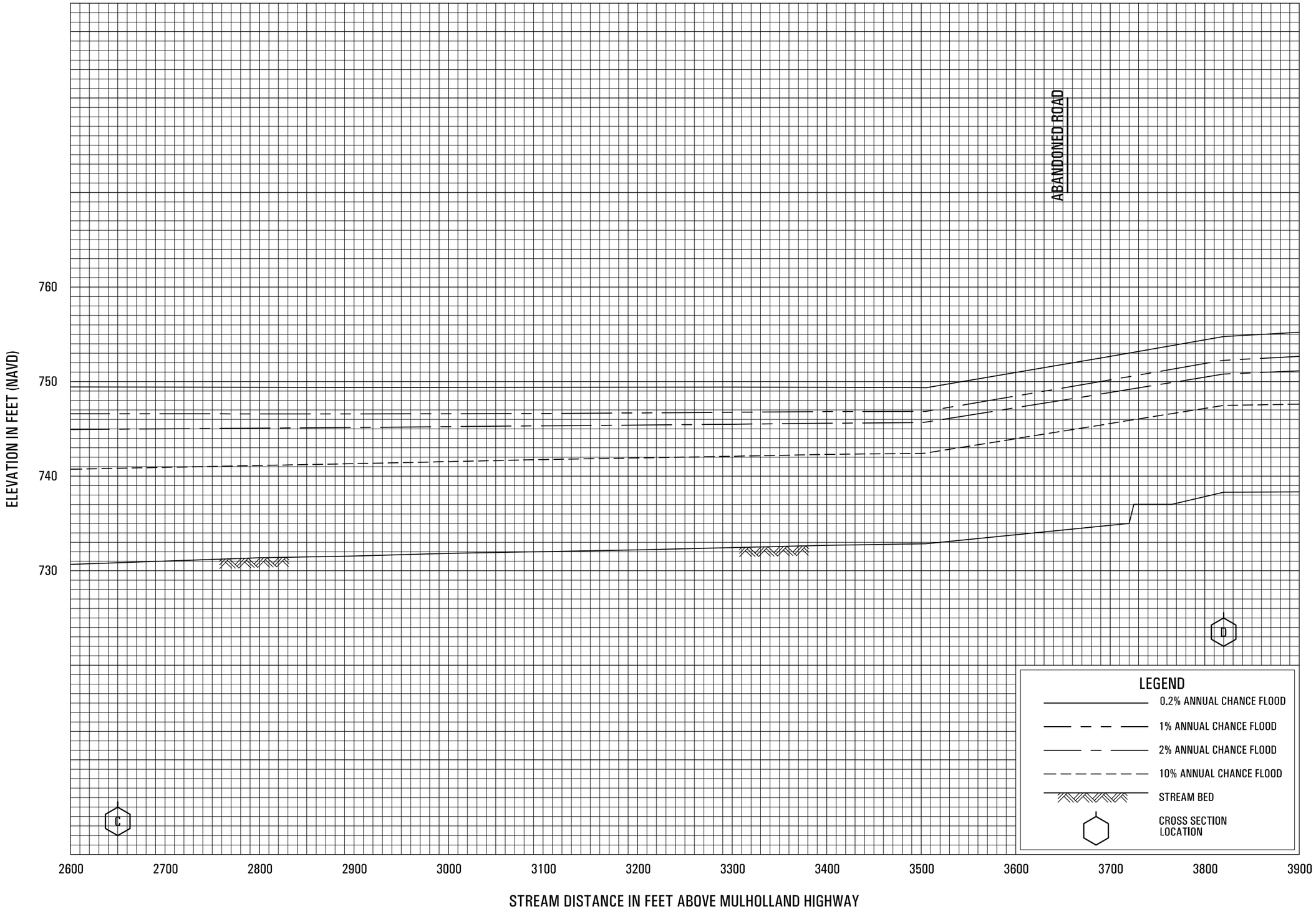
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



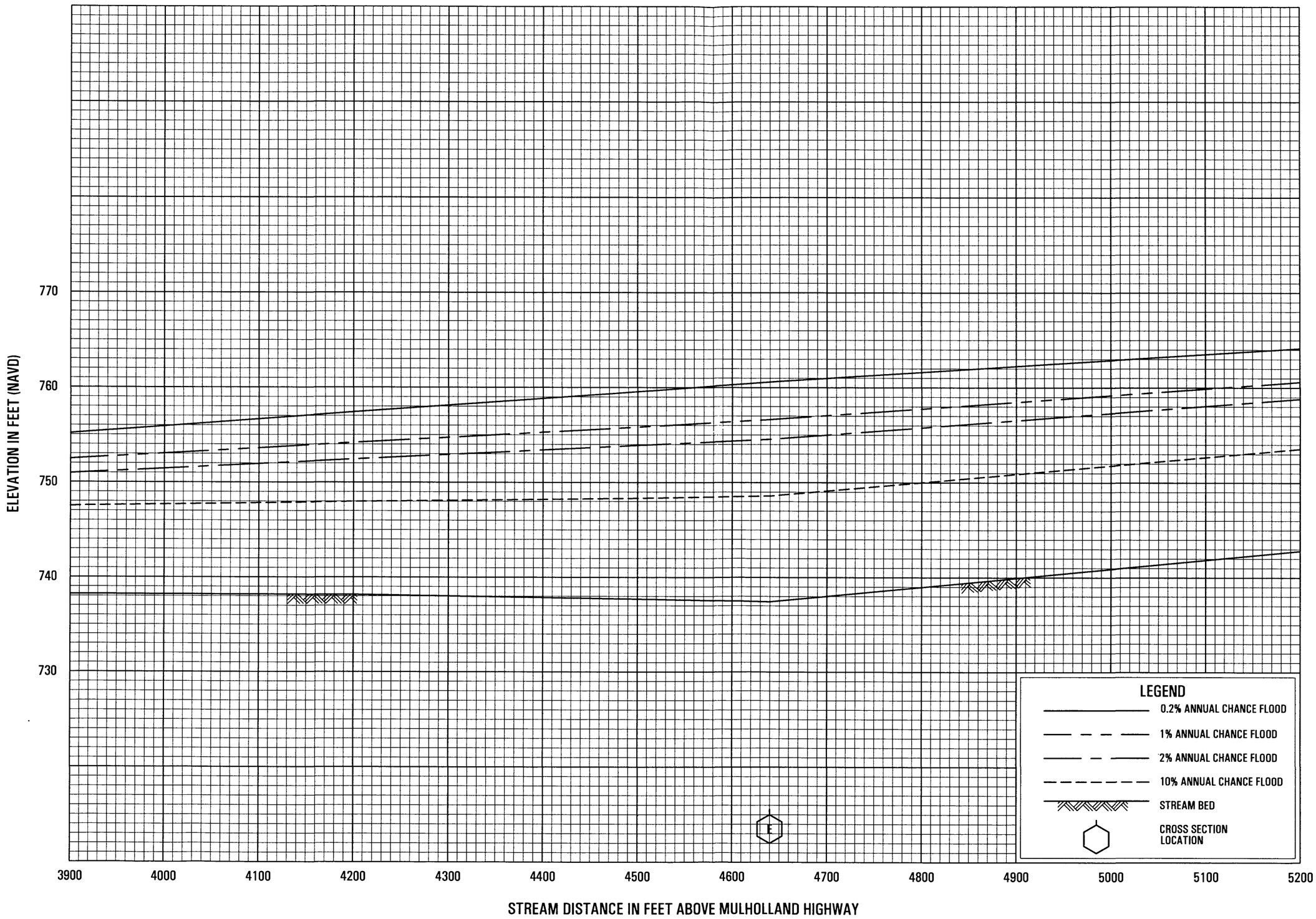
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



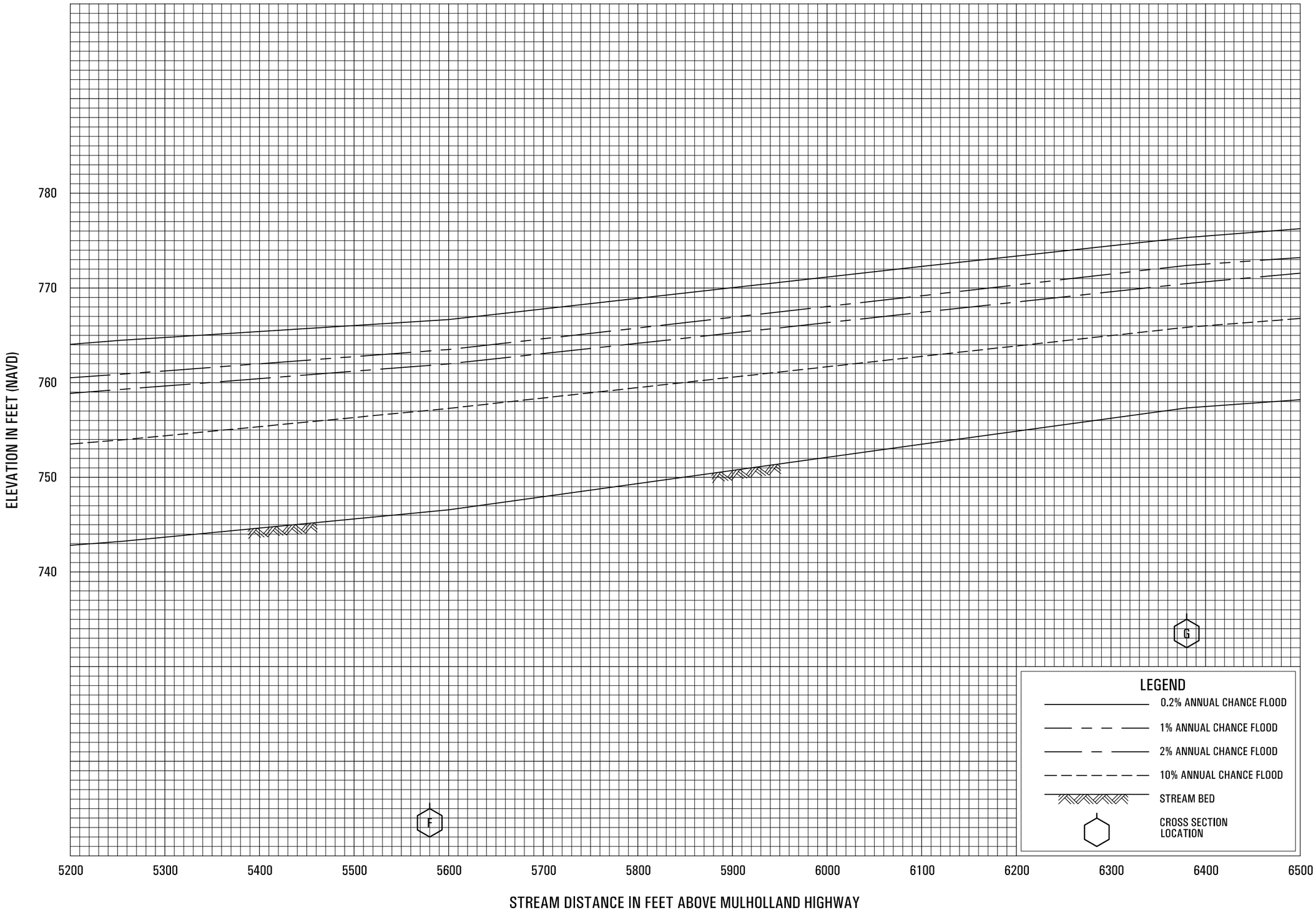
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



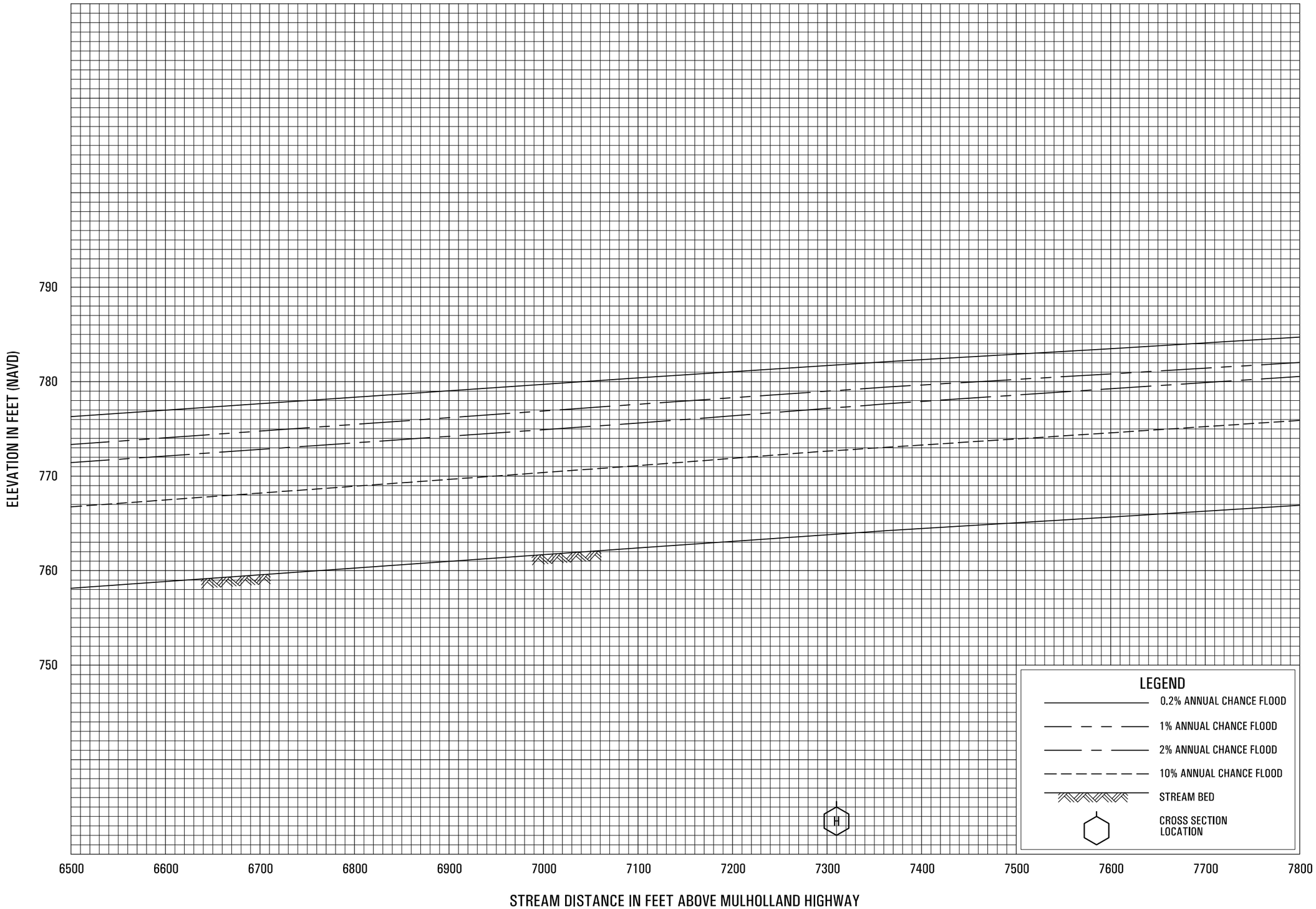
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



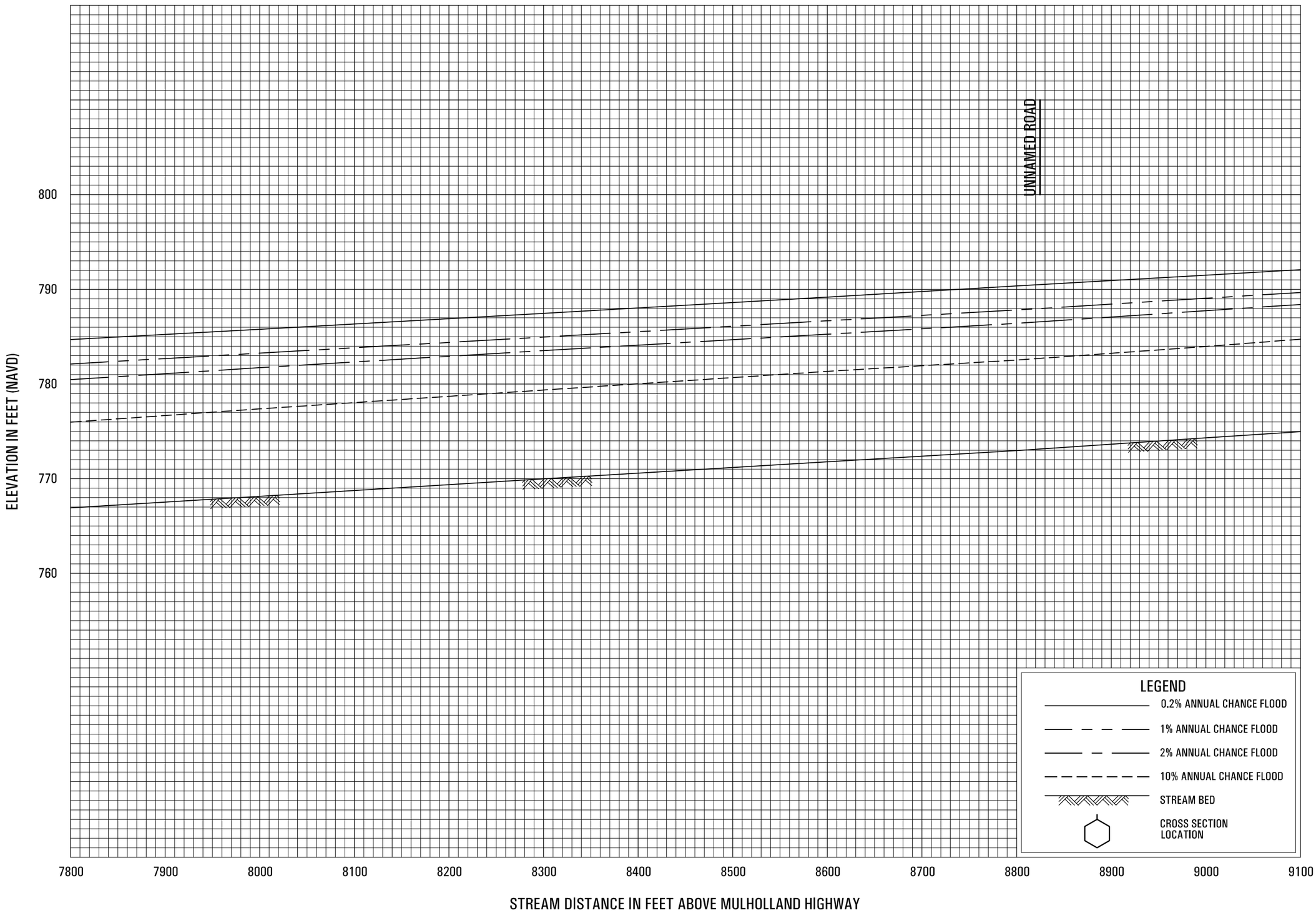
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



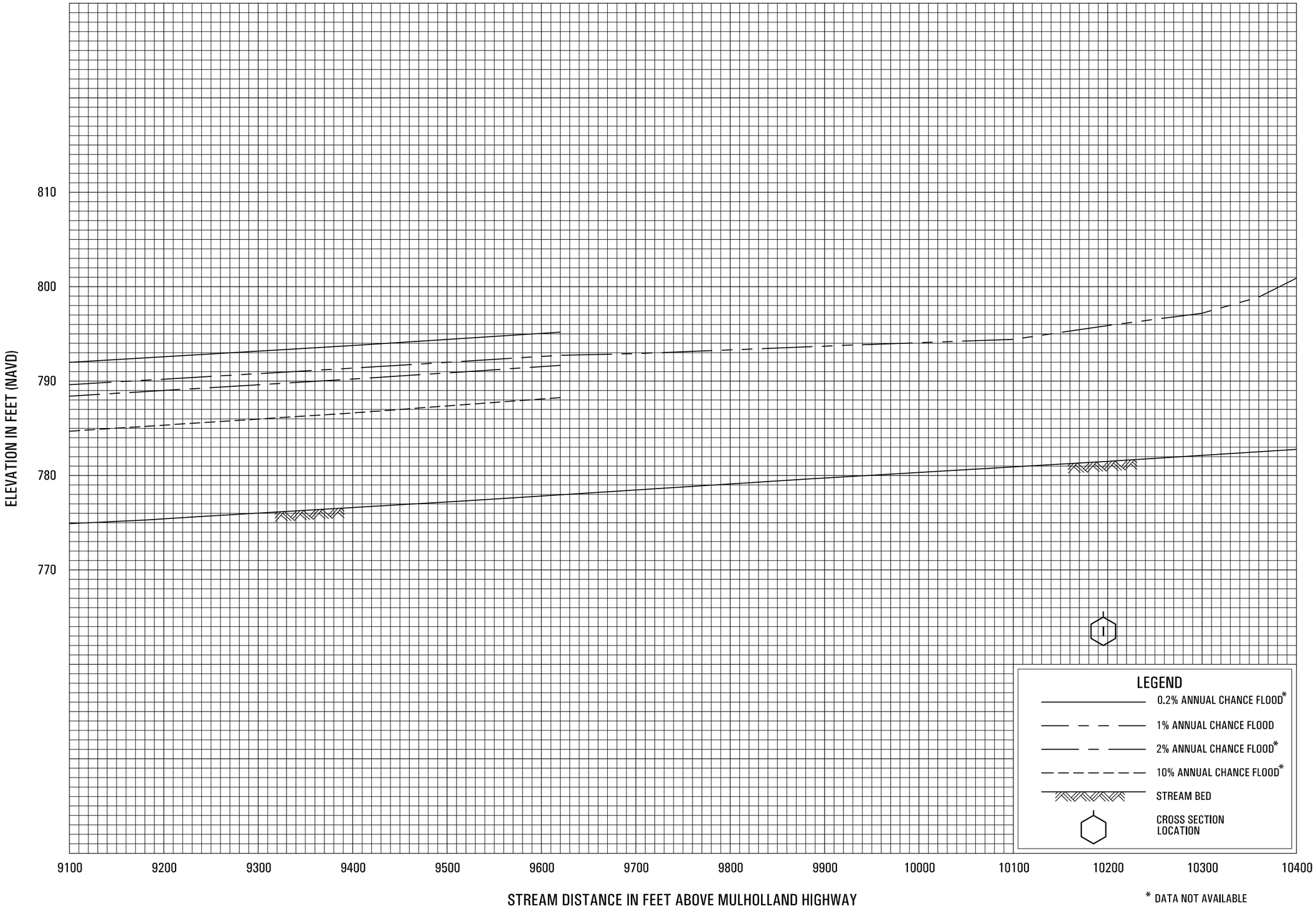
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



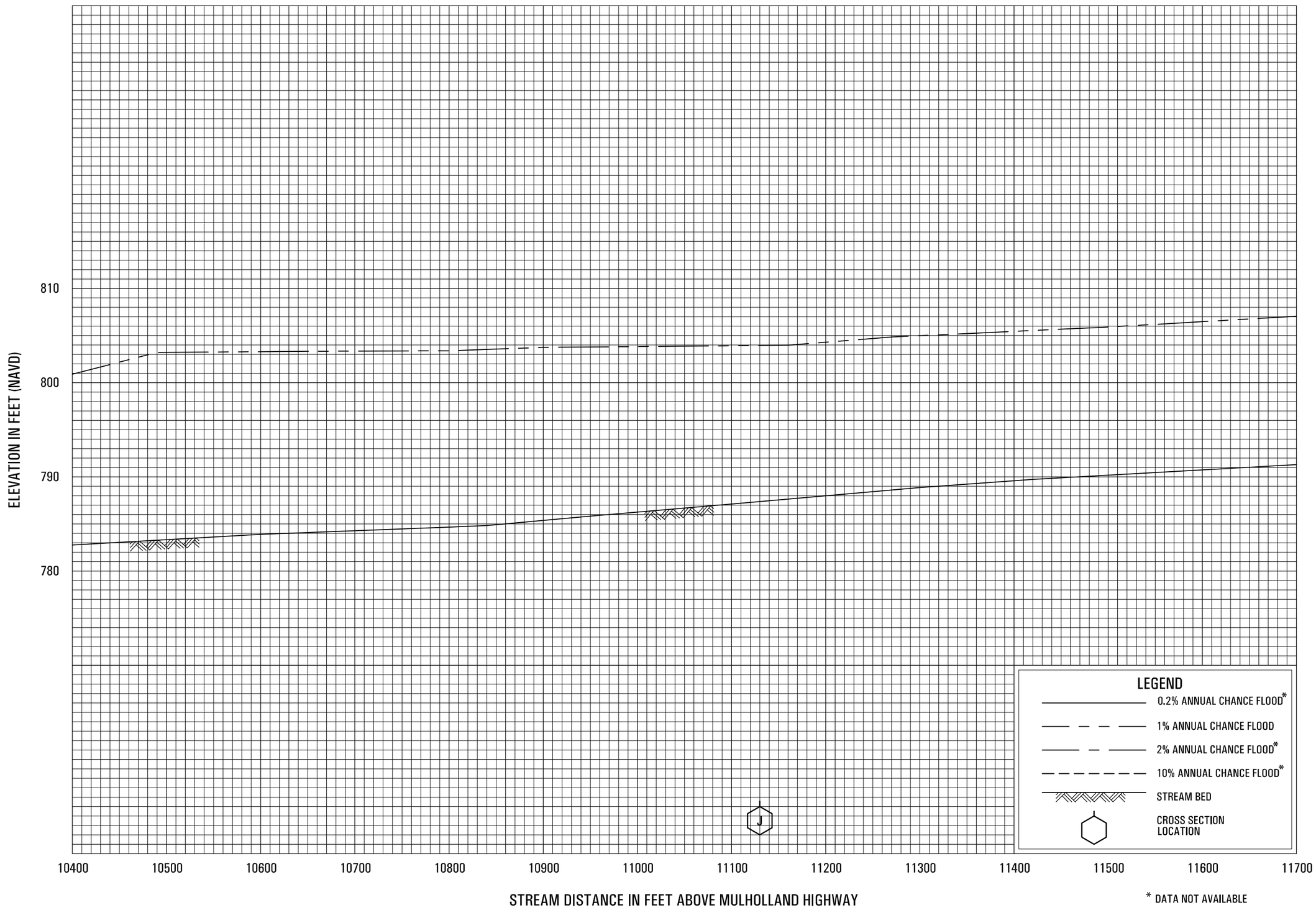
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



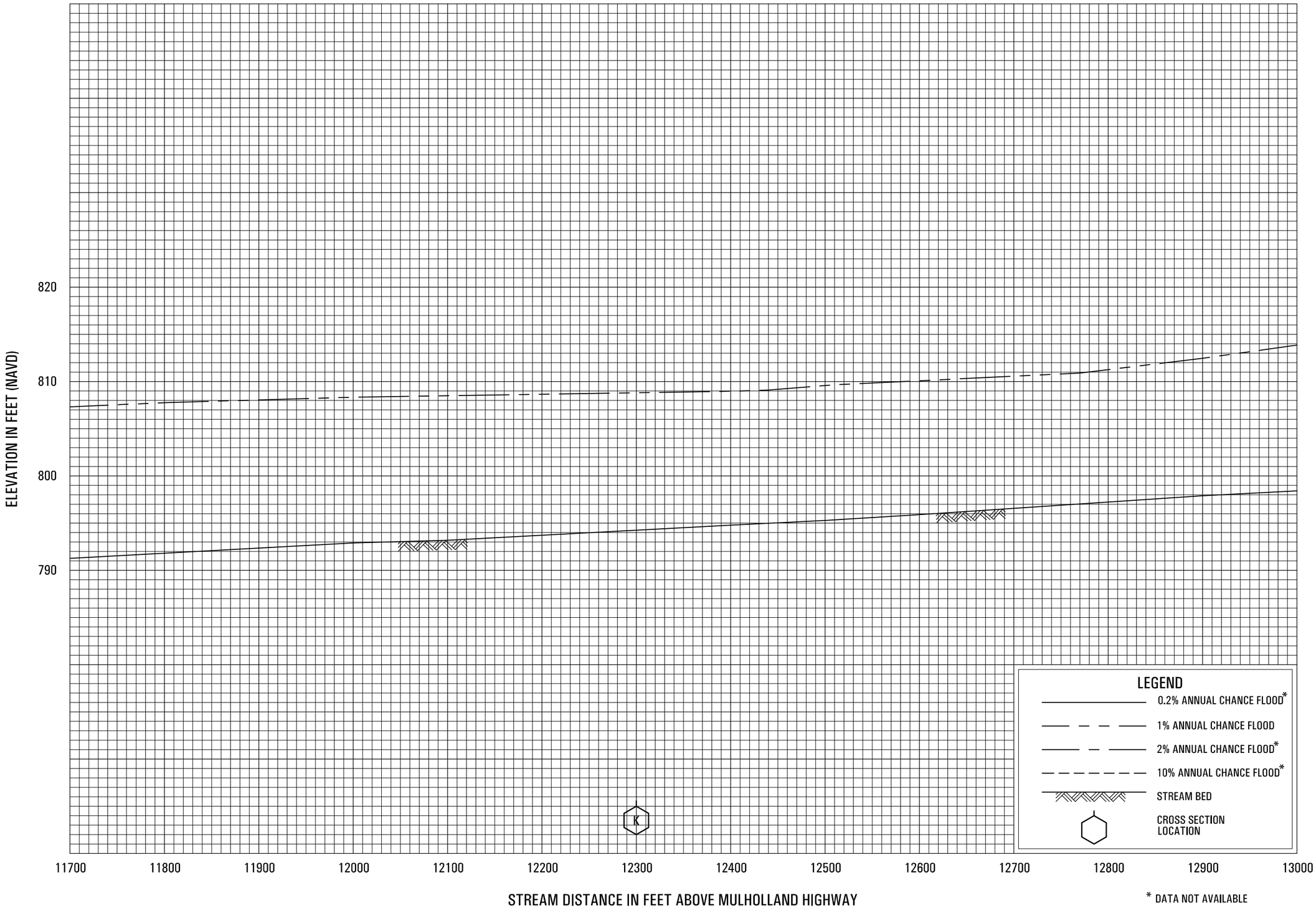
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



* DATA NOT AVAILABLE

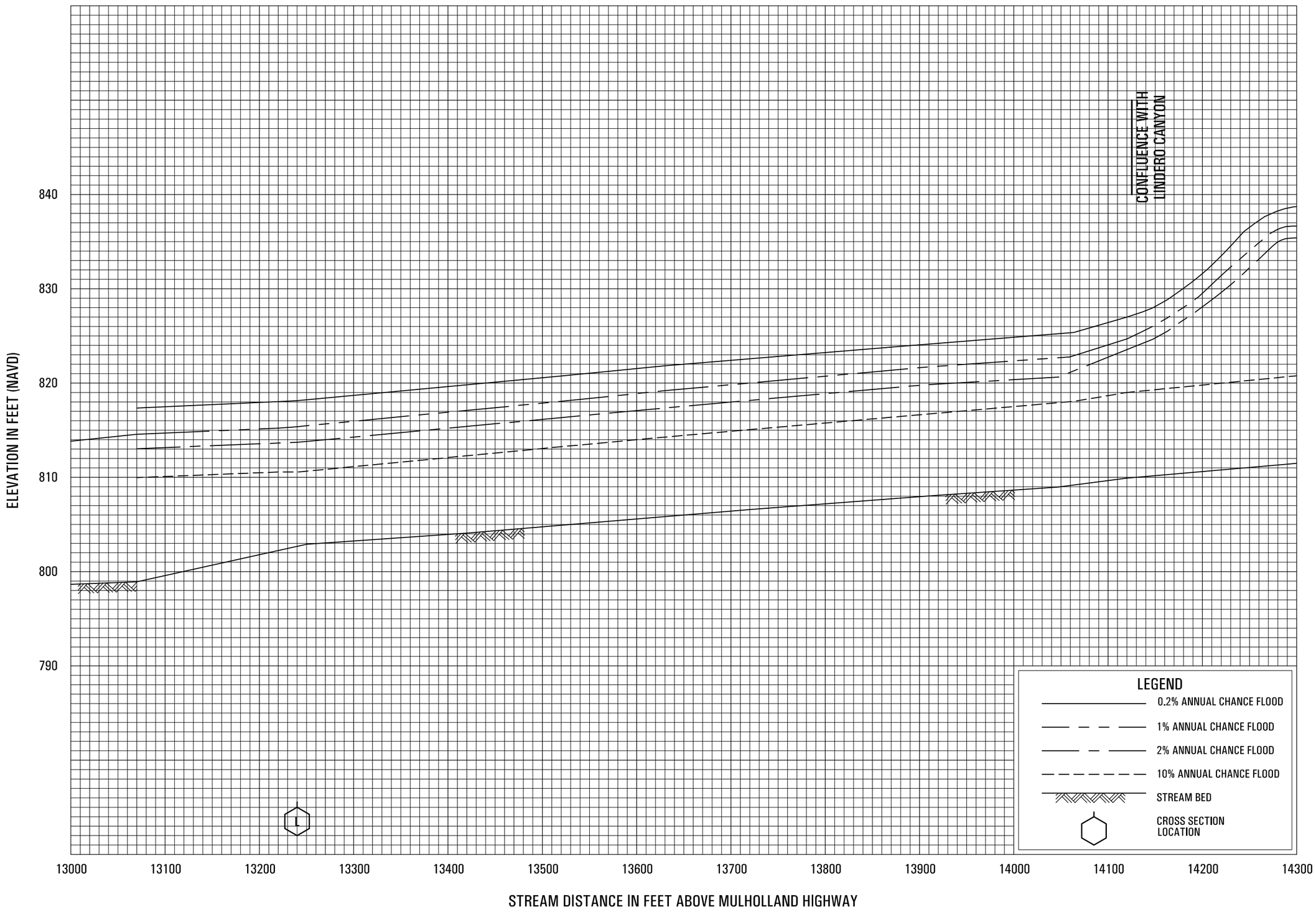
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



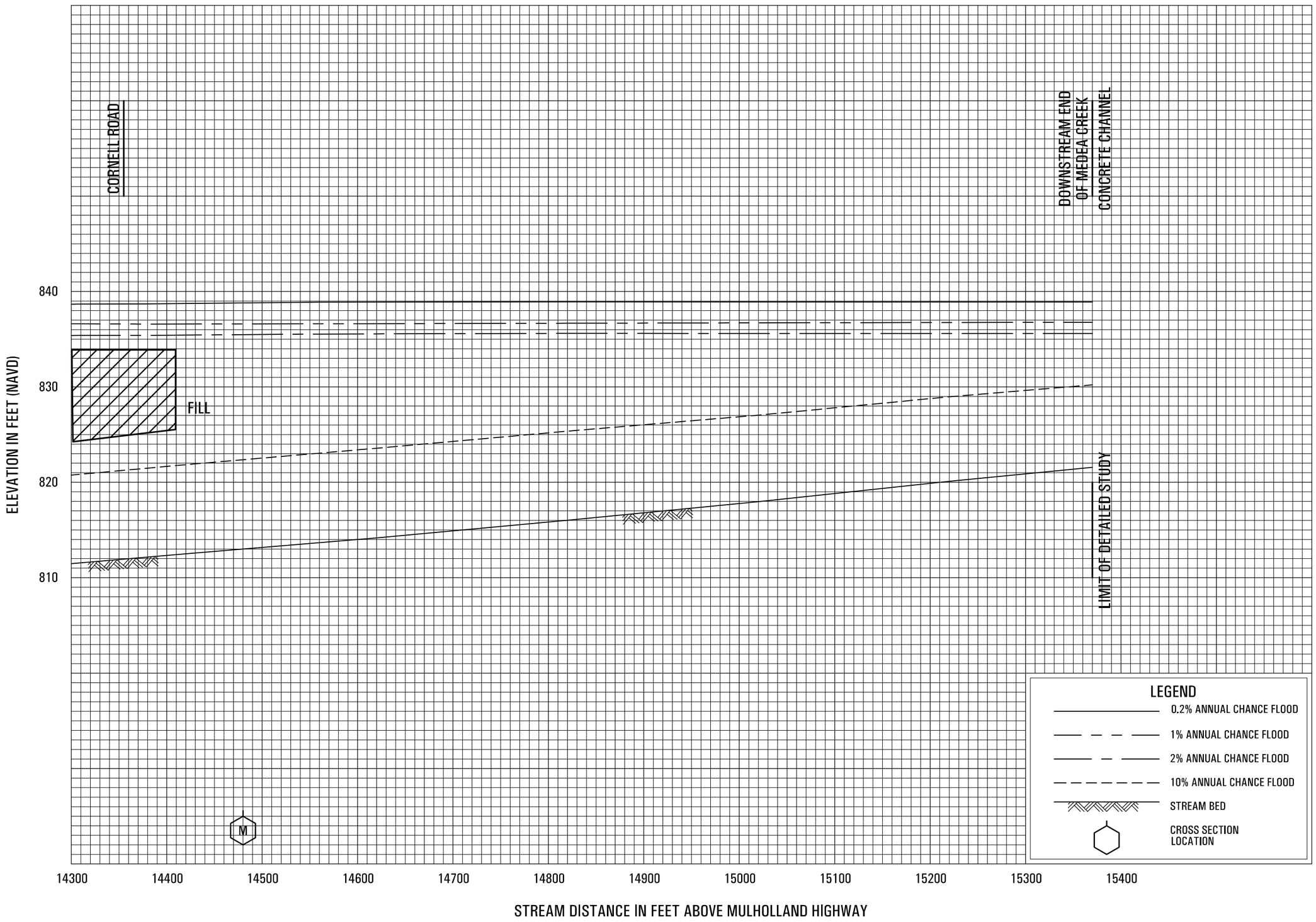
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



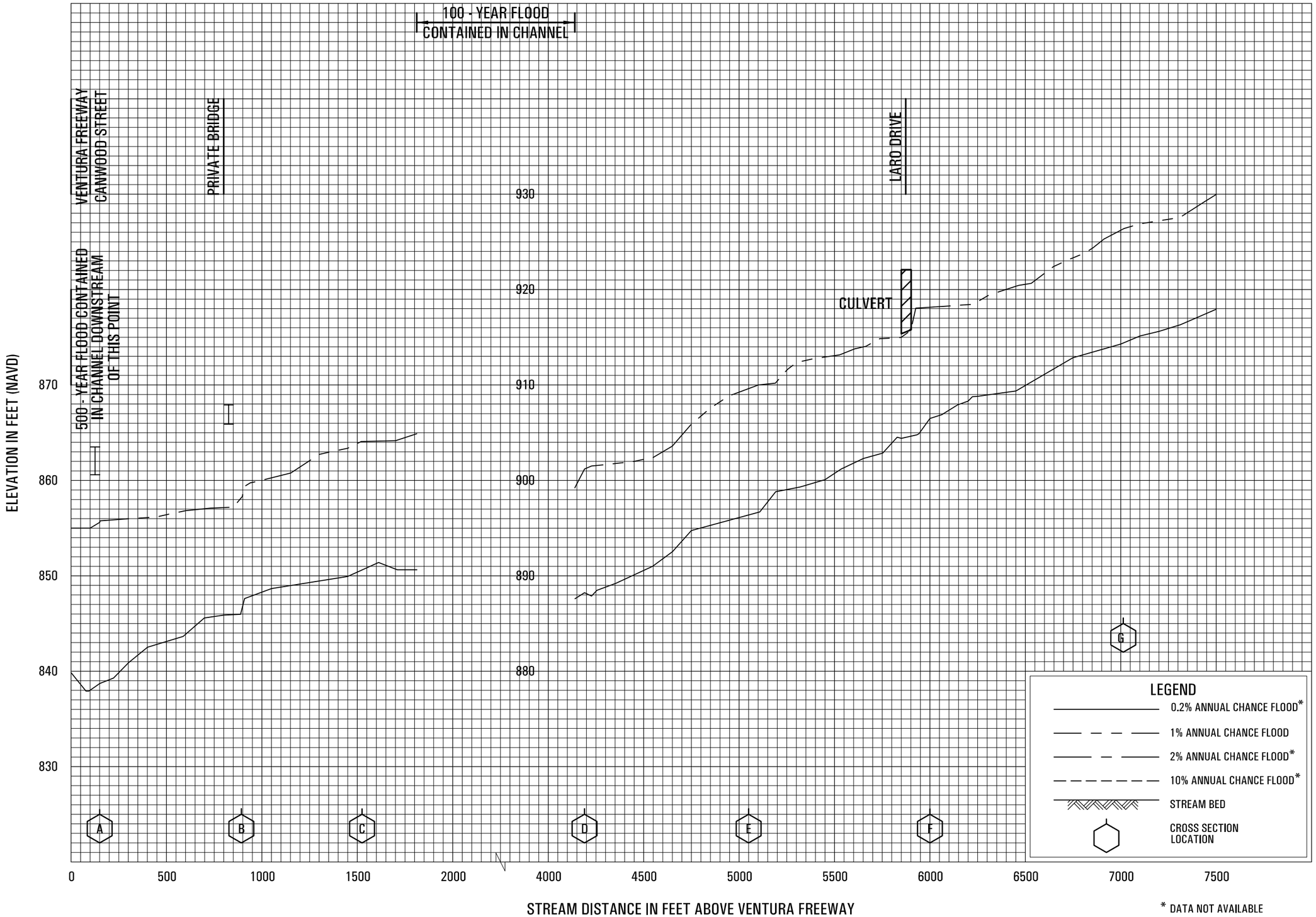
FLOOD PROFILES

MEDEA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



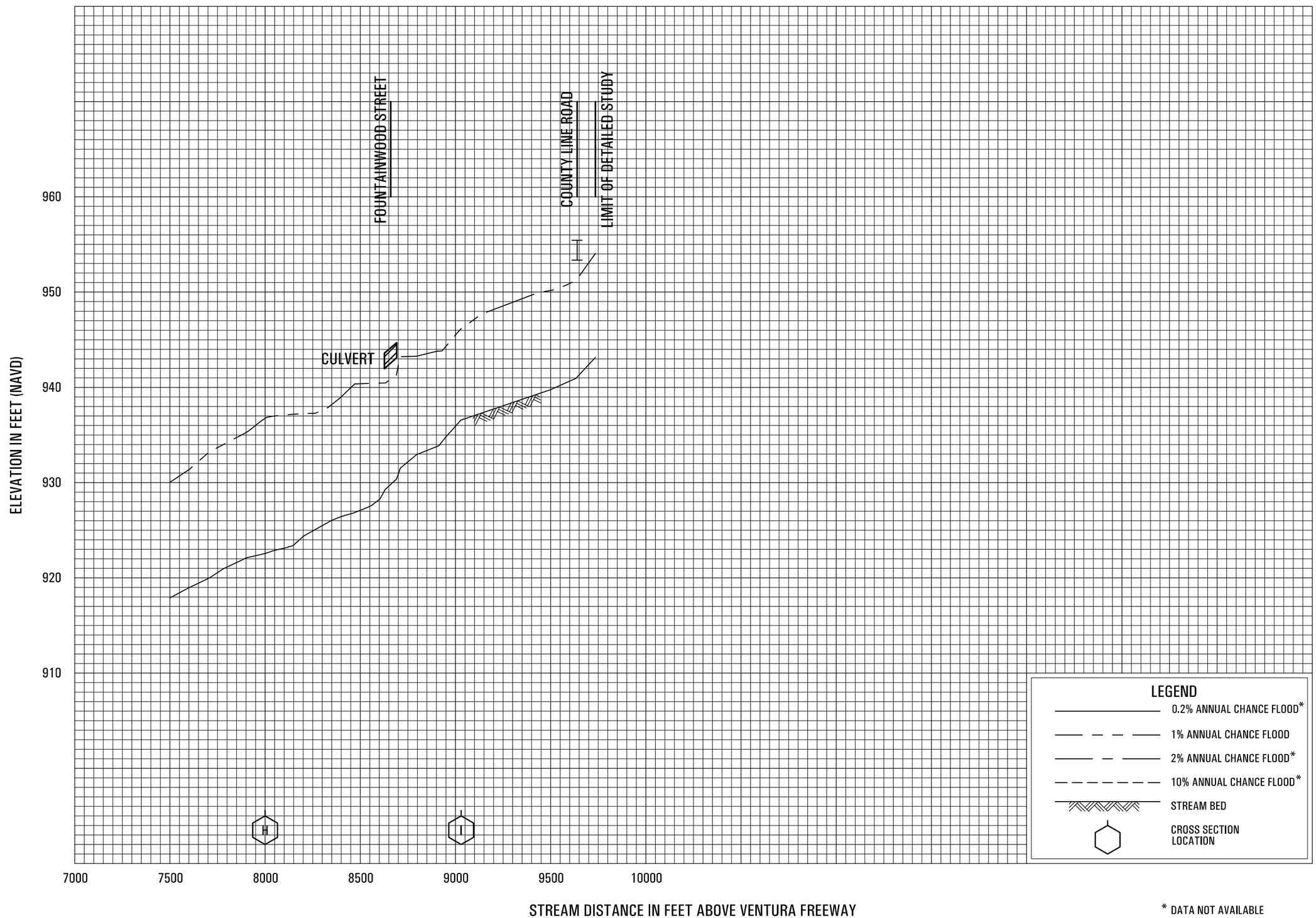
FLOOD PROFILES

MEDEA CREEK (ABOVE VENTURA FREEWAY)

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



* DATA NOT AVAILABLE

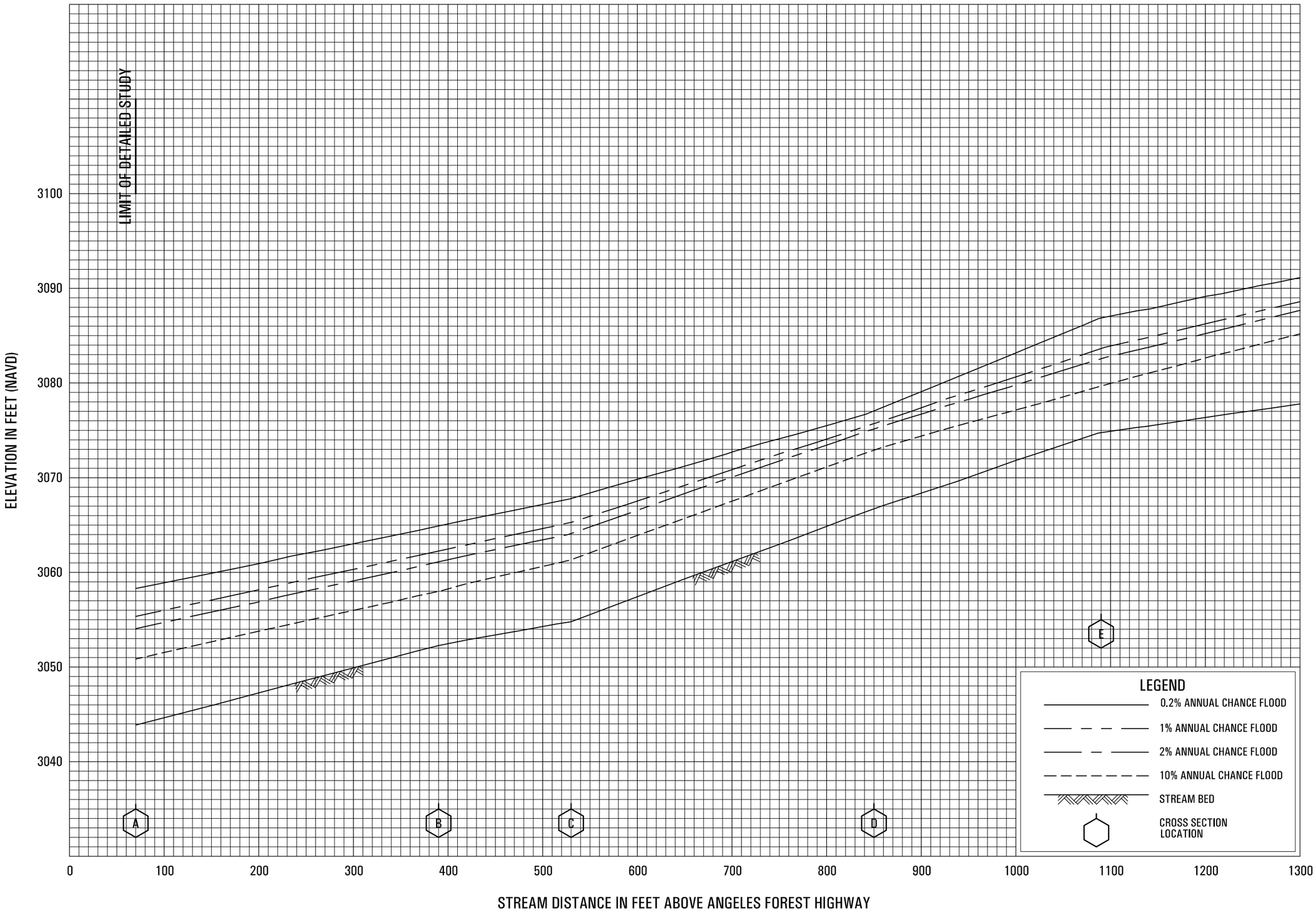
FLOOD PROFILES

MEDEA CREEK (ABOVE VENTURA FREEWAY)

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



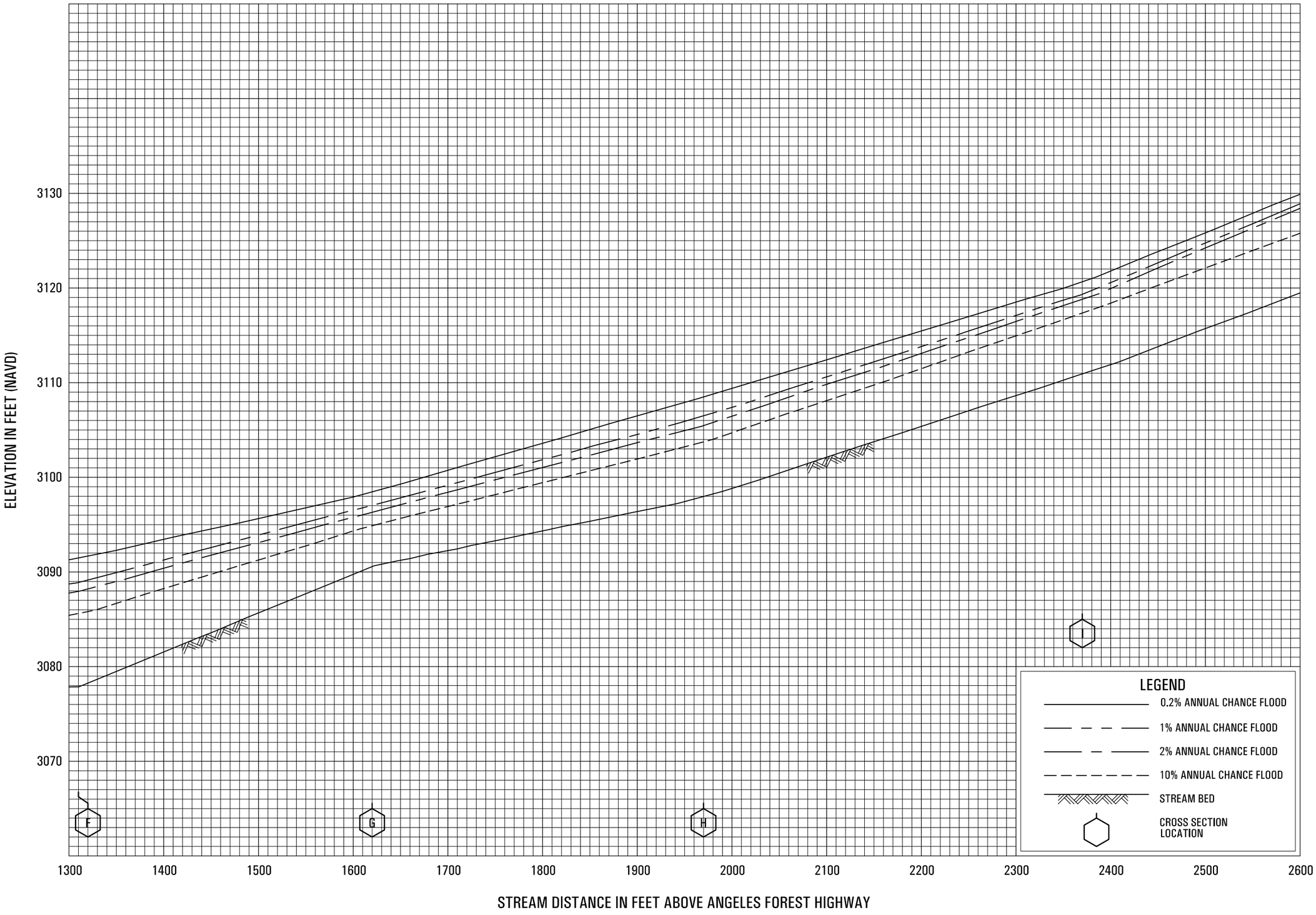
FLOOD PROFILES

MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



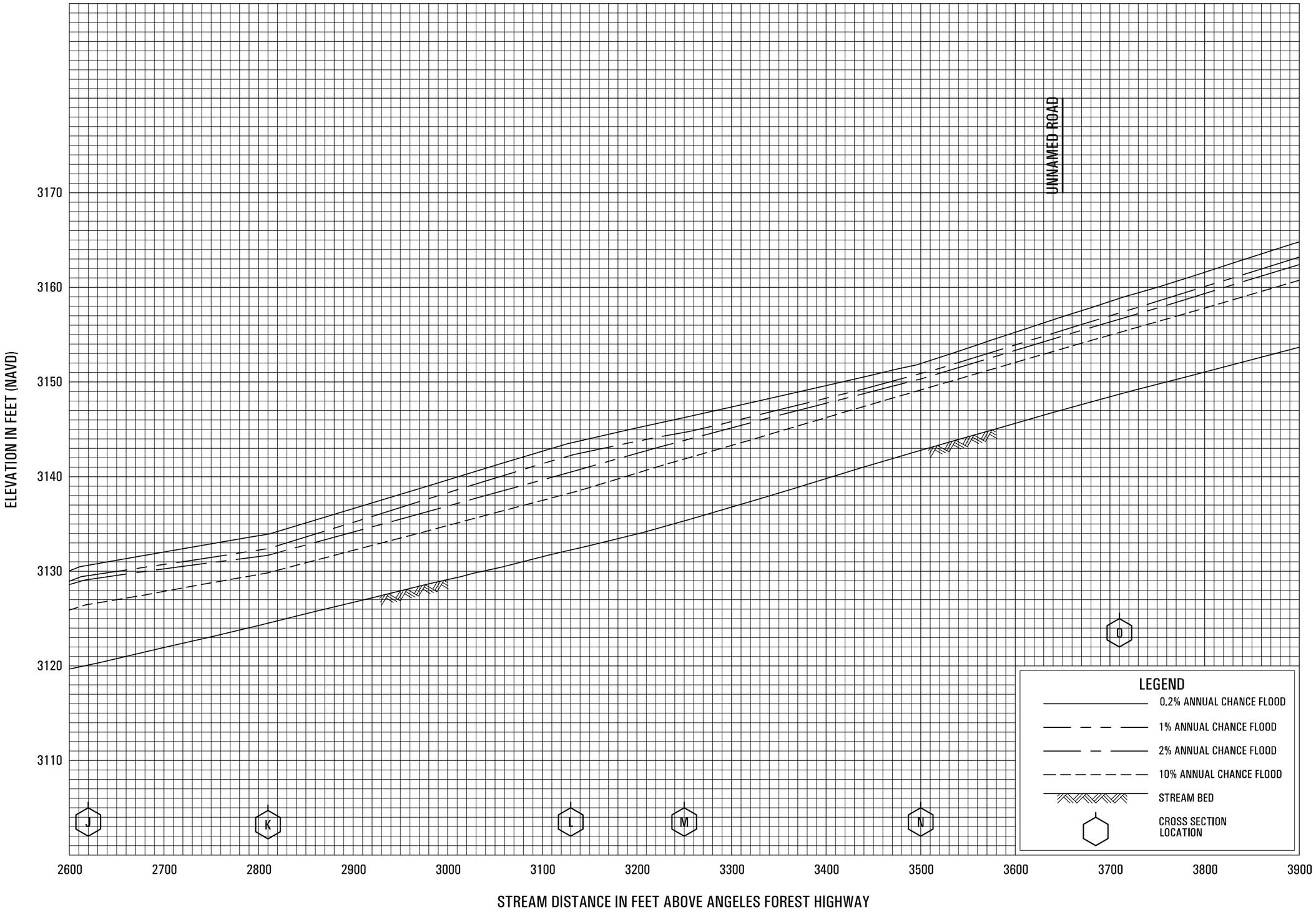
FLOOD PROFILES

MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



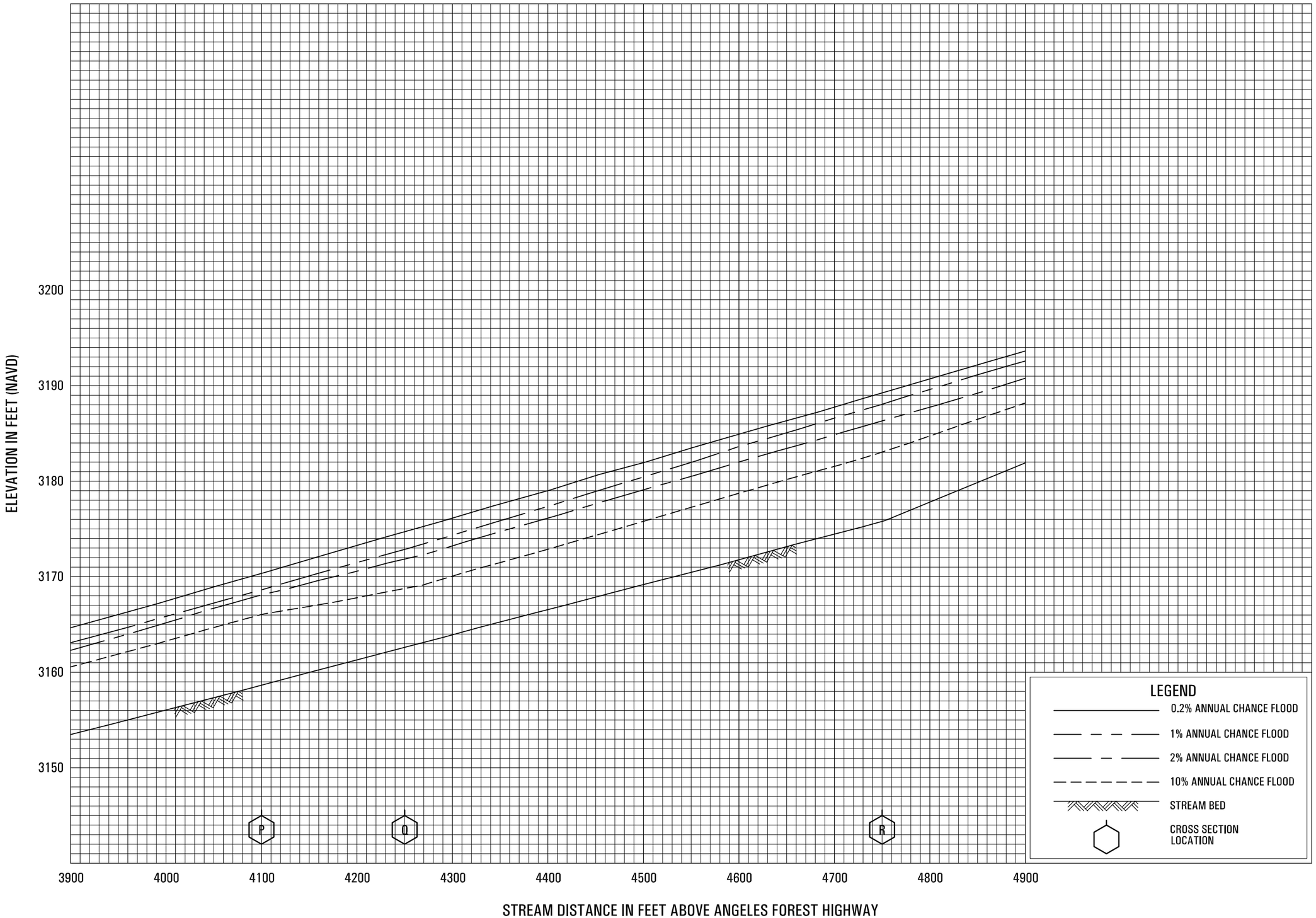
FLOOD PROFILES

MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



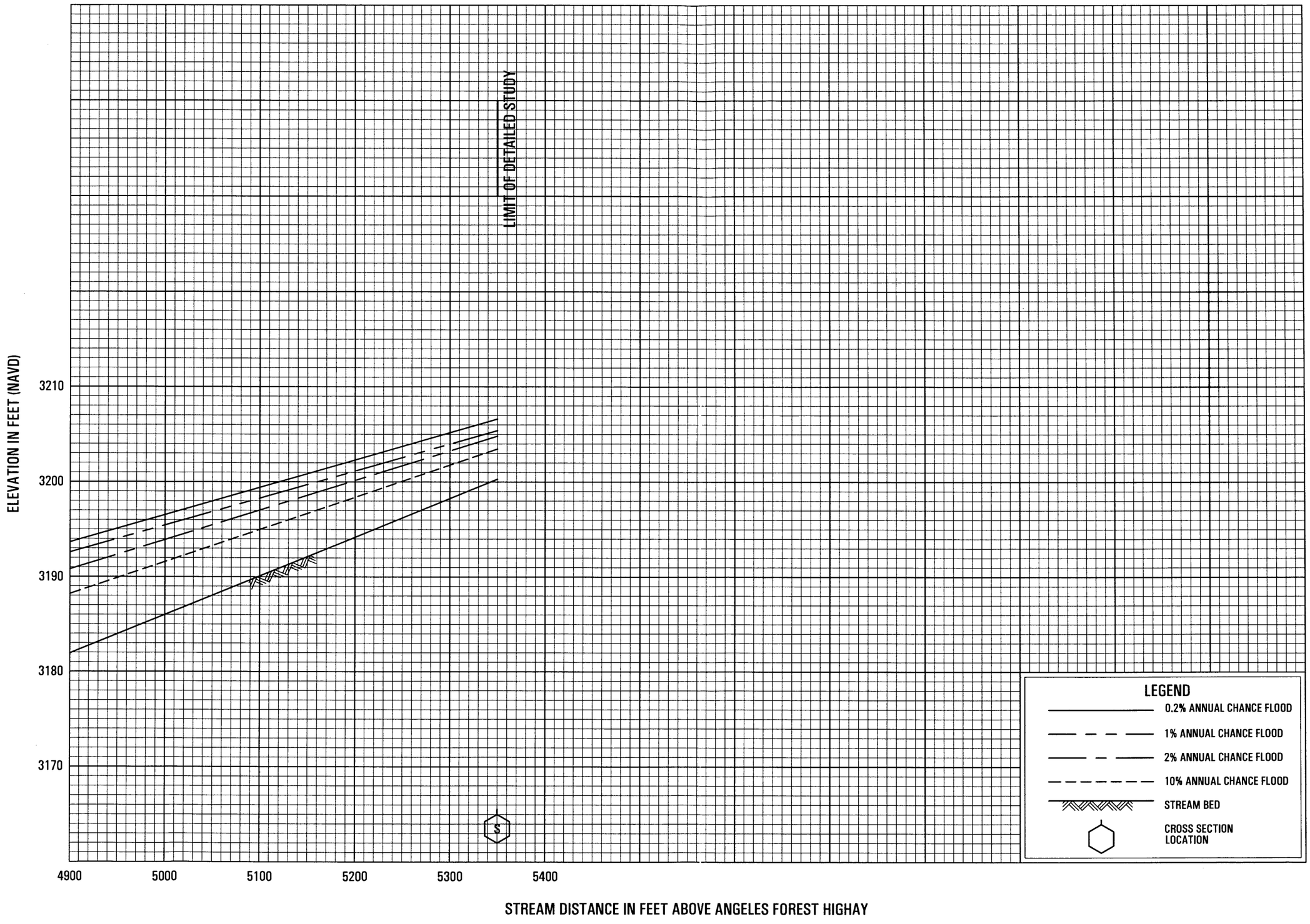
FLOOD PROFILES

MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



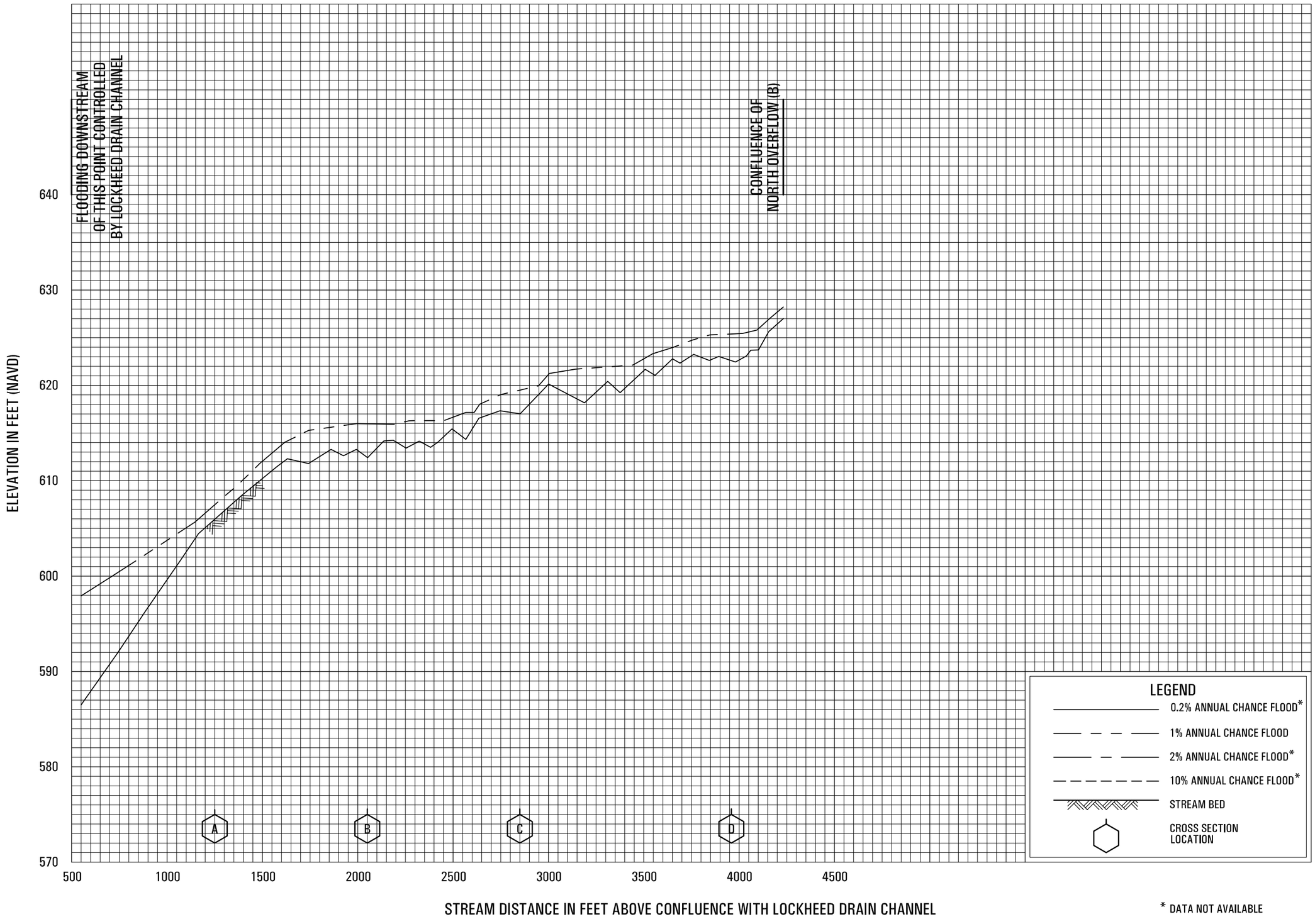
FLOOD PROFILES

MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



* DATA NOT AVAILABLE

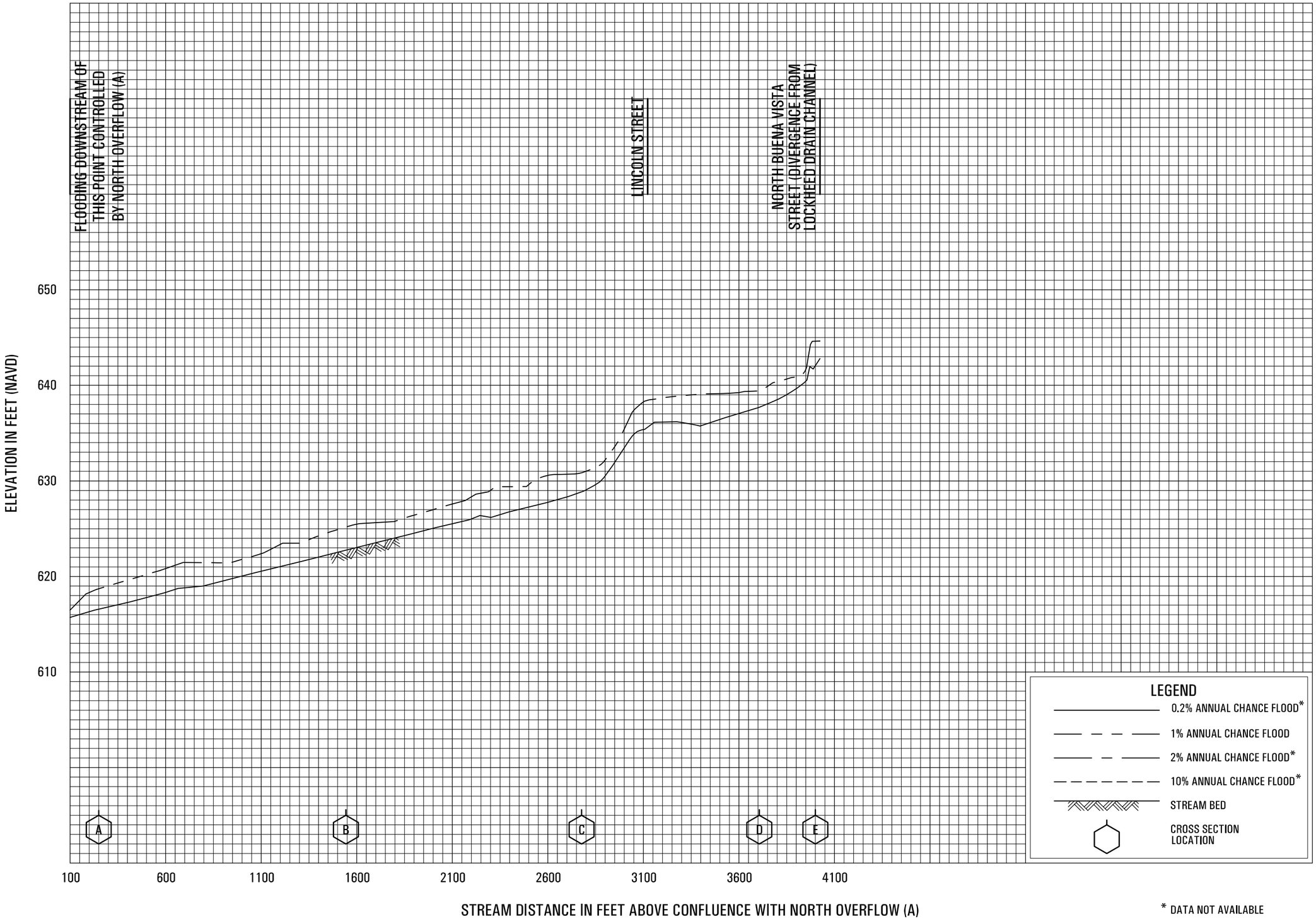
FLOOD PROFILES

NORTH OVERFLOW (A)

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



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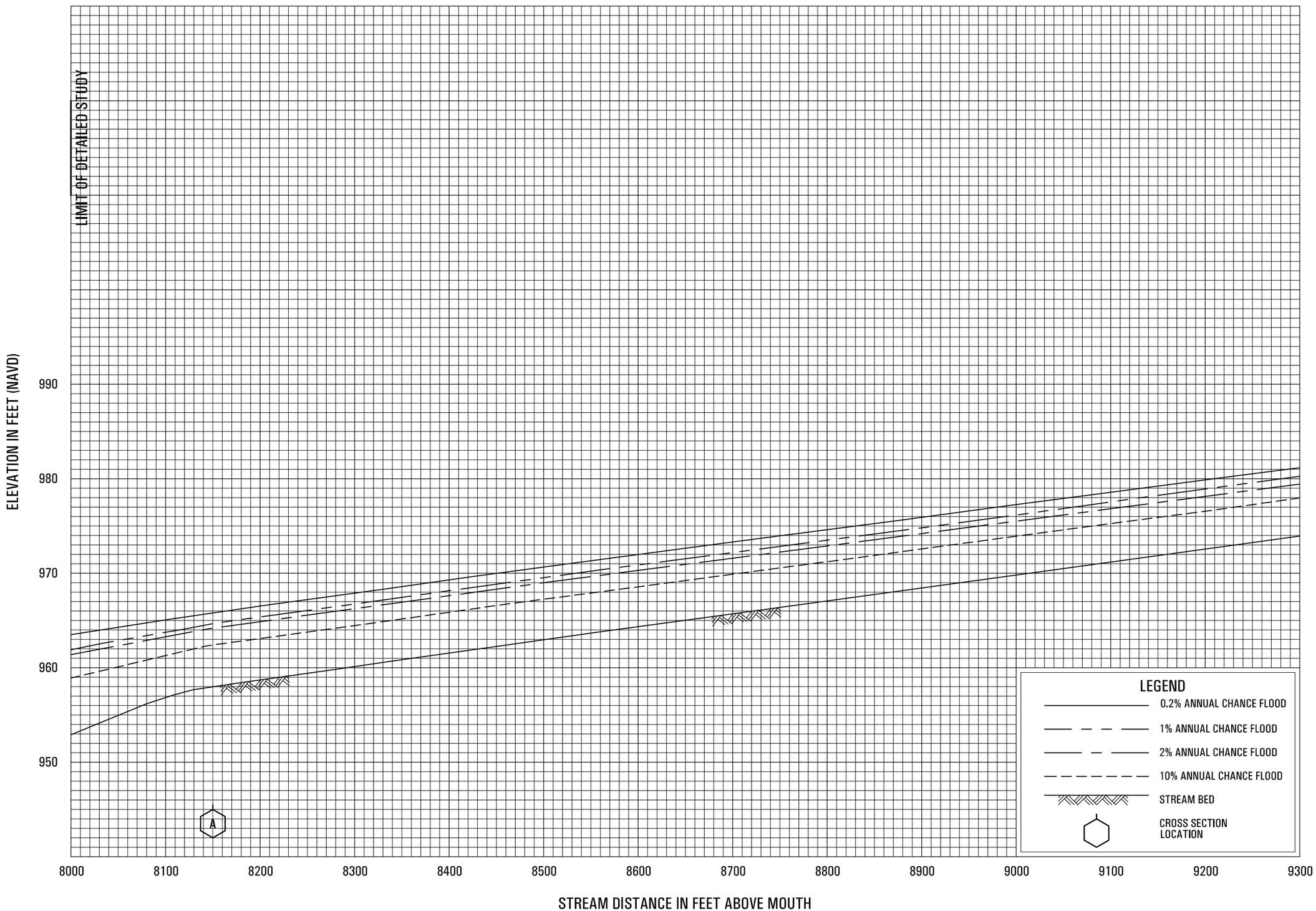
FLOOD PROFILES

NORTH OVERFLOW (B)

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



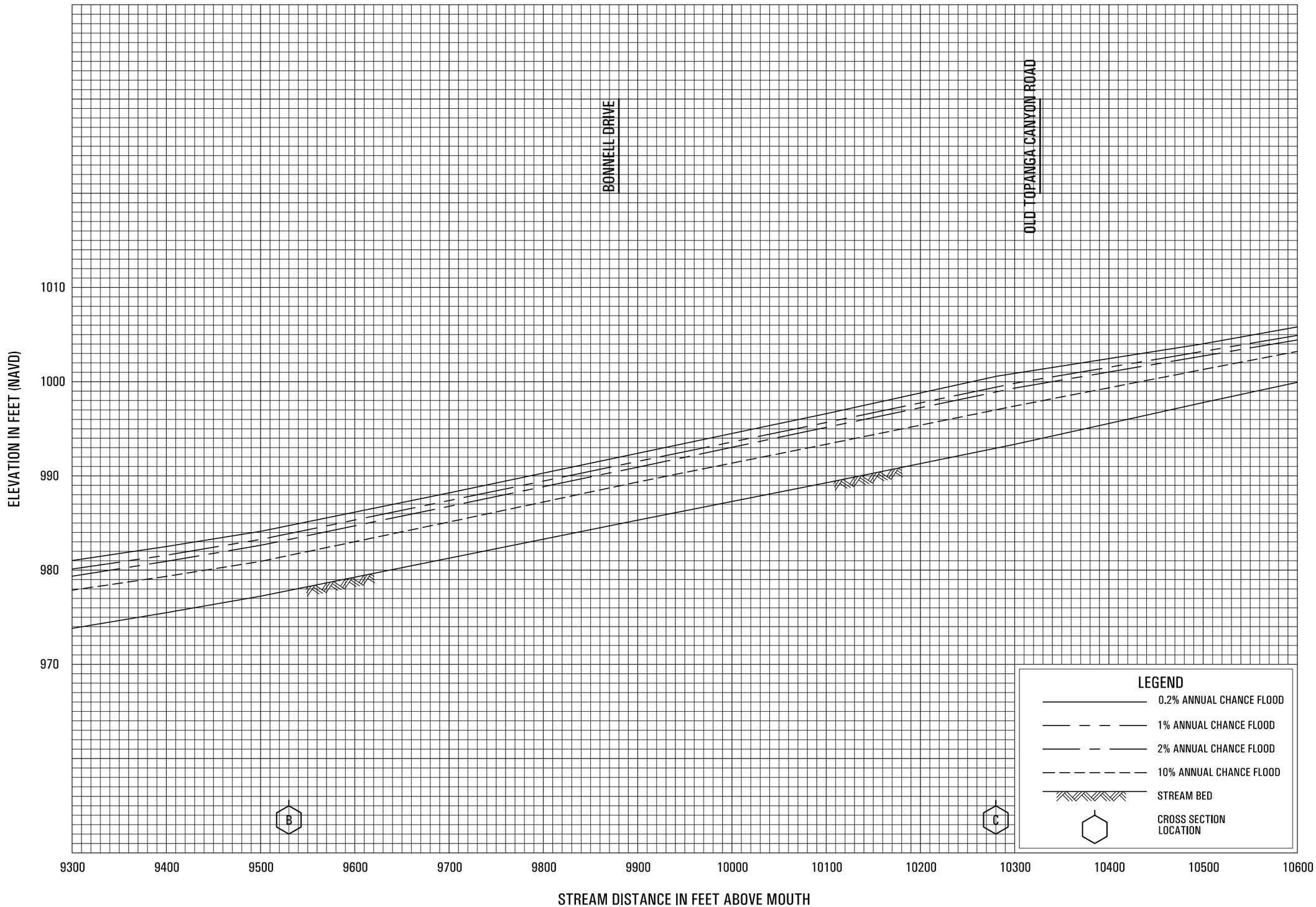
FLOOD PROFILES

OLD TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



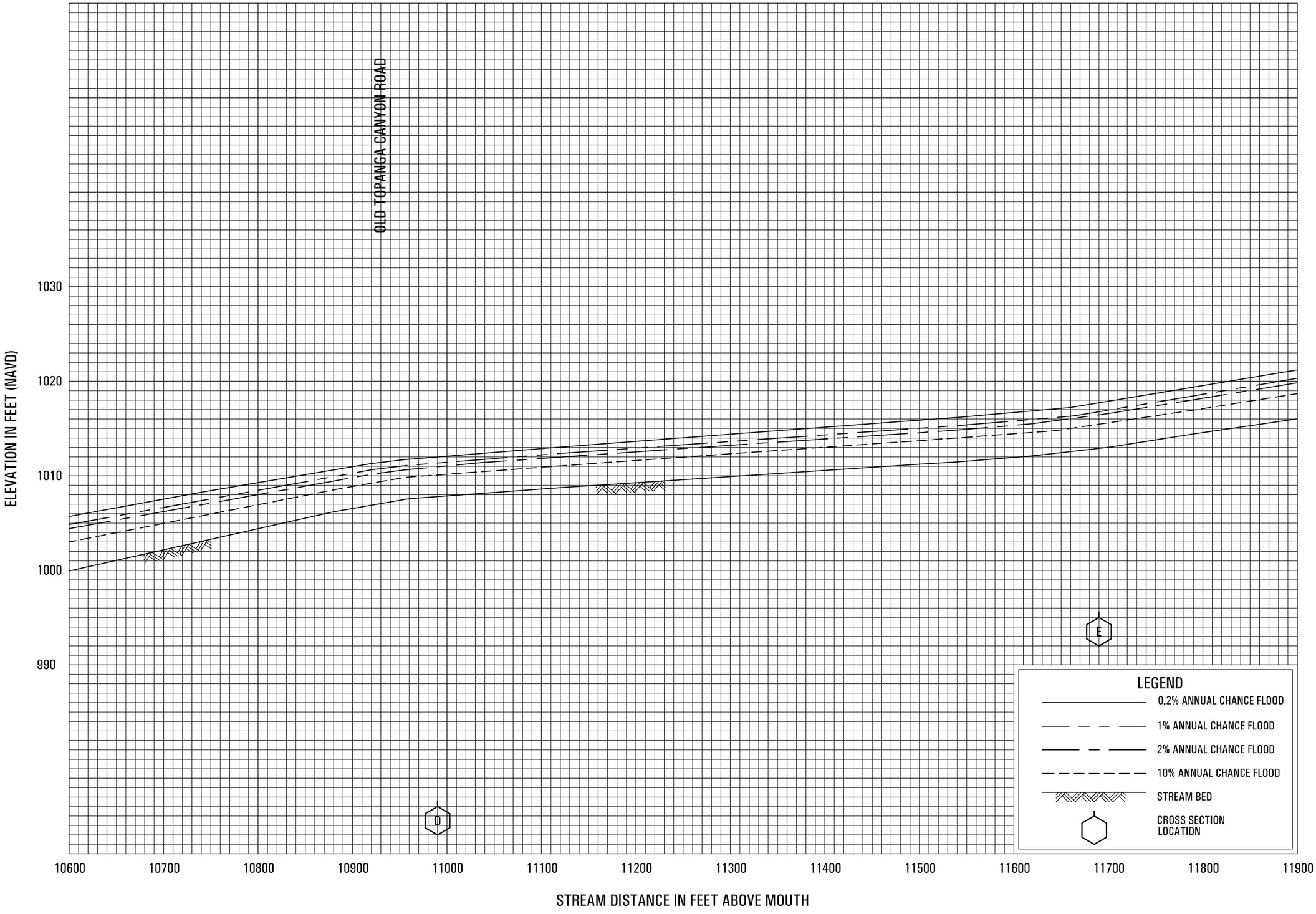
FLOOD PROFILES

OLD TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



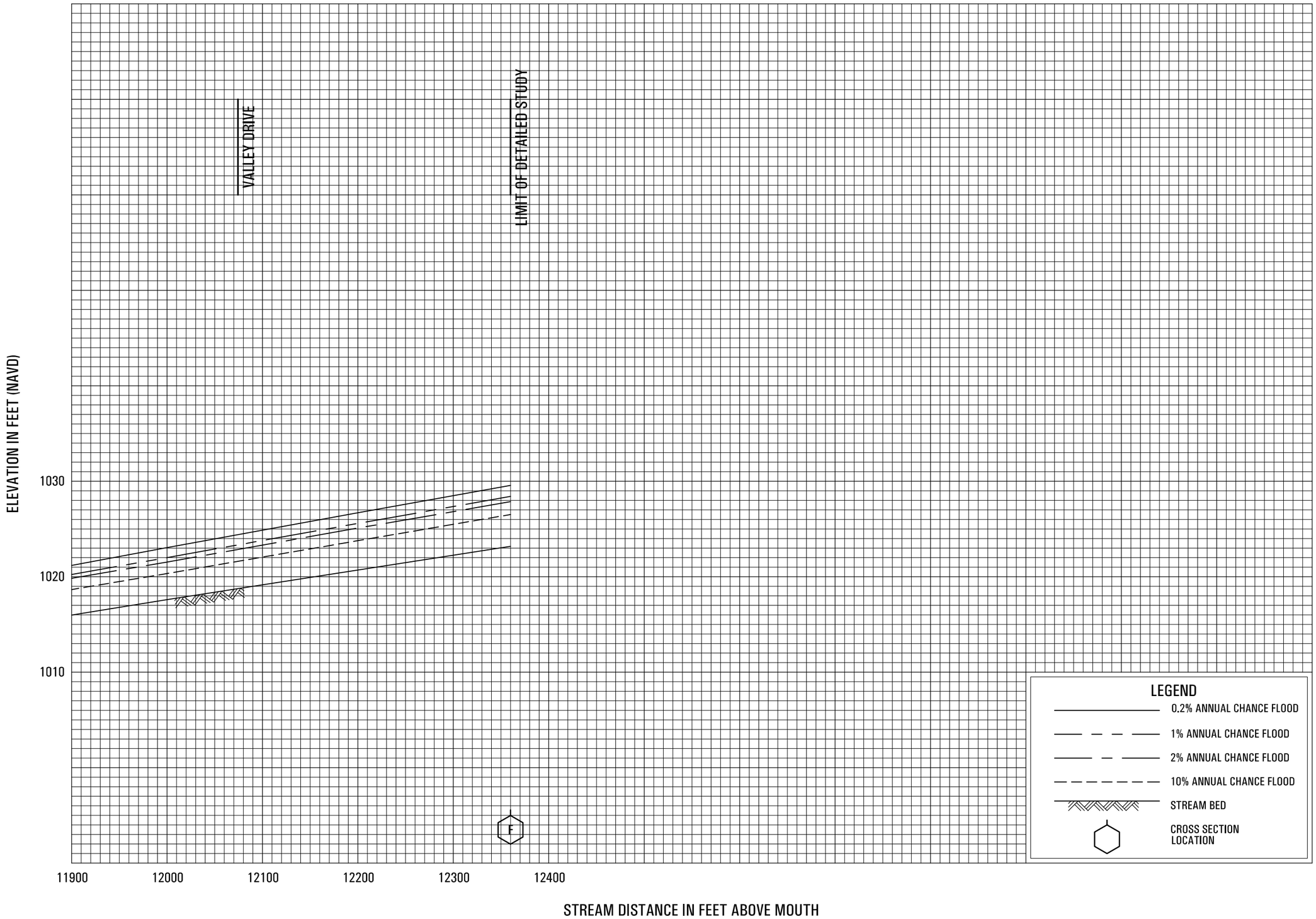
FLOOD PROFILES

OLD TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



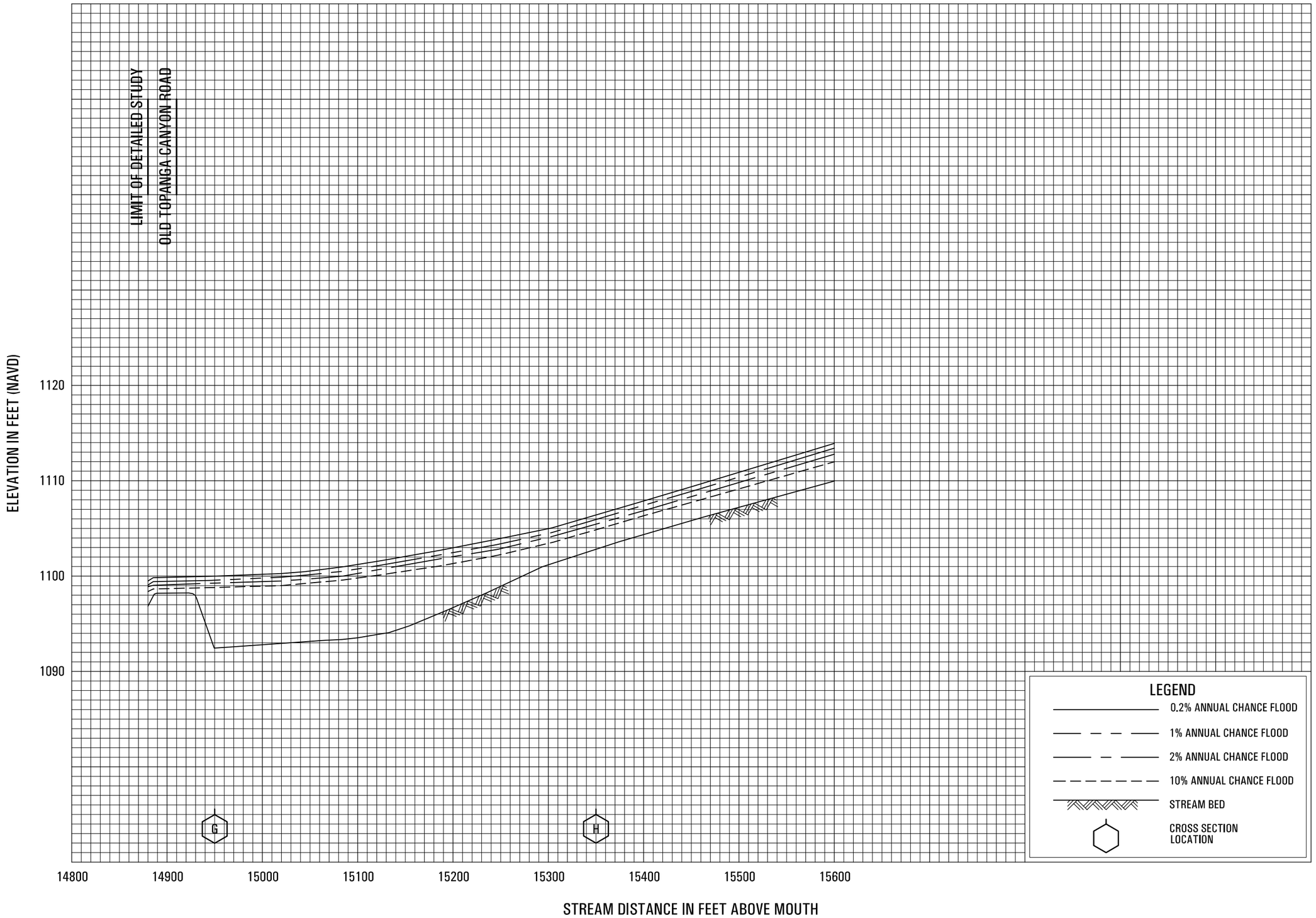
FLOOD PROFILES

OLD TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



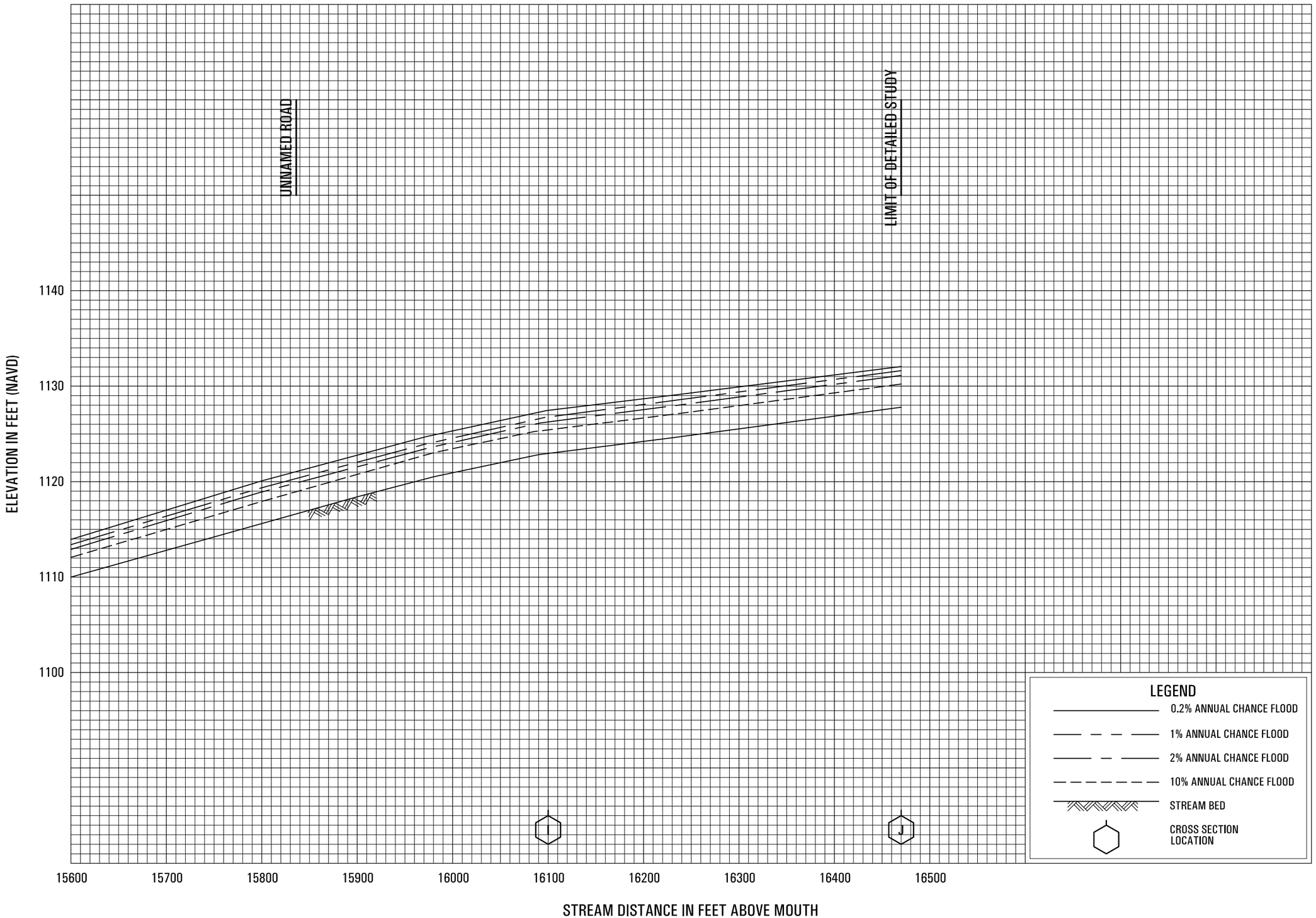
FLOOD PROFILES

OLD TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



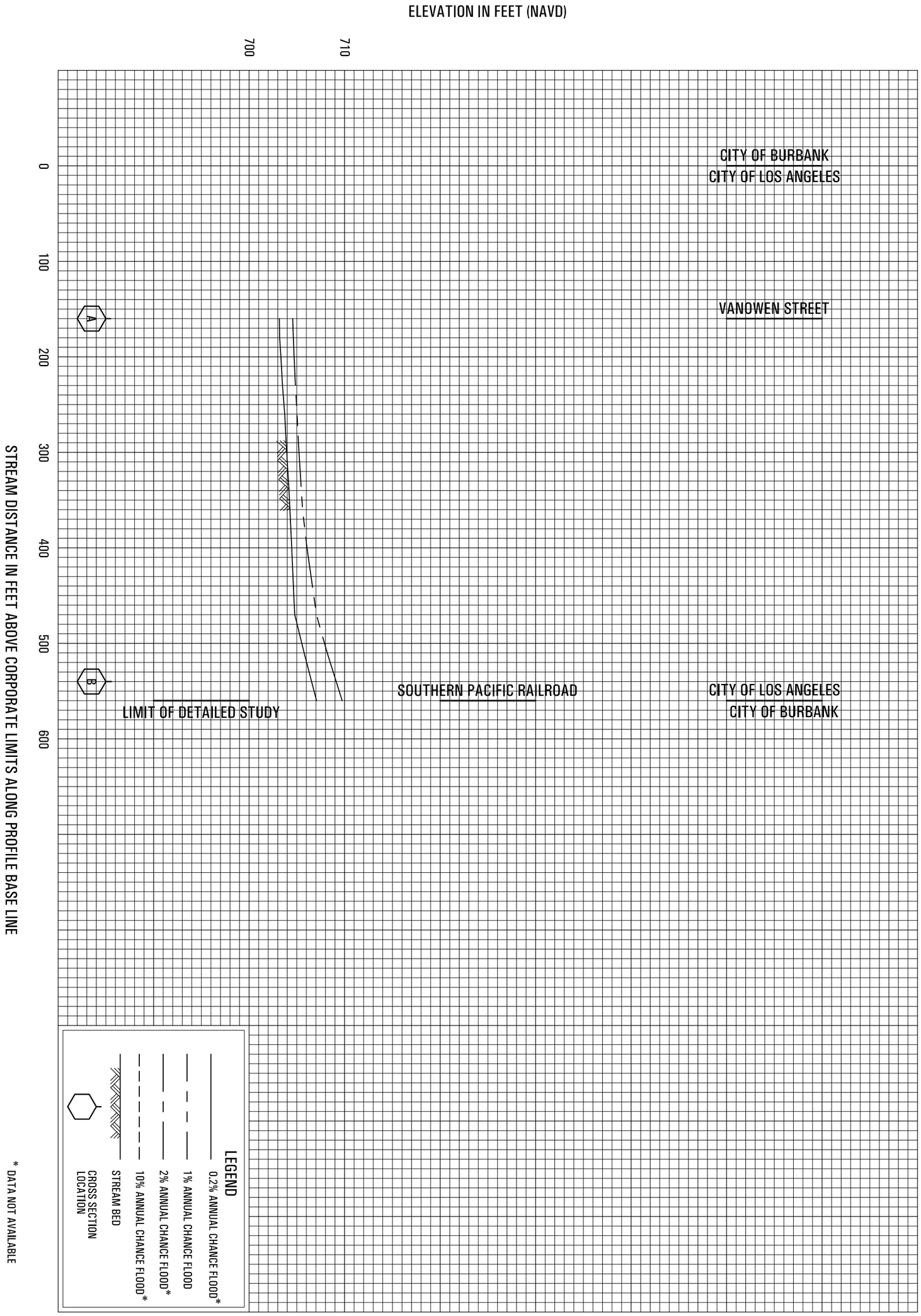
FLOOD PROFILES

OLD TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



* DATA NOT AVAILABLE

143P

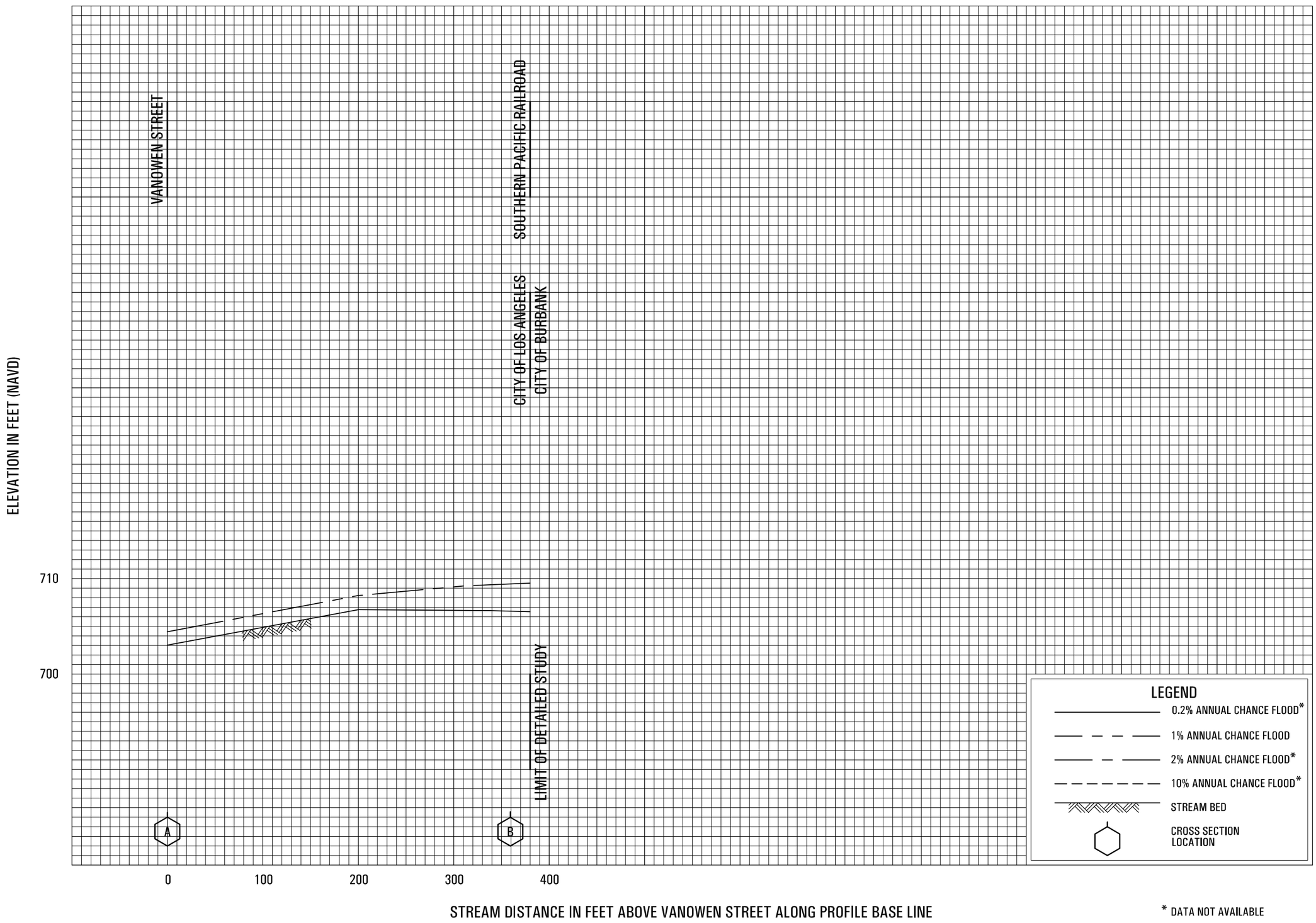
FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

FLOOD PROFILES

OVERFLOW AREA OF LOCKHEED DRAIN CHANNEL



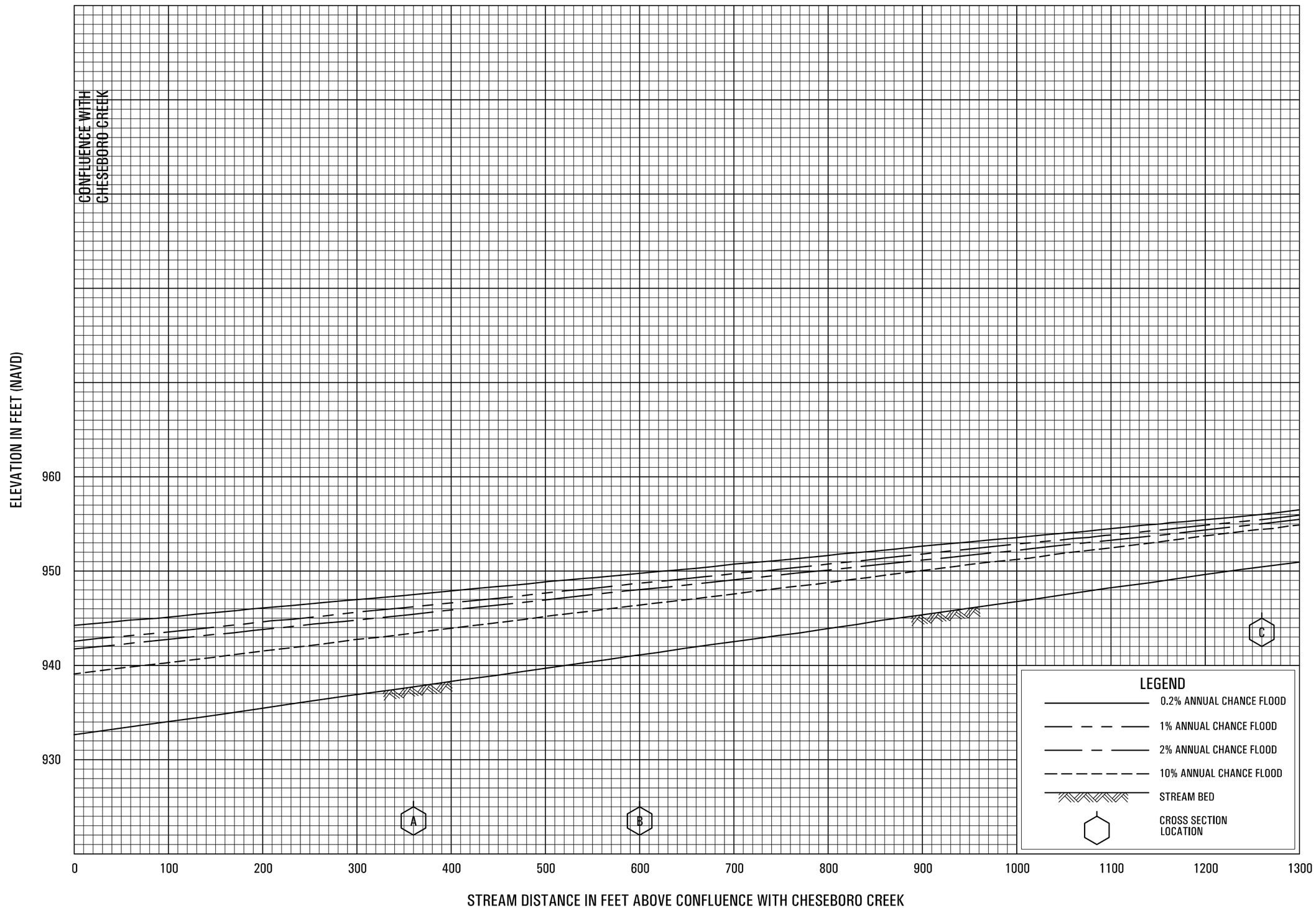
FLOOD PROFILES

OVERFLOW AREA OF LOCKHEED STORM DRAIN

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



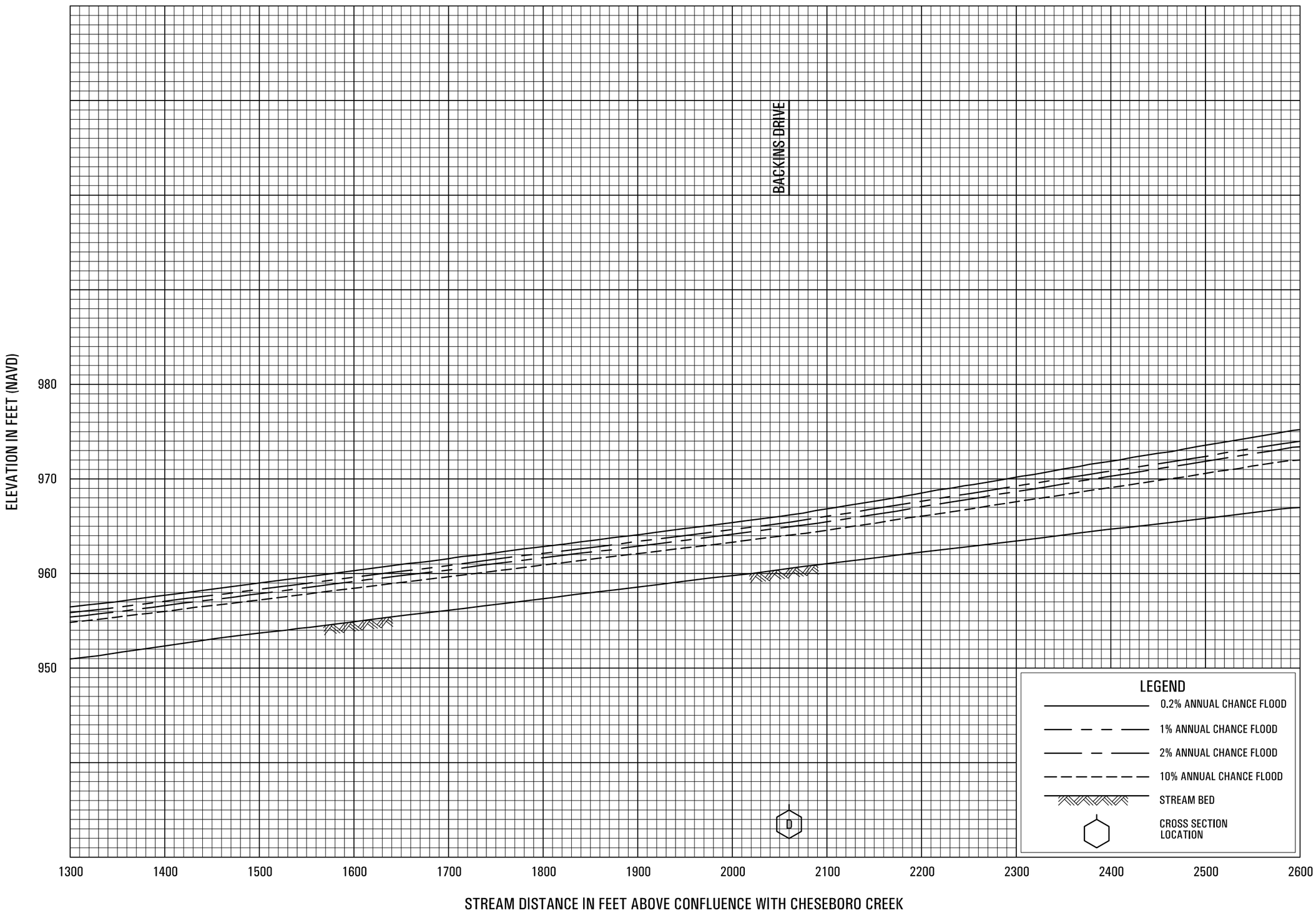
FLOOD PROFILES

PALO COMANDO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



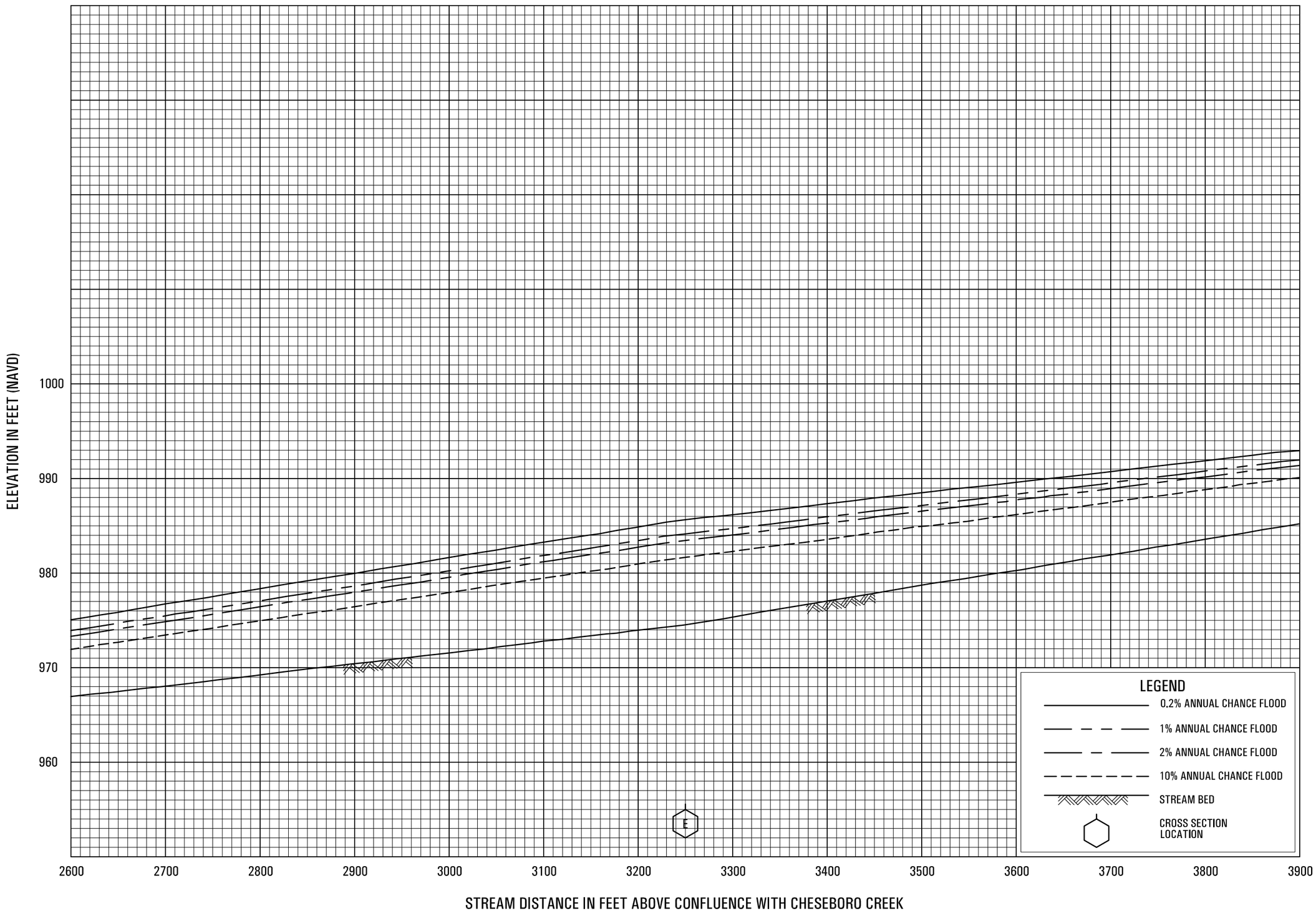
FLOOD PROFILES

PALO COMANDO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



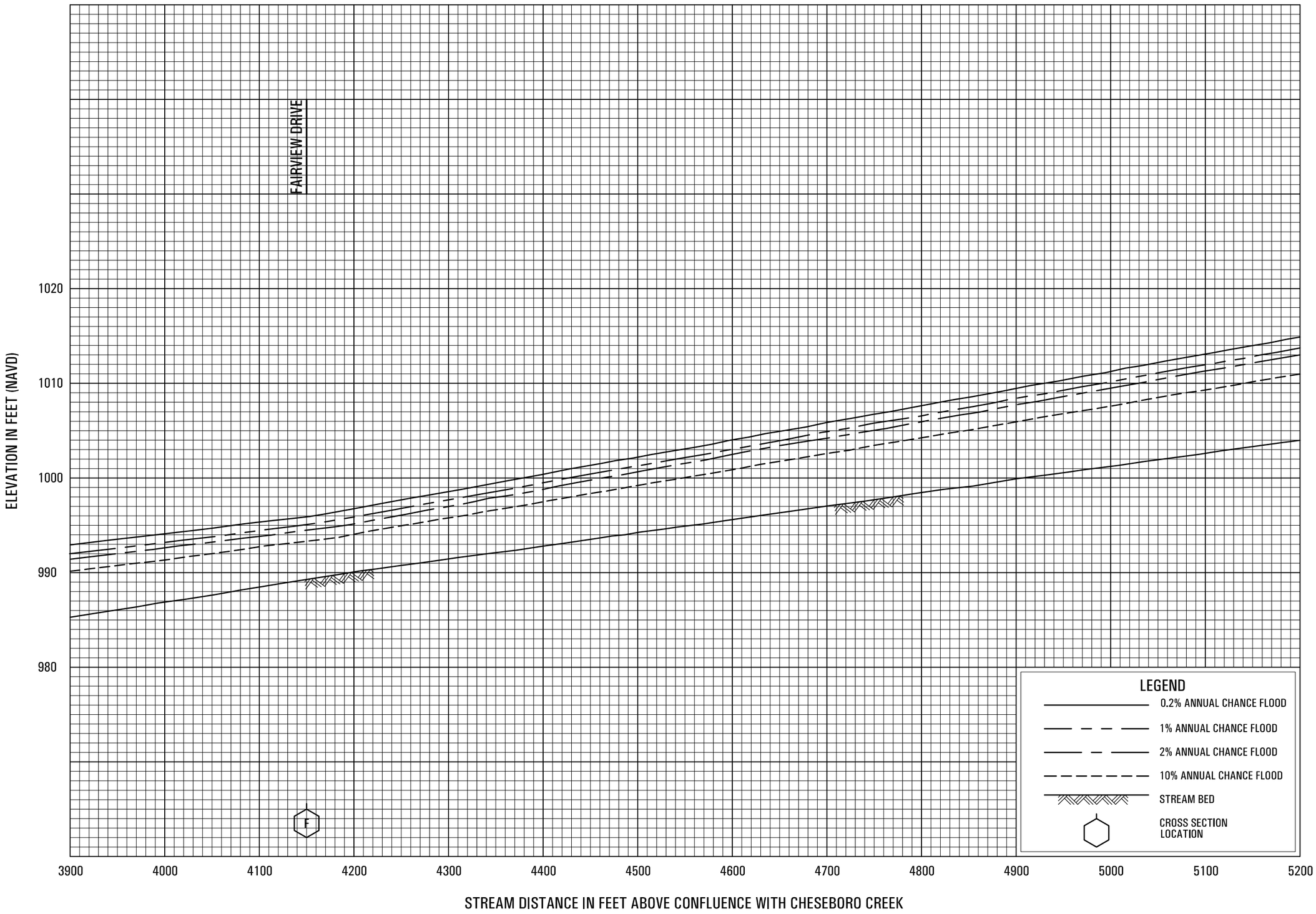
FLOOD PROFILES

PALO COMANDO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



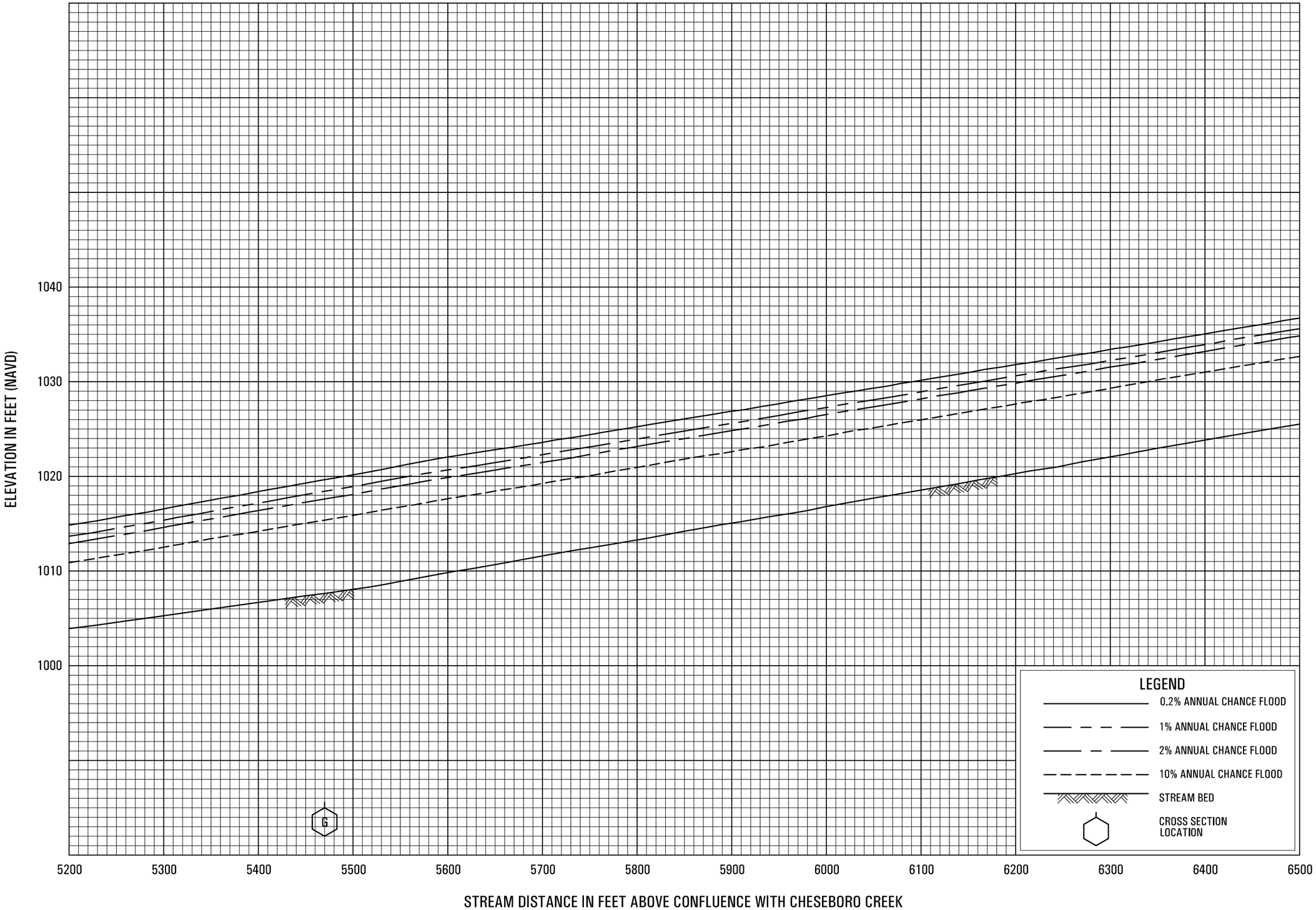
FLOOD PROFILES

PALO COMANDO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



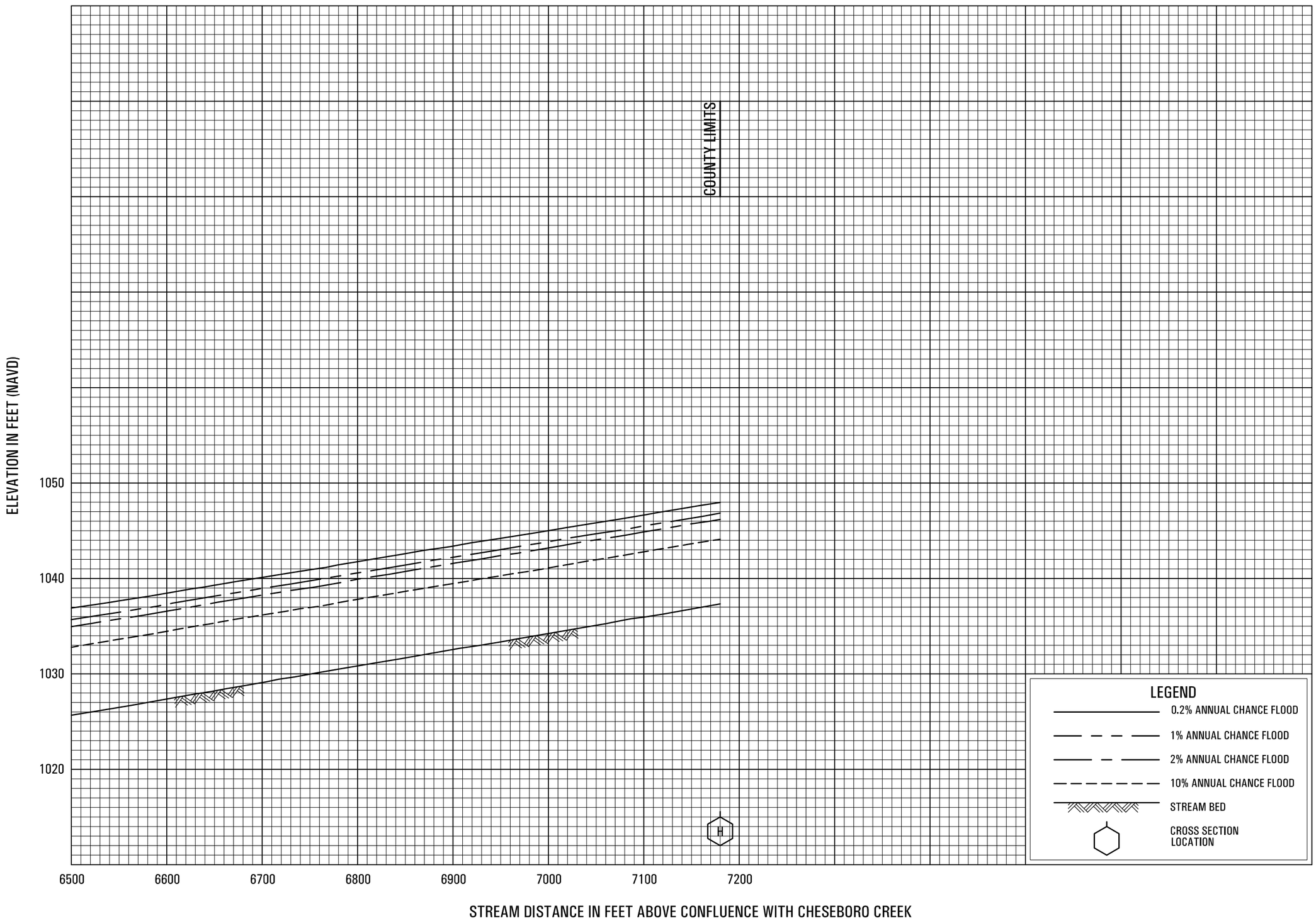
FLOOD PROFILES

PALO COMANDO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



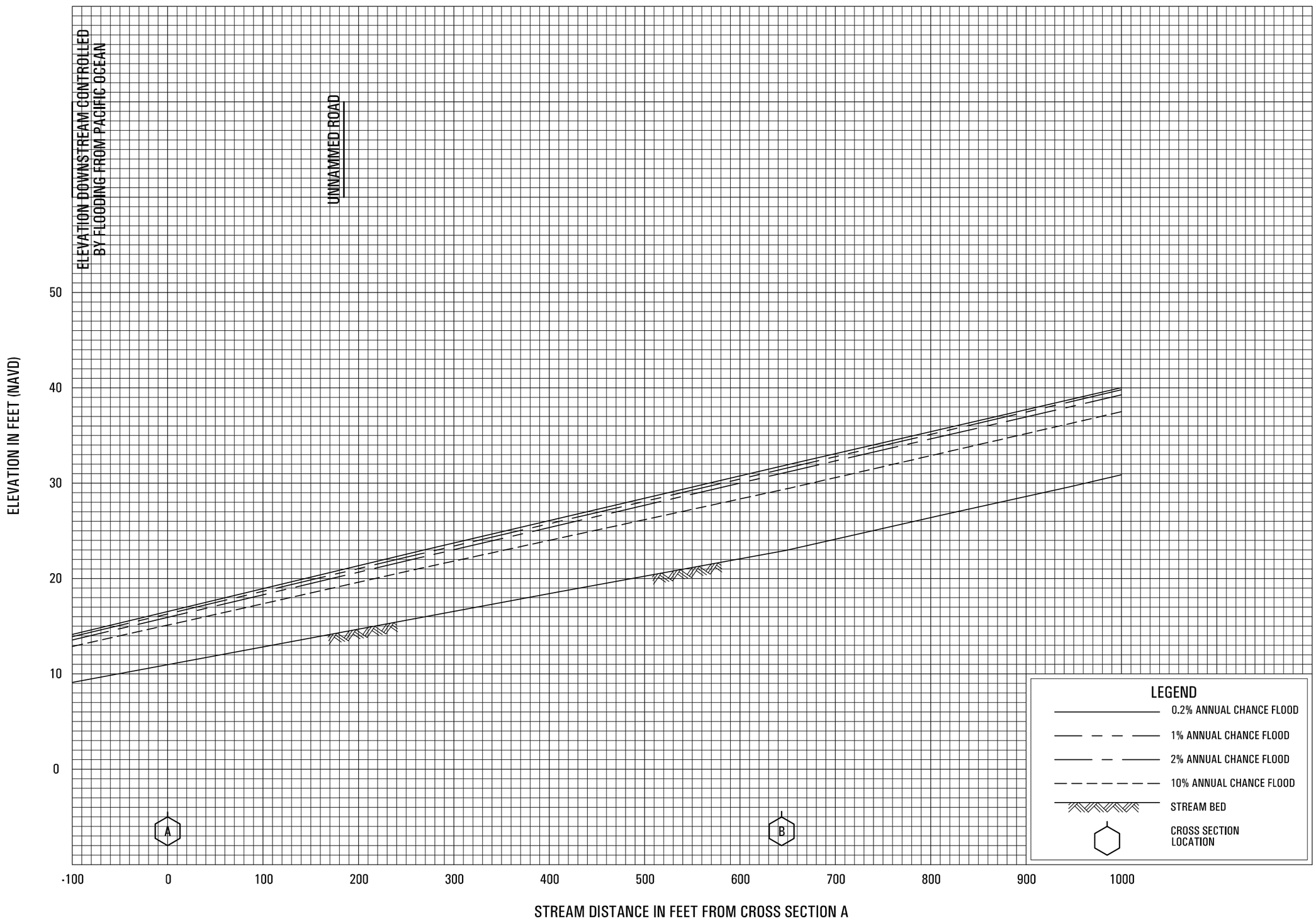
FLOOD PROFILES

PALO COMANDO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



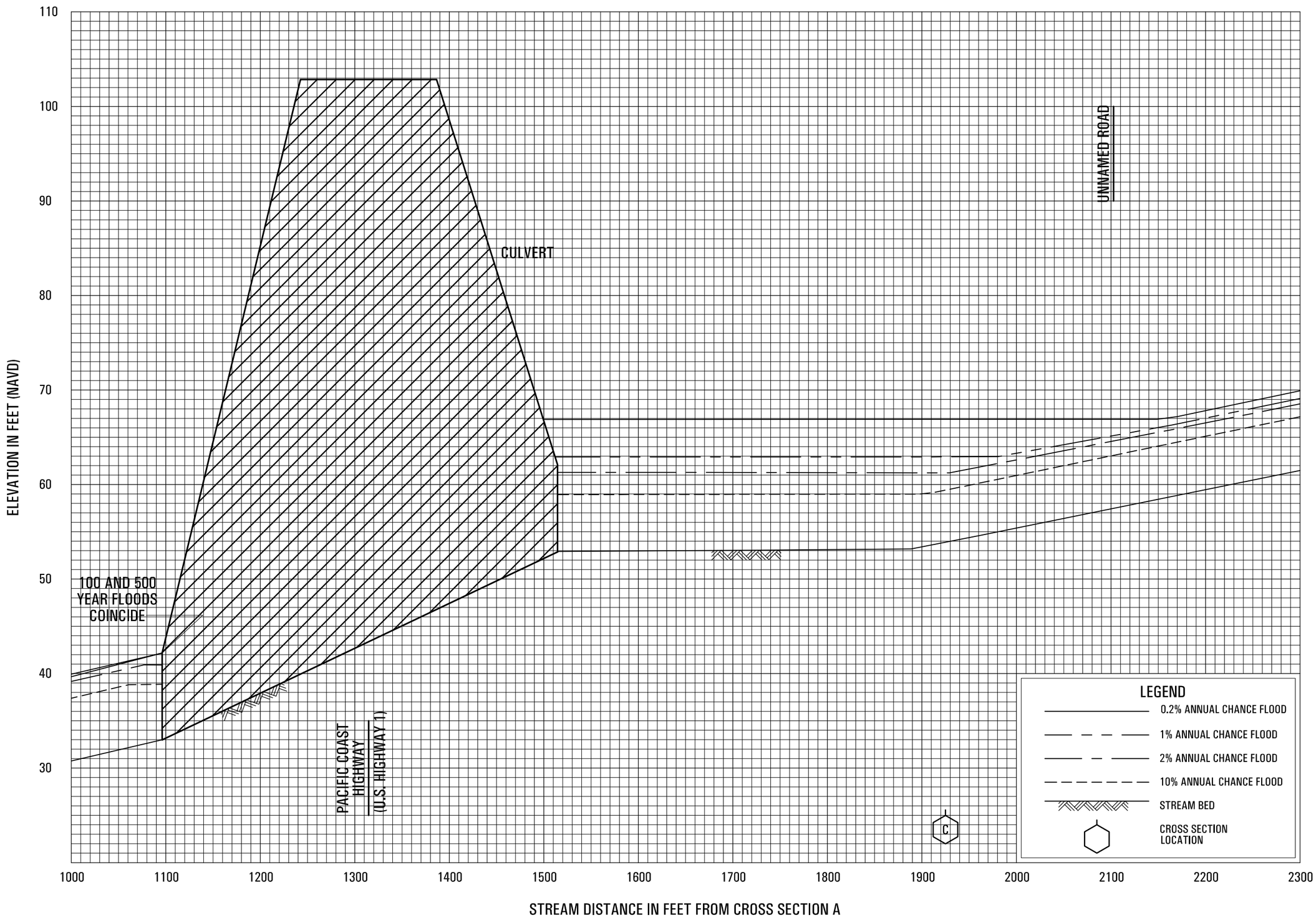
FLOOD PROFILES

RAMIREZ CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



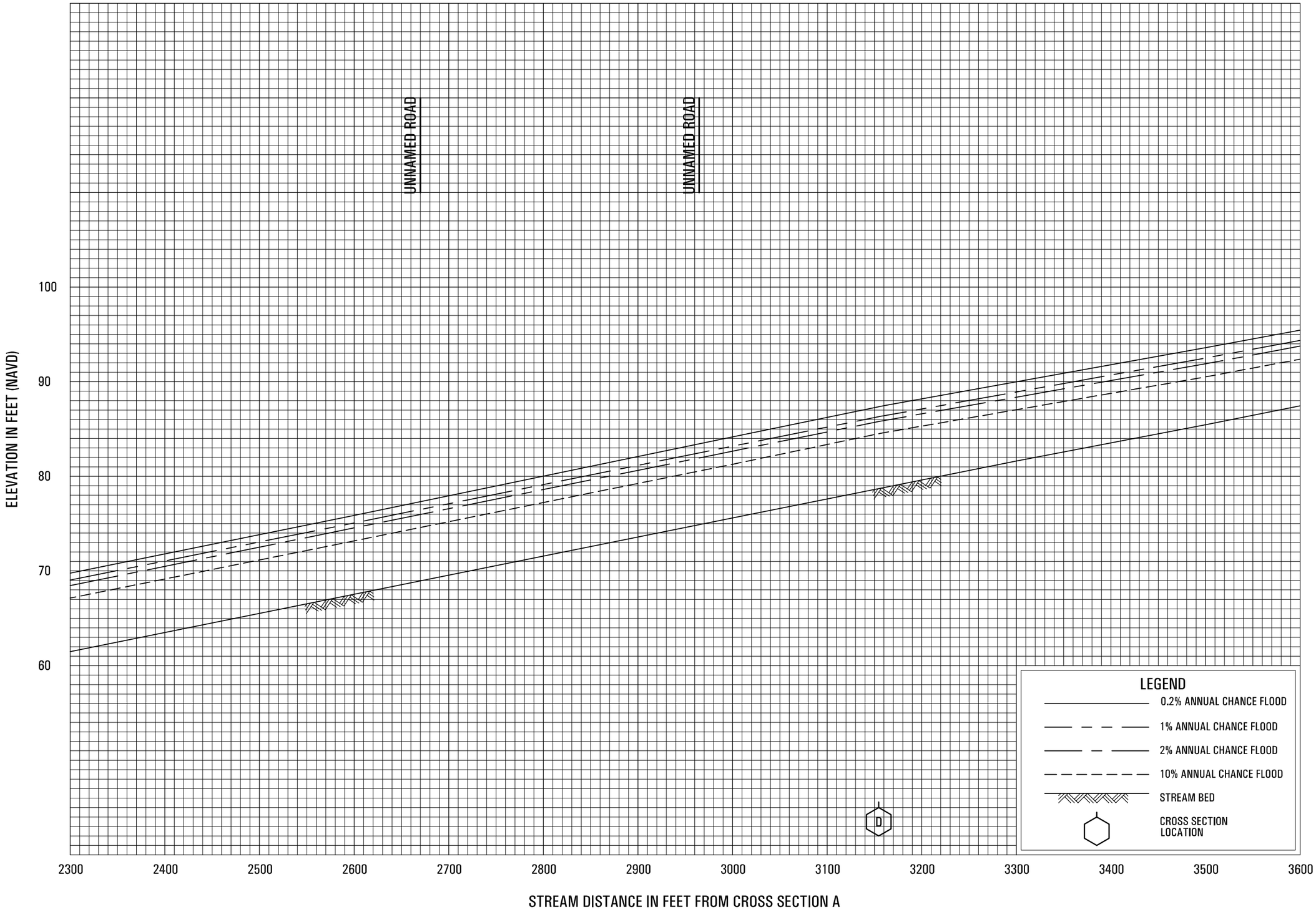
FLOOD PROFILES

RAMIREZ CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



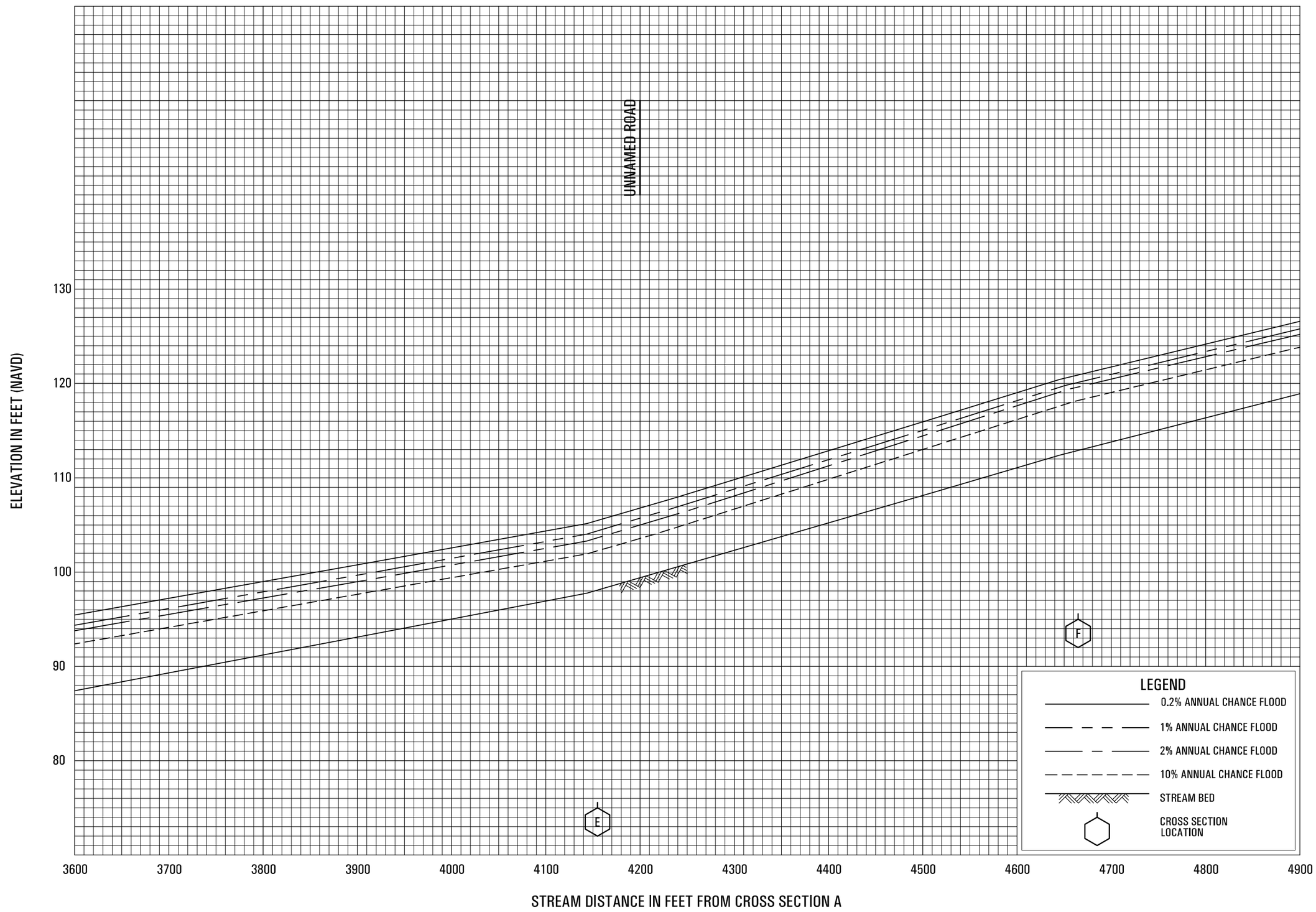
FLOOD PROFILES

RAMIREZ CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



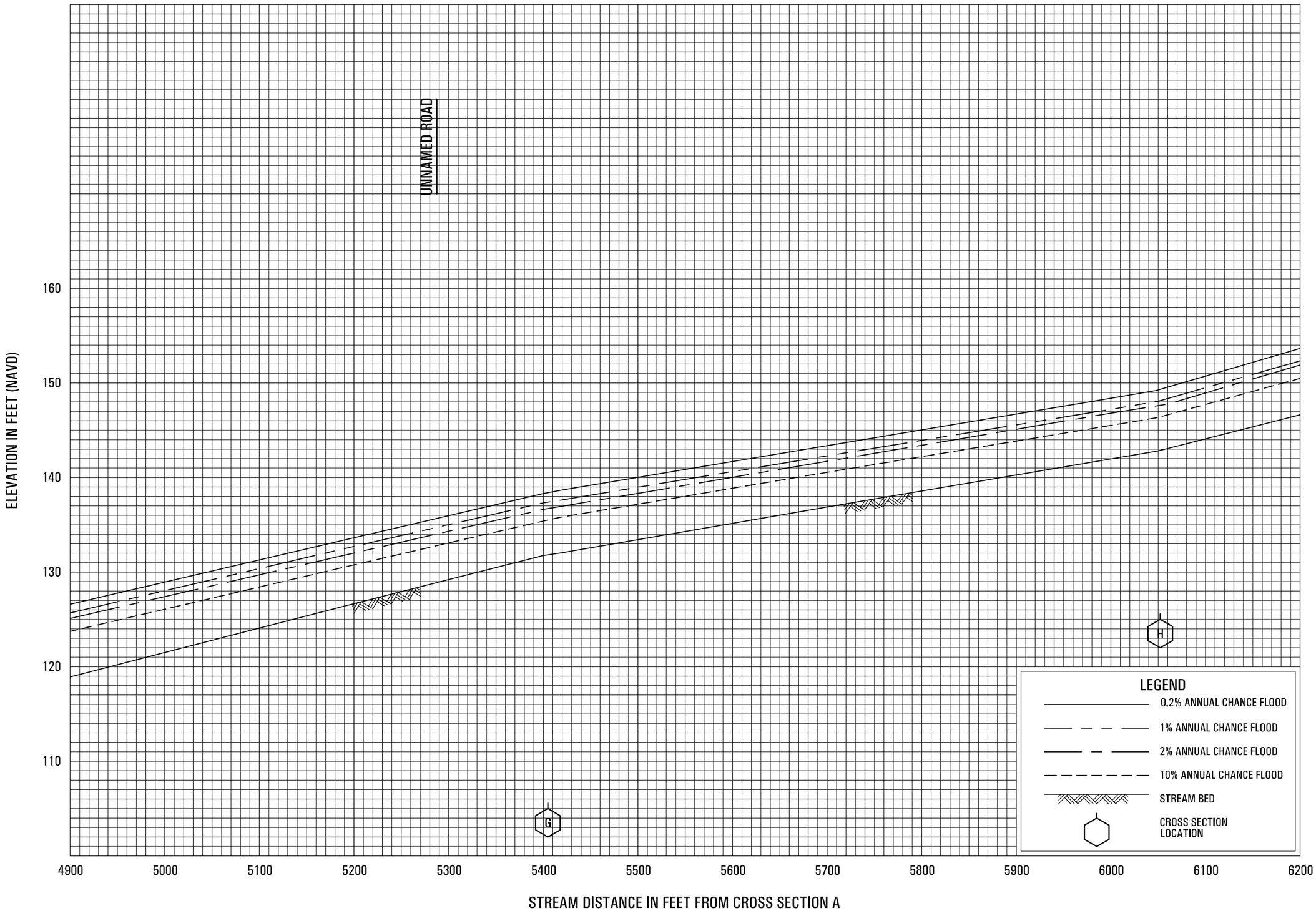
FLOOD PROFILES

RAMIREZ CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



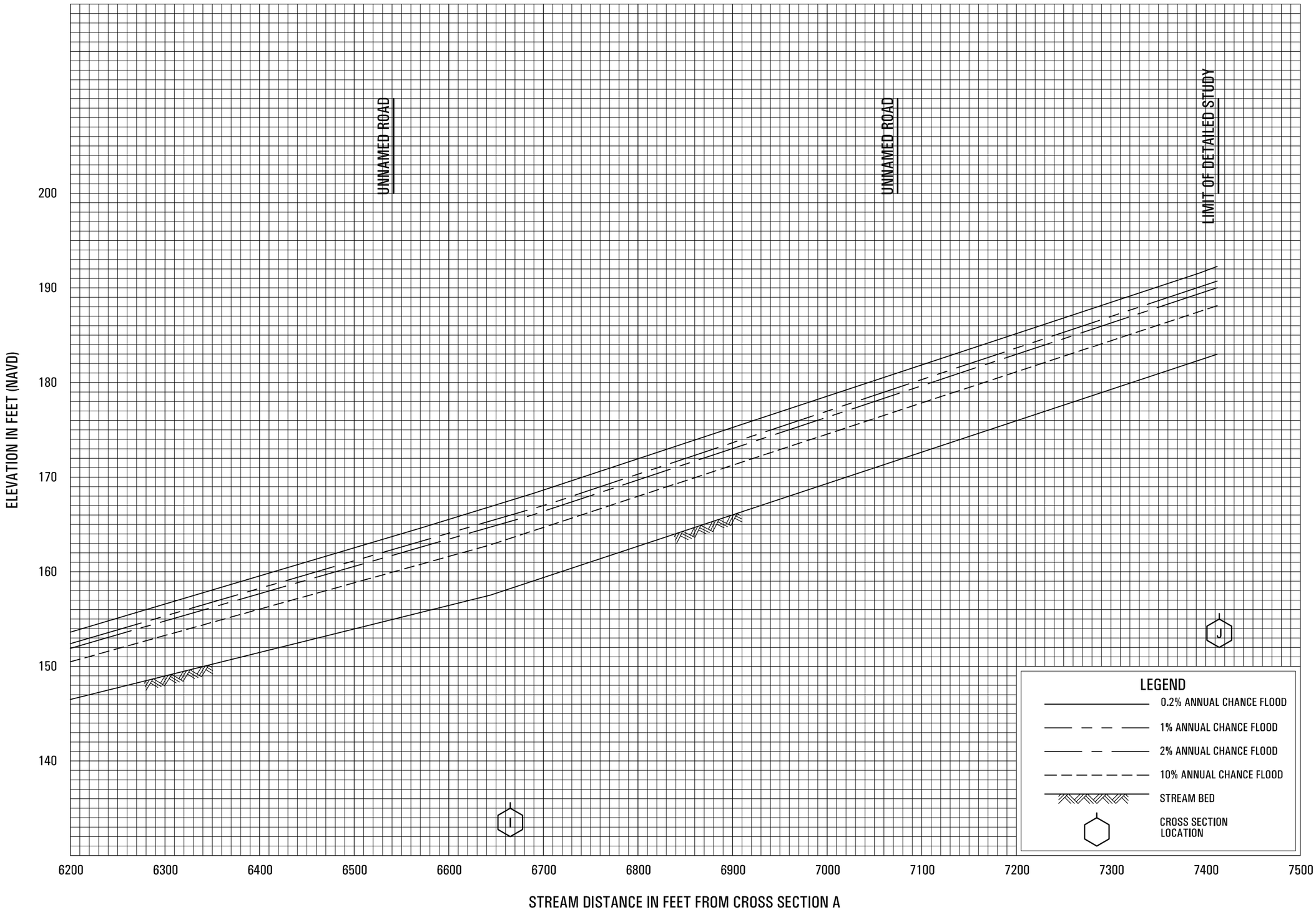
FLOOD PROFILES

RAMIREZ CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



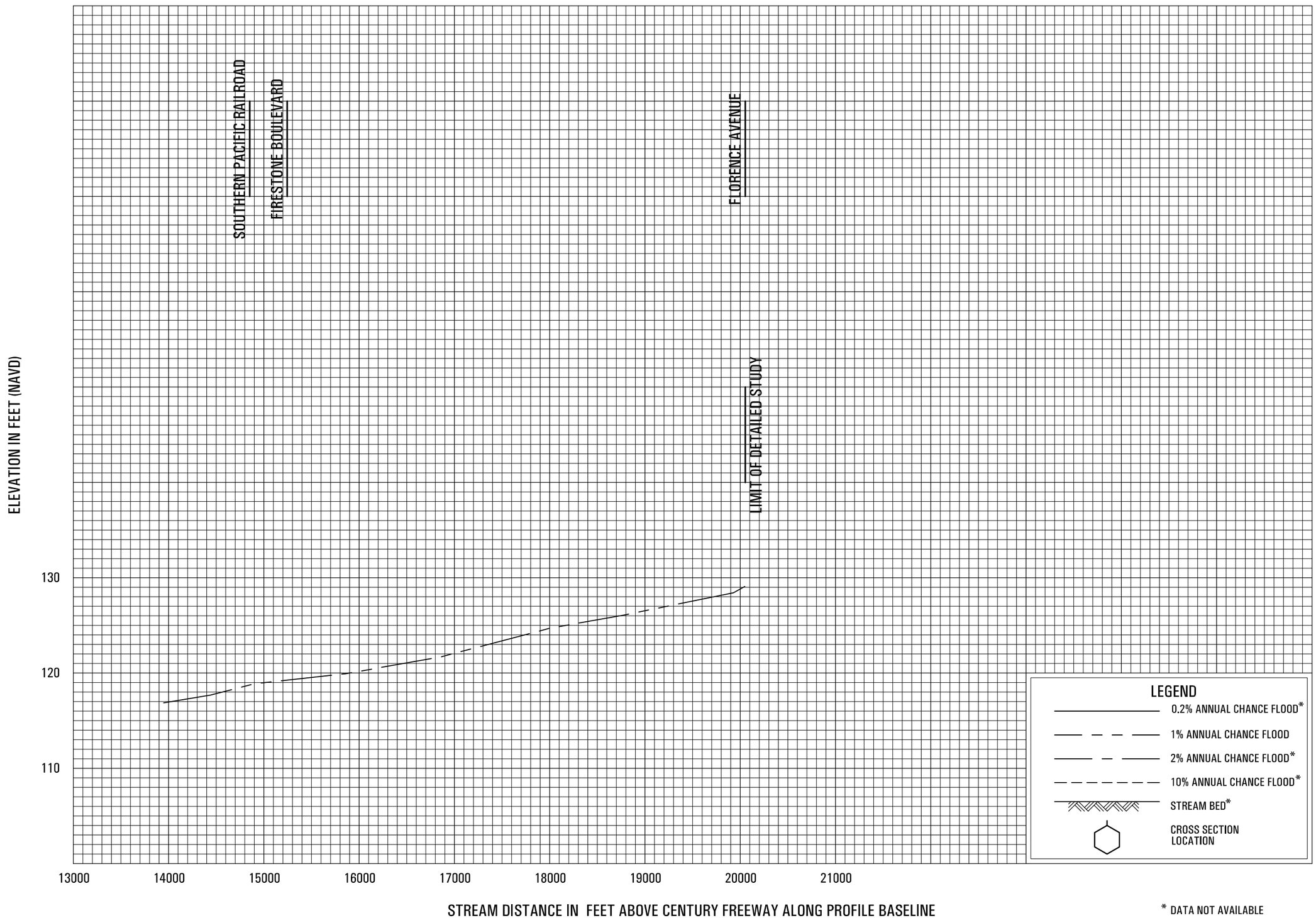
FLOOD PROFILES

RAMIREZ CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



* DATA NOT AVAILABLE

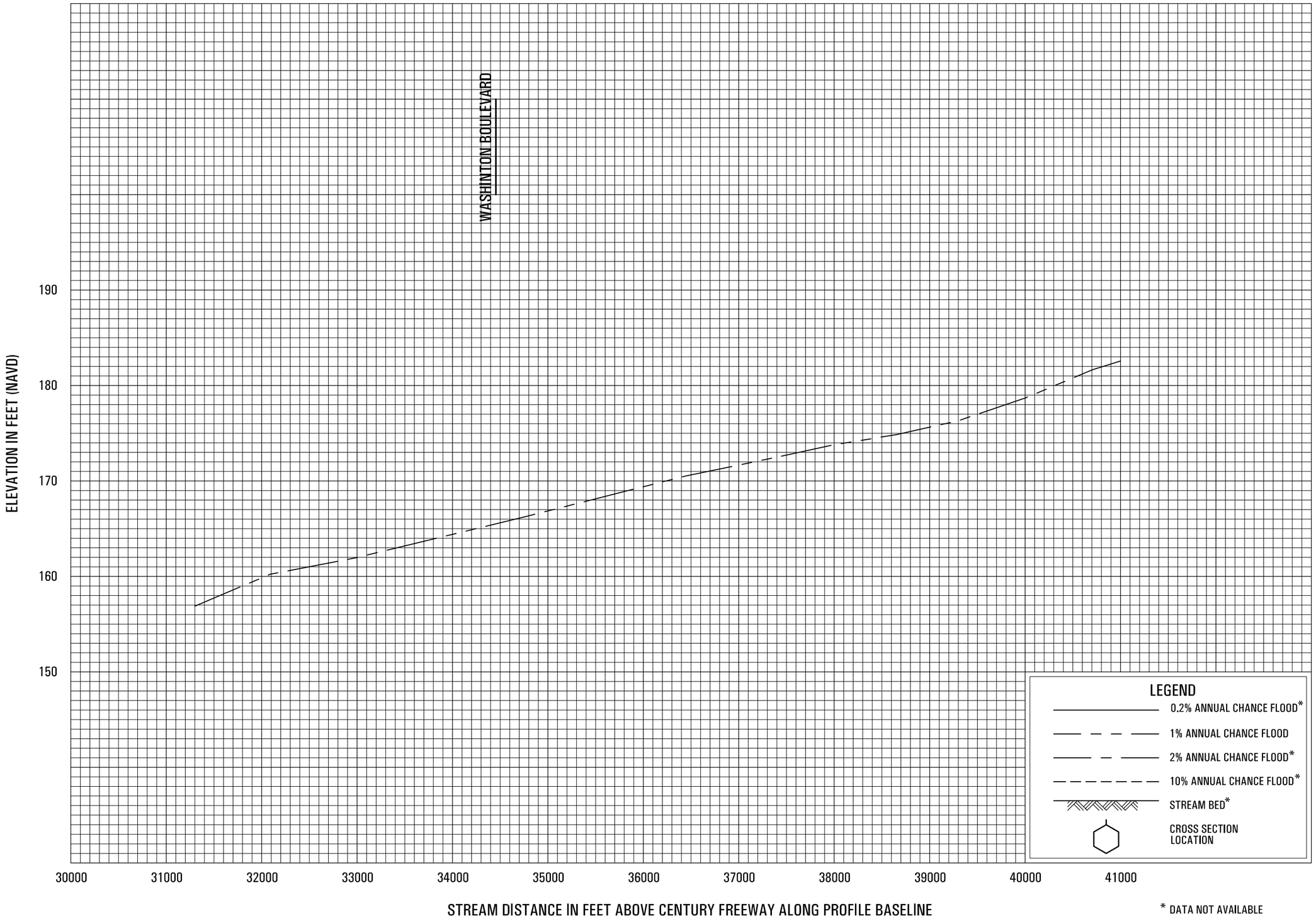
FLOOD PROFILES

RIO HONDO LEFT OVERBANK PATH 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



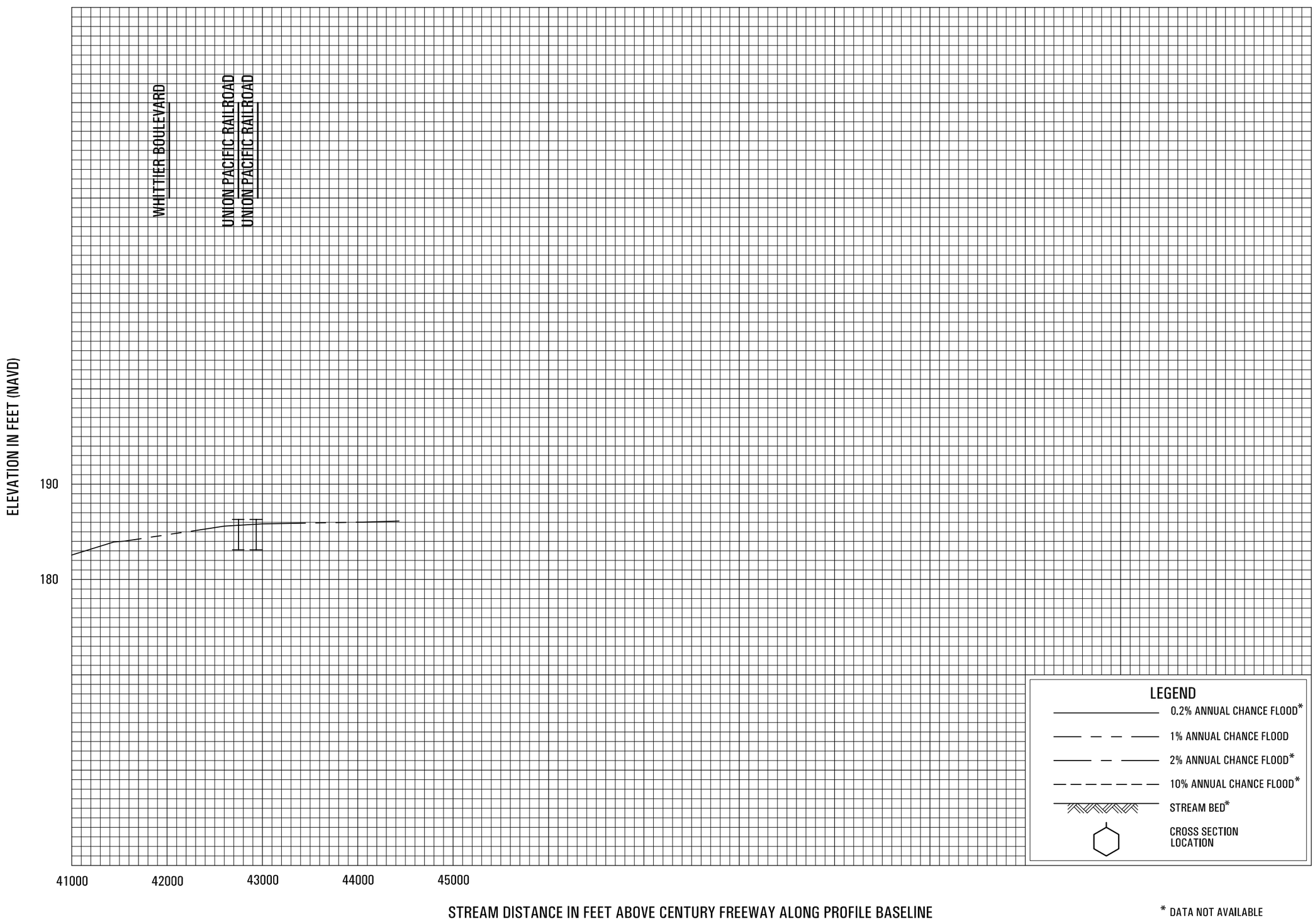
FLOOD PROFILES

RIO HONDO LEFT OVERBANK PATH 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



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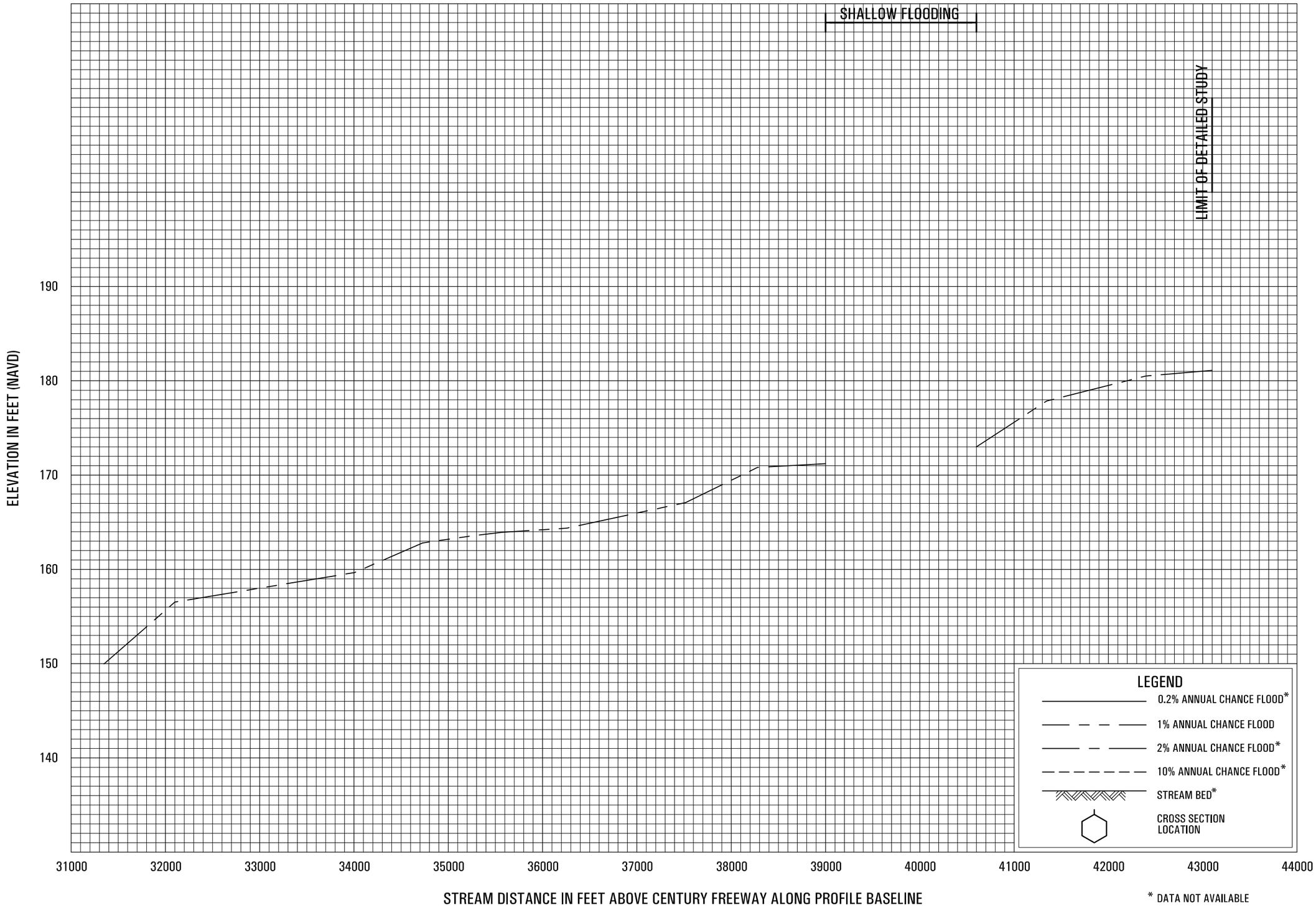
FLOOD PROFILES

RIO HONDO LEFT OVERBANK PATH 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

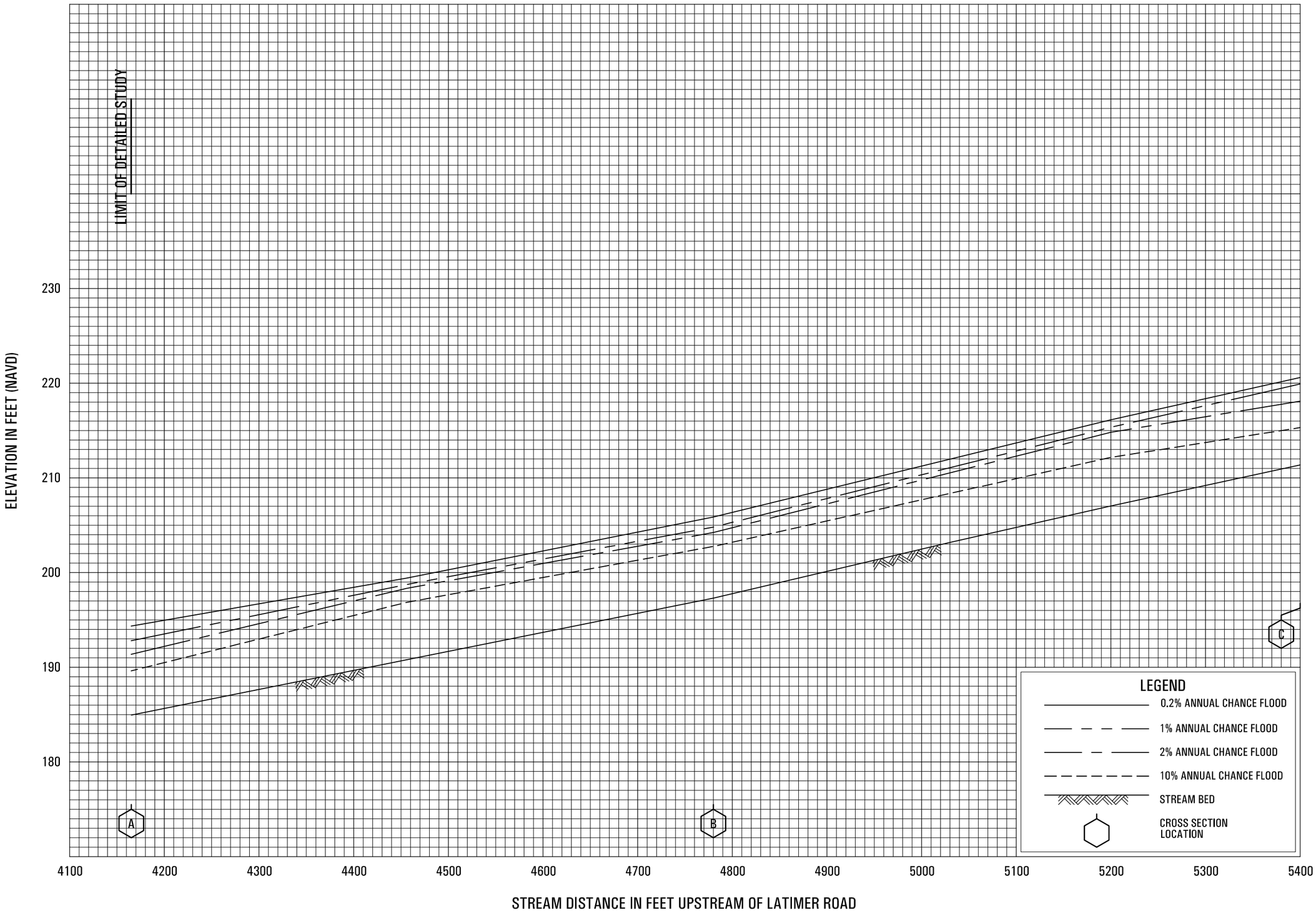
RIO HONDO LEFT OVERBANK PATH 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

160P



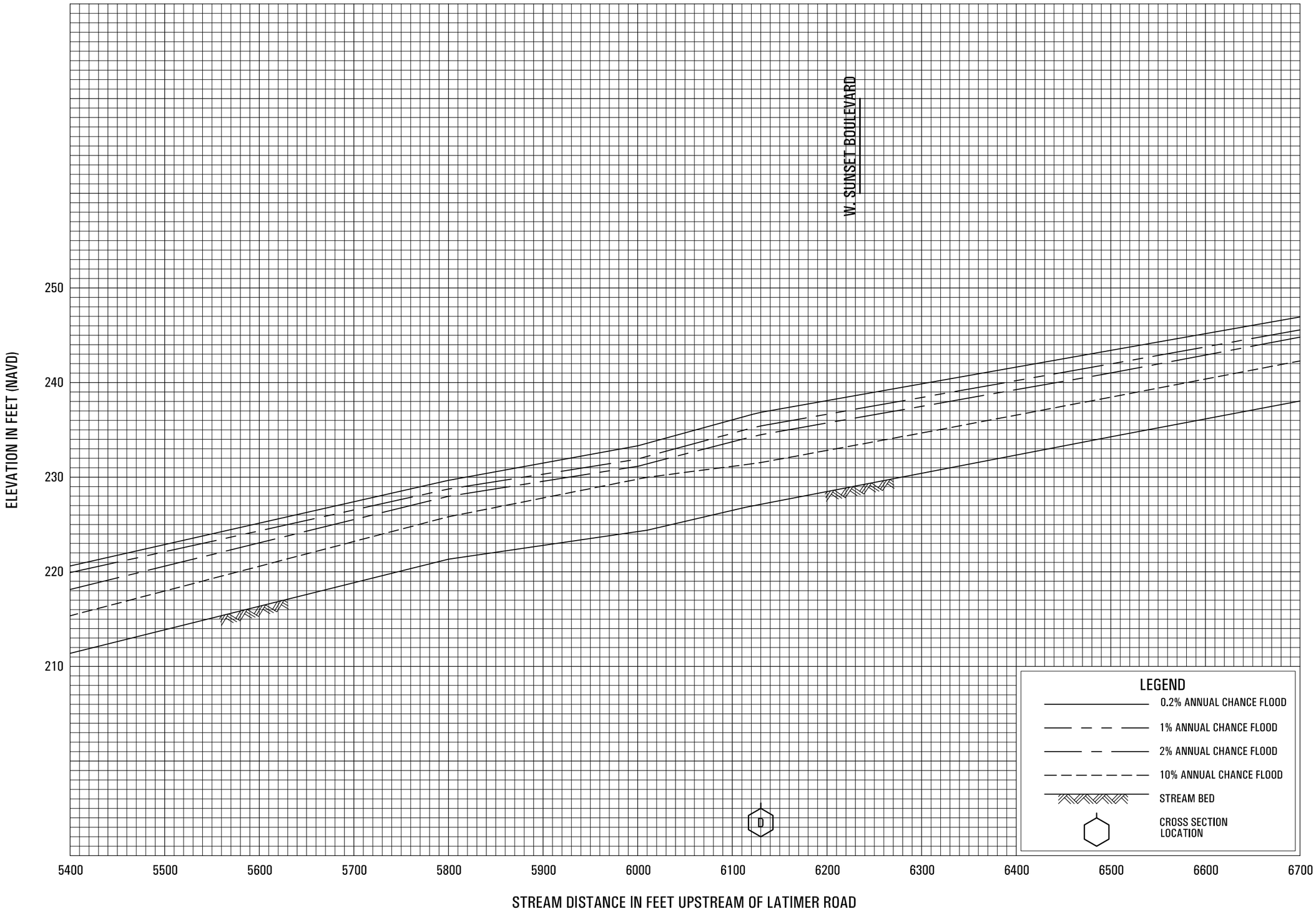
FLOOD PROFILES

RUSTIC CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



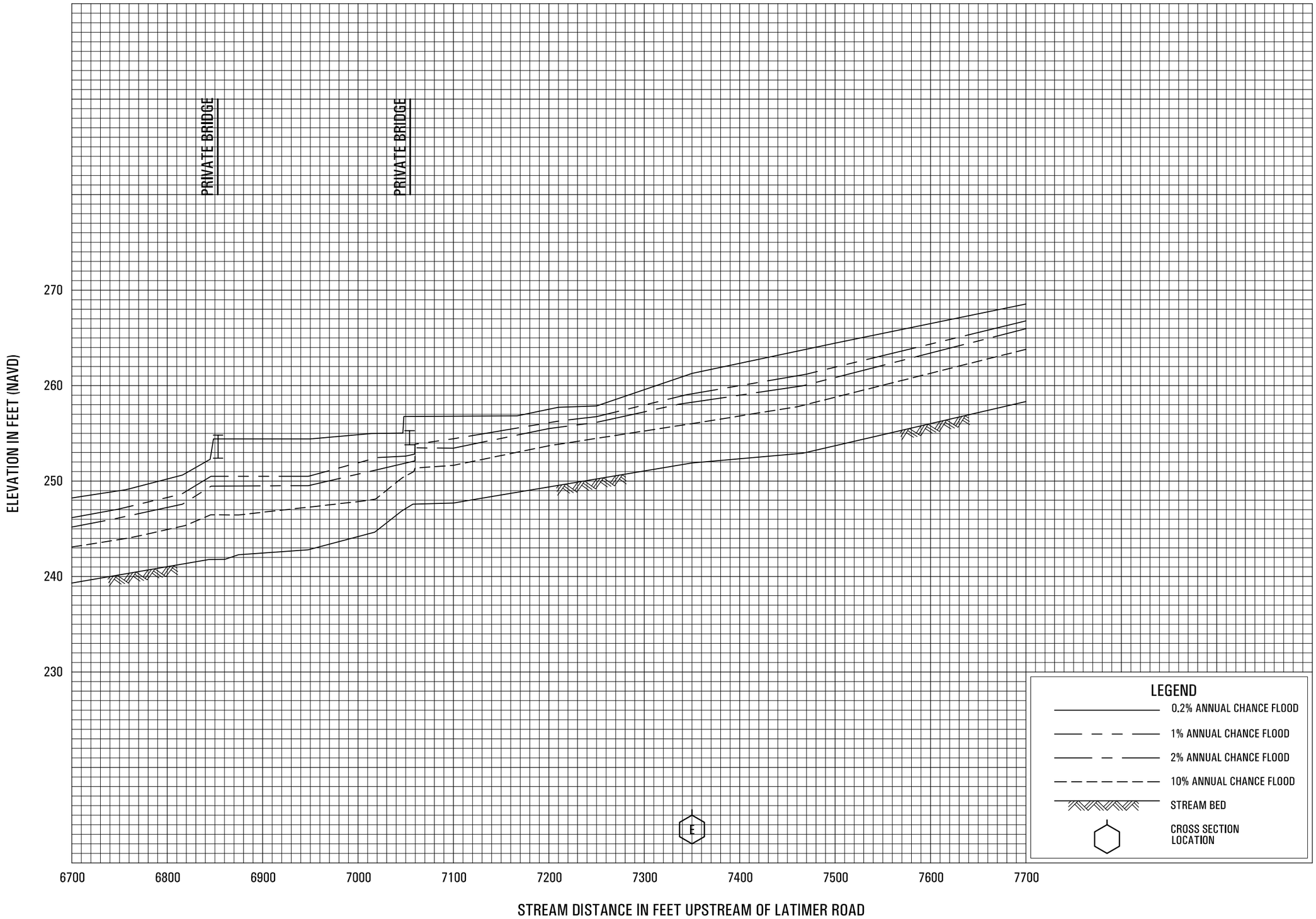
FLOOD PROFILES

RUSTIC CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



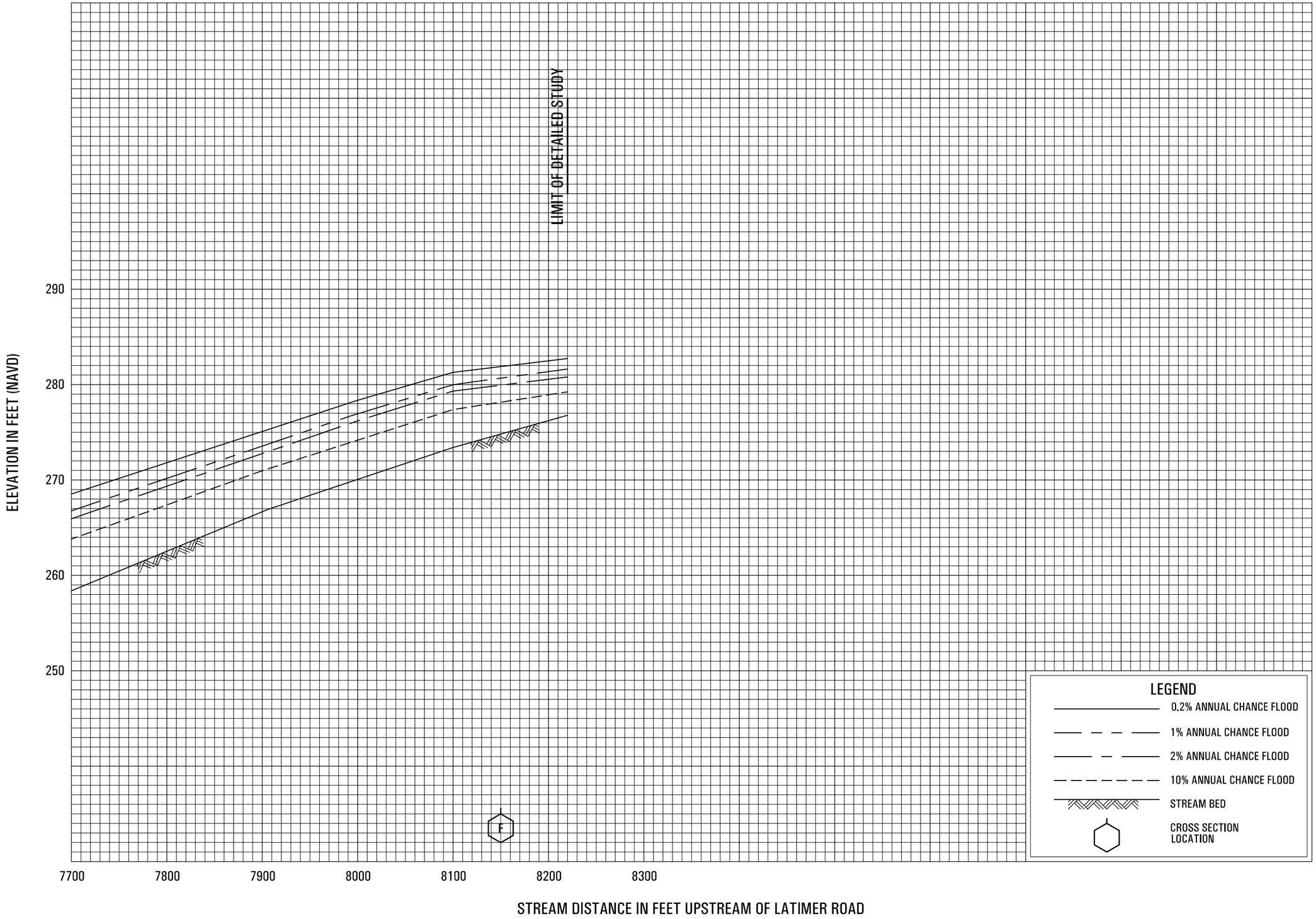
FLOOD PROFILES

RUSTIC CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

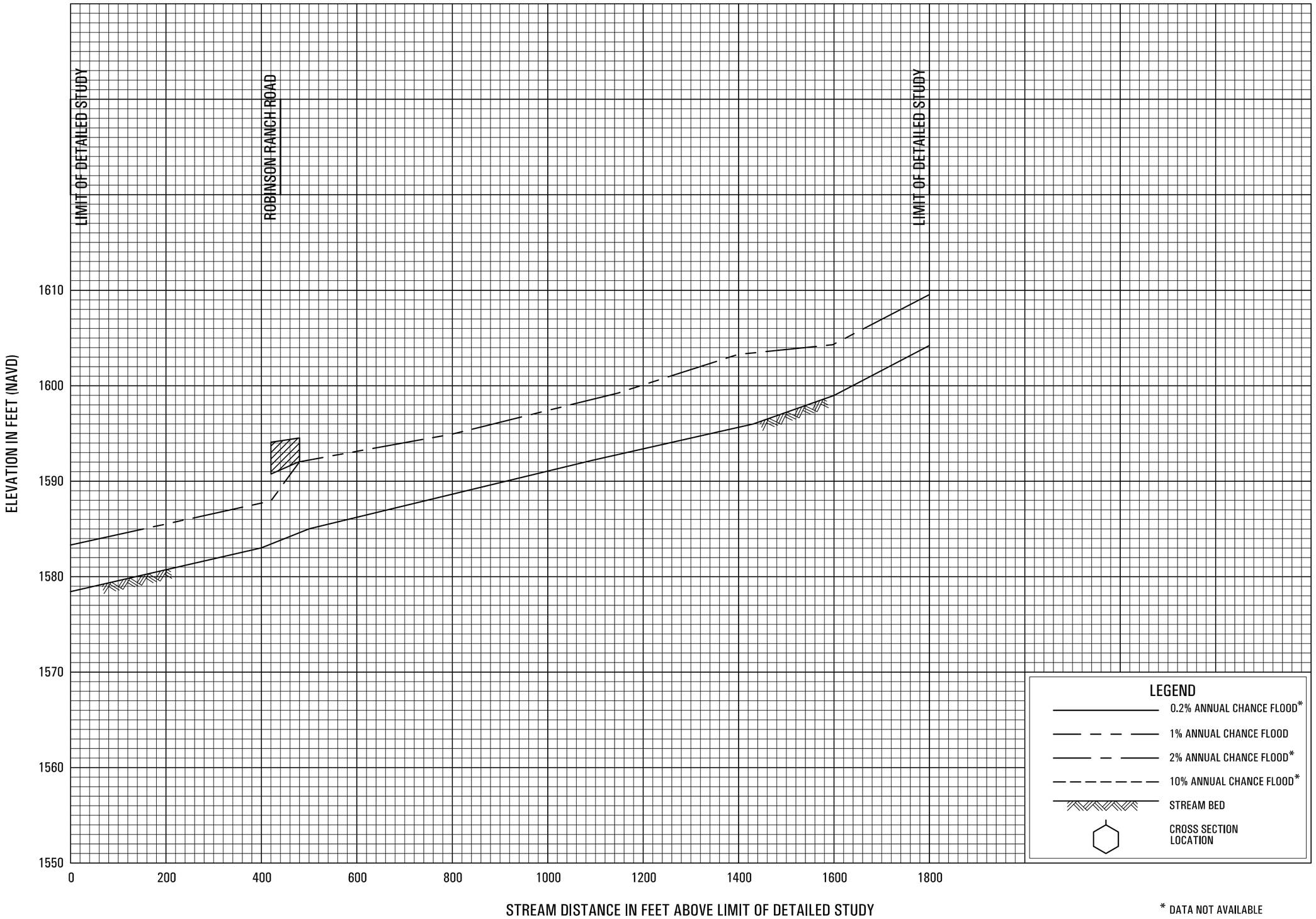
RUSTIC CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

164P



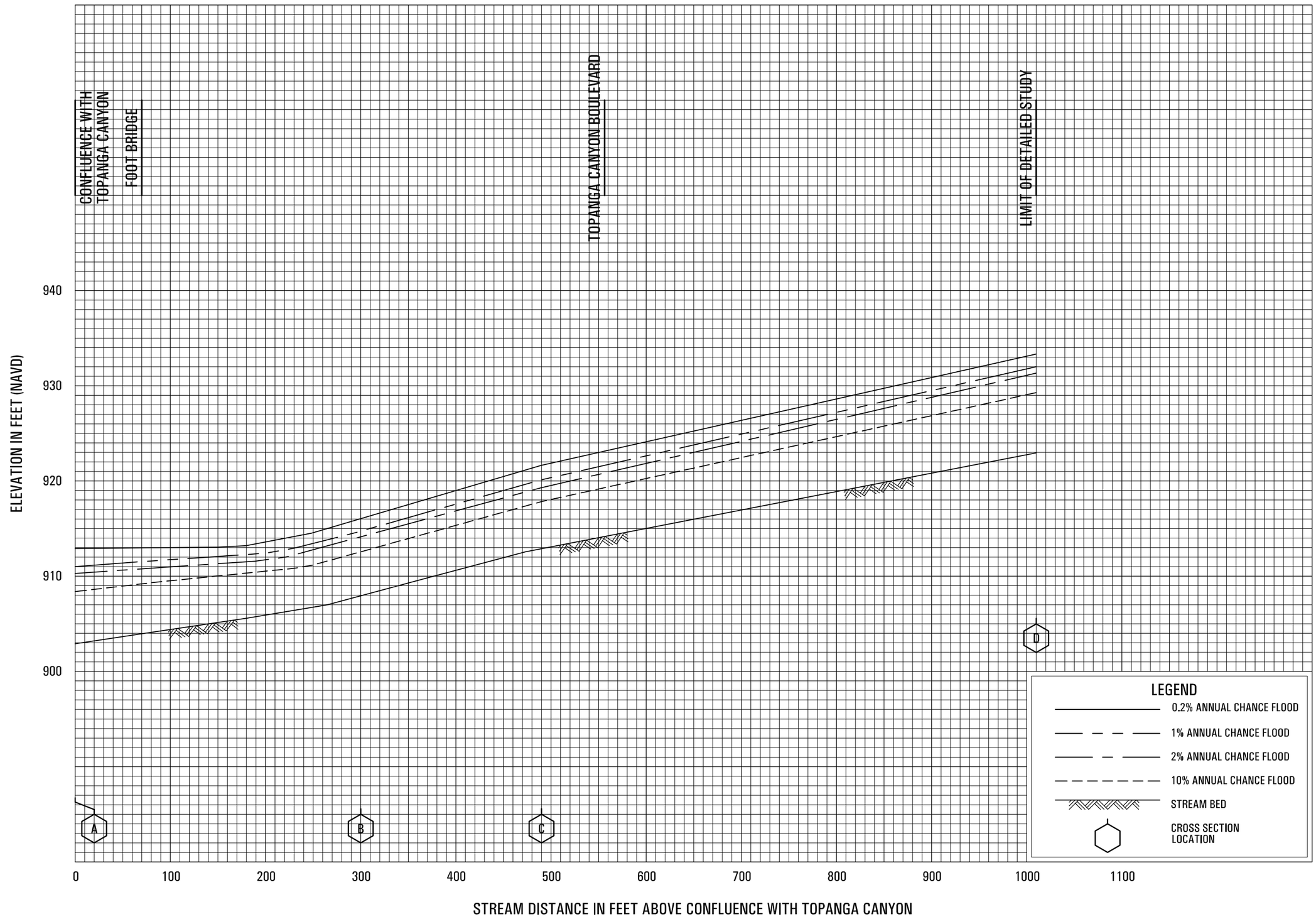
FLOOD PROFILES

SAND CANYON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

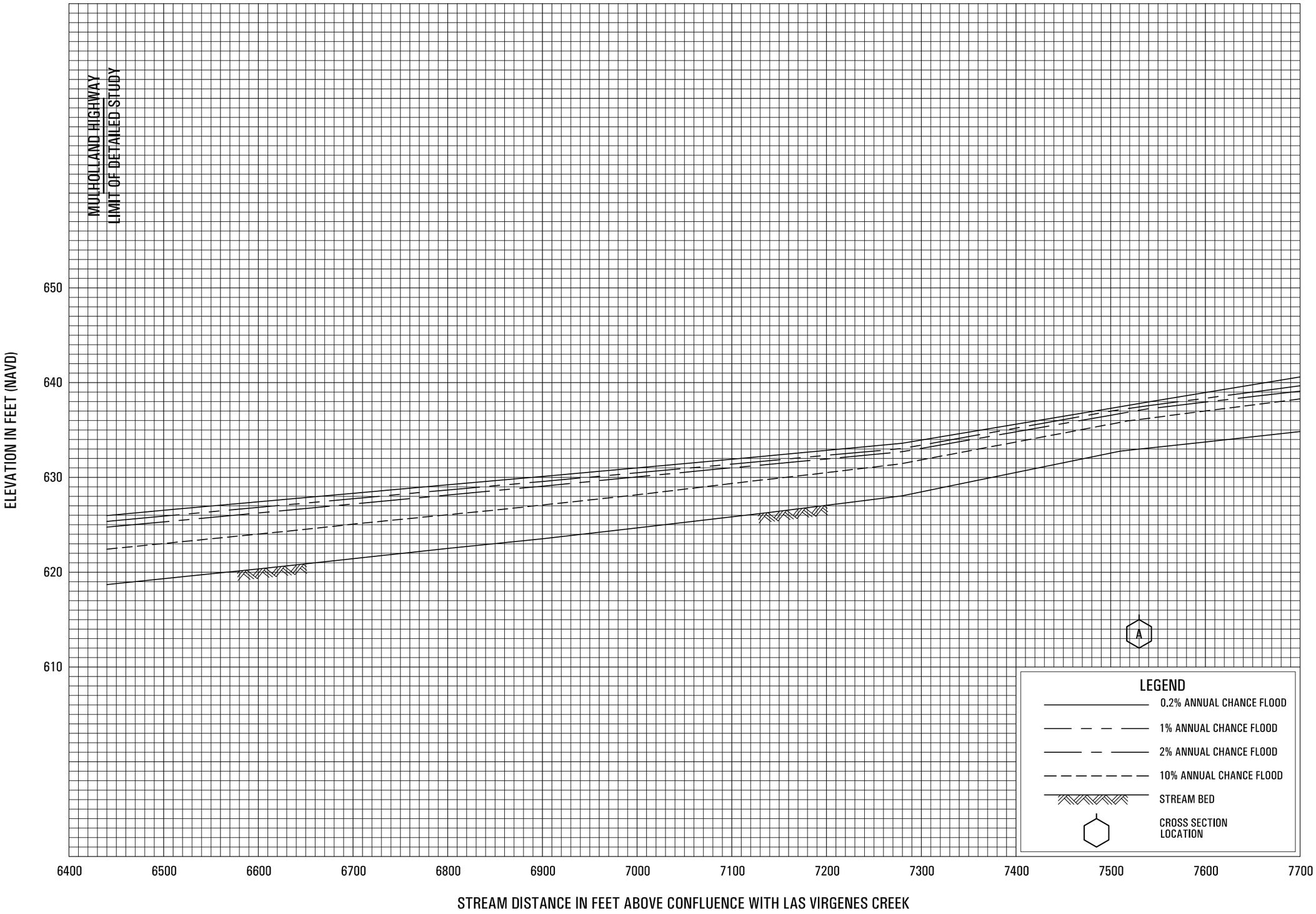
SANTA MARIA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

166P



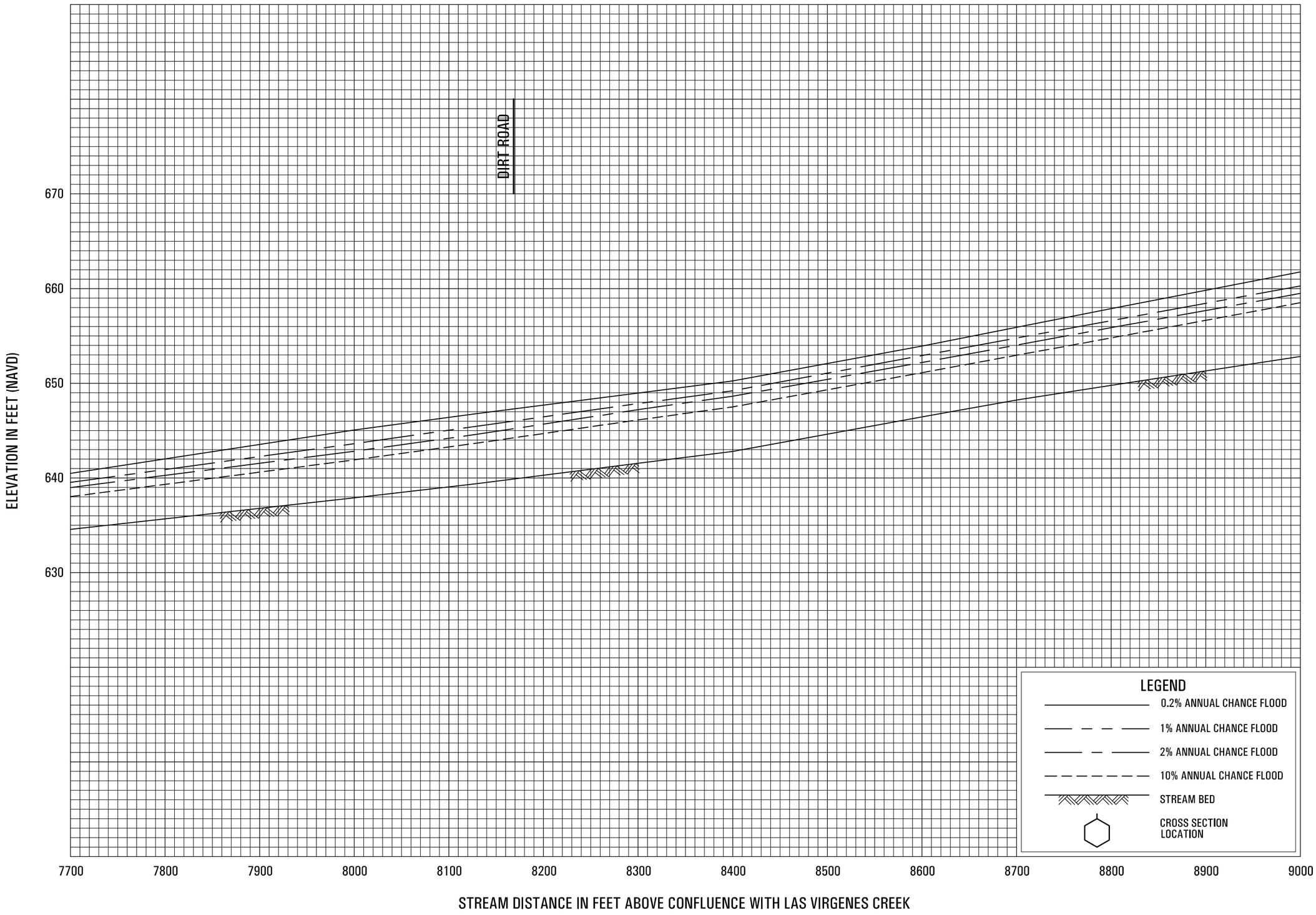
FLOOD PROFILES

STOKES CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

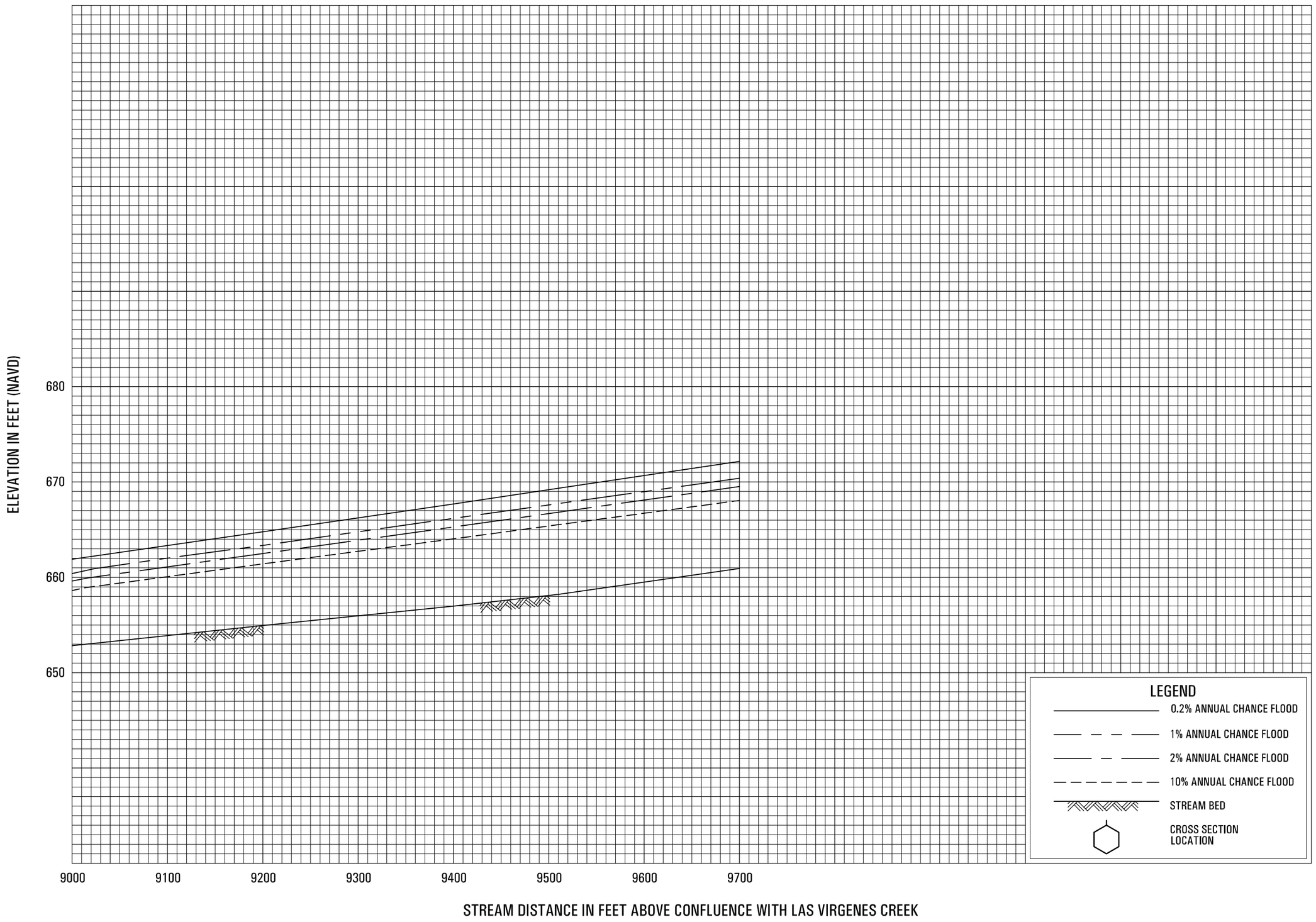
STOKES CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

168P



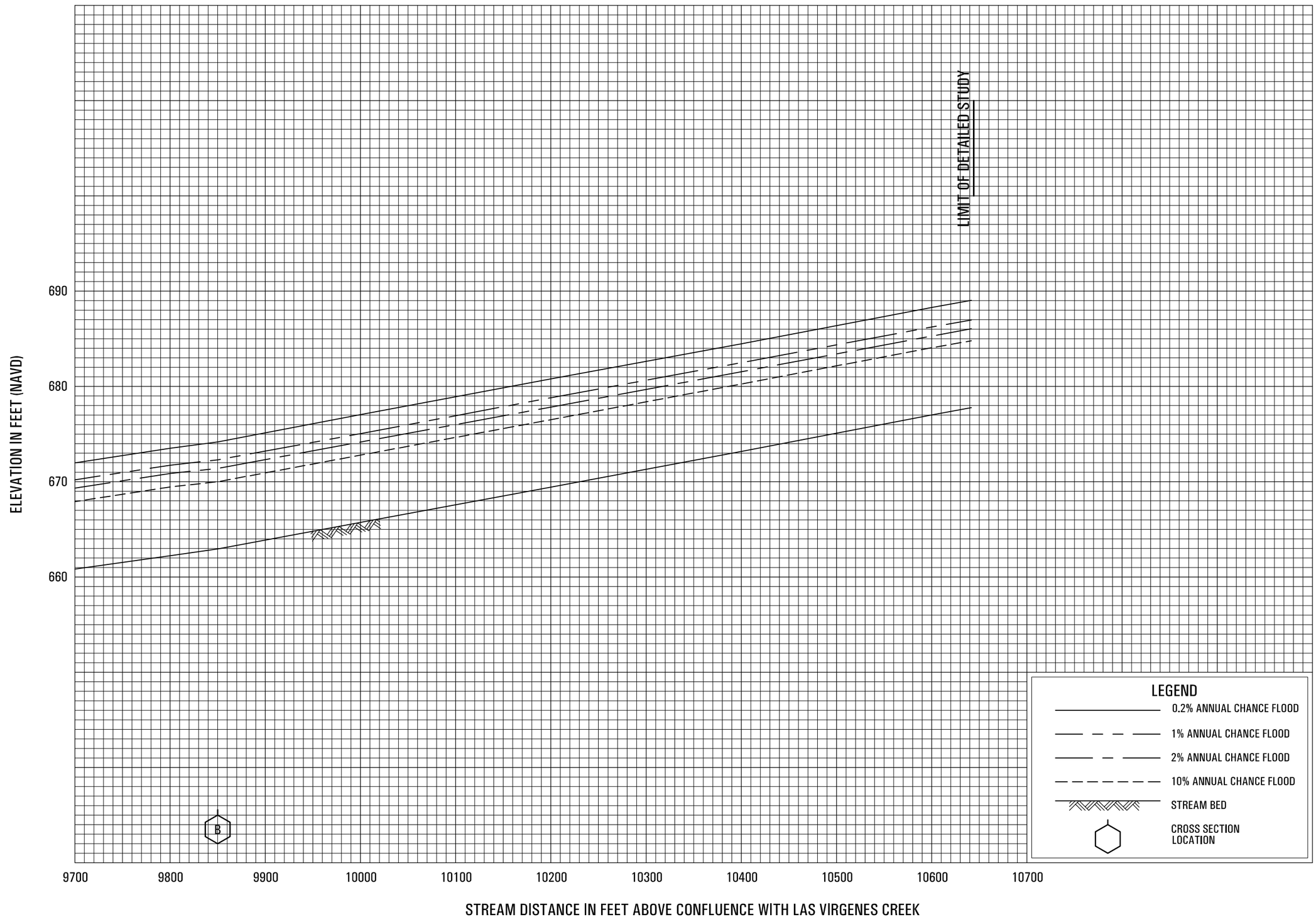
FLOOD PROFILES

STOKES CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

STOKES CANYON

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LOS ANGELES COUNTY, CA

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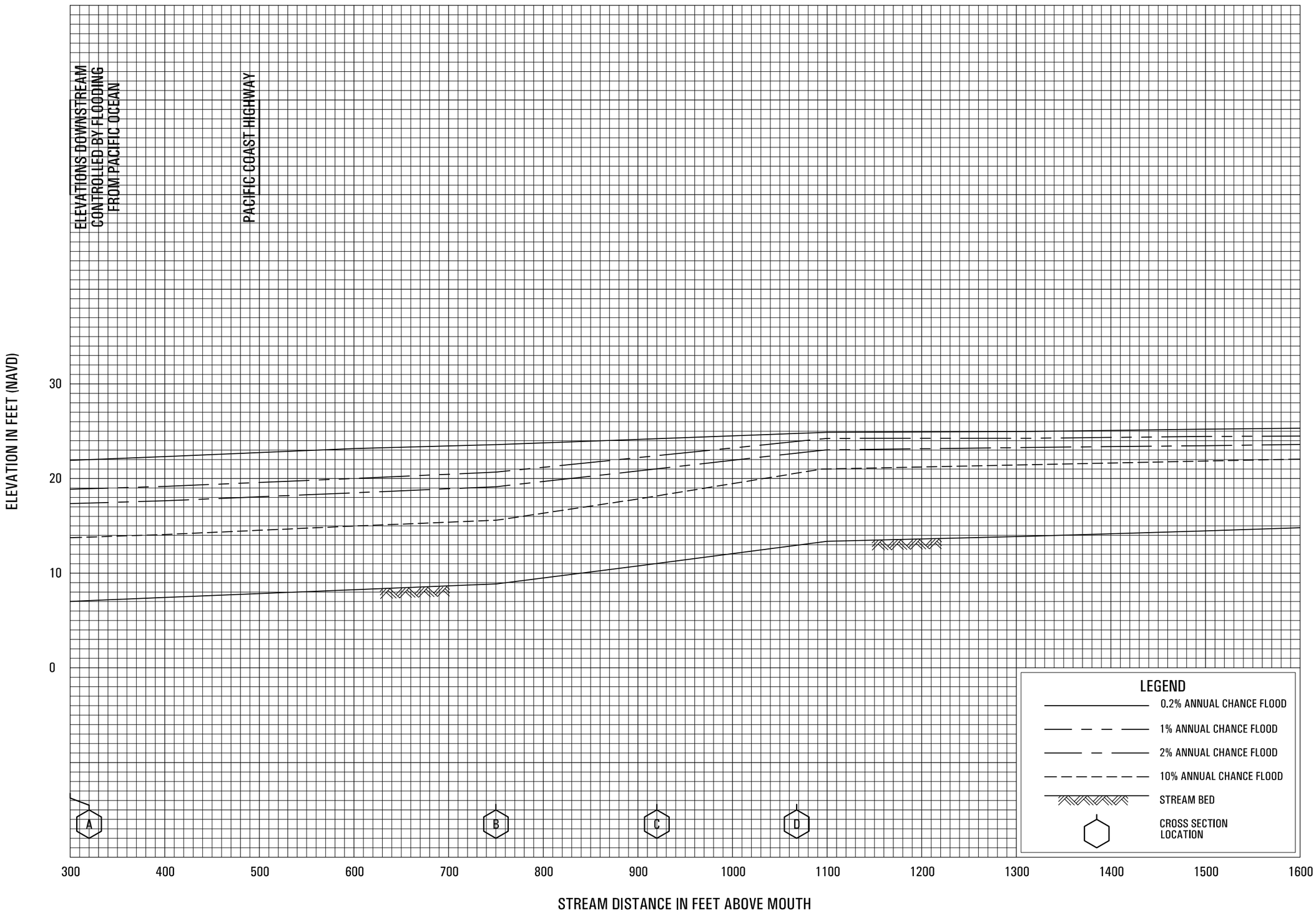


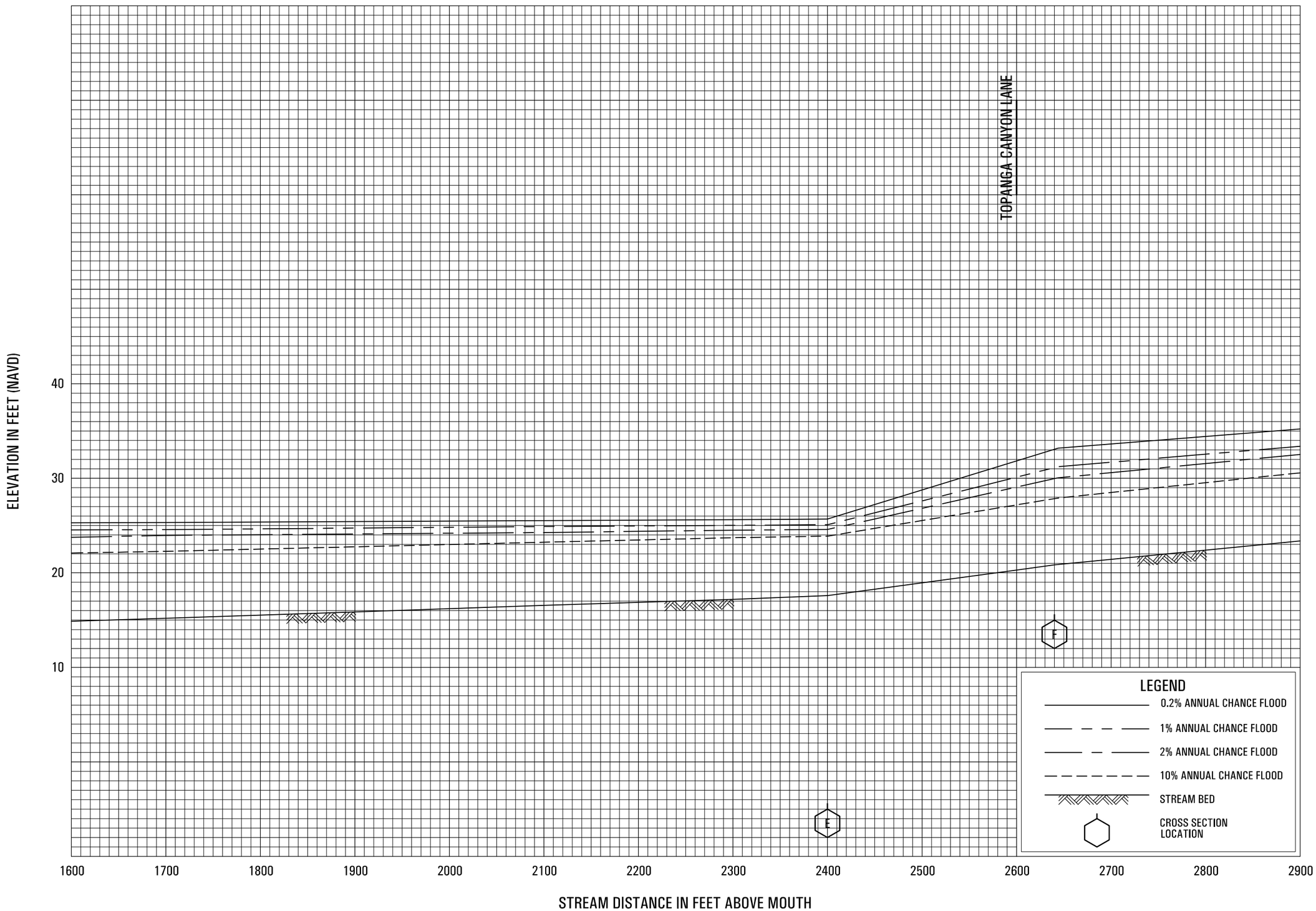
FLOOD PROFILES

TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

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FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

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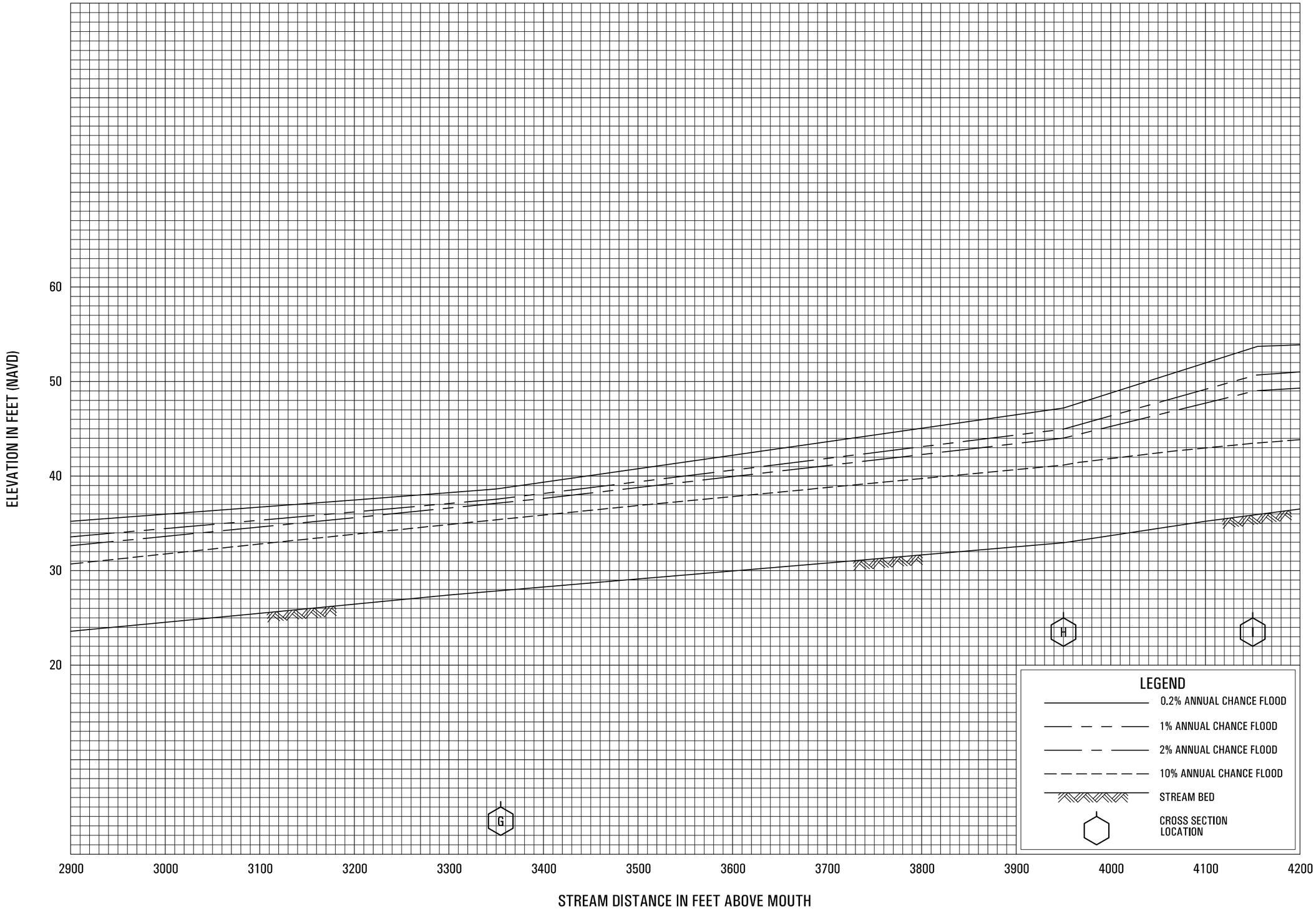

FLOOD PROFILES

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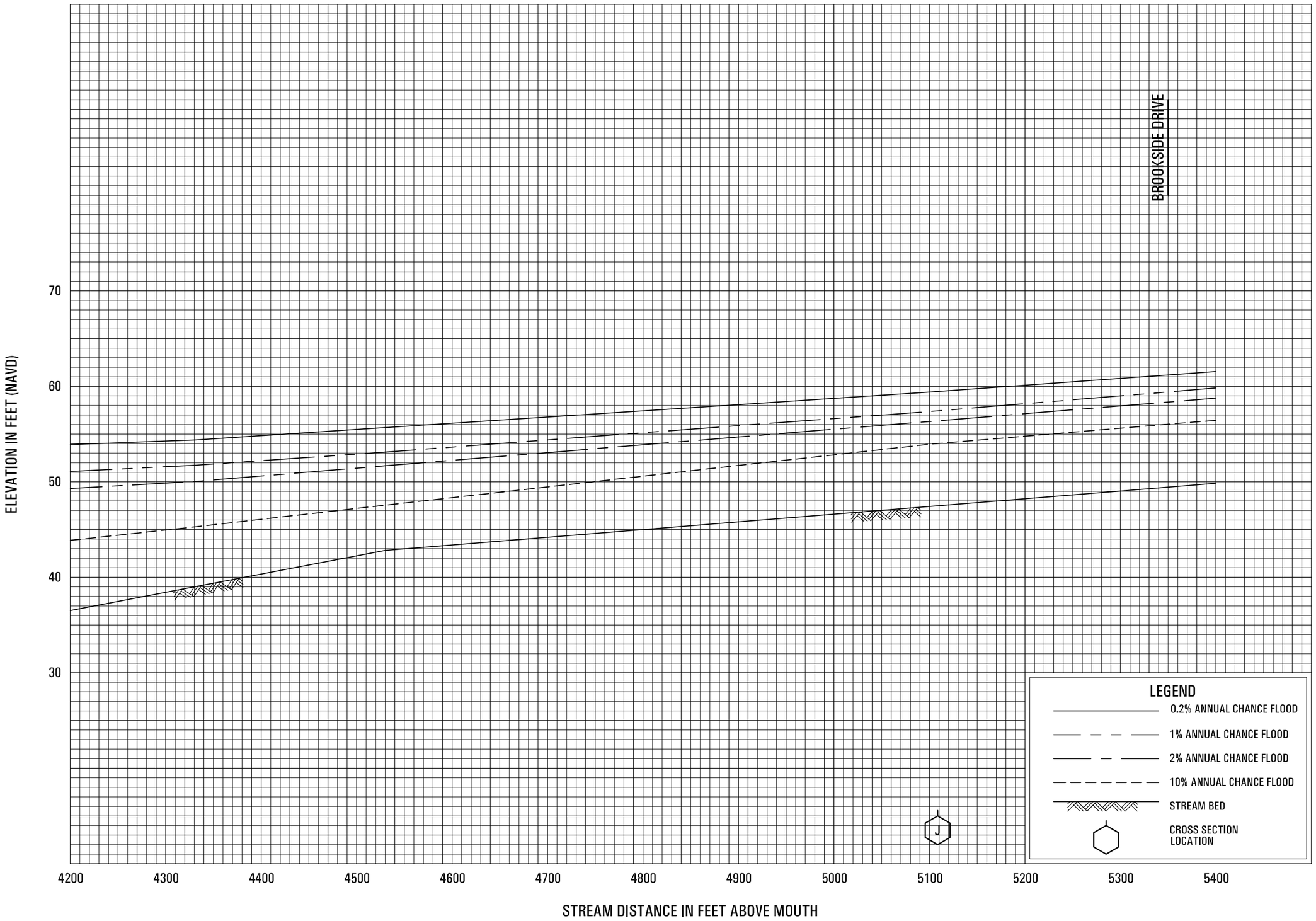
FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

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FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

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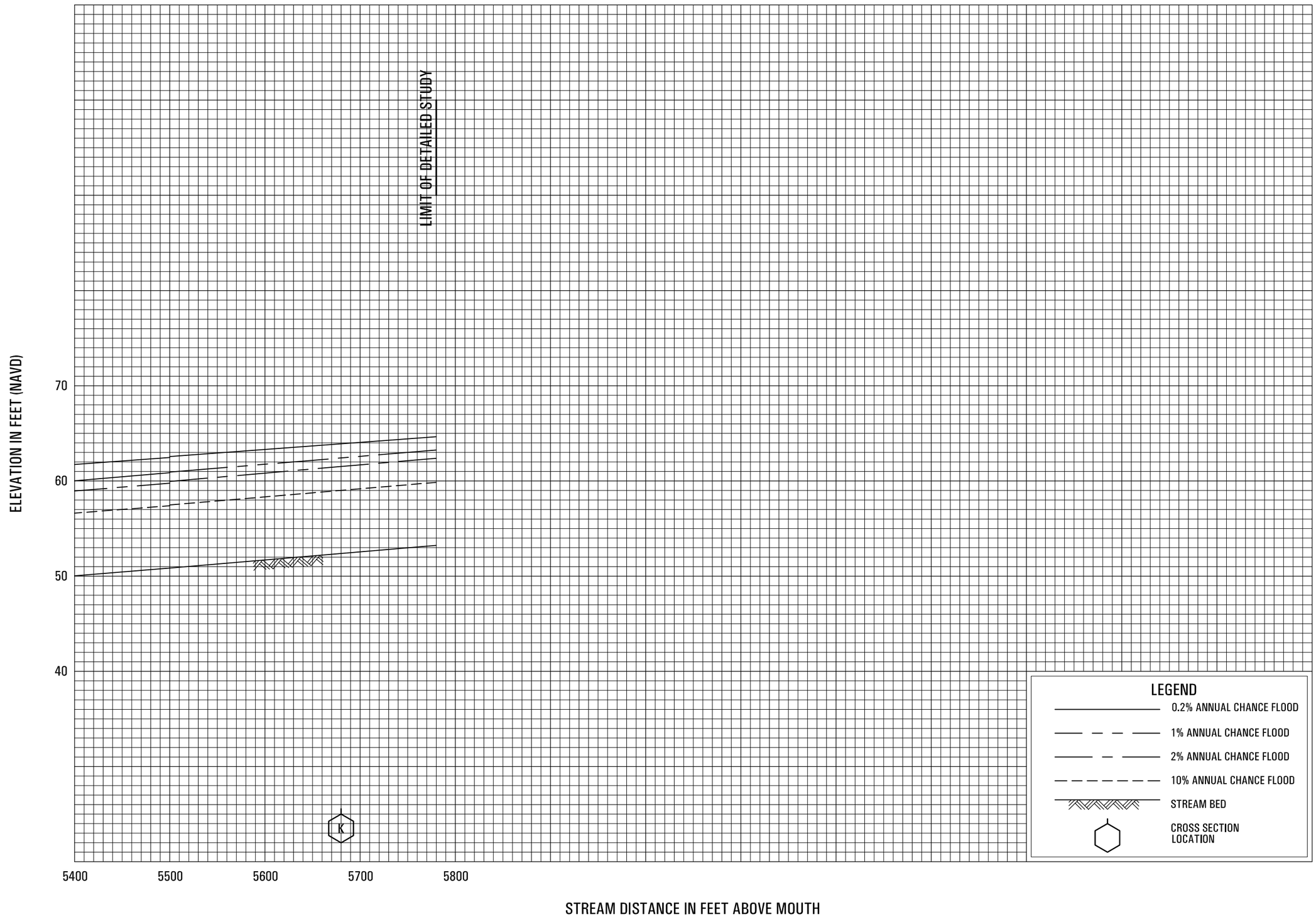

FLOOD PROFILES

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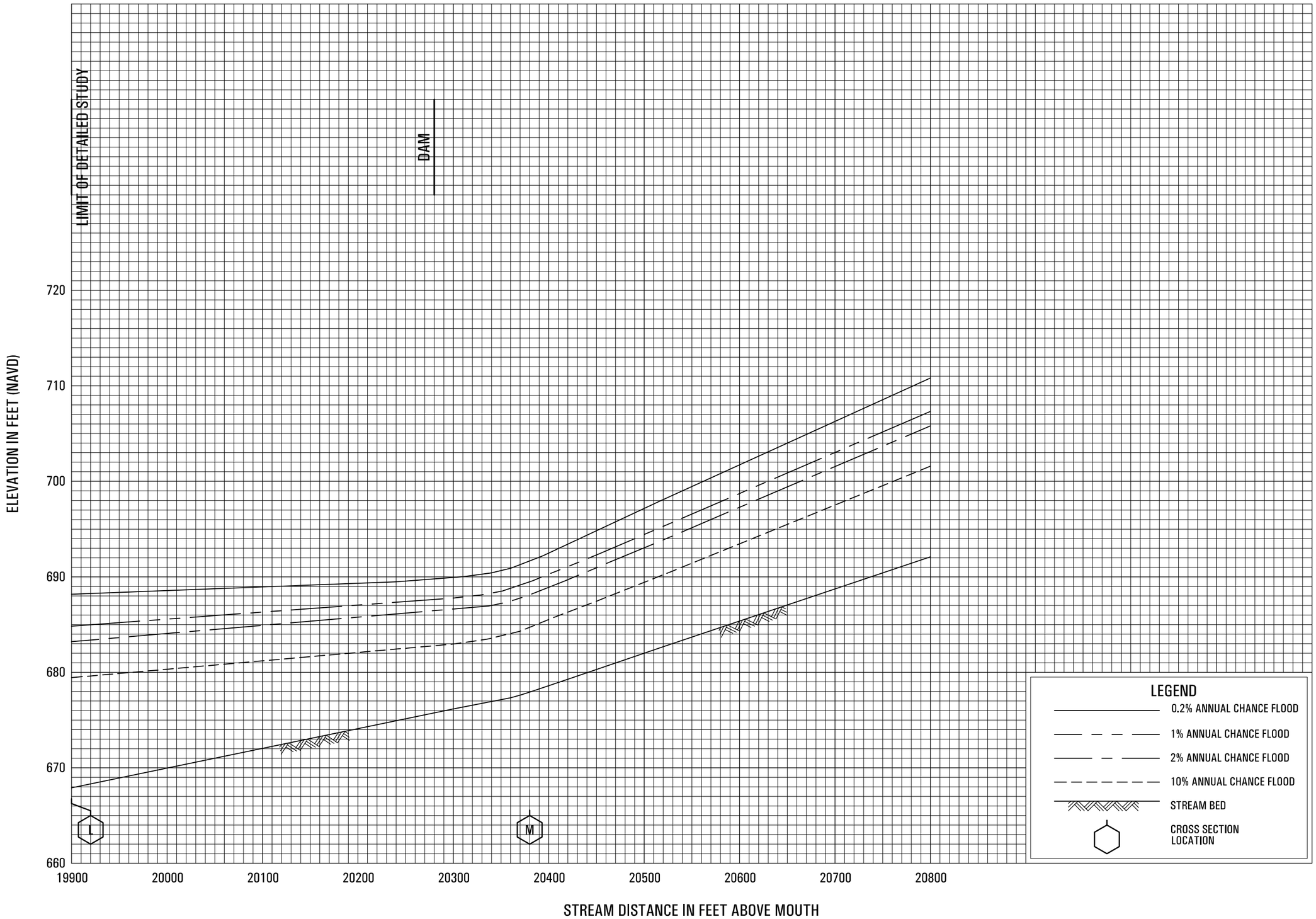
FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

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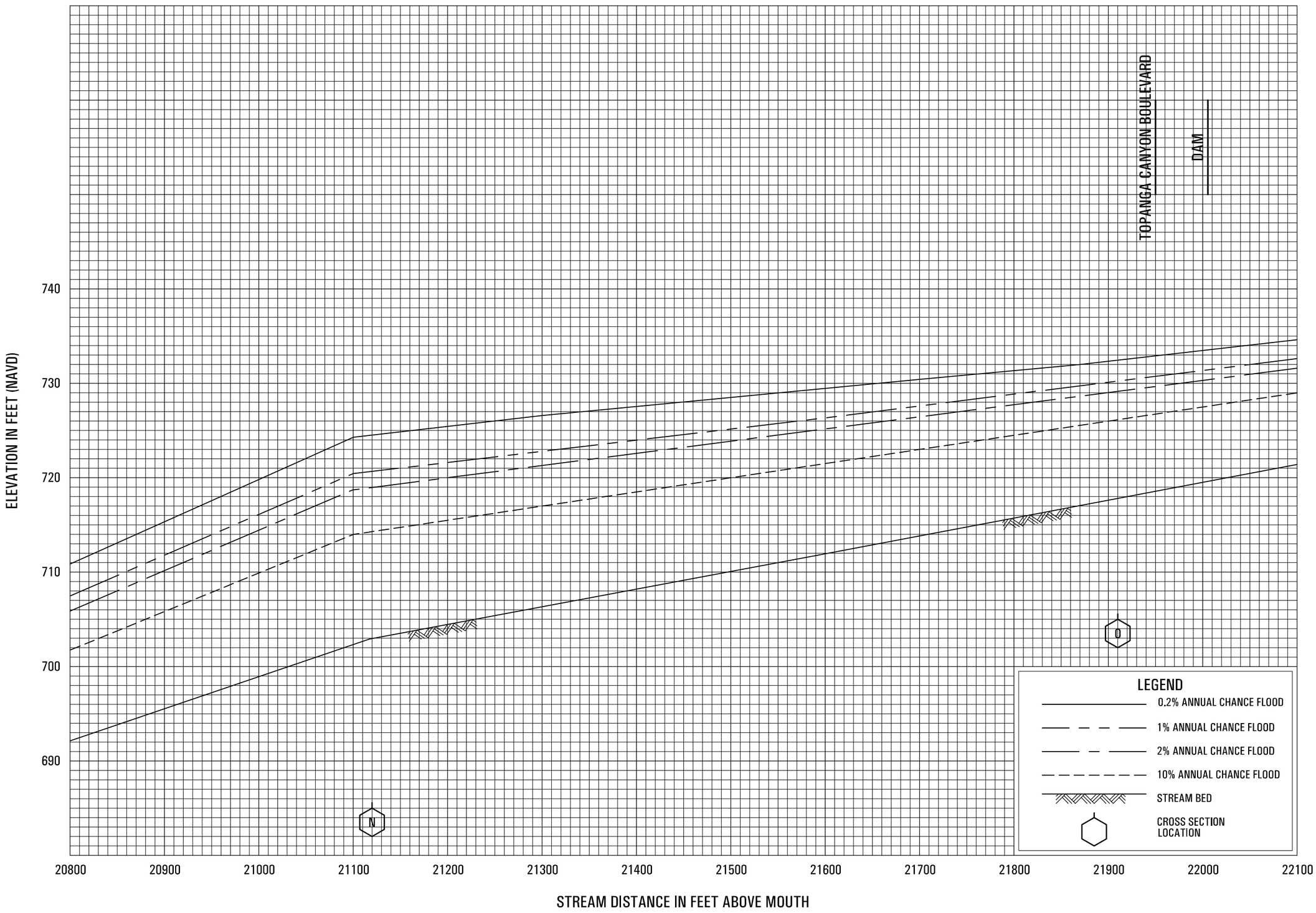
FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

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LOS ANGELES COUNTY, CA

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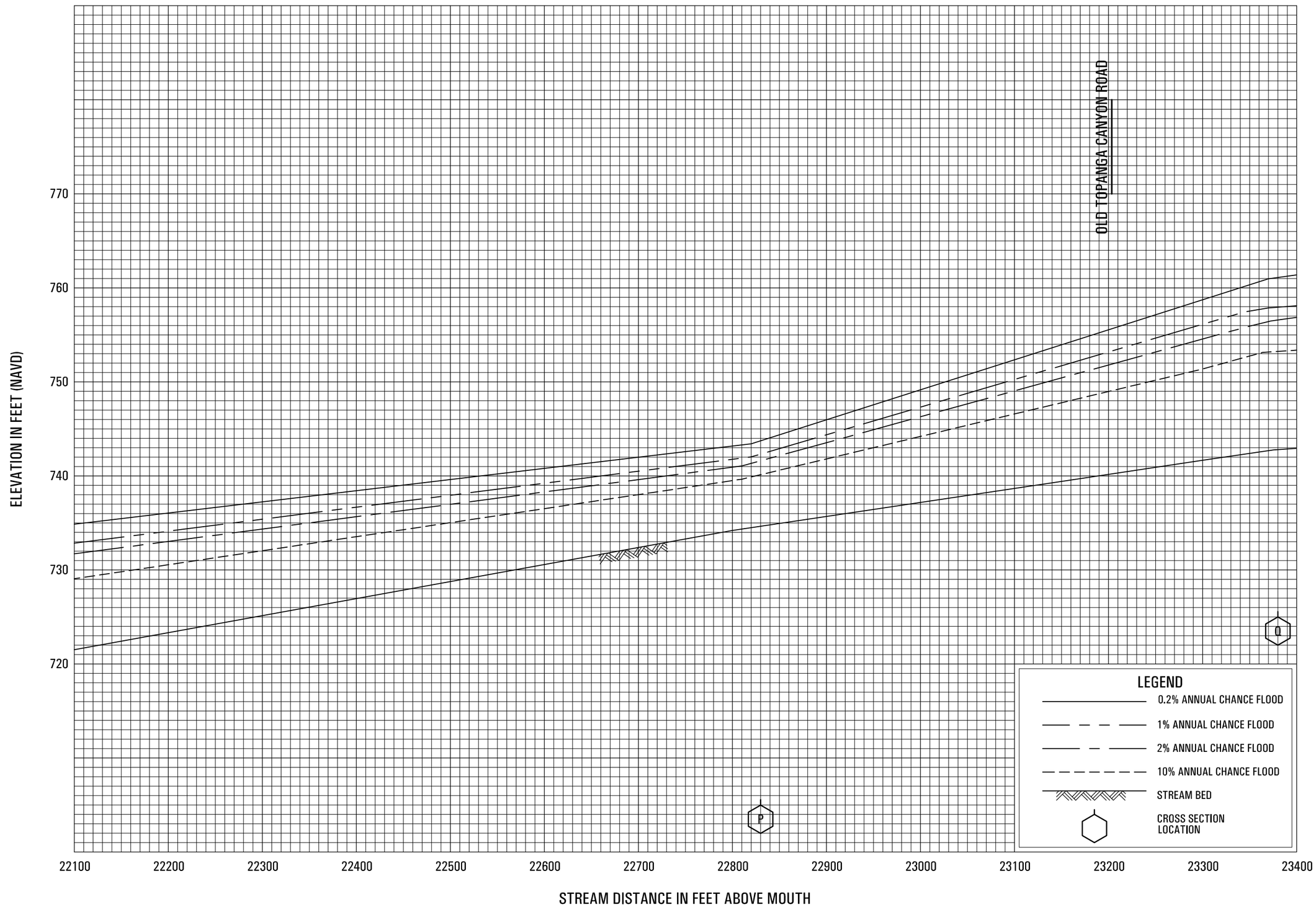

FLOOD PROFILES

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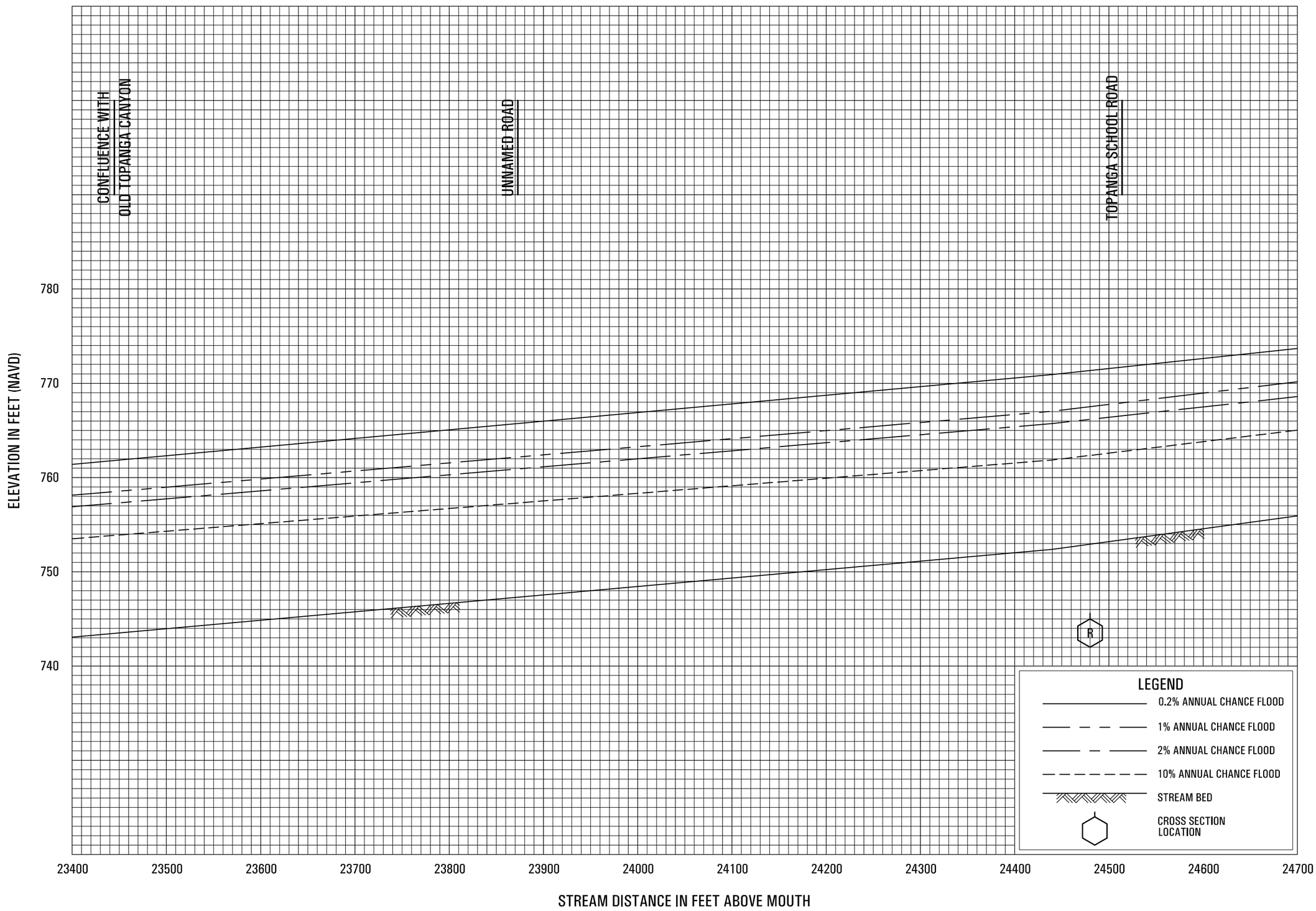
FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

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LOS ANGELES COUNTY, CA

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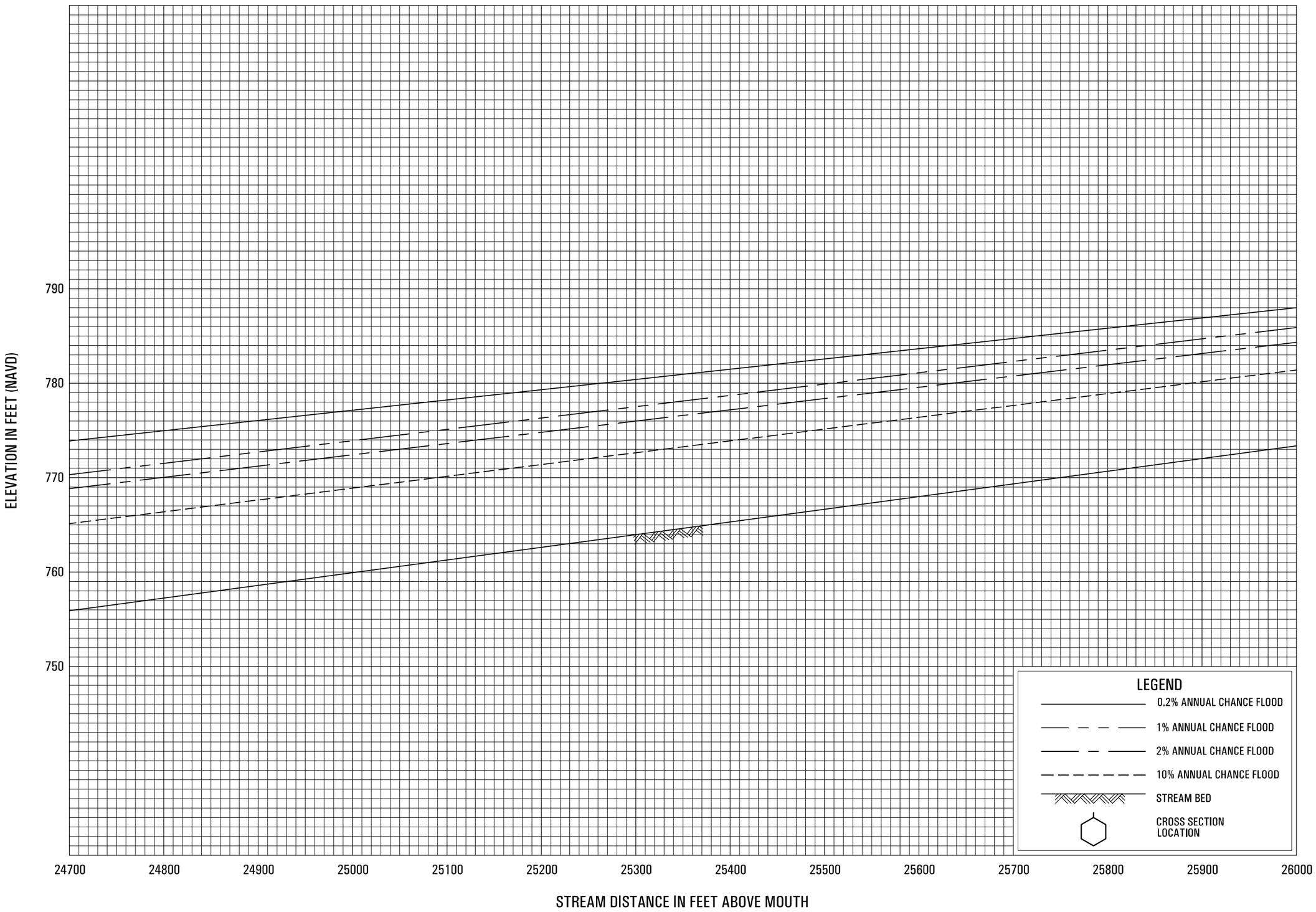

FLOOD PROFILES

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LOS ANGELES COUNTY, CA

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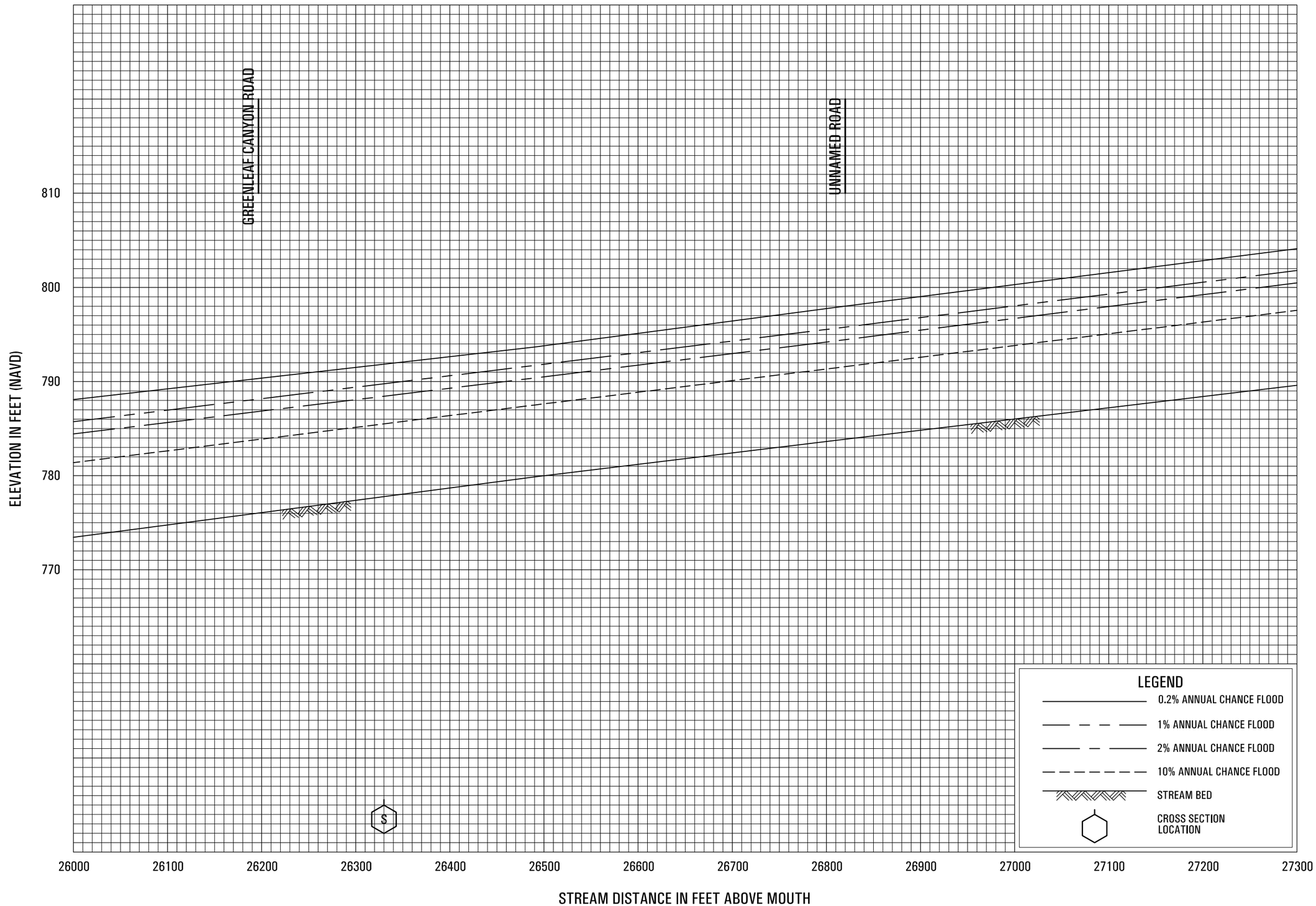

FLOOD PROFILES

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FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

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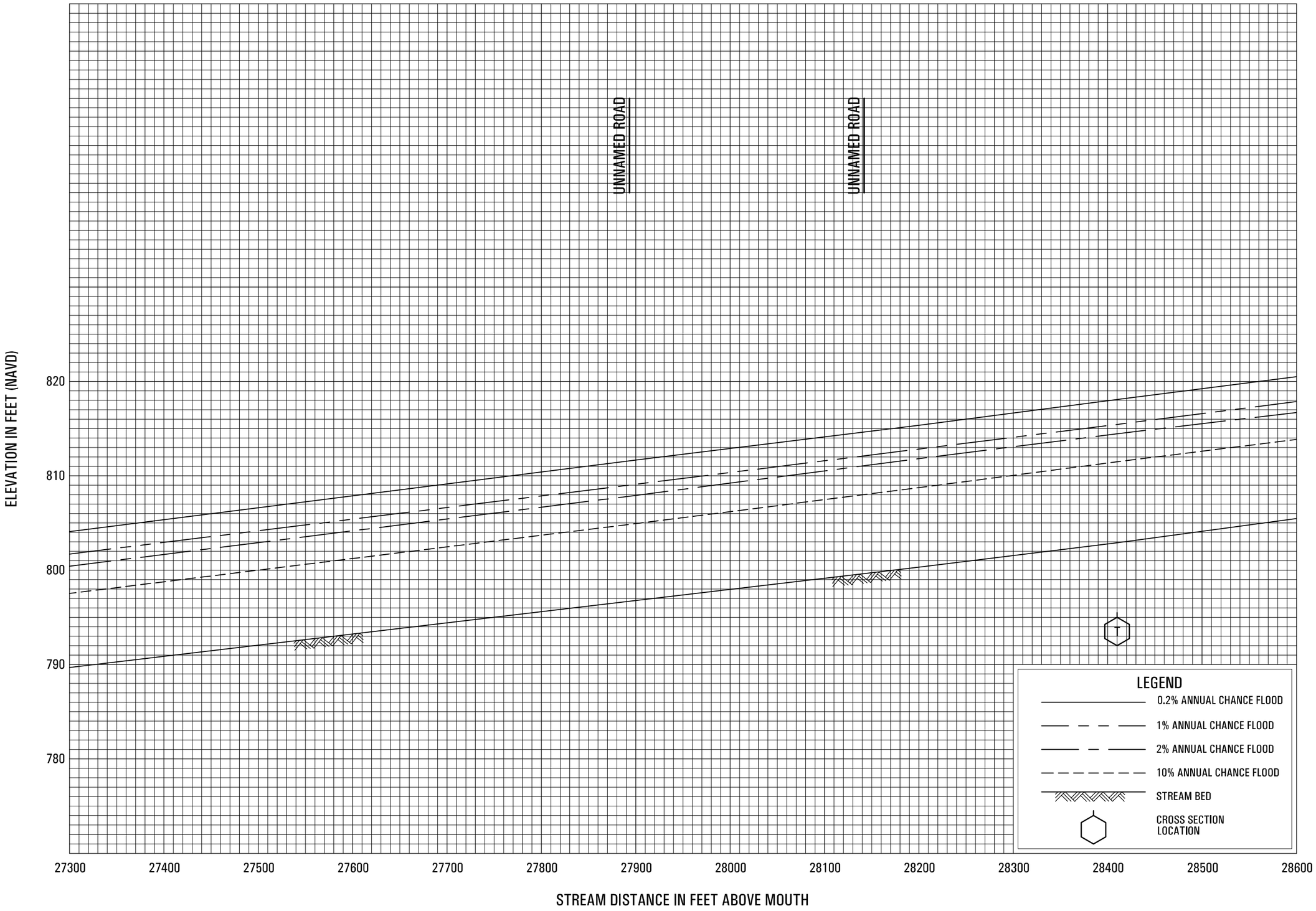

FLOOD PROFILES

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LOS ANGELES COUNTY, CA

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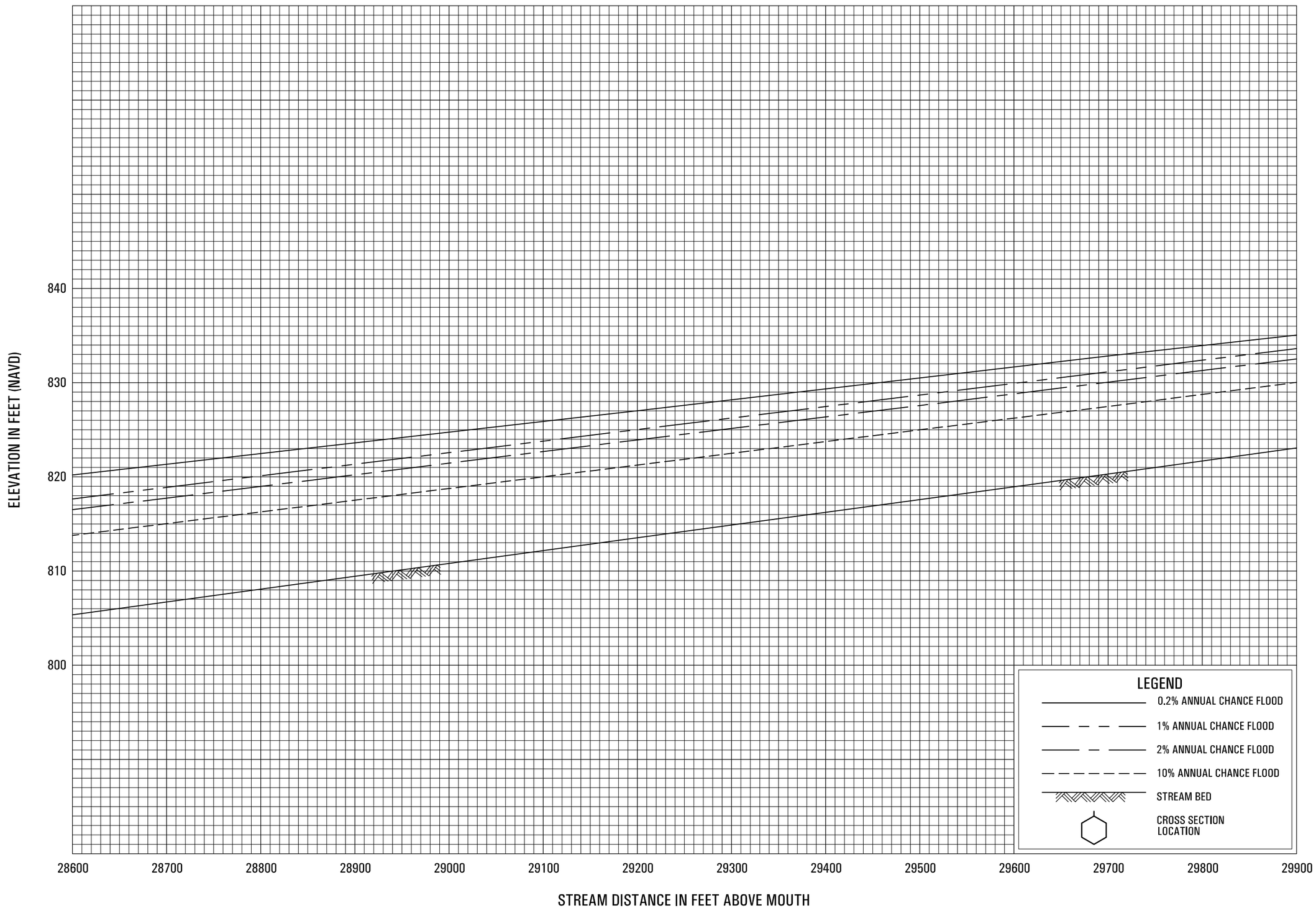

FLOOD PROFILES

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FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

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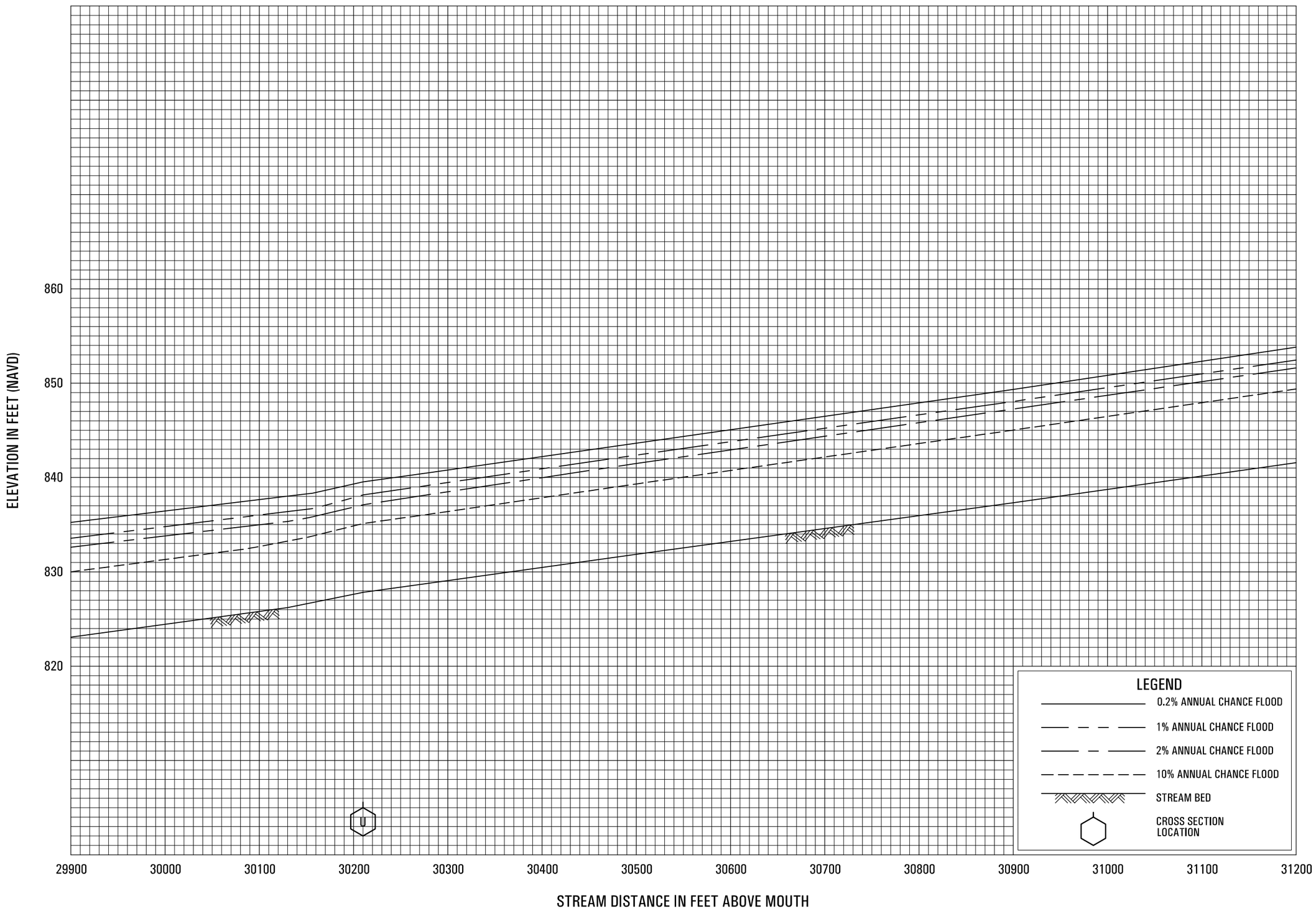

FLOOD PROFILES

TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

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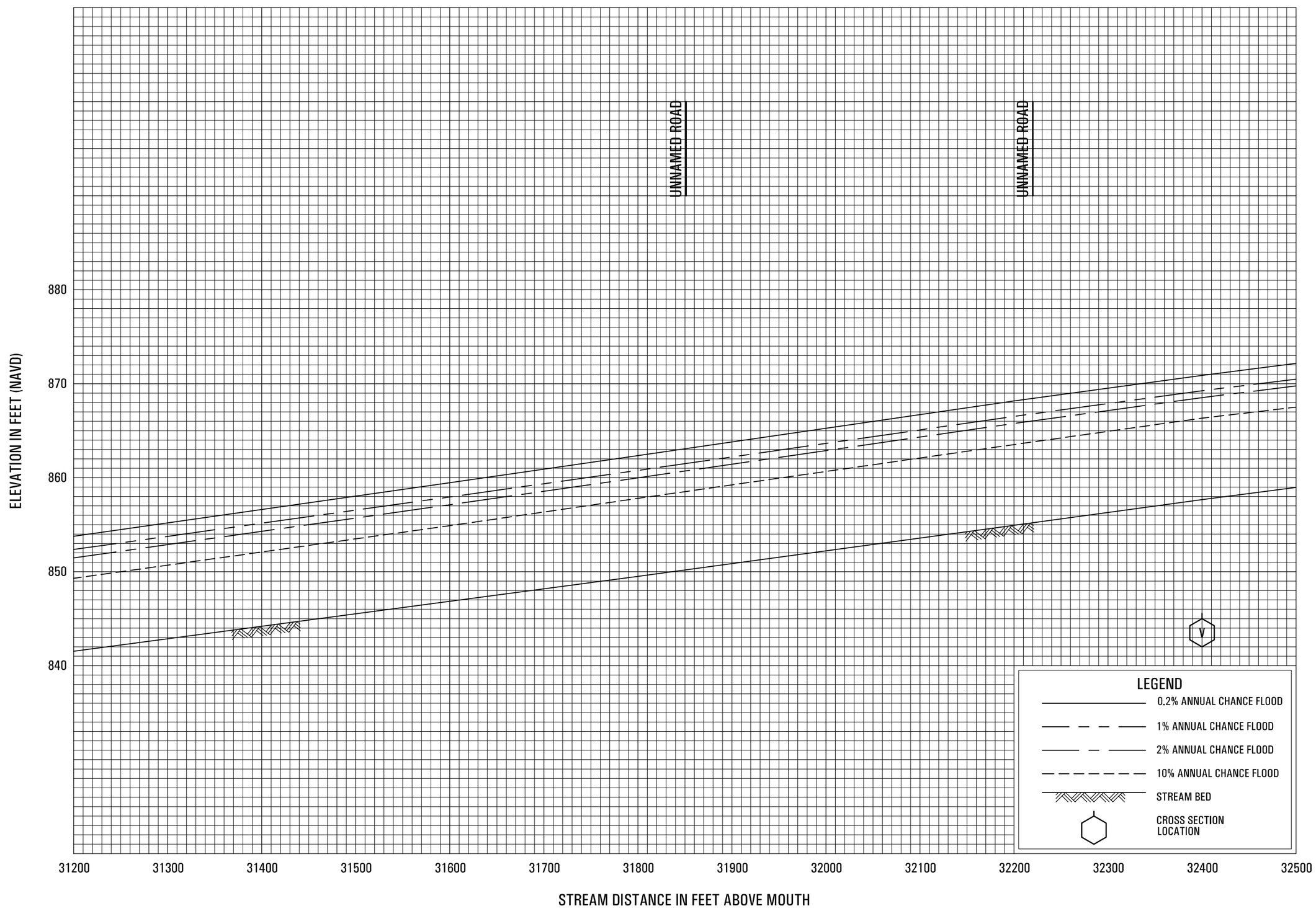


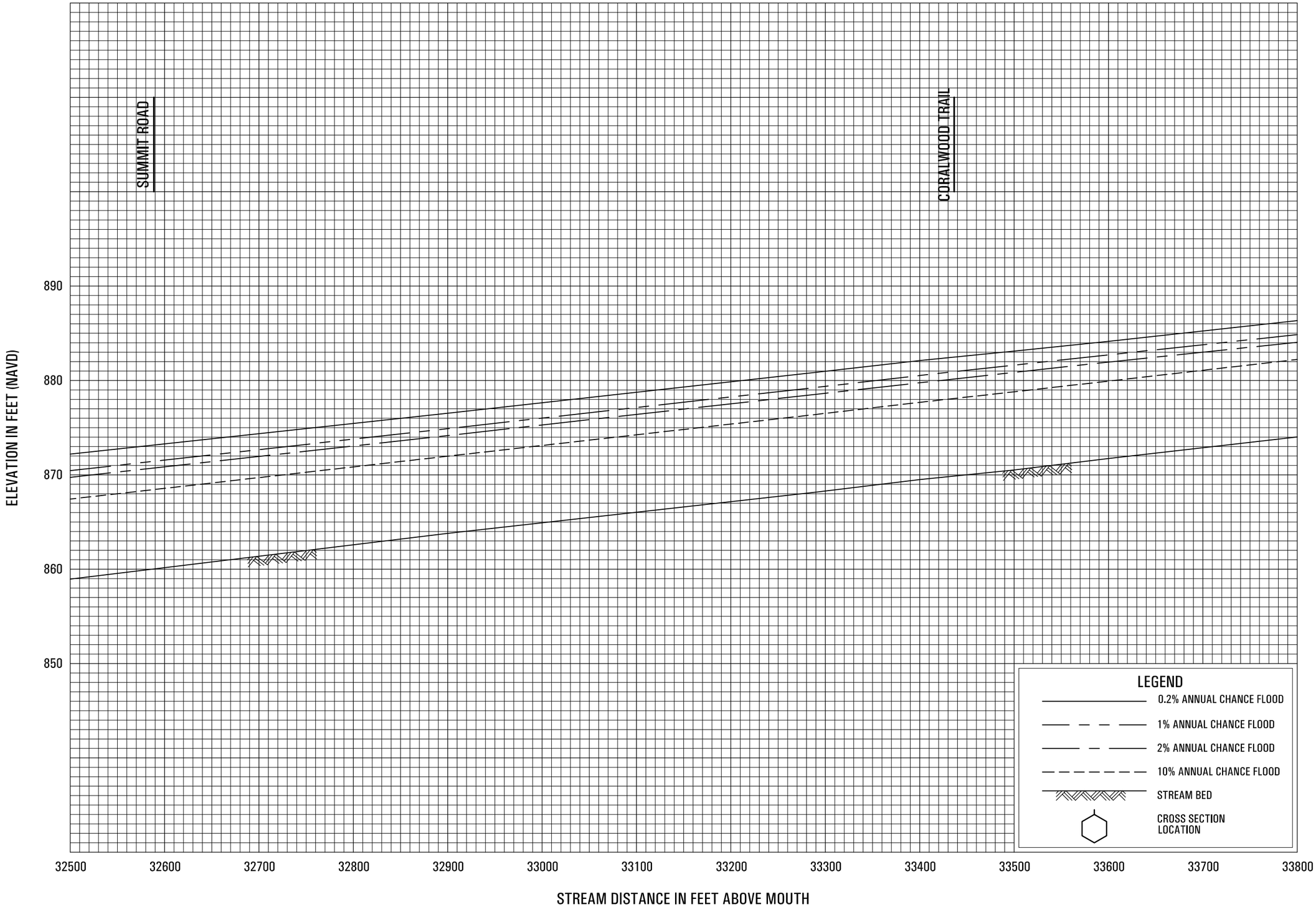
FLOOD PROFILES

TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



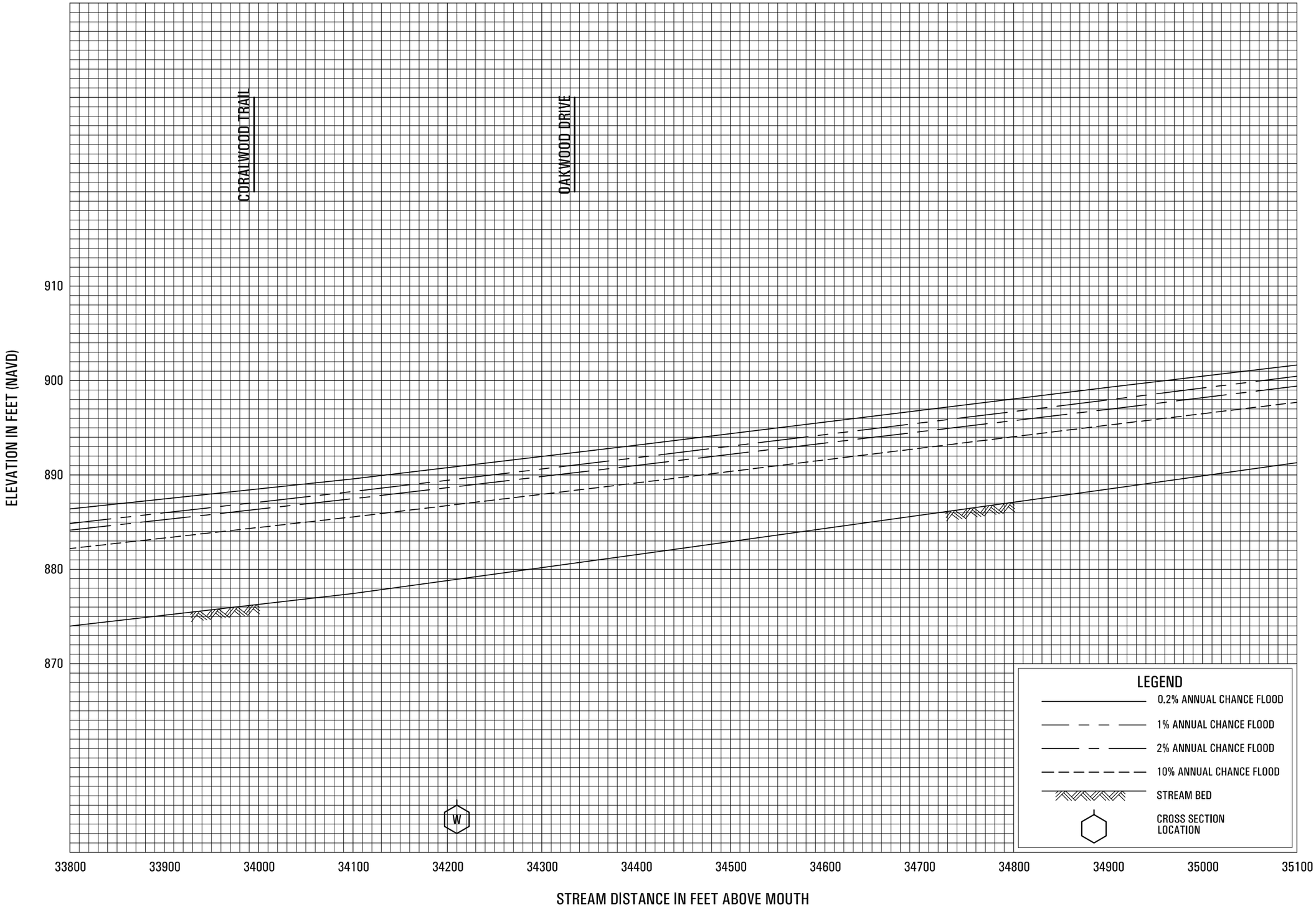
FLOOD PROFILES

TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



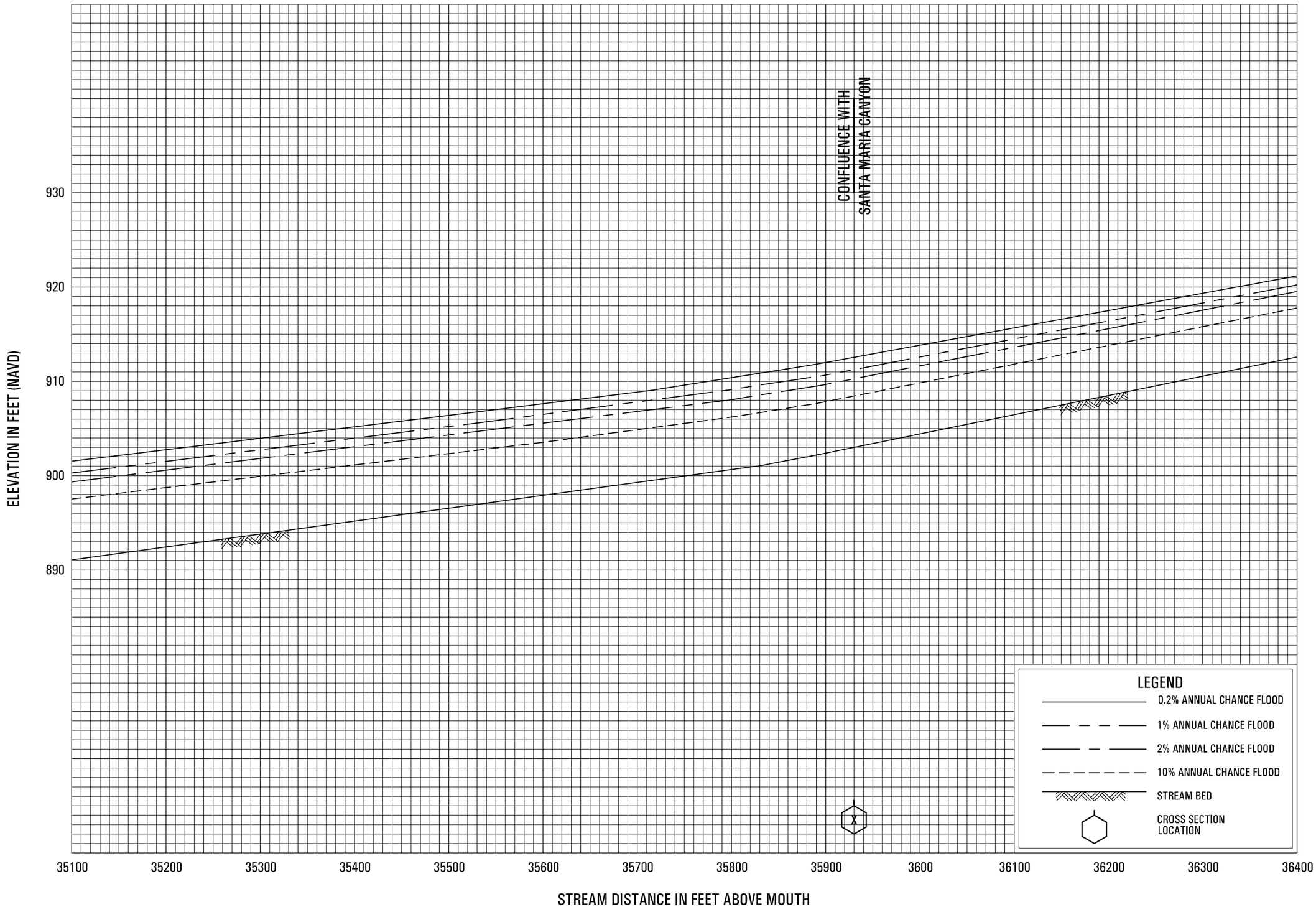
FLOOD PROFILES

TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

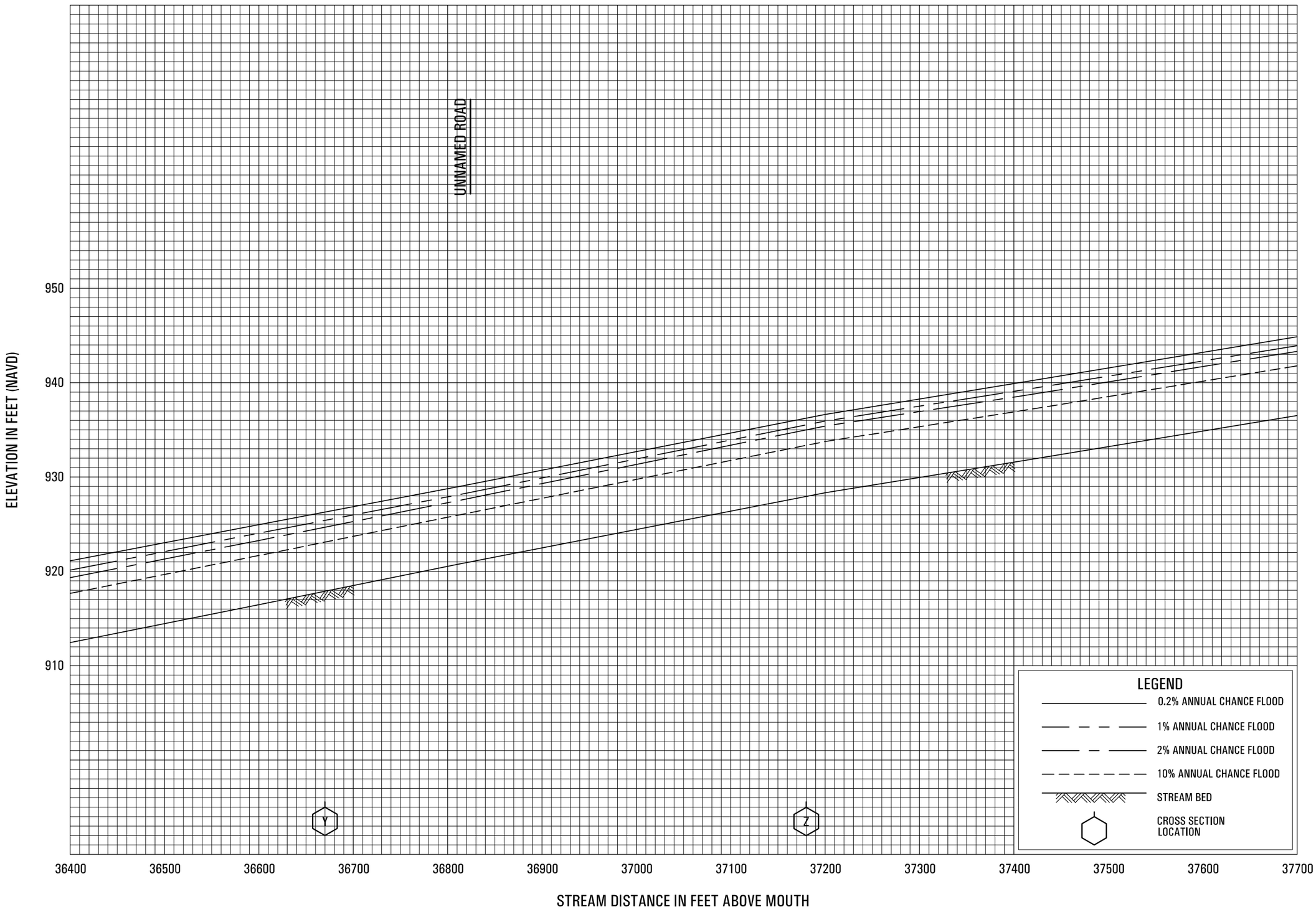
TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

188P



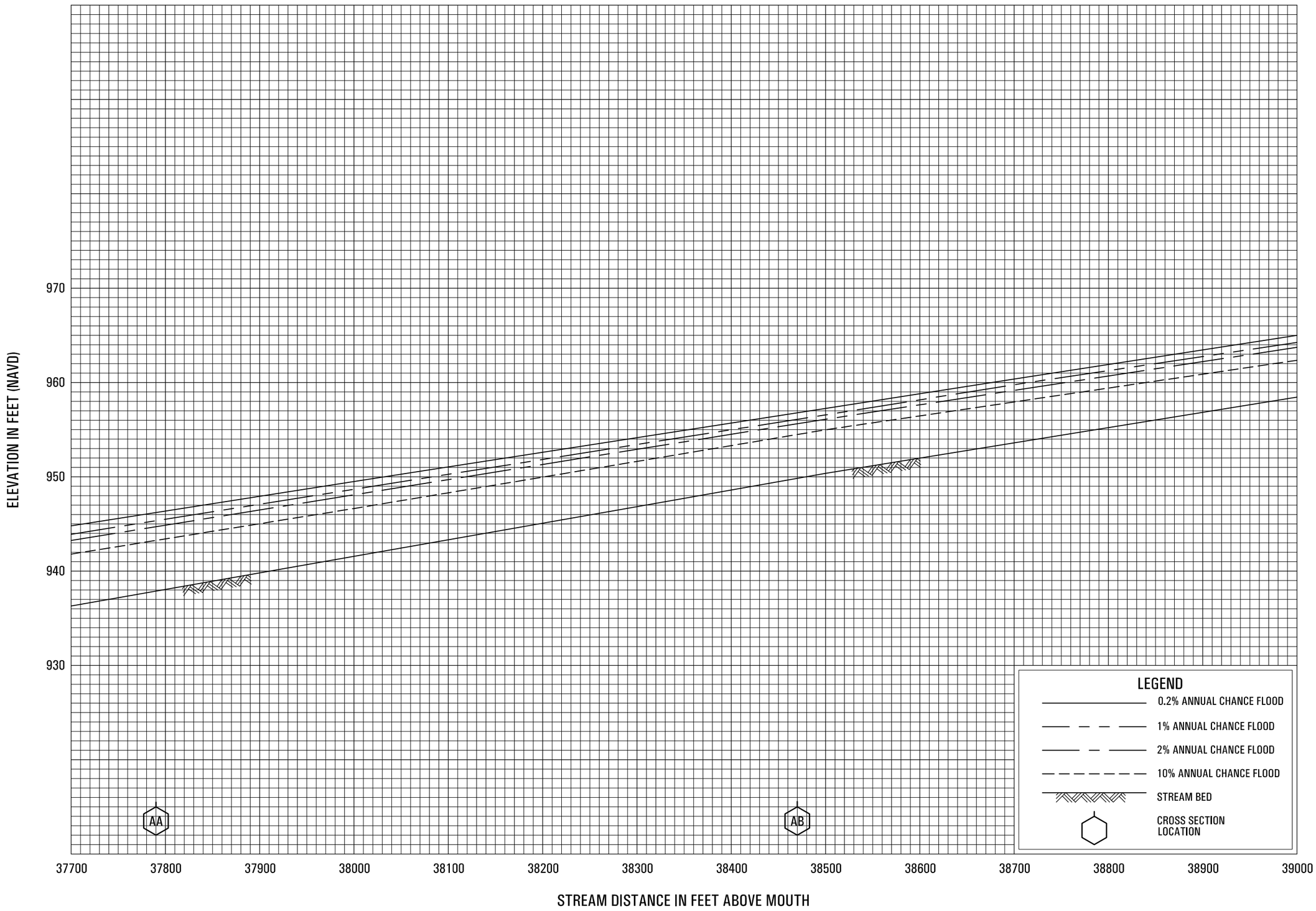
FLOOD PROFILES

TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



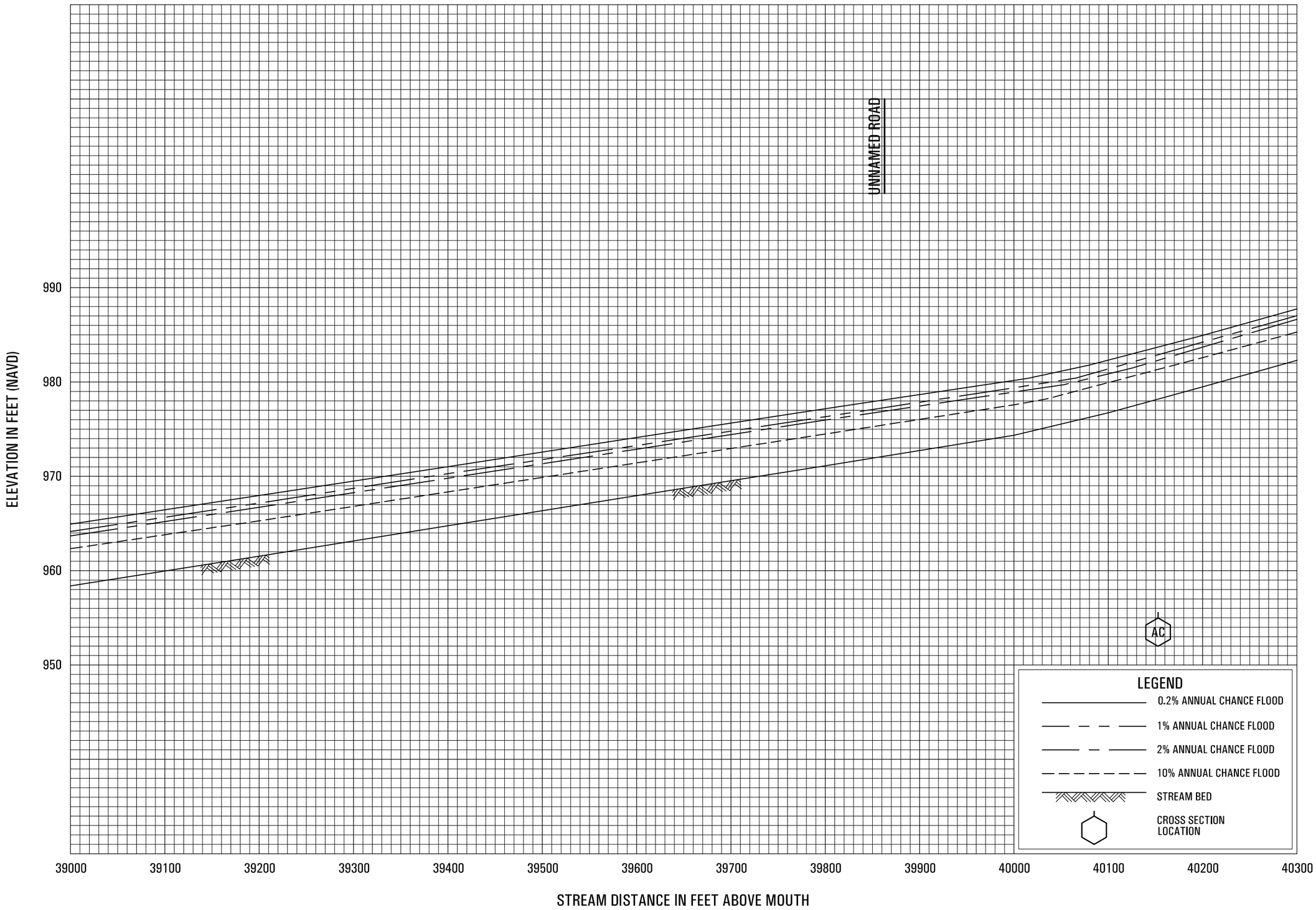
FLOOD PROFILES

TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



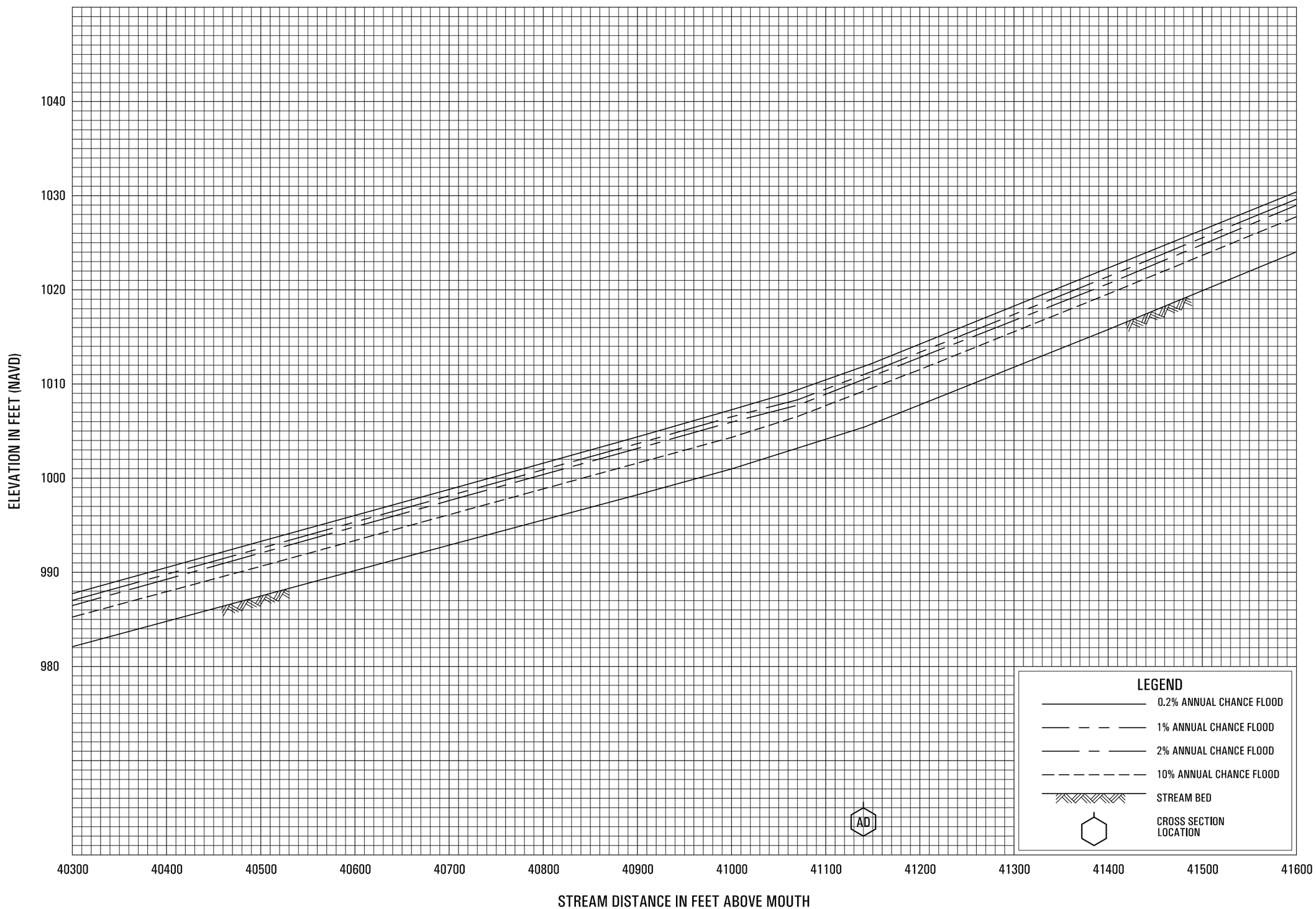
FLOOD PROFILES

TOPANGA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

TOPANGA CANYON

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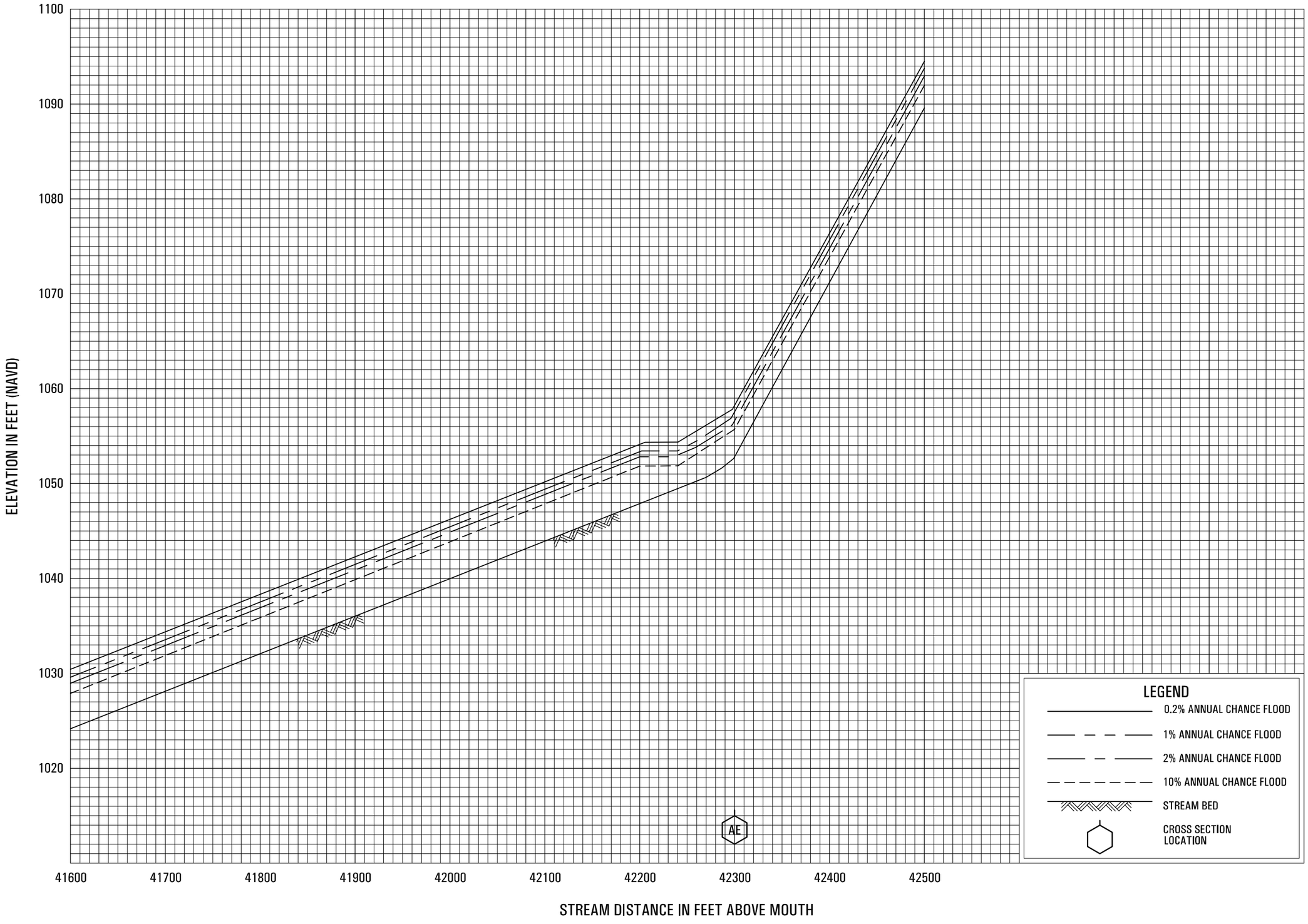

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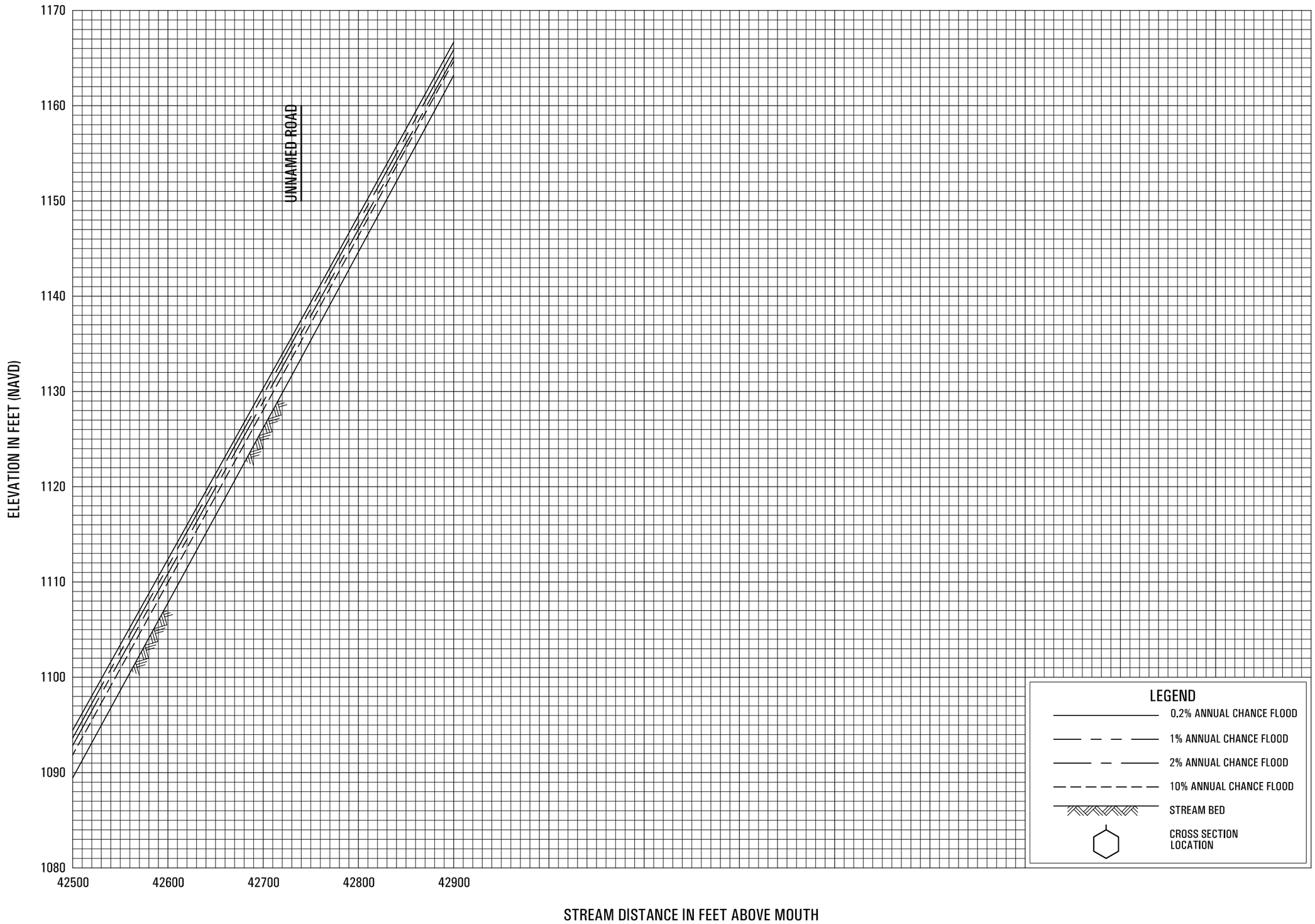

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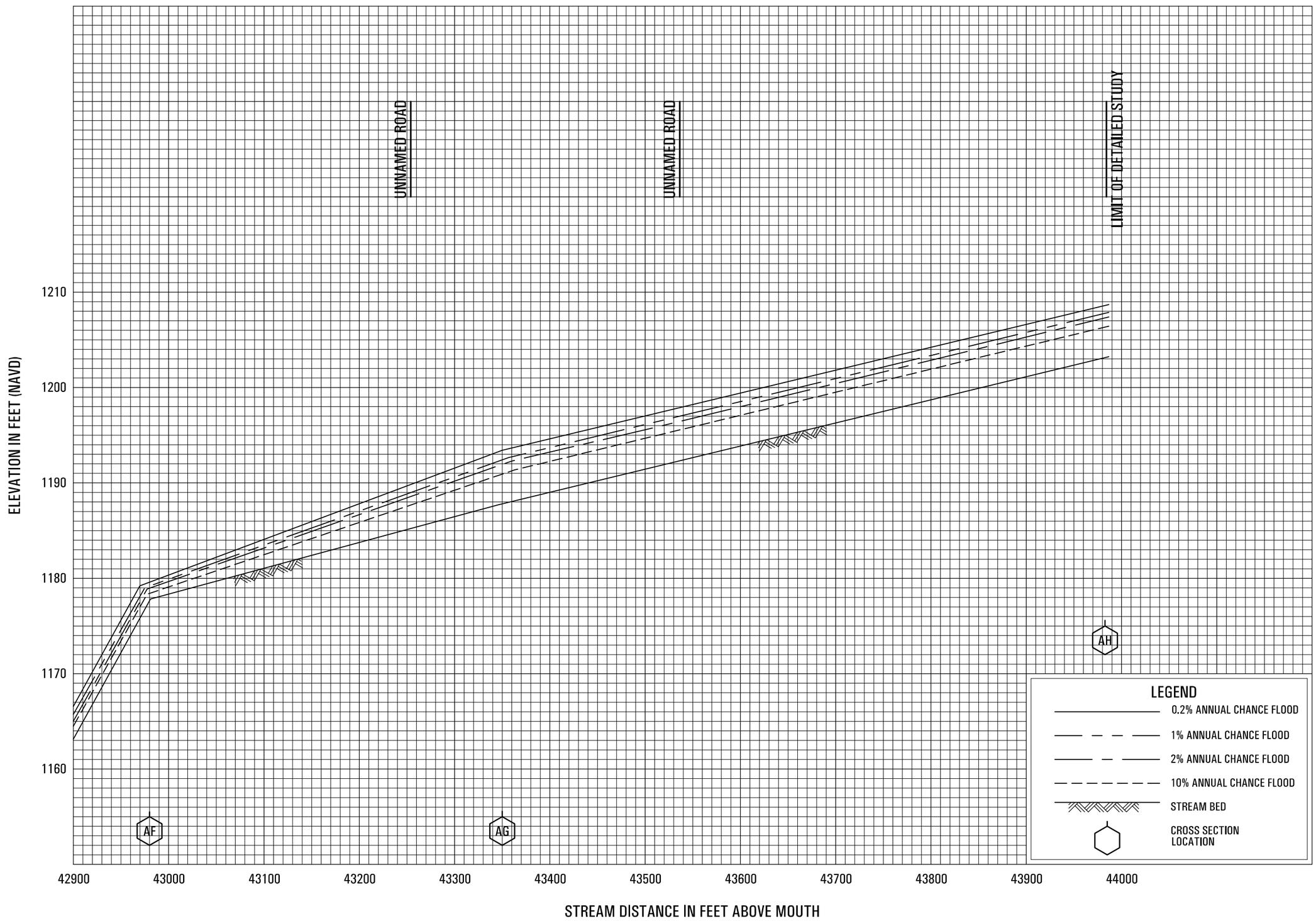

FLOOD PROFILES

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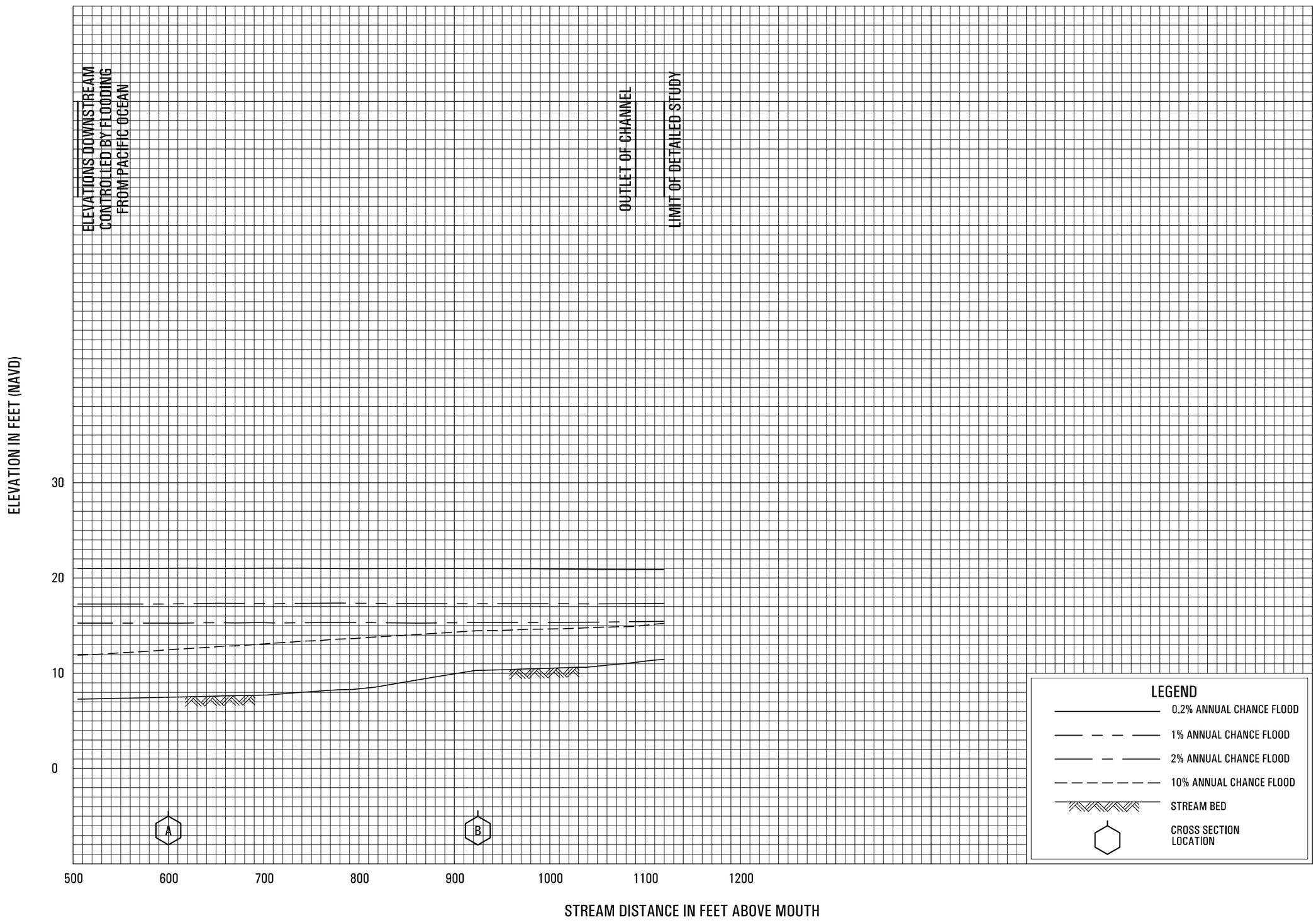

FLOOD PROFILES

TRANCAS CREEK

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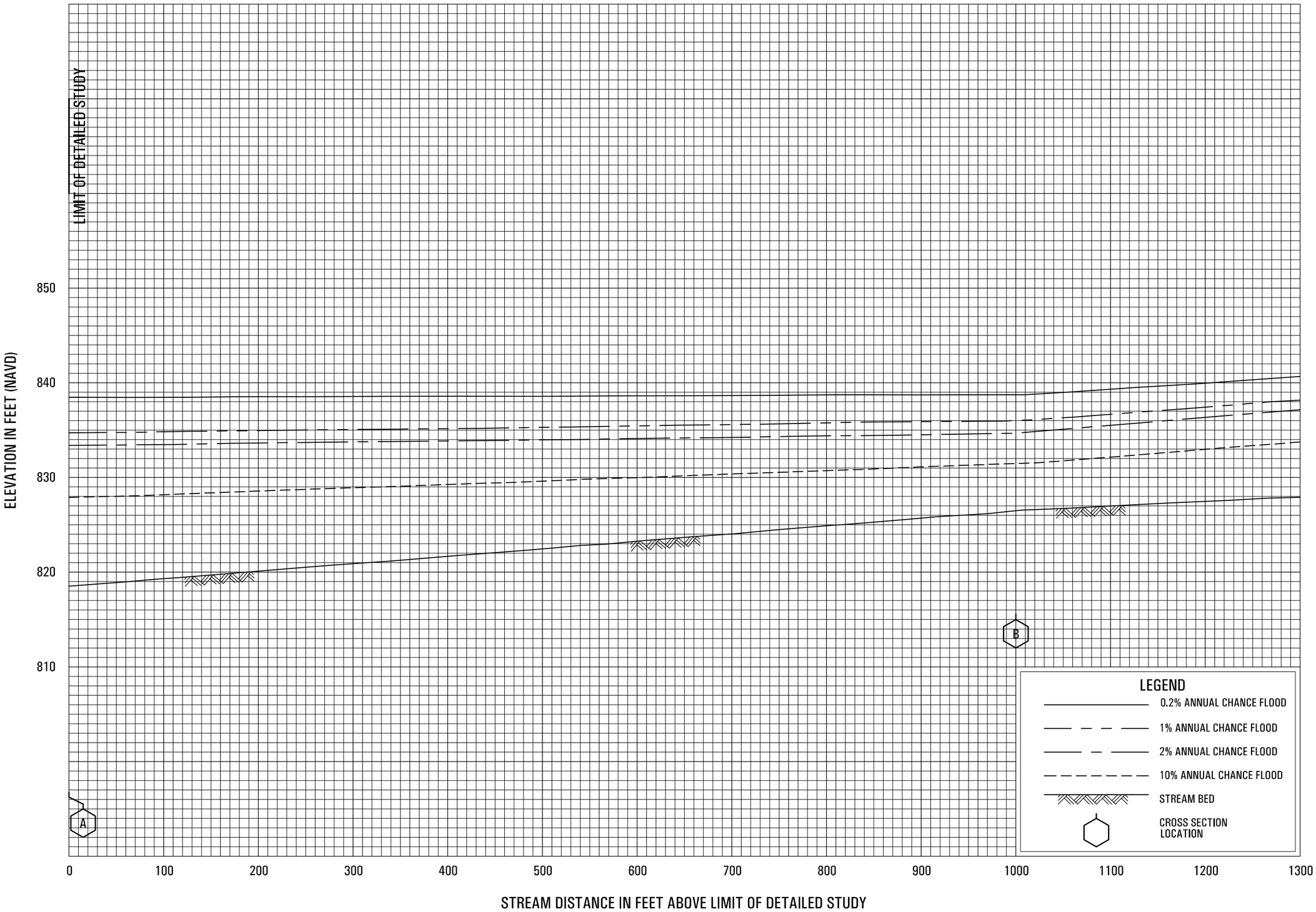
LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



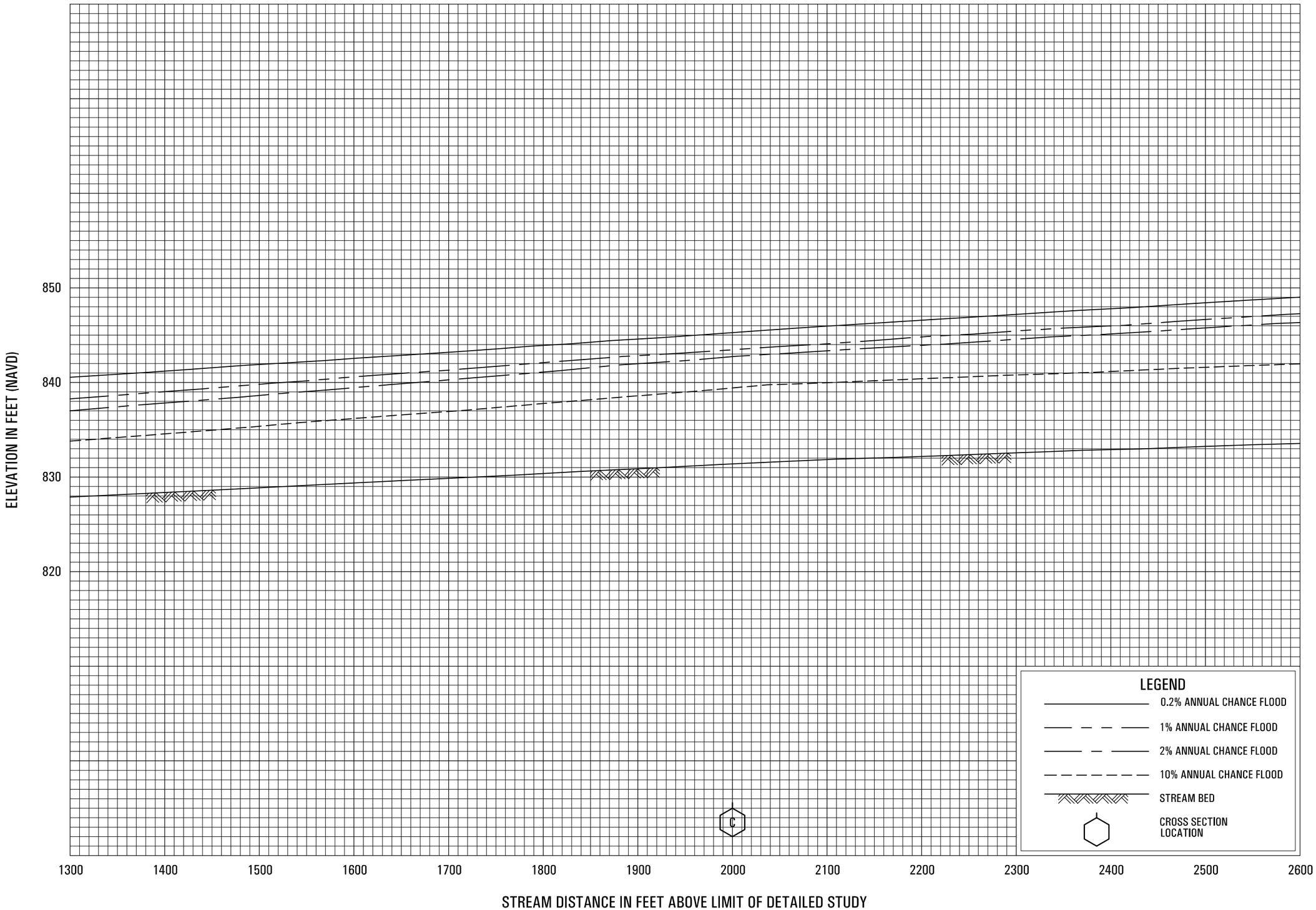
FLOOD PROFILES

TRIUNFO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

TRIUNFO CREEK

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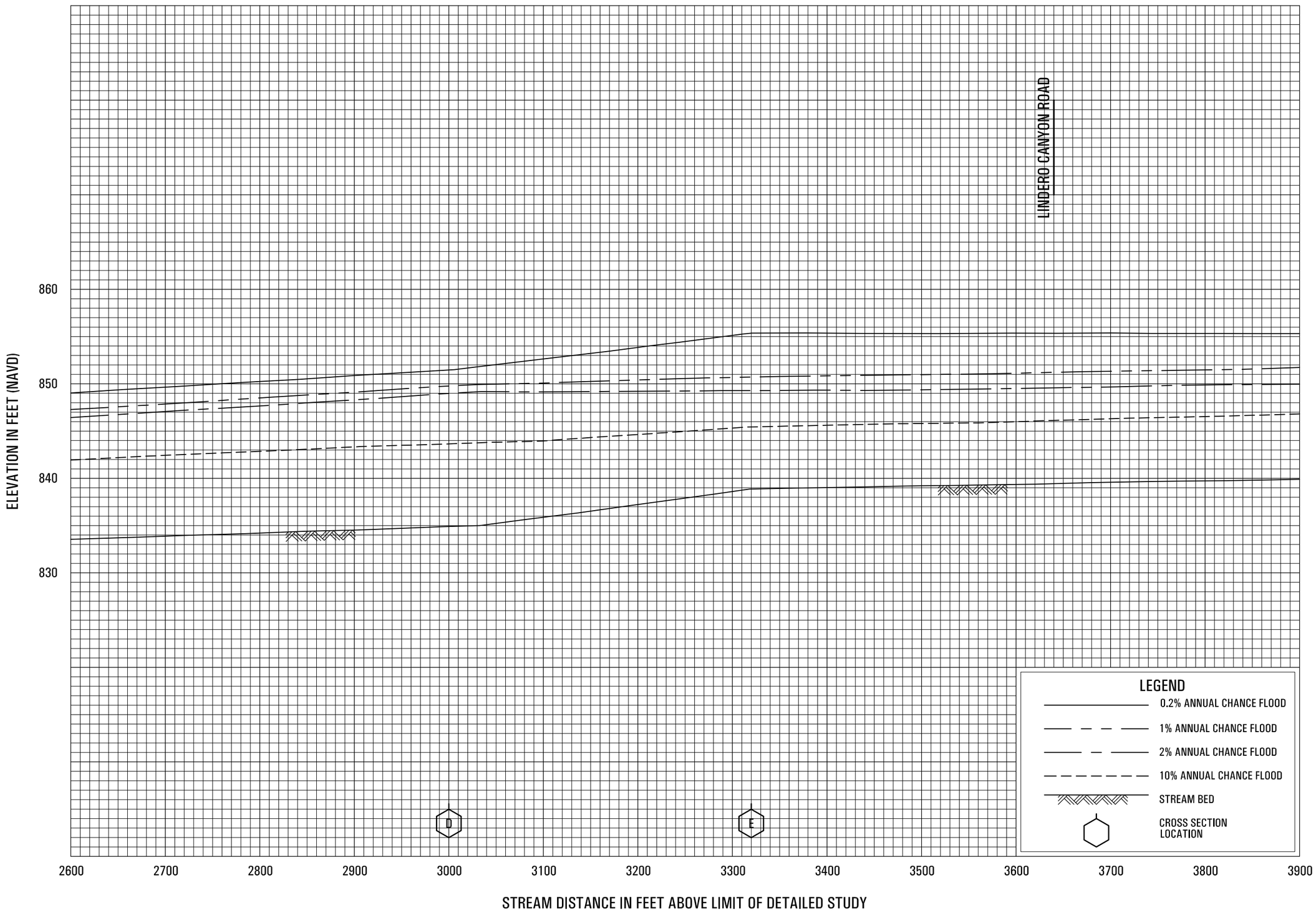
LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

TRIUNFO CREEK

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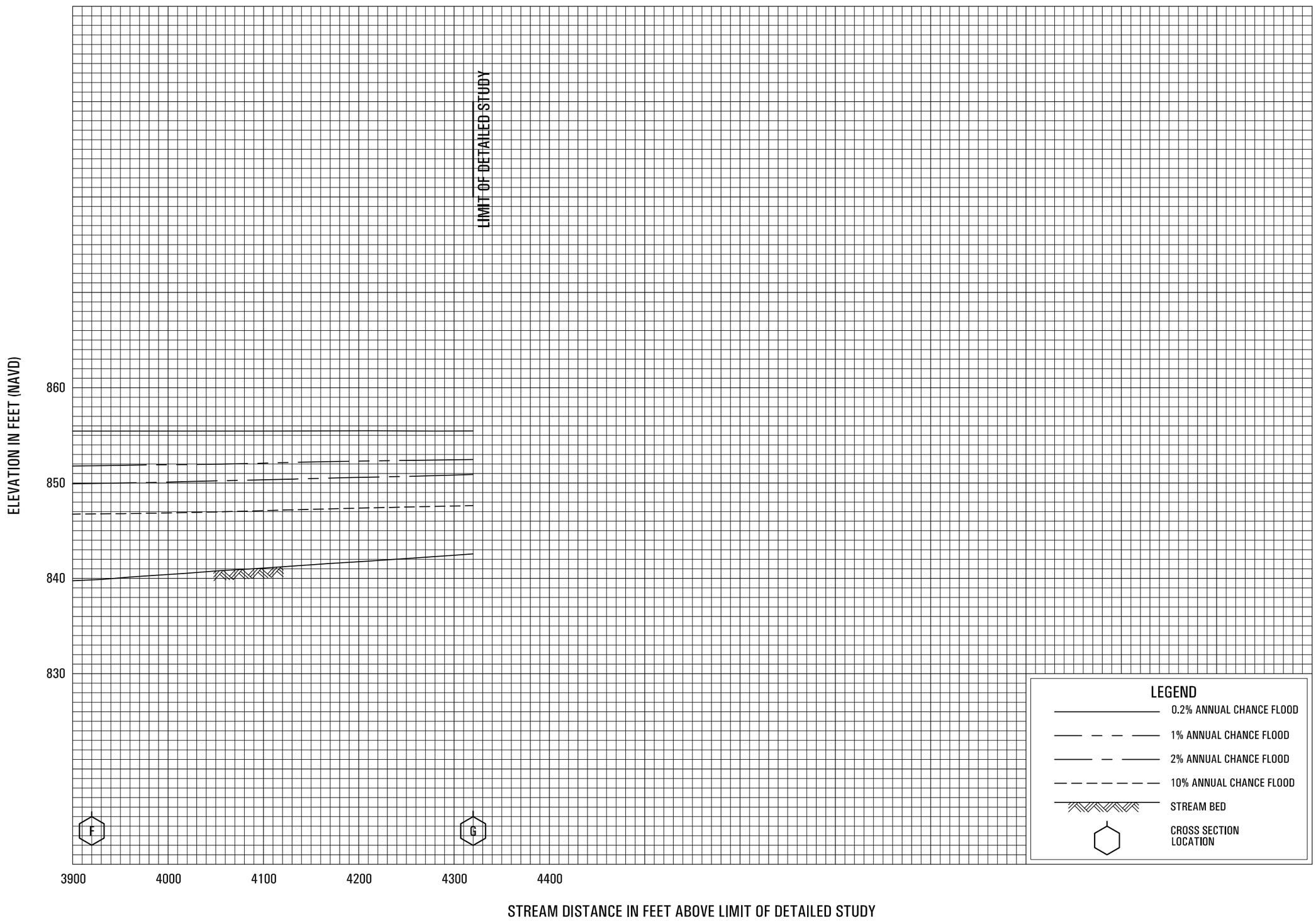
LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



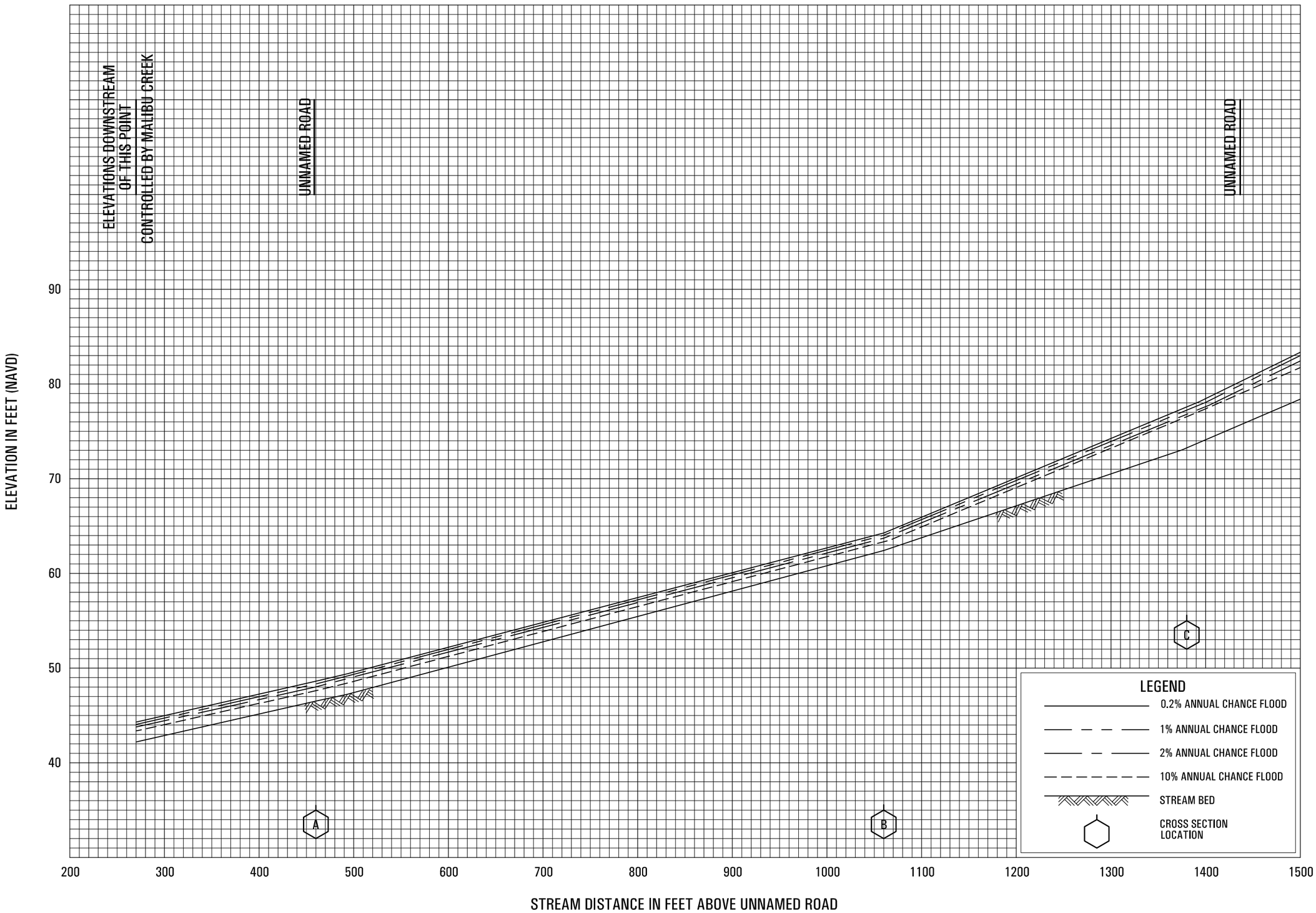
FLOOD PROFILES

TRIUNFO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



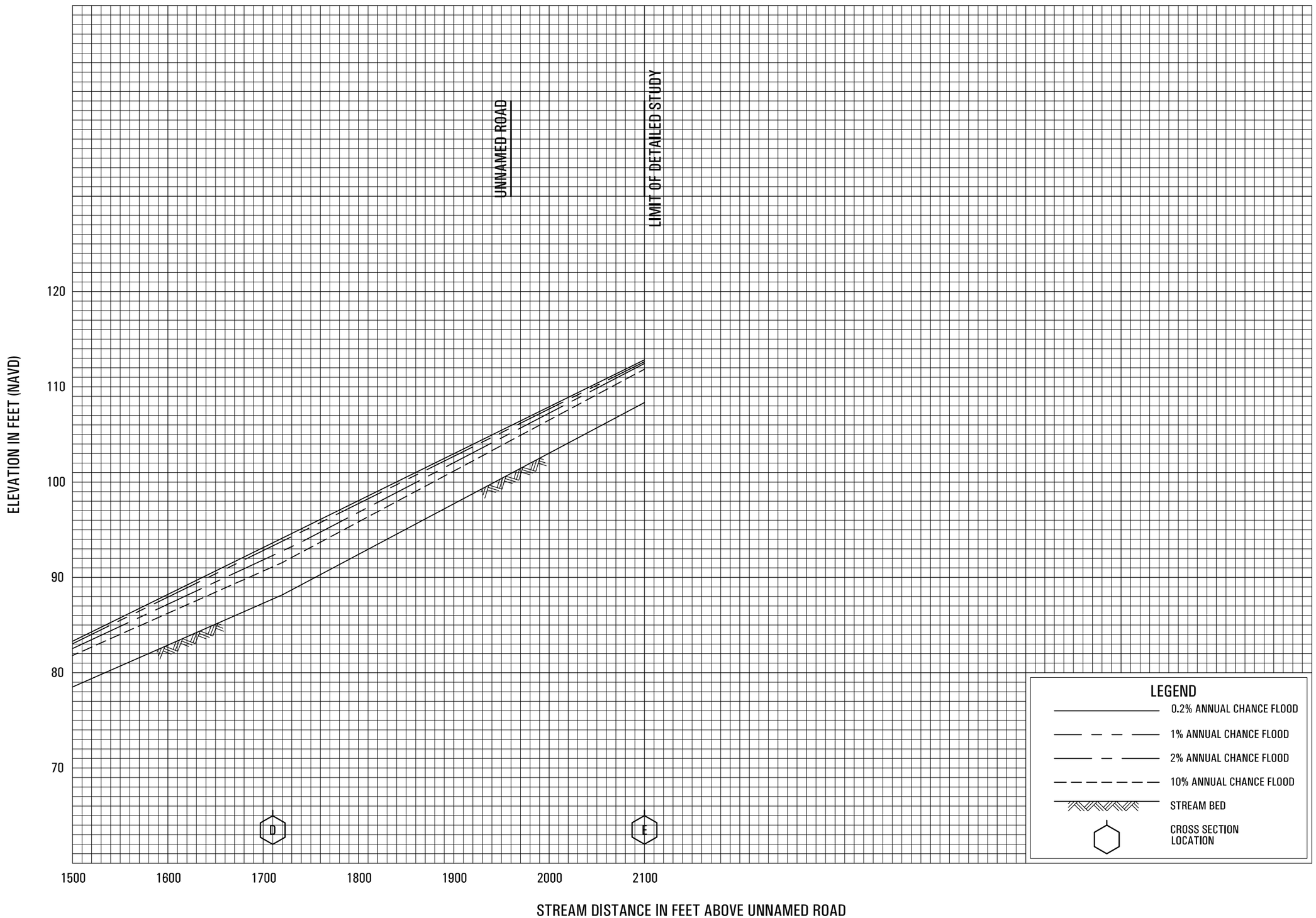
FLOOD PROFILES

UNNAMED CANYON (SERRA RETREAT AREA)

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

UNNAMED CANYON (SERRA RETREAT AREA)

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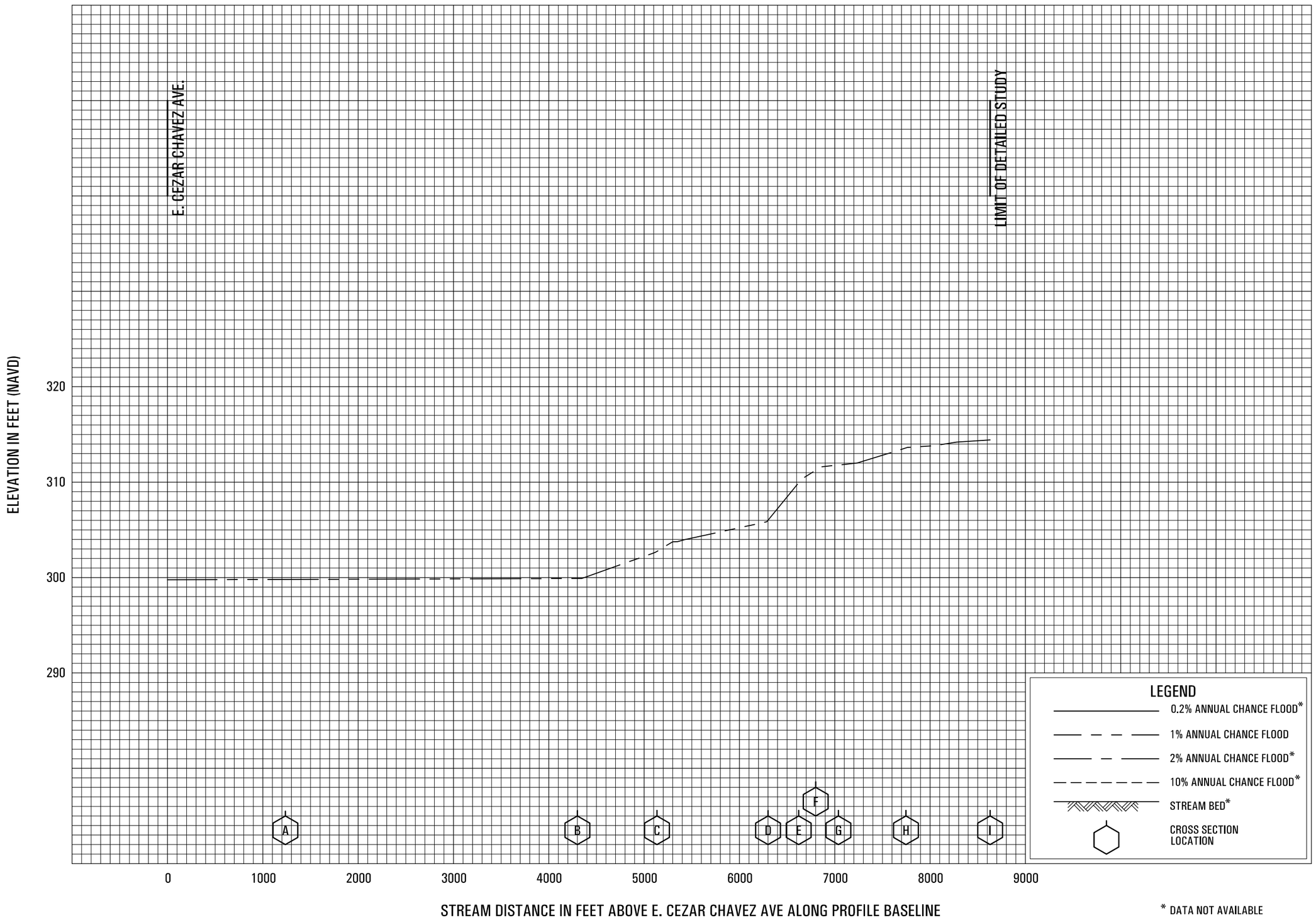
LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



* DATA NOT AVAILABLE

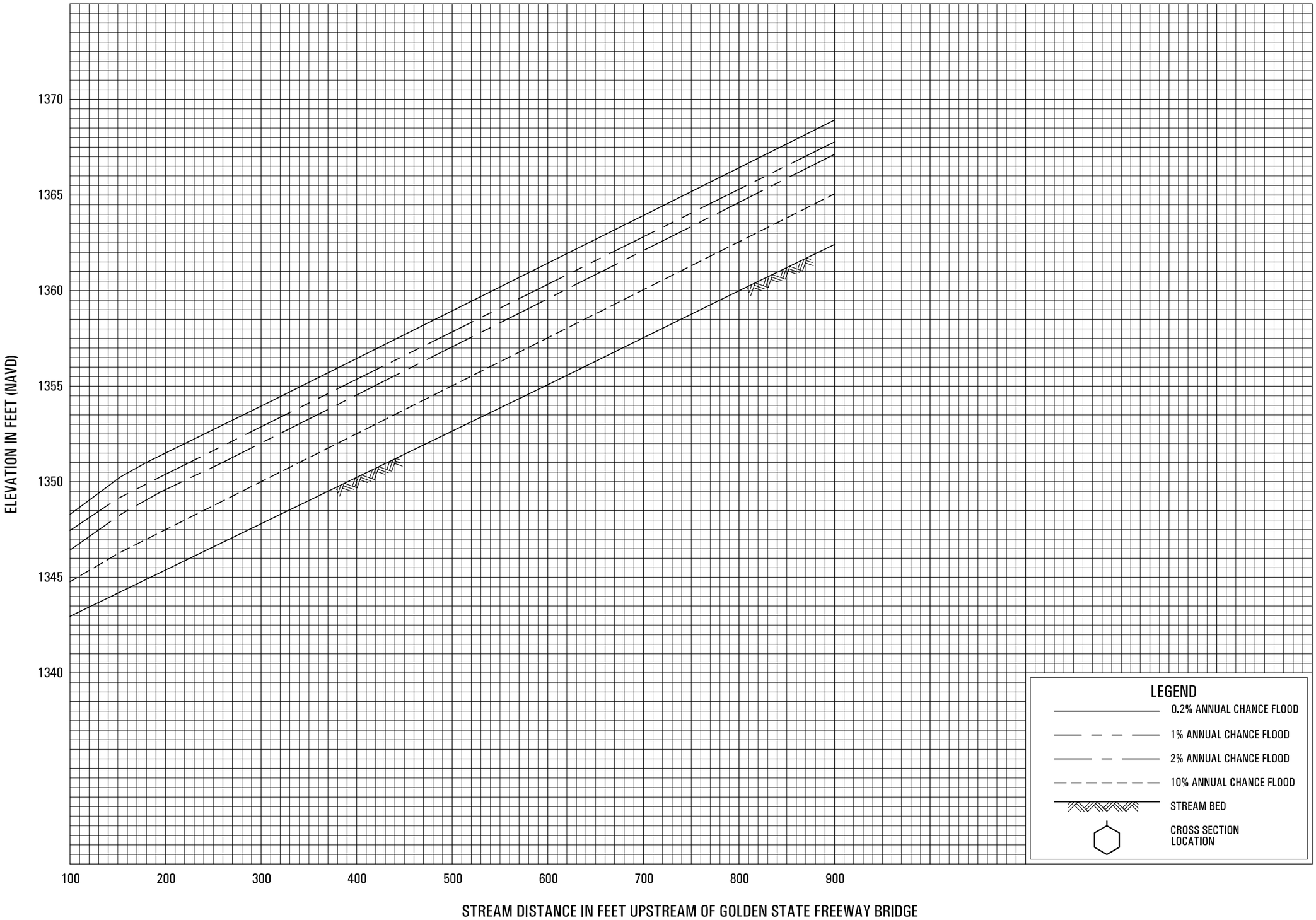
FLOOD PROFILES

UPPER LOS ANGELES RIVER LEFT OVERBANK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



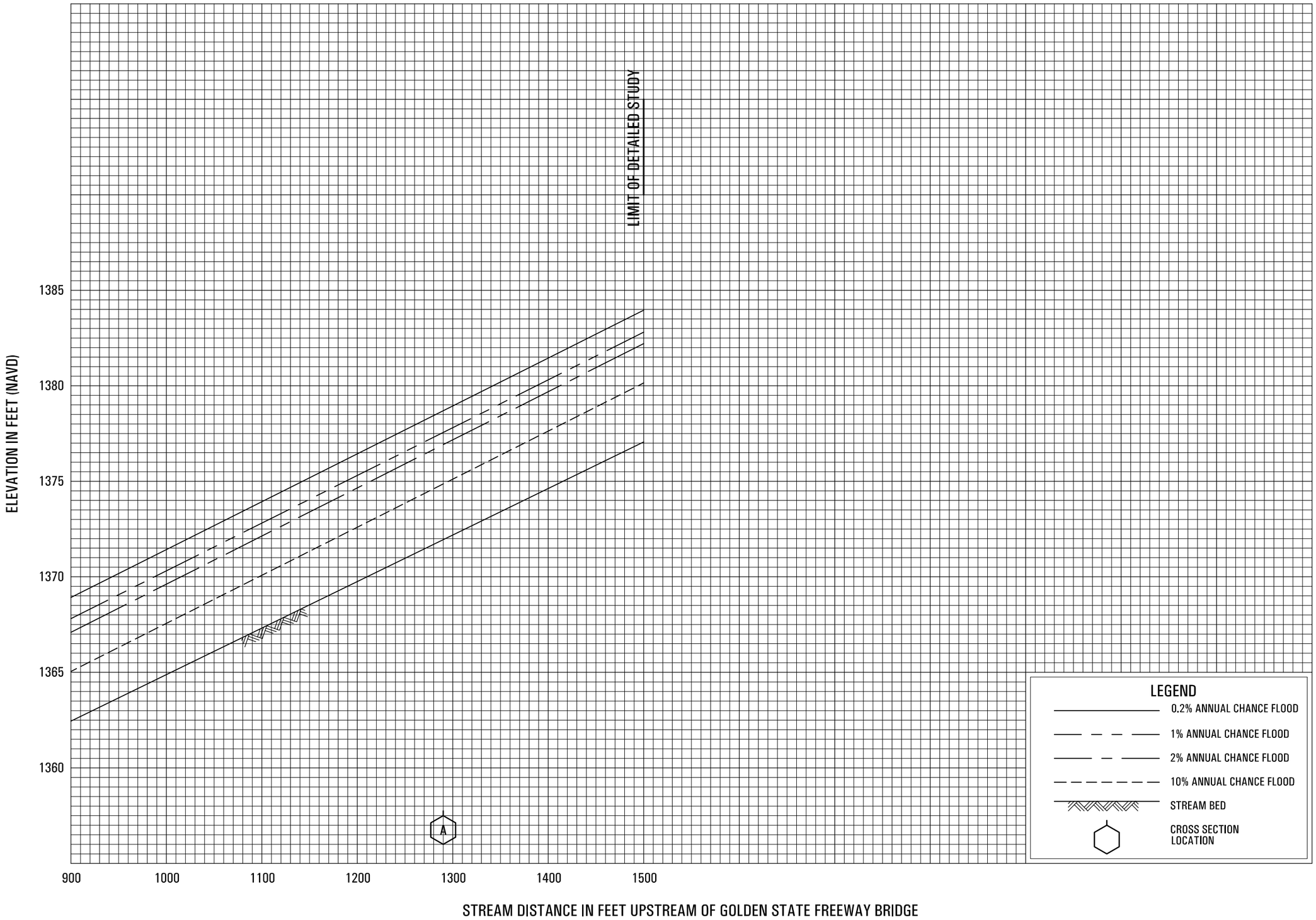
FLOOD PROFILES

WELDON CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



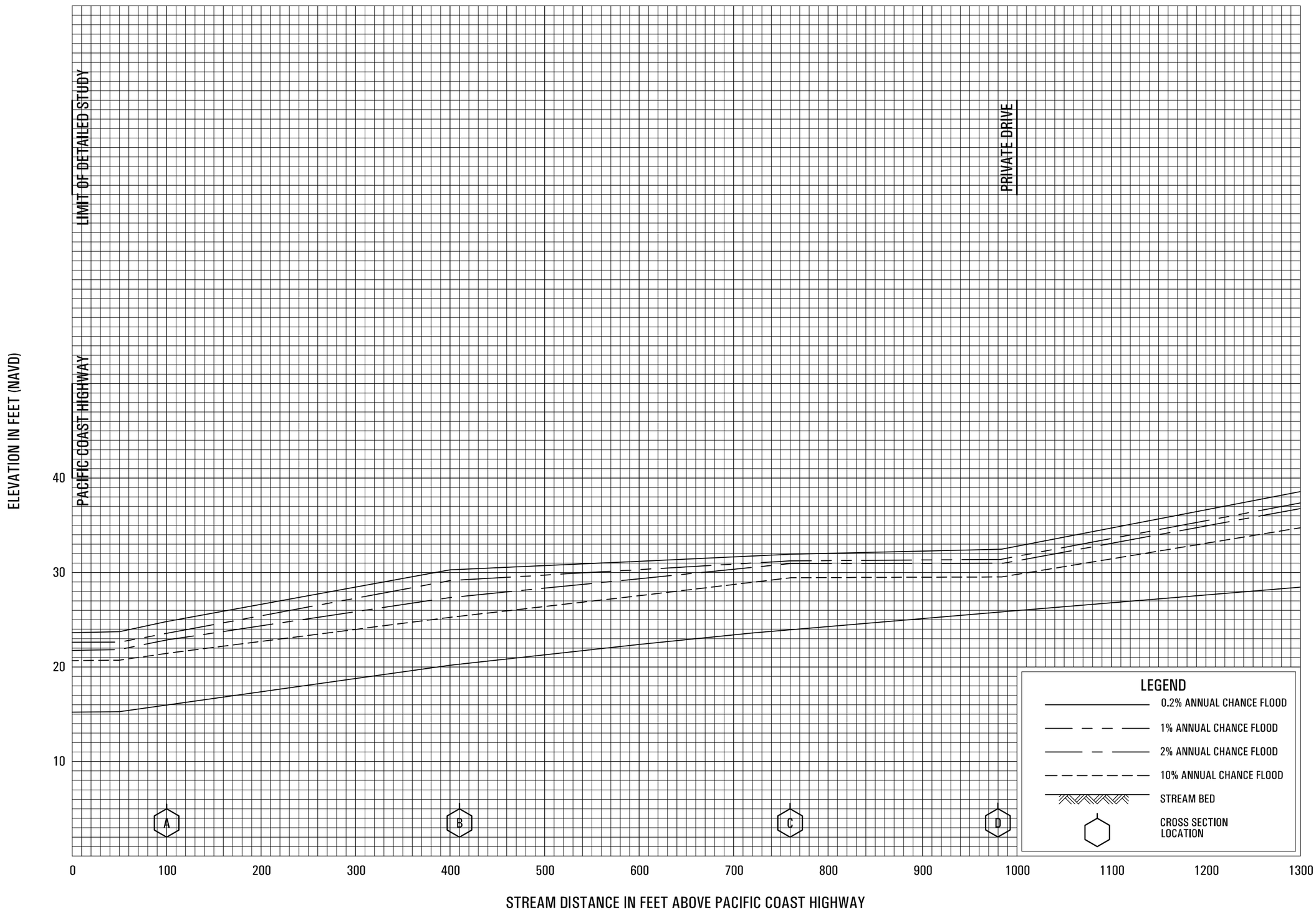
FLOOD PROFILES

WELDON CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



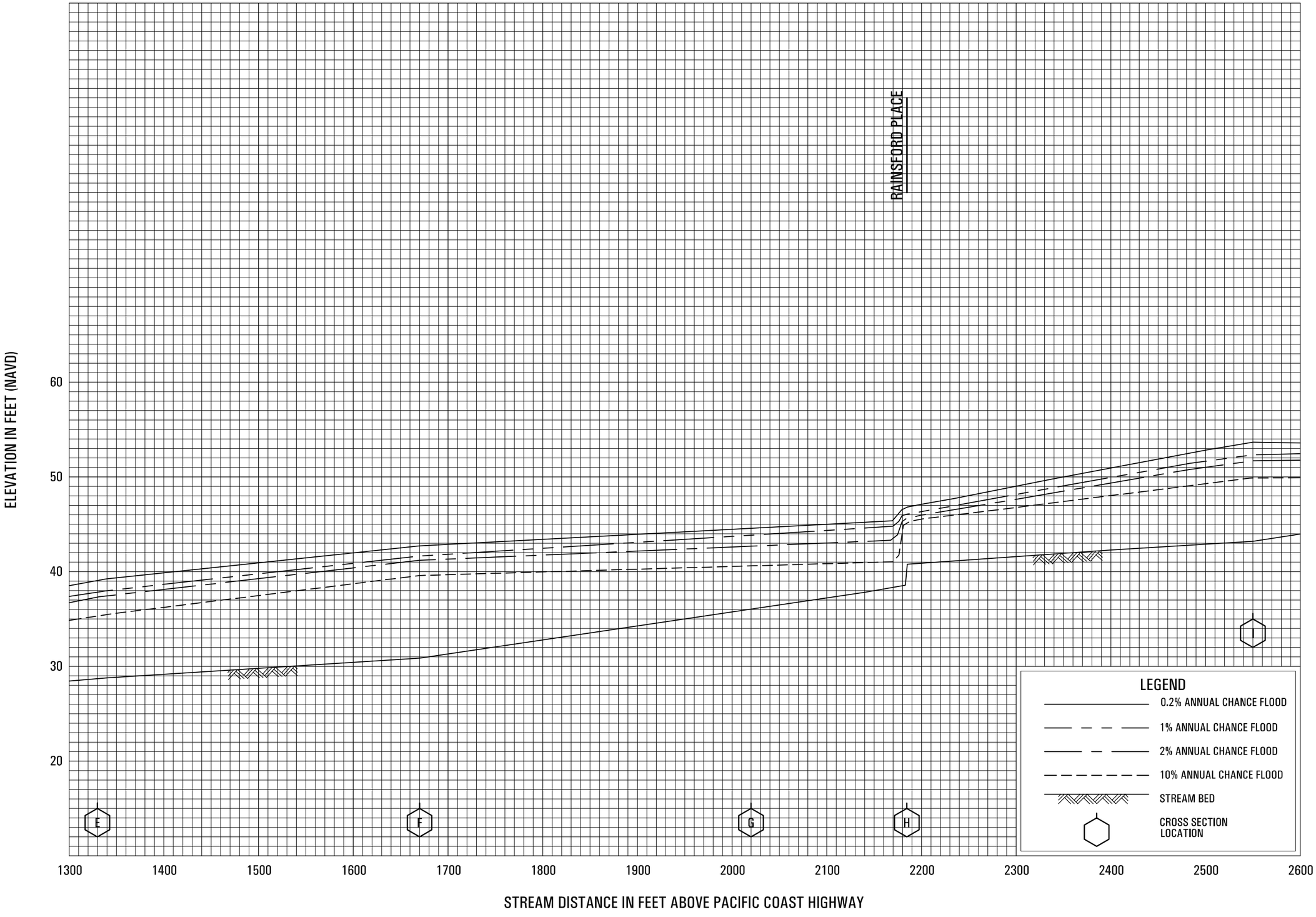
FLOOD PROFILES

ZUMA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

ZUMA CANYON

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LOS ANGELES COUNTY, CA

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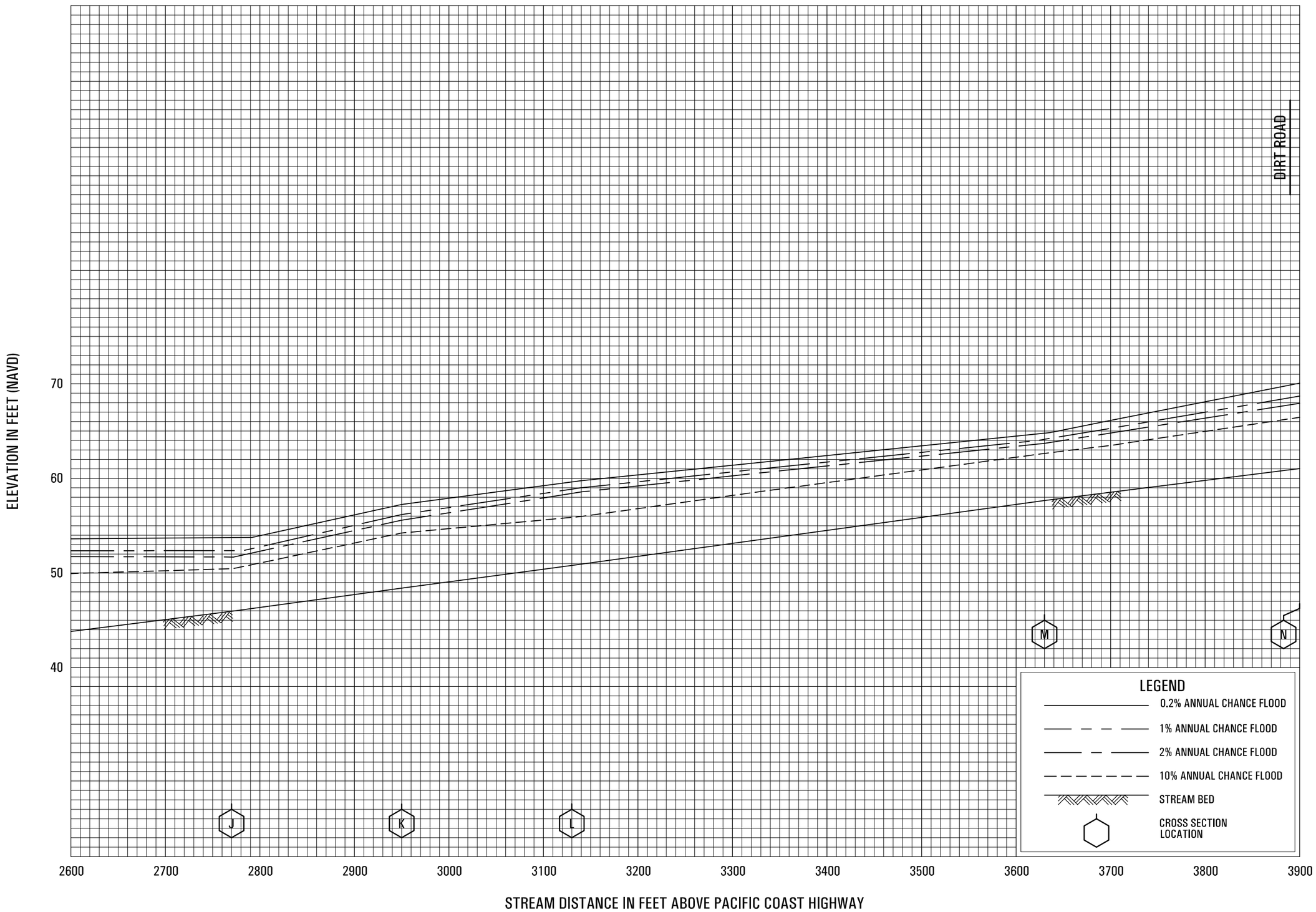

FLOOD PROFILES

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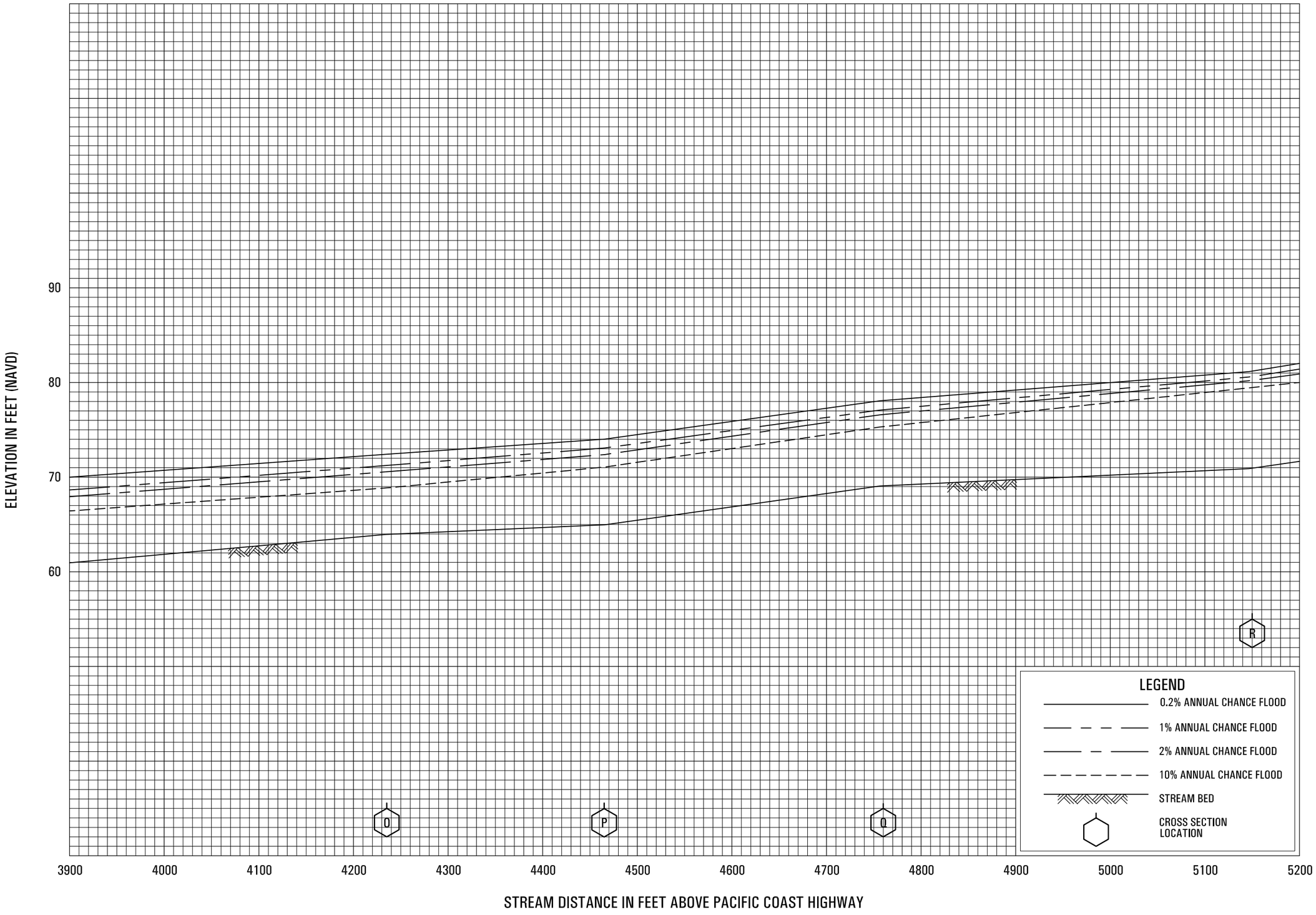
LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS



FLOOD PROFILES

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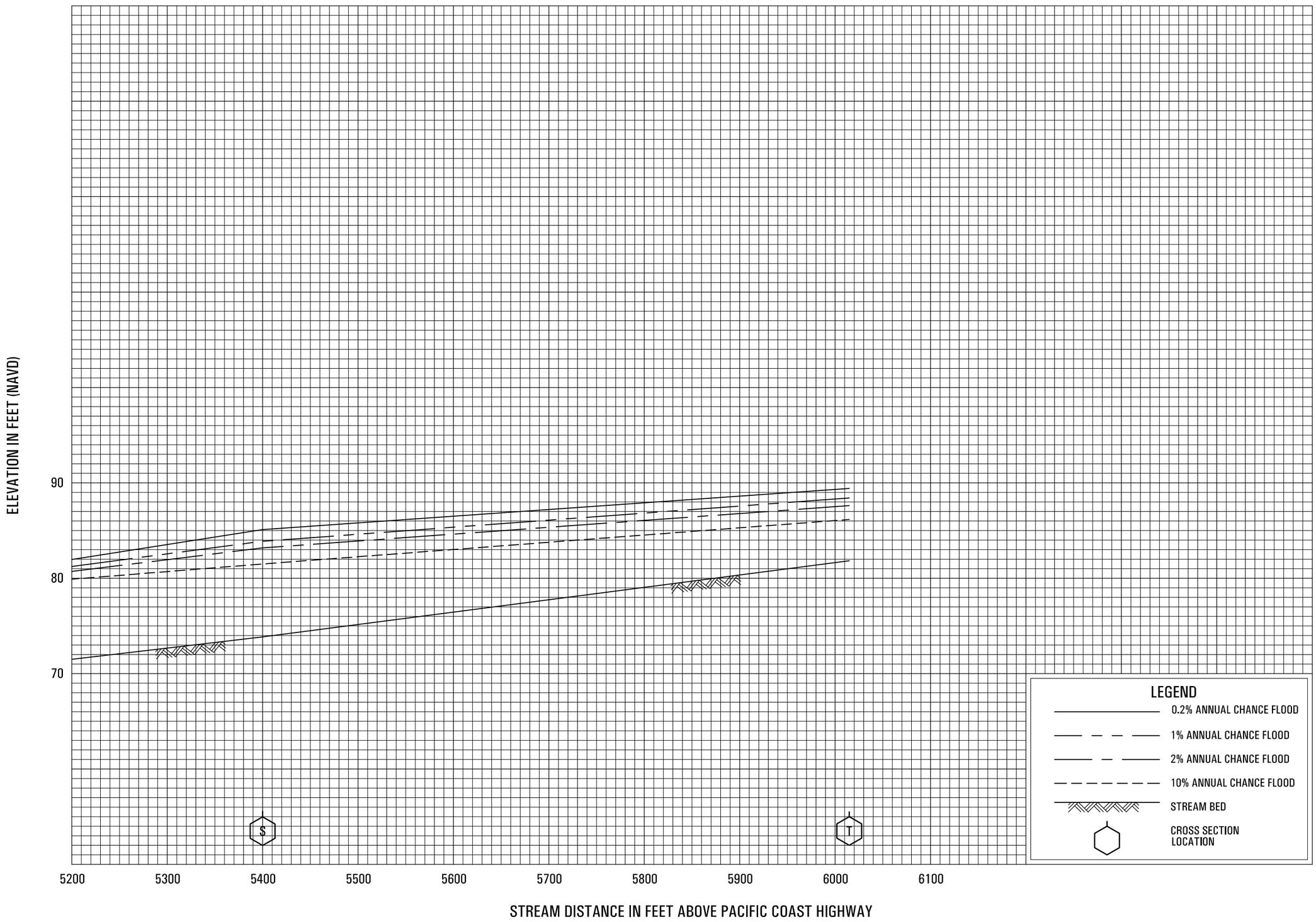

FLOOD PROFILES

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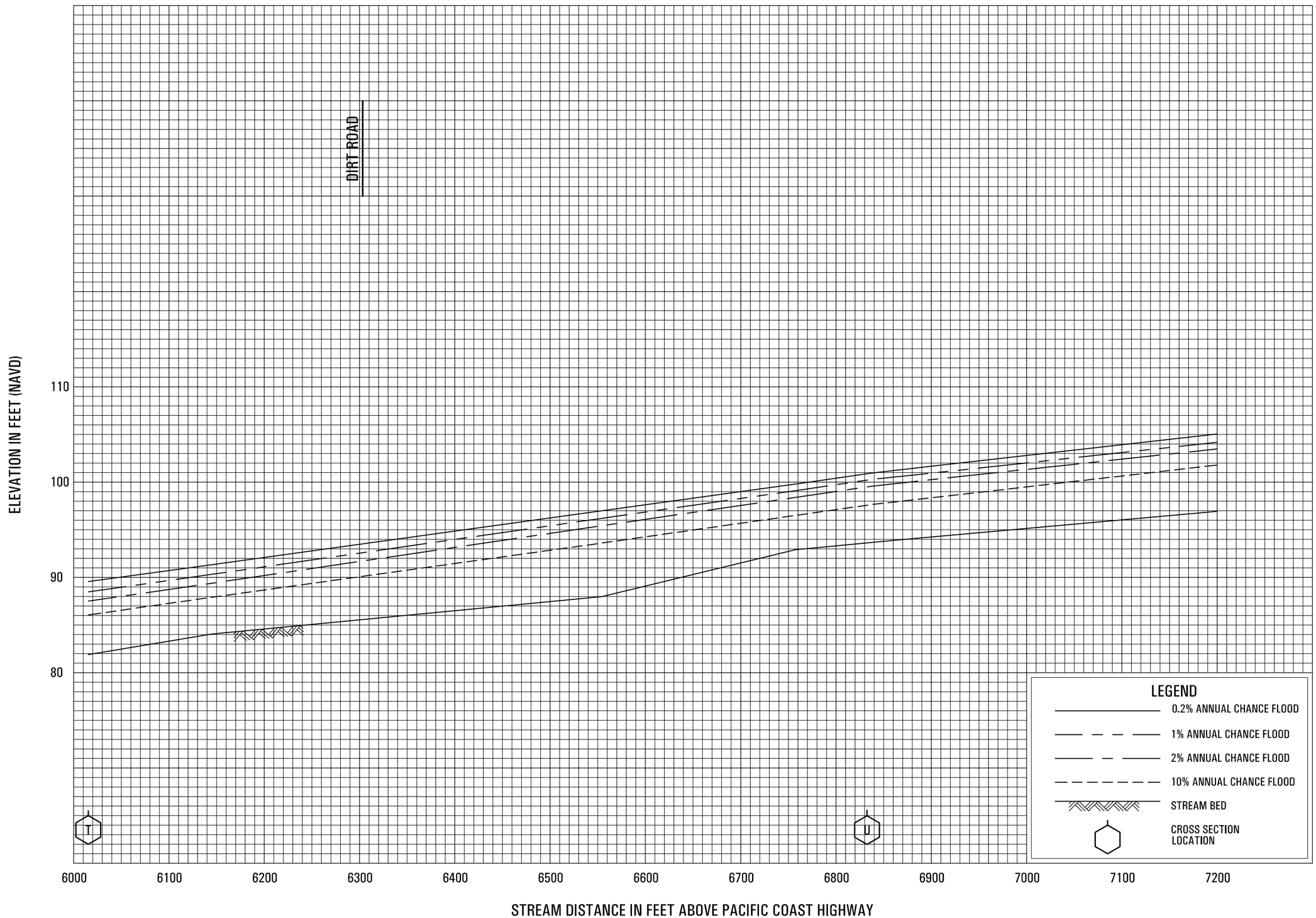

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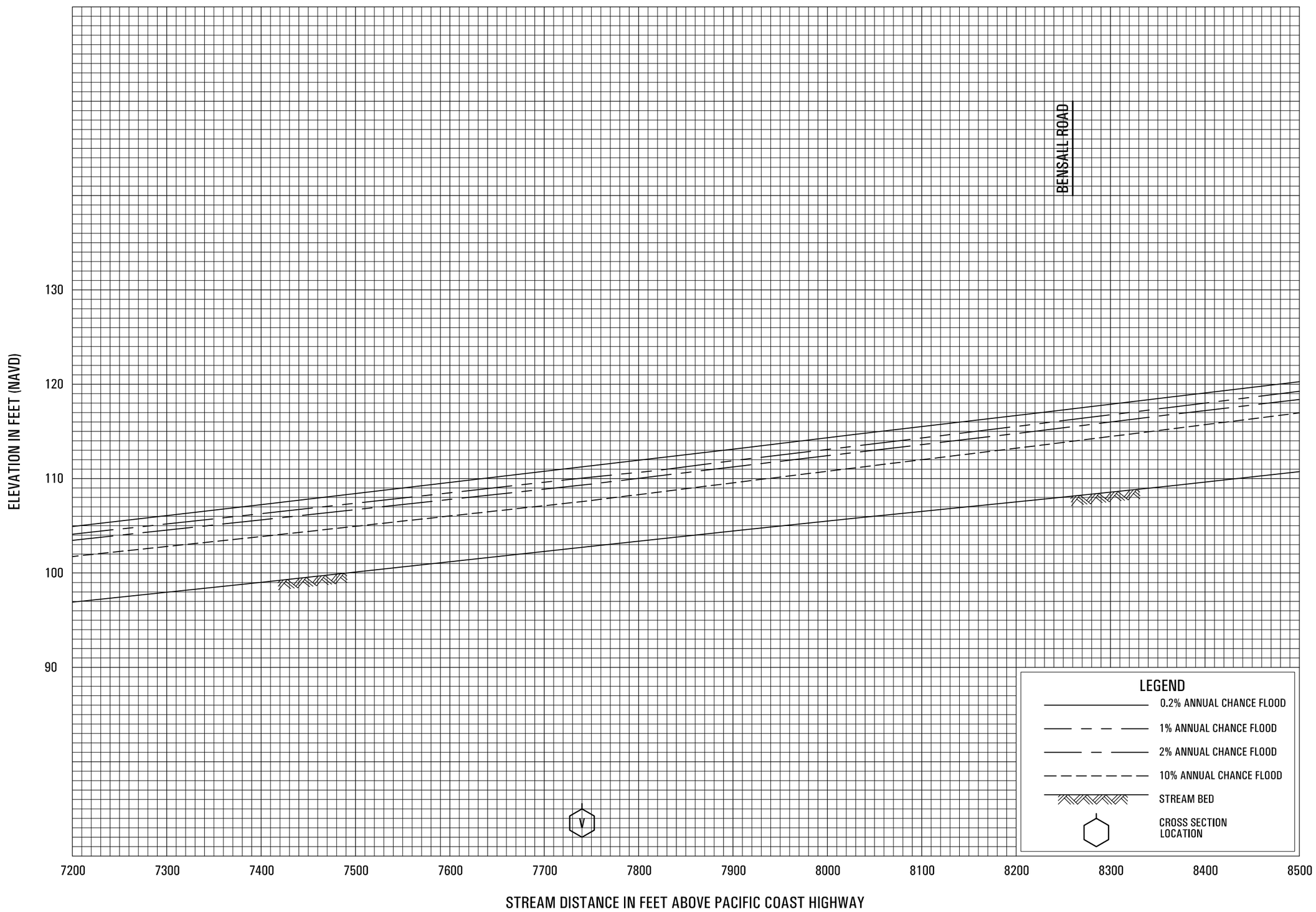

FLOOD PROFILES

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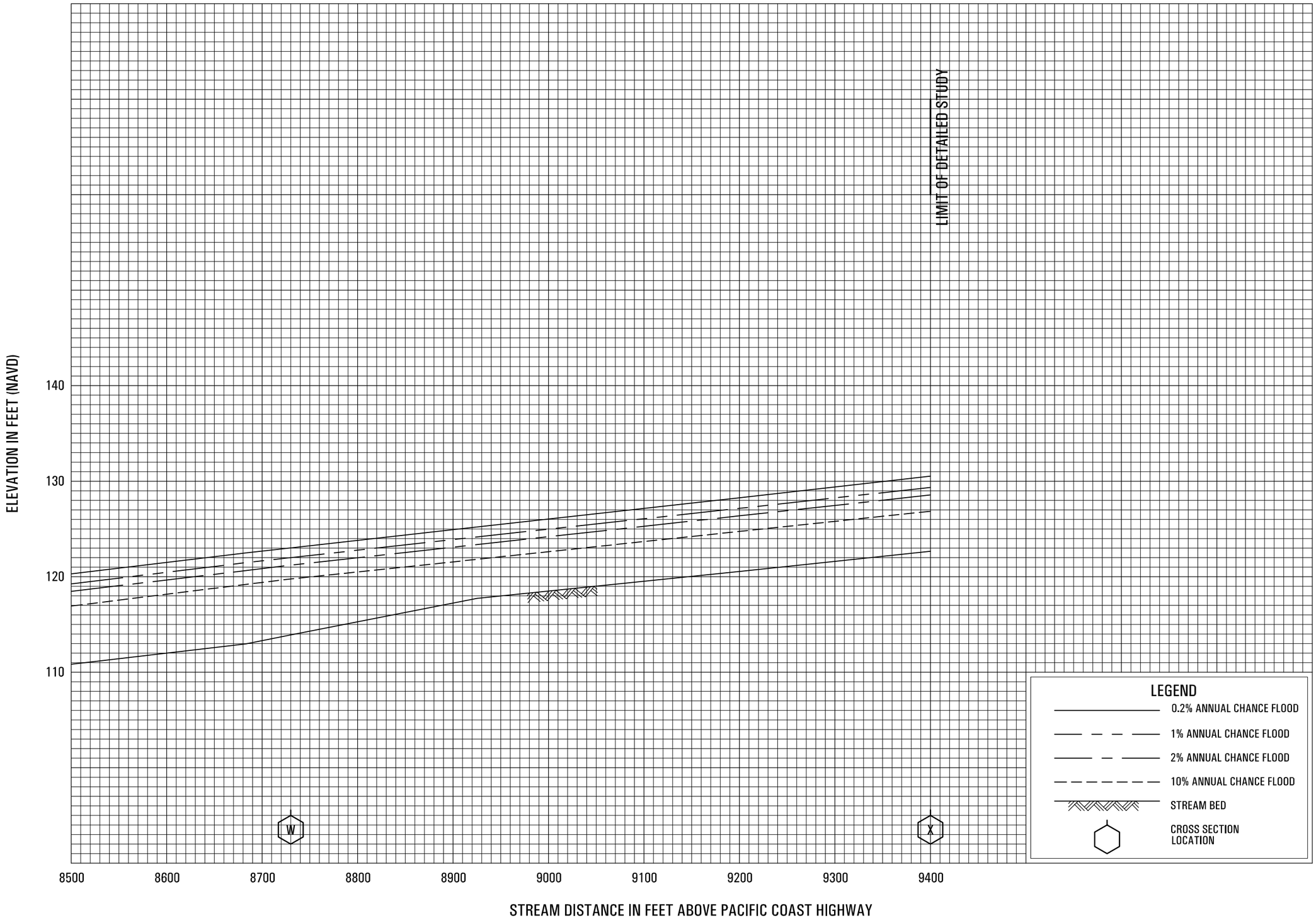

FLOOD PROFILES

ZUMA CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

LOS ANGELES COUNTY, CA

AND INCORPORATED AREAS

Appendix H

Analysis of the Energy Intensity of Water Supplies for West

Analysis of the Energy Intensity of Water Supplies for West Basin Municipal Water District

March, 2007

Robert C. Wilkinson, Ph.D.

Note to Readers

This report for West Basin Municipal Water District is an update and revision of an analysis and report by Robert Wilkinson, Fawzi Karajeh, and Julie Mottin (Hannah) conducted in April 2005. The earlier report, *Water Sources "Powering" Southern California: Imported Water, Recycled Water, Ground Water, and Desalinated Water*, was undertaken with support from the California Department of Water Resources, and it examined the energy intensity of water supply sources for both West Basin and Central Basin Municipal Water Districts. This analysis focuses exclusively on West Basin, and it includes new data for ocean desalination based on new engineering developments that have occurred over the past year and a half.

Principal Investigator: Robert C. Wilkinson, Ph.D.

Dr. Wilkinson is Director of the Water Policy Program at the Donald Bren School of Environmental Science and Management, and Lecturer in the Environmental Studies Program, at the University of California, Santa Barbara. His teaching, research, and consulting focuses on water policy, climate change, and environmental policy issues. Dr. Wilkinson advises private sector entities and government agencies in the U.S. and internationally. He currently served on the public advisory committee for California's 2005 State Water Plan, and he represented the University of California on the Governor's Task Force on Desalination.
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Overview

Southern California relies on imported and local water supplies for both potable and non-potable uses. Imported water travels great distances and over significant elevation gains through both the California State Water Project (SWP) and Colorado River Aqueduct (CRA) before arriving in Southern California, consuming a large amount of energy in the process. Local sources of water often require less energy to provide a sustainable supply of water. Three water source alternatives which are found or produced locally and could reduce the amount of imported water are desalinated ocean water, groundwater, and recycled water. Groundwater and recycled water are significantly less energy intensive than imports, while ocean desalination is getting close to the energy intensity of imports.

Energy requirements vary considerably between these four water sources. All water sources require pumping, treatment, and distribution. Differences in energy requirements arise from the varying processes needed to produce water to meet appropriate standards. This study examines the energy needed to complete each process for the waters supplied by West Basin Municipal Water District (West Basin).

Specific elements of energy inputs examined in this study for each water source are as follows:

- Energy required to **import water** includes three processes: pumping California SWP and CRA supplies to water providers; treating water to applicable standards; and distributing it to customers.
- **Desalination of ocean water** includes three basic processes: 1) pumping water from the ocean or intermediate source (e.g. a powerplant) to the desalination plant; 2) pre-treating and then desalting water including discharge of concentrate; and 3) distributing water from the desalination plant to customers.
- **Groundwater** usage requires energy for three processes: pumping groundwater from local aquifers to treatment facilities; treating water to applicable standards; and distributing water from the treatment plant to customers. Additional injection energy is sometimes needed for groundwater replenishment.
- Energy required to **recycle water** includes three processes: pumping water from secondary treatment plants to tertiary treatment plants; tertiary treatment of the water, and distributing water from the treatment plant to customers.

The energy intensity results of this study are summarized in the table on the following page. They indicate that recycled water is among the least energy-intensive supply options available, followed by groundwater that is naturally recharged and recharged with recycled water. Imported water and ocean desalination are the most energy intensive water supply options in California. East Branch State Water Project water is close in energy intensity to desalination figures based on current technology, and at some points along the system, SWP supplies exceed estimated ocean desalination energy intensity. The following table identifies energy inputs to each of the water supplies including estimated energy requirements for desalination. Details describing the West Basin system operations are included in the water source sections. Note that the Title 22 recycled water energy figure reflects only the *marginal* energy required to treat secondary effluent wastewater which has been processed to meet legal discharge requirements, along with the energy to convey it to user

Energy Intensity of Water Supplies for West Basin Municipal Water District

	af/yr	Percentage of Total Source Type	kWh/af Conveyance Pumping	kWh/af MWD Treatment	kWh/af Recycled Treatment	kWh/af Groundwater Pumping	kWh/af Groundwater Treatment	kWh/af Desalination	kWh/af WBMWD Distribution	Total kWh/af	Total kWh/year
Imported Deliveries											
State Water Project (SWP) [1]	57,559	43%	3,000	44	NA	NA	NA	NA	0	3,044	175,209,596
Colorado River Aqueduct (CRA) [1]	76,300	57%	2,000	44	NA	NA	NA	NA	0	2,044	155,957,200
(other that replenishment water)											
Groundwater[2]											
natural recharge	19,720	40%	NA	NA	NA	350	0	NA	0	350	6,902,030
replenished with (injected) SWP water [1]	9,367	19%	3,000	44	NA	350	0	NA	0	3,394	31,791,598
replenished with (injected) CRA water [1]	11,831	24%	2,000	44	NA	350	0	NA	0	2,394	28,323,432
replenished with (injected) recycled water	8,381	17%	205	0	790	350	0	NA	220	1,565	13,116,278
Recycled Water											
West Basin Treatment, Title 22	21,506	60%	205	NA	0	NA	NA	NA	285	490	10,537,940
West Basin Treatment, RO	14,337	40%	205	NA	790	NA	NA	NA	285	1,280	18,351,360
Ocean Desalination	20,000	100%	200	NA	NA	NA	NA	3,027	460	3,687	82,588,800

Notes:

NA Not applicable

[1] Imported water based on percentage of CRA and SWP water MWD received, averaged over an 11-year period. Note that the figures for imports do not include an accounting for system losses due to evaporation and other factors. These losses clearly exist, and an estimate of 5% or more may be reasonable. The figures for imports above should therefore be understood to be conservative (that is, the actual energy intensity is in fact higher for imported supplies than indicated by the figures).

[2] Groundwater values include entire basin, West Basin service area covers approximately 86% of the basin. Groundwater values are specific to aquifer characteristics, including depth, within the basin.

Energy Intensity of Water

Water treatment and delivery systems in California, including extraction of "raw water" supplies from natural sources, conveyance, treatment and distribution, end-use, and wastewater collection and treatment, account for one of the largest energy uses in the state.[1] The California Energy Commission estimated in its 2005 Integrated Energy Policy Report that approximately 19% of California's electricity is used for water related purposes including delivery, end-uses, and wastewater treatment.[2] The total energy embodied in a unit of water (that is, the amount of energy required to transport, treat, and process a given amount of water) varies with location, source, and use within the state. In many areas, the energy intensity may increase in the future due to limits on water resource extraction, and regulatory requirements for water quality, and other factors.[3] Technology improvements may offset this trend to some extent.

> ***Energy intensity*** is the total amount of energy, calculated on a whole-system basis, required for the use of a given amount of water in a specific location.

The Water-Energy Nexus

Water and energy systems are interconnected in several important ways in California. Water systems both provide energy – through hydropower – and consume large amounts of energy, mainly through pumping. Critical elements of California's water infrastructure are highly energy-intensive. Moving large quantities of water long distances and over significant elevation gains, treating and distributing it within the state's communities and rural areas, using it for various purposes, and treating the resulting wastewater, accounts for one of the largest uses of electrical energy in the state.[4]

Improving the efficiency with which water is used provides an important opportunity to increase related energy efficiency. (*"Efficiency"* as used here describes the useful work or service provided by a given amount of water.) Significant potential economic as well as environmental benefits can be cost-effectively achieved in the energy sector through efficiency improvements in the state's water systems and through shifting to less energy intensive local sources. The California Public Utilities Commission is currently planning to include water efficiency improvements as a means of achieving energy efficiency benefits for the state.[5]

Overview of Energy Inputs to Water Systems

There are four principle energy elements in water systems:

1. primary water extraction and supply delivery (imported and local)
2. treatment and distribution within service areas
3. on-site water pumping, treatment, and thermal inputs (heating and cooling)

4. wastewater collection, treatment, and discharge

Pumping water in each of these four stages is energy-intensive. Other important components of embedded energy in water include groundwater pumping, treatment and pressurization of water supply systems, treatment and thermal energy (heating and cooling) applications at the point of end-use, and wastewater pumping and treatment.[6]

1. Primary water extraction and supply delivery
Moving water from near sea-level in the Sacramento-San Joaquin Delta to the San Joaquin-Tulare Lake Basin, the Central Coast, and Southern California, and from the Colorado River to metropolitan Southern California, is highly energy intensive. Approximately 3,236 kWh is required to pump one acre-foot of SWP water to the end of the East Branch in Southern California, and 2,580 kWh for the West Branch. About 2,000 kWh is required to pump one acre foot of water through the CRA to southern California.[7] Groundwater pumping also requires significant amounts of energy depending on the depth of the source. (Data on groundwater is incomplete and difficult to obtain because California does not systematically manage groundwater resources.)

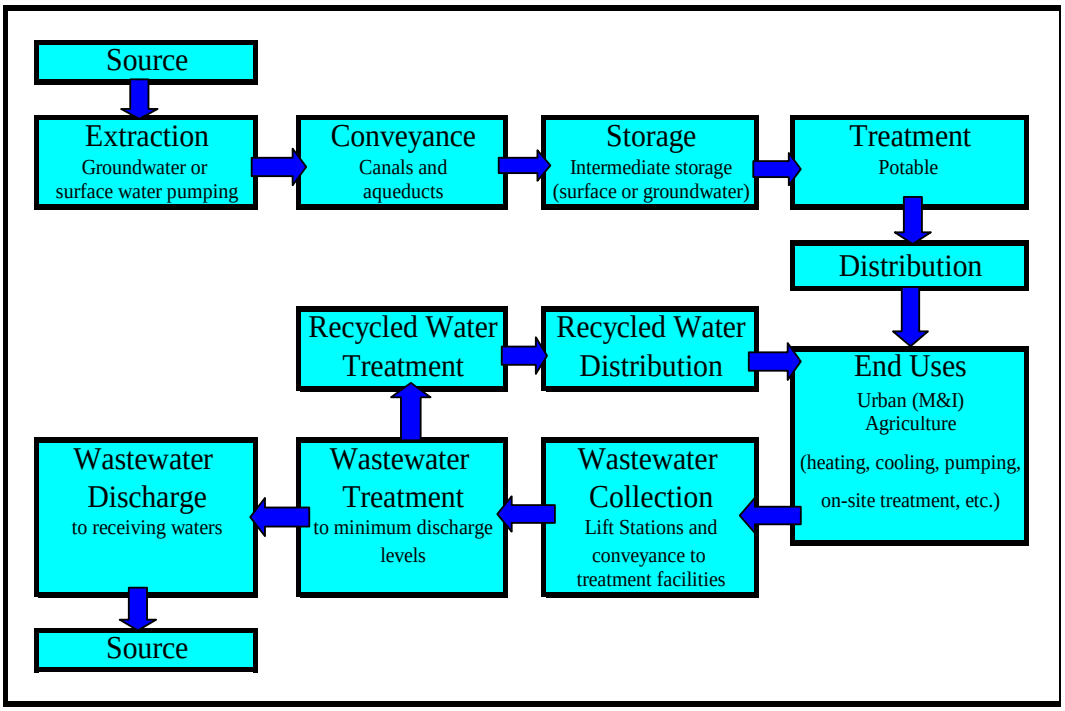
2. Treatment and distribution within service areas
Within local service areas, water is treated, pumped, and pressurized for distribution. Local conditions and sources determine both the treatment requirements and the energy required for pumping and pressurization.

3. On-site water pumping, treatment, and thermal inputs
Individual water users use energy to further treat water supplies (e.g. softeners, filters, etc.), circulate and pressurize water supplies (e.g. building circulation pumps), and heat and cool water for various purposes.

4. Wastewater collection, treatment, and discharge
Finally, wastewater is collected and treated by a wastewater authority (unless a septic system or other alternative is being used). Wastewater is often pumped to treatment facilities where gravity flow is not possible, and standard treatment processes require energy for pumping, aeration, and other processes. (In cases where water is reclaimed and re-used, the calculation of total energy intensity is adjusted to account for wastewater as a *source* of water supply. The energy intensity generally includes the additional energy for treatment processes beyond the level required for wastewater discharge, plus distribution.)

The simplified flow chart below illustrates the steps in the water system process. A spreadsheet computer model is available to allow cumulative calculations of the energy inputs embedded at each stage of the process. This methodology is consistent with that applied by the California Energy Commission in its analysis of the energy intensity of water.

Simplified Flow Diagram of Energy Inputs to Water Systems



Source: Robert Wilkinson, UCSB[8]

Calculating Energy Intensity

Total energy intensity, or the amount of energy required to facilitate the use of a given amount of water in a specific location, may be calculated by accounting for the summing the energy requirements for the following factors:

- imported supplies
- local supplies
- regional distribution
- treatment
- local distribution
- on-site thermal (heating or cooling)
- on-site pumping
- wastewater collection
- wastewater treatment

Water pumping, and specifically the long-distance transport of water in conveyance systems, is a major element of California's total demand for electricity as noted above. Water use (based on embedded energy) is the next largest consumer of electricity in a typical Southern California home after refrigerators and air conditioners. Electricity required to support water service in the typical home in Southern California is estimated at between 14% to 19% of total residential energy demand.[9] If air conditioning is not a factor the figure is even higher. Nearly three quarters of this energy demand is for pumping imported water.

Interbasin Transfers

Some of California's water systems are uniquely energy-intensive, relative to national averages, due to the pumping requirements of major conveyance systems which move large volumes of water long distances and over thousands of feet in elevation lift. Some of the interbasin transfer systems (systems that move water from one watershed to another) are net energy producers, such as the San Francisco and Los Angeles aqueducts. Others, such as the SWP and the CRA require large amounts of electrical energy to convey water. On *average*, approximately 3,000 kWh is necessary to pump one AF of SWP water to southern California,[10] and 2,000 kWh is required to pump one AF of water through the CRA to southern California.[11]

Total energy savings for reducing the full embedded energy of *marginal* (e.g. imported) supplies of water used indoors in Southern California is estimated at about 3,500 kWh/af.[12] Conveyance over long distances and over mountain ranges accounts for this high marginal energy intensity. In addition to avoiding the energy and other costs of pumping additional water supplies, there are environmental benefits through reduced extractions from stressed ecosystems such as the delta.

Imported Water:
The State Water Project and the Colorado River Aqueduct

Water diversion, conveyance, and storage systems developed in California in the 20th century are remarkable engineering accomplishments. These water works move millions of AF of water around the state annually. The state's 1,200-plus reservoirs have a total storage capacity of more than 42.7 million acre feet (maf).[13] West Basin receives imported water from Northern California through the State Water Project and Colorado River water via the Colorado River Aqueduct. The Metropolitan Water District of Southern California delivers both of these imported water supplies to the West Basin.

California's Major Interbasin Water Projects

The State Water Project

The State Water Project (SWP) is a state-owned system. It was built and is managed by the California Department of Water Resources (DWR). The SWP provides supplemental water for agricultural and urban uses.[14] SWP facilities include 28 dams and reservoirs, 22 pumping and generating plants, and nearly 660 miles of aqueducts.[15] Lake Oroville on the Feather River, the project's largest storage facility, has a total capacity of about 3.5 maf.[16] Oroville Dam is the tallest and one of the largest earth-fill dams in the United States.[17]

Water is pumped out of the delta for the SWP at two locations. In the northern Delta, Barker Slough Pumping Plant diverts water for delivery to Napa and Solano counties through the North Bay

Aqueduct.[18] Further south at the Clifton Court Forebay, water is pumped into Bethany Reservoir by the Banks Pumping Plant. From Bethany Reservoir, the majority of the water is conveyed south in the 444-mile-long Governor Edmund G. Brown California Aqueduct to agricultural users in the San Joaquin Valley and to urban users in Southern California. The South Bay Pumping Plant also lifts water from the Bethany Reservoir into the South Bay Aqueduct. [19]

The State Water Project is the largest consumer of electrical energy in the state, requiring an average of 5,000 GWh per year.[20] The energy required to operate the SWP is provided by a combination of DWR's own hydroelectric and other generation plants and power purchased from other utilities. The project's eight hydroelectric power plants, including three pumping-generating plants, and a coal-fired plant produce enough electricity in a normal year to supply about two-thirds of the project's necessary power.

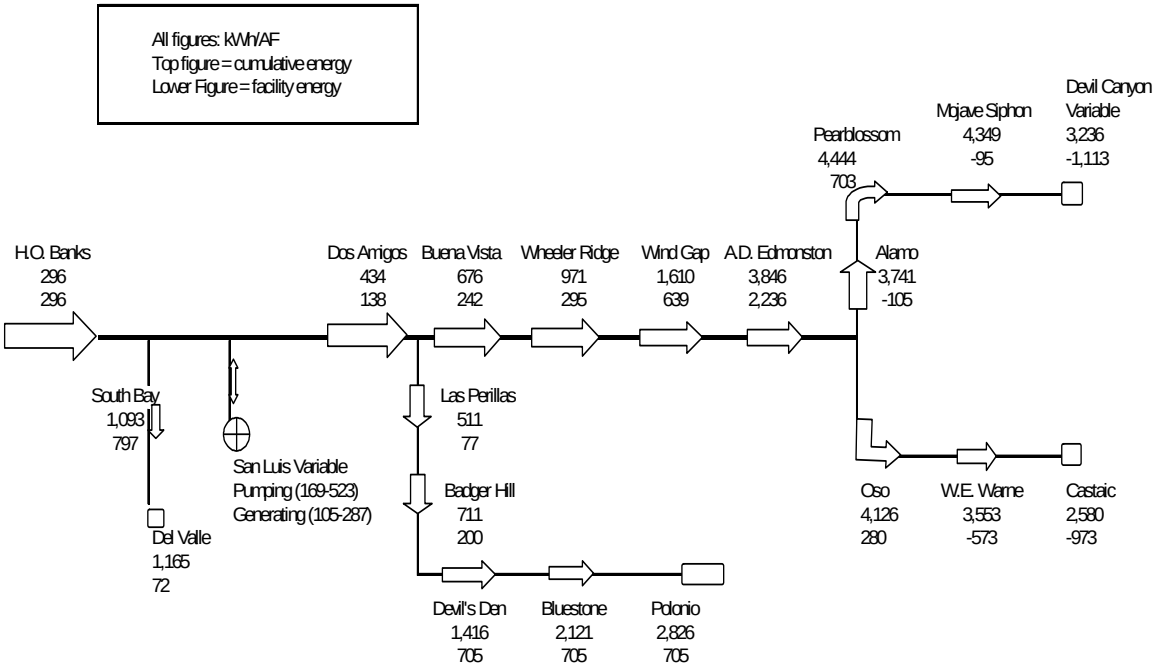
Energy requirements would be considerably higher if the SWP was delivering full contract volumes of water. The project delivered an average of approximately 2.0 mafy, or half its contracted volumes, throughout the 1980s and 1990s.[21] Since 2000 the volumes of imported water have generally increased.

The following map indicates the location of the pumping and power generation facilities on the SWP.

Names and Locations of Primary State Water Delivery Facilities

The following schematic shows each individual pumping unit on the State Water Project, along with data for both the individual and cumulative energy required to deliver an AF of water to that point in the system. Note that the figures include energy recovery in the system, but they do not account for losses due to evaporation and other factors. These losses may be in the range of 5% or more. While more study of this issue is in order, it is important to observe that the energy intensity numbers are conservative (e.g. low) in that they assume that all of the water originally pumped from the delta reaches the ends of the system without loss.

State Water Project
Kilowatt-Hours per Acre Foot Pumped
(Includes Transmission Losses)



Source: Wilkinson, based on data from: California Department of Water Resources, State Water Project Analysis Office, Division of Operations and Maintenance, *Bulletin 132-97*, 4/25/97.

The Colorado River Aqueduct

Significant volumes of water are imported to the Los Angeles Basin and San Diego in Southern California from the Colorado River via the Colorado River Aqueduct (CRA). The aqueduct was built by the Metropolitan Water District of Southern California (MWD). Though MWD's allotment of the Colorado River water is 550,000 afy, it has historically extracted as much as 1.3 mafy through a combination of waste reduction arrangements with Imperial Irrigation District (IID) (adding about 106,000 afy) and by using "surplus" water.[22] The Colorado River water supplies require about 2,000 kWh/af for conveyance to the Los Angeles basin.

The Colorado River Aqueduct extends 242 miles from Lake Havasu on the Colorado River to its terminal reservoir, Lake Mathews, near Riverside. The CRA was completed in 1941 and expanded in 1961 to a capacity of more than 1 MAF per year. Five pumping plants lift the water 1,616 feet, over several mountain ranges, to southern California. To pump an average of 1.2 maf of water per year into the Los Angeles basin requires approximately 2,400 GWh of energy for the CRA's five pumping plants.[23] On average, the energy required to import Colorado River water is about 2,000 kWh/AF. The aqueduct was designed to carry a flow of 1,605 cfs (with the capacity for an additional 15%).

The sequence for CRA pumping is as follows: The Whitsett Pumping Plant elevates water from Lake Havasu 291 feet out of the Colorado River basin. At "mile 2," Gene pumping plant elevates water 303 feet to Iron Mountain pumping plant at mile 69, which then boosts the water another 144 feet. The last two pumping plants provide the highest lifts - Eagle Mountain, at mile 110, lifts the water 438 feet, and Hinds Pumping Plant, located at mile 126, lifts the water 441 feet.[24]

MWD has recently improved the system's energy efficiency. The average energy requirement for the CRA was reduced from approximately 2,100 kWh /af to about 2,000 kWh /af "through the increase in unit efficiencies provided through an energy efficiency program." The energy required to pump each acre foot of water through the CRA is essentially constant, regardless of the total annual volume of water pumped. This is due to the 8-pump design at each pumping plant. The average pumping energy efficiency does not vary with the number of pumps operated, and MWD states that the same 2,000 kWh/af estimate is appropriate for both the "Maximum Delivery Case" and the "Minimum Delivery Case."[25]

It appears that there are limited opportunities to shift pumping off of peak times on the CRA. Due to the relatively steep grade of the CRA, limited active water storage, and transit times between plants, the system does not generally lend itself to shifting pumping loads from on-peak to off-peak. Under the Minimum Delivery Case, the reduced annual water deliveries would not necessarily bring a reduction in annual peak load, since an 8-pump flow may still need to be maintained in certain months.

Electricity to run the CRA pumps is provided by power from hydroelectric projects on the Colorado River as well as off-peak power purchased from a number of utilities. The Metropolitan Water District has contractual hydroelectric rights on the Colorado River to "more than 20 percent of the firm energy and contingent capacity of the Hoover power plant and 50 percent of the energy and capacity of the Parker power plant."[26] Energy purchased from utilities makes up approximately 25 percent of the remaining energy needed to power the Colorado River Aqueduct.[27]

Minimizing the Need for Inter-Basin Transfers

For over 100 years, California has sought to transfer water from one watershed for use in another. The practice has caused a number of problems. As of 2001, California law requires that the state examine ways to "*minimize the need to import water from other hydrologic regions*" and report on these approaches in the official State Water Plan.[28] A new focus and priority has been placed on developing *local* water supply sources, including efficiency, reuse, recharge, and desalination. The law directs the Department of Water Resources as follows:[29]

> The department, as a part of the preparation of the department's Bulletin 160-03, shall include in the California Water Plan a report on the development of regional and local water projects within each hydrologic region of the state, as described in the department's Bulletin 160-98, to improve water supplies to meet municipal, agricultural, and environmental water needs and *minimize the need to import water from other hydrologic regions*.

(Note that Bulletin 160-03 became Bulletin 160-05 due to a slip in the completion schedule.)

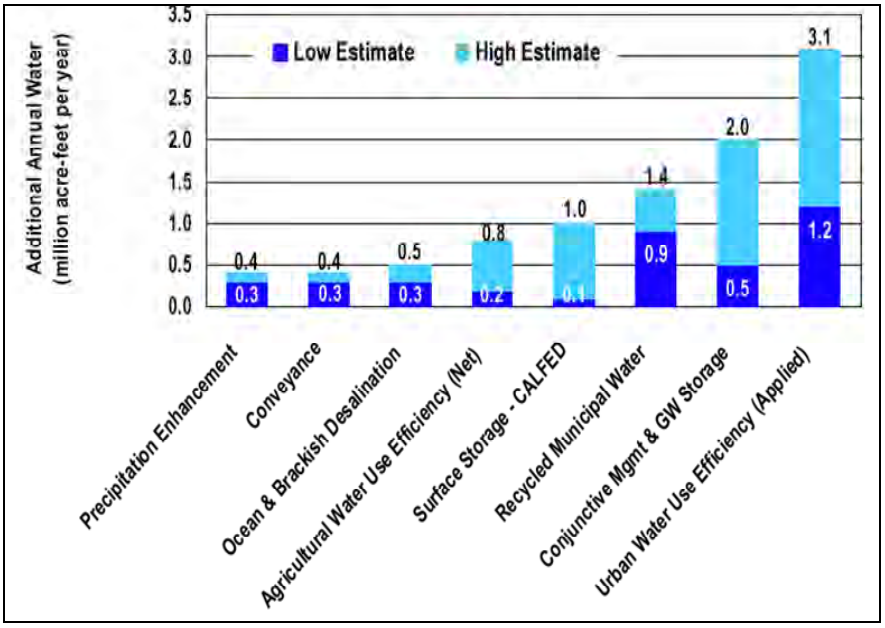
The legislation set forth the range of local supply options to be considered:

> The report shall include, but is not limited to, regional and local water projects that use technologies for desalting brackish groundwater and ocean water, reclaiming water for use within the community generating the water to be reclaimed, the construction of improved potable water treatment facilities so that water from sources determined to be unsuitable can be used, and the construction of dual water systems and brine lines, particularly in connection with new developments and when replacing water piping in developed or redeveloped areas.

This law calls for a thorough consideration in the state's official water planning process of work that is already going on in various areas of the state. The significance of the legislation is that for the first time, local supply development is designated as a priority in order to minimize inter-basin transfers.

The Department of Water Resources State Water Plan (Bulletin 160-05) reflects this new direction for the state in its projection of water supply options for the next quarter century. The following graph clearly indicates the importance of local water supplies from various sources in the future.

California State Water Plan 2005
Water Management and Supply Options for the Next 25 Years



Source: *California Water Plan Update 2005*.[30]

Energy Requirements for Treatment of State Water Project and the Colorado River Aqueduct Supplies

Imported SWP and CRA supplies require an estimated 44 kWh/af for treatment before it enters the local distribution systems. Water pressure from MWD's system is sufficient to move supplies through the West Basin distribution system without requiring additional pressure.

Groundwater and Recycled Water at West Basin MWD

Nearly half of the water used in the service area of the Metropolitan Water District of Southern California (from Ventura to Mexico) is secured from *local* sources, and the percentage of total supplies provided by local sources is growing steadily.[31] This figure is up from approximately one-third of the supply provided by local resources in the mid-1990s.[32] MWD has encouraged local supply development through support for recycling, groundwater recovery, conservation, groundwater storage, and most recently, ocean desalination.

Groundwater and recycled water are important and growing supply sources for West Basin. Water flows through natural hydrologic cycles continuously. The water we use today has made the journey many times. In water recycling programs, water is treated and re-used for various purposes including recharging groundwater aquifers. The treatment processes essentially short-circuit the longer-term process of natural evaporation and precipitation. In cities around the world water is used and then returned to natural water systems where it flows along to more users down stream. It is often used again and again before it flows to the ocean or to a terminal salt sink.

Groundwater at West Basin MWD

Groundwater reservoirs in West Basin are replenished with four water sources; natural recharge, SWP supplies, CRA supplies, and recycled water supplies. The largest portion (approximately 40%) of groundwater supplies is derived from natural recharge. The energy associated with recovering this naturally recharged supply is estimated at 350 kWh/af for groundwater pumping.

Imported water, from both the SWP and CRA, is injected into the groundwater supply in West Basin. The imported water remains at sufficient pressure for injection, so no additional energy is required. The energy requirements for importing water are significant, however, primarily due to the energy associated with importing the water from northern California and the Colorado River. The imported water also passes through MWD's treatment plant, incurring additional energy requirements. The total energy intensity for West Basin's imported water used for recharge of groundwater storage from the SWP is 3,394 kWh/af and from the CRA is 2,394 kWh/af.

Recycled water is also used to recharge groundwater in the basin. West Basin replenishes groundwater by injecting RO treated recycled water from the West Basin Water Recycling Facility (WBWRF). The total energy use is 1,565 kWh/af. Details for the recycled water energy are described in the next section.

Recycled Water at West Basin MWD

Many cities in California are using advanced processes and filtering technology to treat wastewater so it can be re-used for irrigation, industry, and other purposes. In response to increasing demands for water, limitations on imported water supplies, and the threat of drought, West Basin has developed state-of-the-art regional water recycling programs. Water is increasingly being used more than once within systems at both the end-use level and at the municipal level. This is because scarce water resources (and wastewater discharges) are increasing in cost and because cost-effective technologies and techniques for re-using water have been developed that meet health and safety requirements. At the end-use, water is recycled within processes such as cooling towers and industrial processes prior to entering the wastewater system. Once-through systems are increasingly being replaced by re-use technologies. At the municipal level, water re-use has become a significant source of supplies for both landscape irrigation and for commercial and industrial processes. MWD of Southern California is supporting 33 recycling programs in which treated wastewater is used for non-potable purposes. [33]

West Basin provides customers with recycled water used for municipal, commercial and industrial applications. Approximately 27,000 AF of recycled water is annually distributed to more than 210 sites in the South Bay. These sites use recycled water for a wide range of non-potable applications. Based in El Segundo, California, the WBWRF is among the largest projects of its kind in the nation, producing five qualities of recycled water with the capacity at full build-out to recycle 100,000 AF per year of wastewater from the Los Angeles Hyperion Treatment Plant.

In 1998, West Basin began to construct the nation's only regional high-purity water treatment facility, the Carson Regional Water Recycling Facility (CRWRF). A pipeline stretching through five South Bay communities connects the CRWRP to West Basin's El Segundo facility. At the CRWRF, West Basin ultra-purifies the recycled water it gets from the El Segundo facility. From the CRWRF, West Basin uses service lines to transport two types of purified water to the BP Refinery in Carson. The West Basin expansion also includes a new disposal pipeline to carry brine reject water from the CRWRF to a Los Angeles County Sanitation District's outfall.

In order to provide perspective on the energy requirements for the WBWRF, two water qualities and associated energy intensity are presented. "Title 22" water, produced by a gravity filter treatment system, requires conveyance pumping energy from Hyperion to WBWRF at 205 kWh/af. The water flows through the filters via gravity, thus no additional energy is required for treatment. The final energy requirement is 285 kWh/af for distribution with a total energy requirement of 490 kWh/af. This is the lowest grade of recycled water that WBWRF produces. Contrasting the Title 22 water, WBWRF produces RO water with a total energy requirement of 1,280 kWh/af. This includes 205 kWh/af for conveyance from Hyperion, 790 kWh/af for treatment with RO, and 285 kWh/af for distribution.

More than 210 South Bay sites use 9 billion gallons of West Basin's recycled water for applications including irrigation, industrial processes, indirect potable uses, and seawater barrier injection. West Basin has been successful in changing the perception of recycled water from merely a conservation tool with minimal applications to a cost-effective business tool that can reduce costs and improve reliability.

Local oil refineries are major customers for West Basin's recycled water. The Chevron Refinery in El Segundo, the Exxon-Mobile refinery in Torrance, and the BP refinery in Carson use recycled water for cooling towers and in the boiler feed systems.

Ocean Water Desalination Development

Desalination technologies are in use around the world. A number of approaches work well and produce high quality water. Many workable and proven technology options are available to remove salt from water. During World War Two, desalination technology was developed as a water source for military operations.[34] Grand plans for nuclear-driven desalination systems in California were drawn up after the war, but they were never implemented due to cost and feasibility problems.

Desalination techniques range from distillation to "reverse osmosis" (RO) technologies. Current applications around the world are dominated by the "multistage flash distillation" process (at about 44% of the world's applications), and RO, (at about 42%).[35] Other desalting technologies include electrodialysis (6%), vapor compression (4%), multi-effect distillation (4%), and membrane softening (2%) to remove salts.[36] All of the ocean desalination projects currently in place or proposed for municipal water supply in California employ RO technology.

Reverse Osmosis Membranes

A recent inventory of desalination facilities world-wide indicated that as of the beginning of 1998, a total of 12,451 desalting units with a total capacity of 6.72 afy[37] had been installed or contracted worldwide.[38] (Note that *capacity* does not indicate actual operation.) Non-seawater desalination plants have a capacity 7,620 af/d[39], whereas the seawater desalination plant capacity reached 10,781af/d.[40]

Desalination systems are being used in over 100 countries, but 10 countries are responsible for 75 percent of the capacity.[41] Almost half of the desalting capacity is used to desalt seawater in the Middle East and North Africa. Saudi Arabia ranks first in total capacity (about 24 percent of the world's capacity) followed by the United Arab Emirates and Kuwait, with most of the capacity being made up of seawater desalting units that use the distillation process.[42]

The salinity of ocean water varies, with the average generally exceeding 30 grams per liter (g/l).[43] The Pacific Ocean is 34-38 g/l, the Atlantic Ocean averages about 35 g/l, and the Persian Gulf is 45 g/l. Brackish water drops to 0.5 to 3.0 g/l.[44] Potable water salt levels should be below 0.5 g/l.

Reducing salt levels from over 30 g/l to 0.5 g/l and lower (drinking water standards) using existing technologies requires considerable amounts of energy, either for thermal processes or for the pressure to drive water through extremely fine filters such as RO, or for some combination of thermal and pressure processes. Recent improvements in energy efficiency have reduced the amount of thermal and pumping energy required for the various processes, but high energy intensity is still an issue. The energy required is in part a function of the degree of salinity and the temperature of the water.

West Basin is in the process of developing plans to construct an ocean desalinating plant. Estimated energy requirements have been calculated by Gerry Filteau of Separation Processes, Inc for each step in the process.[45] The values presented for desalination are based on his work. Since the proposed plant will tap the source water at the power plant, there is no ocean intake pumping required. The source water is estimated to require 200 kWh/af this energy will bring ocean water from the power plant to the desalination system, approximately one quarter of a mile in distance. Pre-treatment of the source water is estimated at 341 kWh/af. This figure includes microfiltration and transfer to the RO units via a 5-10 micron cartridge filter. The RO process requires 2,686 kWh/af if operated at the most energy-efficient level. A slightly less efficient but more cost-effective level of operation would require 2,900 kWh/af, or 214 kWh/af additional energy input according to Filteau. Finally, an estimated 460 kWh/af is required to deliver the product water to the distribution system, including elevation gain, conveyance over distance, and pressurization to 90 psi. No additional energy is required to discharge the brine, as it flows back to the ocean outfall line by gravity.

The energy intensity figures presented here for desalination are lower than previous estimates. This is mainly due to improved membrane technologies, efficiency improvements for high pressure pumps, and pressure recovery systems. It should be noted that the figures provided here are based on engineering estimates, not on actual plant operations.

The total energy required to desalinate the ocean water, including each of the steps above, is estimated to be 3,687 kWh/af. If the energy intensity is increased slightly to improve cost-effectiveness, the total figure increases to 3,901 kWh/af.

Summary

This study examined the energy intensity of imported and local water supplies (ocean water, groundwater, and recycled water) for both potable and non-potable uses for West Basin. All water sources require pumping, treatment, and distribution. Differences in energy requirements arise from varying pumping, treatment, and distribution processes needed to produce water to meet appropriate standards for different uses.

The key findings of this study are: 1) the marginal energy required to treat and deliver recycled water is among the *least* energy intensive supply options available, 2) naturally recharged groundwater is low in energy intensity, though replenishment with imported water is not, and 3) current ocean desalination technology is getting close to the level of energy intensity of imported supplies.

Further refinement of the data in this study, such as applying an agency's own energy values, may provide a more accurate basis for decision-making tailored to a unique water system. The information presented, however, provides a reasonable basis for water managers to explore energy (and cost) benefits of increased use of local water sources, and it indicates that desalination of ocean water is getting close to the energy intensity of existing supplies.

Sources

[1] Water systems account for roughly 7% of California's electricity use: See Wilkinson, Robert C., 2000. Methodology For Analysis of The Energy Intensity of California's Water Systems, and an Assessment of Multiple Potential Benefits Through Integrated Water-Energy Efficiency Measures, Exploratory Research Project, Ernest Orlando Lawrence Berkeley Laboratory, California Institute for Energy Efficiency.

[2] California Energy Commission, 2005. *Integrated Energy Policy Report*, November 2005, CEC-100-2005-007-CMF.

[3] Franklin Burton, in a recent study for the Electric Power Research Institute (EPRI), includes the following elements in water systems: "Water systems involve the transportation of water from its source(s) of treatment plants, storage facilities, and the customer. Currently, most of the electricity used is for pumping; comparatively little is used in treatment. For most surface sources, treatment is required consisting usually of chemical addition, coagulation and settling, followed by filtration and disinfection. In the case of groundwater (well) systems, the treatment may consist only of disinfection with chlorine. In the future, however, implementation of new drinking water regulations will increase the use of higher energy consuming processes, such as ozone and membrane filtration." Burton, Franklin L., 1996, *Water and Wastewater Industries: Characteristics and Energy Management Opportunities*. (Burton Engineering) Los Altos, CA, Report CR-106941, Electric Power Research Institute Report, p.3-1.

[4] Wilkinson, Robert C., 2000. *Methodology For Analysis of The Energy Intensity of California's Water Systems, and an Assessment of Multiple Potential Benefits Through Integrated Water-Energy Efficiency Measures*, Exploratory Research Project, Ernest Orlando Lawrence Berkeley Laboratory, California Institute for Energy Efficiency.

[5] California Public Utilities Commission, Order Instituting Rulemaking Regarding to Examine the Commission's post-2005 Energy Efficiency Policies, Programs, Evaluation, Measurement and Verification, and Related Issues, Rulemaking 06-04-010 (Filed April 13, 2006)

[6] An AF of water is the volume of water that would cover one acre to a depth of one foot. An AF equals 325,851 gallons, or 43,560 cubic feet, or 1233.65 cubic meters.

[7] Metropolitan Water District of Southern California, *Integrated Resource Plan for Metropolitan's Colorado River Aqueduct Power Operations*, 1996, p.5.

[8] This schematic, based on the original analysis by Wilkinson (2000) has been refined and improved with input from Gary Wolff, Gary Klein, William Kost, and others. It is the basic approach reflected in the CEC IEPR and other analyses.

[9]QEI, Inc., 1992, *Electricity Efficiency Through Water Efficiency*, Report for the Southern California Edison Company, p. 24.

[10] Figures cited are *net* energy requirements (gross energy for pumping minus energy recovered through generation).

[11] Metropolitan Water District of Southern California, *Integrated Resource Plan for Metropolitan's Colorado River Aqueduct Power Operations*, 1996, p.5.

[12] Wilkinson, Robert C., 2000. *Methodology For Analysis of The Energy Intensity of California's Water Systems, and an Assessment of Multiple Potential Benefits Through Integrated Water-Energy Efficiency Measures*, Exploratory Research Project, Ernest Orlando Lawrence Berkeley Laboratory, California Institute for Energy Efficiency.

[13] California Department of Finance. California Statistical Abstract. Tables G-2, "Gross Capacities of Reservoirs by Hydrographic Region," and G-3 "Major Dams and Reservoirs of California." January 2001. (http://www.dof.ca.gov/html/fs_data/stat-abs/toc.htm)

[14] "The SWP, managed by the Department of Water Resources, is the largest state-built, multi-purpose water project in the country. Approximately 19 million of California's 32 million residents receive at least part of their water from the SWP. SWP water irrigates approximately 600,000 acres of farmland. The SWP was designed and built to deliver water, control floods, generate power, provide recreational opportunities, and enhance habitats for fish and wildlife." California Department of Water Resources, *Management of the California State Water Project*. Bulletin 132-96. p.xix.

[15] California Department of Water Resources, 1996, *Management of the California State Water Project*. Bulletin 132-96.p.xix.

[16] Three small reservoirs upstream of Lake Oroville — Lake Davis, Frenchman Lake, and Antelope Lake — are also SWP facilities. California Department of Water Resources, 1996, *Management of the California State Water Project*. Bulletin 132-96.

[17] California Department of Water Resources, 1996, *Management of the California State Water Project*. Bulletin 132-96. Power is generated at the Oroville Dam as water is released down the Feather River, which flows into the Sacramento River, through the Sacramento-San Joaquin Delta, and to the ocean through the San Francisco Bay.

[18] The North Bay Aqueduct was completed in 1988. (California Department of Water Resources, 1996, *Management of the California State Water Project*. Bulletin 132-96.)

[19] The South Bay Aqueduct provided initial deliveries for Alameda and Santa Clara counties in 1962 and has been fully operational since 1965. (California Department of Water Resources, 1996, *Management of the California State Water Project*. Bulletin 132-96.)

[20] Carrie Anderson, 1999, "Energy Use in the Supply, Use and Disposal of Water in California", Process Energy Group, Energy Efficiency Division, California Energy Commission, p.1.

[21] Average deliveries for 1980-89 were just under 2.0 mafy, deliveries for 1990-99 were just over 2.0 mafy. There is disagreement regarding the ability of the SWP to deliver the roughly 4.2 mafy that has been contracted for.

[22] According to MWD, "Metropolitan's annual dependable supply from the Colorado River is approximately 656,000 AF -- about 550,000 AF of entitlement and at least 106,000 AF obtained through a conservation program Metropolitan funds in the Imperial Irrigation District in the southeast corner of the state. However, Metropolitan has been allowed to take up to 1.3 maf of river water a year by diverting either surplus water or the unused portions of other agencies' apportionments." Metropolitan Water District of Southern California, 1999, "Fact Sheet" at: http://www.mwd.dst.ca.us/docs/fctsheet.htm.

[23] Metropolitan Water District of Southern California, 1999, http://www.mwd.dst.ca.us/pr/powres/summ.htm.

[24] The five pumping plants each have nine pumps. The plants are designed for a maximum flow of 225 cubic feet per second (cfs). The CRA is designed to operate at full capacity with eight pumps in operation at each plant (1800 cfs). The ninth pump operates as a spare to facilitating maintenance, emergency operations, and repairs. Metropolitan Water District of Southern California, 1999, Colorado River Aqueduct: http://aqueduct.mwd.dst.ca.us/areas/desert.htm, 08/01/99.

[25] Metropolitan Water District of Southern California, 1996, "Integrated Resource Plan for Metropolitan's Colorado River Aqueduct Power Operations", 1996, p.5.

[26] Metropolitan Water District of Southern California, 1999, "Summary of Metropolitan's Power Operation". February, 1999, p.1, http://aqueduct.mwd.dst.ca.us/areas/desert.htm.

[27] Metropolitan Water District of Southern California, 1999, http://www.mwd.dst.ca.us/pr/powres/summ.htm. MWD provides further important system information as follows: Metropolitan owns and operates 305 miles of 230 kV transmission lines from the Mead Substation in southern Nevada. The transmission system is used to deliver power from Hoover and Parker to the CRA pumps. Additionally, Mead is the primary interconnection point for Metropolitan's economy energy purchases. Metropolitan's transmission system is interconnected with several utilities at multiple

interconnection points. Metropolitan's CRA lies within Edison's control area. Resources for the load are contractually integrated with Edison's system pursuant to a Service and Interchange Agreement (Agreement), which terminates in 2017. Hoover and Parker resources provide spinning reserves and ramping capability, as well as peaking capacity and energy to Edison, thereby displacing higher cost alternative resources. Edison, in turn, provides Metropolitan with exchange energy, replacement capacity, supplemental power, dynamic control and use of Edison's transmission system.

[28] SB 672, Machado, 2001. California Water Plan: Urban Water Management Plans. (The law amended Section 10620 of, and adds Section 10013 to, the Water Code) September 2001.

[29] SEC. 2. Section 10013 to the Water Code, 10013. (a) SB 672, Machado. California Water Plan: Urban Water Management Plans. September 2001, (Emphasis added.)

[30] California Department of Water Resources, 2005. California Water Plan Update 2005. Bulletin 160-05, California Department of Water Resources, Sacramento, CA.

[31] Metropolitan Water District of Southern California, 2000. *The Regional Urban Water Management Plan for the Metropolitan Water District of Southern California*, p.A.2-3.

[32] "About 1.36 maf per year (34 percent) of the region's average supply is developed locally using groundwater basins and surface reservoirs and diversions to capture natural runoff." Metropolitan Water District of Southern California, 1996, "Integrated Resource Plan for Metropolitan's Colorado River Aqueduct Power Operations", 1996, Vol.1, p.1-2.

[33] MWD estimates that reclaimed water will ultimately produce 190,000 AF of water annually. Metropolitan Water District of Southern California, 1999, "Fact Sheet" at: http://www.mwd.dst.ca.us/docs/fctsheet.htm.

[34] Buros notes that "American government, through creation and funding of the Office of Saline Water (OSW) in the early 1960s and its successor organizations like the Office of Water Research and echnology (OWRT), made one of the most concentrated efforts to develop the desalting industry. The American government actively funded research and development for over 30 years, spending about $300 million in the process. This money helped to provide much of the basic investigation of the different technologies for desalting sea and brackish waters." Buros, O.K., 2000. *The ABCs of Desalting, International Desalination Association*, Topfield, Massachusetts, p.5. This very useful summary is available at http://www.ida.bm/PDFS/Publications/ABCs.pdf

[35] Buros, O.K., 2000. *The ABCs of Desalting, International Desalination Association*, Topfield, Massachusetts, p.5. This very useful summary is available at http://www.ida.bm/PDFS/Publications/ABCs.pdf See also; Buros et al.1980. *The USAID Desalination Manual.* Produced by CH2M HILL International for the U.S. Agency for International Development.

[36] Wangnick,Klaus.1998 *IDA Worldwide Desalting Plants Inventory Report No.15.*Produced by Wangnick Consulting for International Desalination Association; and Buros, O.K., 2000. *The ABCs of Desalting, International Desalination Association*, Topfield, Massachusetts, p.5.

[37] Desalination systems with a unit size of 100 m3/d or more. Figures in original cited as 6,000 mgd.

[38] Wangnick Consulting GMBH (http://www.wangnick.com) maintains a permanent desalting plants inventory and publishes the results biennially in co-operation with the International Desalination Association, as the IDA Worldwide Desalting Plants Inventory Report. Thus far, fifteen reports have been published, with the latest report having data through the end of 1997; and see Wangnick,Klaus.*1998 IDA Worldwide Desalting Plants Inventory Report No.15.*Produced by Wangnick Consulting for International Desalination Association. The data cited are as of December 31, 1997.

[39] Cited in original as 9,400,000 m3/d.

[40] Wangnick,Klaus.*1998 IDA Worldwide Desalting Plants Inventory Report No.15.*Produced by Wangnick Consulting for International Desalination Association. (Cited in original in m3d (13,300,000 m3/d).

Appendix G

Tech Memo No. 1 Development, Evaluation, and Selection of Treatment Alternatives for the Eastside Water Treatment Plant

Table 1.1 Characteristics of the Two Source Waters for the New EWTP - SPW Aqueduct and LRW (2000 to 2006)
Eastside Water Treatment Plant
Palmdale Water District

		SPW Aqueduct					Littlerock Reservoir				
Parameter	**Units**	**No. of Samples**	**Minimum**	**Maximum**	**Median**	**Average**	**No. of Samples**	**Minimum**	**Maximum**	**Median**	**Average**
Sulfate	mg/L	9	37	63	40	44	5	11	24	17	17
Chloride	mg/L	9	54	145	100	92	5	–	10	–	–
Iron	mg/L	9	0.01	0.53	0.27	0.26	4	0.01	0.45	0.16	0.19
Manganese	mg/L	8	0.002	0.02	0.01	0.01	3	0.03	0.21	0.12	0.12
Total Hardness	mg/L as $CaCO_3$	9	99	198	110	119	5	75	147	130	114
Total Alkalinity	mg/L as $CaCO_3$	186	44	106	77	74	90	71	237	96	106
pH	-	183	7.3	8.8	8.3	8.2	93	7.0	8.8	7.5	7.4
Turbidity	NTU	172	0.2	71	2.3	3.5	86	0.2	41	2.3	3.5
Temperature	°C	175	8.9	27.2	18.3	17.8	90	6.7	22.2	11.1	11.7
Bromide	mg/L	53	0.05	0.43	0.18	0.19	8	–	<0.01	–	–
Total Organic Carbon (TOC)[1]	mg/L	77	1.3	8.1	3.0	3.3	28	1.7	9.1	5.0	4.7
Color (True)	Color Unit	175	1	80	20	25	90	10	50	30	33
Odor	Threshold Odor Number	-	–	<1[1]	–	–	5	11	24	17	17

Notes
1. Data provided courtesy of AVEK. Data is for the time between January 1999 and June 2006.

Appendix F

FAVEK 2011 Annual Water Quality Report

ANTELOPE VALLEY – EAST KERN WATER AGENCY

2011 ANNUAL WATER QUALITY REPORT

LOS ANGELES COUNTY SYSTEM

BOARD OF DIRECTORS

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Division 4
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Division 7

ANTELOPE VALLEY - EAST KERN WATER AGENCY
AVEK
ESTABLISHED 1959

A PUBLIC AGENCY

OFFICERS

DAN FLORY
General Manager

HOLLY H. HUGHES
Secretary-Treasurer

February 1, 2012

Dear General Manager:

This is the 2011 Annual Water Quality Report from the Antelope Valley-East Kern Water Agency (AVEK). Since the water you obtain from AVEK represents one of your sources of water, we have included the actual laboratory reports of analyses as well as a summary of results for your convenience.

In accordance with the Consumer Confidence Report (CCR) guidance manuals issued by the California Department of Public Health and the United States Environmental Protection Agency, we are herein providing you with the monitoring data and other information you will need to produce your CCR.

Please notice that *bromate* monitoring has been added to this year's report. Bromate is a disinfection byproduct formed when water containing bromide is disinfected with ozone. We implemented the use of ozone in our treatment process full-time in 2011 and state and federal regulations require us to monitor for bromate at the entry point to our distribution system monthly. Compliance is based upon a running annual average, computed quarterly, of these monthly samples. The MCL, based upon the running annual average, is 10 µg/L.

If you have any questions or need additional information, please call me at 661-943-3201. However, please do not designate AVEK or this office as your contact in your CCR. According to the CDPH and EPA guidelines, the designated contact person should be someone from your system. While we are always happy to clarify questions about AVEK water, we do not have the specific information necessary to answer questions about your water, blending practices or distribution systems.

Respectfully,

Justin Livesay
Laboratory Director

6500 WEST AVENUE N • PALMDALE, CALIFORNIA 93551
(661) 943-3201 • FAX (661) 943-3204

Antelope Valley-East Kern Water Agency

2011 Annual Water Quality Report

We are very pleased to provide you with this year's Annual Water Quality Report. We want to keep you informed about the excellent water we have delivered to you over the past year. Our goal is, and always has been, to provide to you a safe supply of drinking water.

Our water source is the State Water Project, California Aqueduct. The California Department of Public Health has assessed the vulnerability of this source as to possible contaminating activities. The assessment's description and discussion of vulnerability:

> "The California Aqueduct originates at the Sacramento-San Joaquin Delta at Clifton Court Forebay. Water in the Delta originates in the Sacramento River watershed, the San Joaquin watershed, and the watershed drainage from the Mokelumne River, Stanislaus River, Merced River and several smaller rivers that drain the eastern slopes of the Sierra Nevadas. Located in these drainage areas are a broad variety of potential sources of contamination including municipal, industrial and agricultural activities. Also influencing the quality of water pumped from the Delta is the impact of the estuarial nature of the Delta and the naturally occurring salt-water intrusion which is dependent to a large extent on the inflow from the contributing rivers.
>
> The possible contaminating activities present within the California Aqueduct watershed are described in the State Water Project Watershed Sanitary Survey conducted by the California Department of Water Resources and their consultants in 1986 and updated in 2001 and 2006.
>
> A copy of the complete assessment may be viewed at, Antelope Valley-East Kern Water Agency, 6500 West Avenue N, Palmdale, CA 93551."

If you have any questions about this report or the Antelope Valley-East Kern Water Agency, please contact Justin Livesay, Laboratory Director at 661-943-3201. We want our valued customers to be informed about our Water Agency. If you want to learn more, please attend any of our regularly scheduled Board meetings. They are held on the second and fourth Tuesday of every month, 6:30 PM, at the Antelope Valley-East Kern Water Agency Office, 6500 West Avenue N, Palmdale, CA, 93551.

Antelope Valley-East Kern Water Agency routinely monitors for contaminants in our drinking water according to Federal and State laws. The table in this report, "2011 Annual Water Quality Report", shows the results of our monitoring for the period of January 1st to December 31st, 2011.

All drinking water, including bottled drinking water, may be reasonably expected to contain at least small amounts of some contaminants. It is important to remember that the presence of these contaminants does not necessarily pose a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 1-800-426-4791.

We are proud to report that our drinking water is safe and meets or exceeds all State and Federal requirements. We have learned through our monitoring and testing that some contaminants have been detected. The EPA has determined that your water IS SAFE at these levels.

Total Coliform: Water systems are required to meet a strict standard for coliform bacteria. Coliform bacteria are usually harmless, but their presence in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If the standard is exceeded, the water supplier must notify the public by newspaper, television or radio.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbiological contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Antelope Valley-East Kern Water Agency
2011 Annual Water Quality Report - Los Angeles County System

The Antelope Valley-East Kern Water Agency provides treated surface water as a source of drinking water.
Treatment technique: Conventional
EPA Turbidity Performance Standards: Turbidity of the filtered water must:

1. Be less than or equal to 0.30 NTU in 95% of measurements in a month.
2. Not exceed 1 NTU at any time.

Lowest monthly percentage of samples that met Turbidity Performance Standard No. 1: **100%**
Highest single turbidity measurement during the year: **0.23 NTU**
Percentage of samples < 0.30 NTU: **100%**
The number of violations of any surface water treatment requirements: **NONE**
Turbidity (measured in NTU) is a measurement of the cloudiness of water and is a good indicator of water quality and filtration performance. Turbidity results which meet performance standards are considered to be in compliance with filtration requirements.

MICROBIOLOGICAL CONTAMINANTS

Type of Sample(s)	Parameter	Sampling Frequency	MCL	No. of Months in Violation	System Results Range	System Results Average
Distribution	Total Coliform Bacteria	104 - 154 / mo	5% positive	None	0.0 - 0.8%	0.07%
Distribution	Fecal Coliform/*E. coli*	104 - 154 / mo	1 pos. with 2 TC pos.	None	0%	0%

INORGANIC CONTAMINANTS

Parameter	Units	MCL	DLR	PHG or (MCLG)	RESULTS: Acton Plant Effluent (CWR) Range	Acton Plant Effluent (CWR) Average	Eastside Plant Effluent (CWR) Range	Eastside Plant Effluent (CWR) Average	Quartz Hill Plant Effluent (CWR) Range	Quartz Hill Plant Effluent (CWR) Average	Raw Influent (Source) Range	Raw Influent (Source) Average
Aluminum	mg/L	1	0.05	0.6	ND	ND	ND	ND	ND	ND		ND
Antimony	µg/L	6	6	20		ND		ND		ND		ND
Arsenic	µg/L	10	2	0.004		ND		ND		ND		ND
Barium	mg/L	1	0.1	2		ND		ND		ND		ND
Beryllium	µg/L	4	1	1		ND		ND		ND		ND
Cadmium	µg/L	5	1	0.04		ND		ND		ND		ND
Chromium (Total)	µg/L	50	10			ND		ND		ND		ND
Cyanide	µg/L	150	100	150		ND		ND		ND		ND
Fluoride	mg/L	2	0.1	1		ND		ND		ND		ND
Lead	µg/L		5	0.2		ND		ND		ND		ND
Mercury	µg/L	2	1	1.2		ND		ND		ND		ND
Nickel	µg/L	100	10	12		ND		ND		ND		ND
Nitrate (as NO3)	mg/L	45	2	45		ND		2.0		2.2	ND-3.6	2.2
Nitrite (as N)	mg/L	1	0.4	1		ND		ND		ND		ND
Nitrate+Nitrite (as N)	mg/L	10		10		ND		ND		1.0		1.0
Perchlorate	µg/L	6	4	6		ND		ND		ND		ND
Selenium	µg/L	50	5	30		ND		ND		ND		ND
Thallium	µg/L	2	1	0.1		ND		ND		ND		ND

RADIOLOGICAL CONTAMINANTS

Parameter	Units	MCL	DLR	PHG	RESULTS: Raw Influent (Source)
Gross Beta	pCi/L	50	4		<4.0 ± 1.06
Tritium	pCi/L	20000	1000	400	<1000 ± 115
Strontium 90	pCi/L	8	2	0.35	<2.0 ± 0.192

VOLATILE ORGANIC CONTAMINANTS

Parameter	Units	MCL	DLR	PHG	RESULTS: Raw Influent (Source)
1,1,1-Trichloroethane (1,1,1-TCA)	µg/L	200	0.5	100	ND
1,1,2,2-Tetrachloroethane	µg/L	1	0.5	0.1	ND
1,1,2-Trichloroethane (1,1,2-TCA)	µg/L	5	0.5	0.3	ND
1,1-Dichloroethane (1,1-DCA)	µg/L	5	0.5	3	ND
1,1-Dichloroethylene (1,1-DCE)	µg/L	6	0.5	10	ND
1,2,4-Trichlorobenzene	µg/L	5	0.5	5	ND
1,2-Dichlorobenzene (o-DCB)	µg/L	600	0.5	600	ND
1,2-Dichloroethane (1,2-DCA)	µg/L	0.5	0.5	0.4	ND
1,2-Dichloropropane	µg/L	5	0.5	0.5	ND
1,3-Dichloropropene (Total)	µg/L	0.5	0.5	0.2	ND
1,4-Dichlorobenzene (p-DCB)	µg/L	5	0.5	6	ND
Benzene	µg/L	1	0.5	0.15	ND
Carbon tetrachloride	µg/L	0.5	0.5	0.1	ND
cis-1,2-Dichloroethylene (c-1,2-DCE)	µg/L	6	0.5	100	ND
Dichloromethane (Methylene Chloride)	µg/L	5	0.5	4	ND
Ethylbenzene	µg/L	300	0.5	300	ND
Methyl-tert-butyl ether (MTBE)	µg/L	13	3	13	ND
Monochlorobenzene (Chlorobenzene)	µg/L	70	0.5	200	ND
Styrene	µg/L	100	0.5	0.5	ND
Tetrachloroethylene (PCE)	µg/L	5	0.5	0.06	ND
Toluene	µg/L	150	0.5	150	ND
trans-1,2-Dichloroethylene (t-1,2-DCE)	µg/L	10	0.5	60	ND
Trichloroethylene (TCE)	µg/L	5	0.5	1.7	ND
Trichlorofluromethane (Freon11)	µg/L	150	5	700	ND
Trichlorotrifluoroethane (Freon 113)	µg/L	1200	10	4000	ND
Vinyl Chloride (VC)	µg/L	0.5	0.5	0.05	ND
Xylenes (Total)	µg/L	1750	0.5	1800	<0.50

Antelope Valley-East Kern Water Agency
2011 Annual Water Quality Report - Los Angeles County System

GENERAL PHYSICAL AND SECONDARY STANDARDS

Parameter	Units	MCL	DLR	RESULTS: Acton Plant Effluent (CWR) Range	Acton Plant Effluent (CWR) Average	Eastside Plant Effluent (CWR) Range	Eastside Plant Effluent (CWR) Average	Quartz Hill Plant Effluent (CWR) Range	Quartz Hill Plant Effluent (CWR) Average	Raw Influent (Source) Range	Raw Influent (Source) Average
Aluminum	µg/L	200	50	ND	ND	ND	ND	ND	ND		ND
Calcium	mg/L	no standard			12		14		13		13
Chloride	mg/L	250			25		23		24		22
Color	Units	15		<1-<5	<5	<1-<5	<5	<1-<5	<5		
Copper	µg/L	1000	50		ND		ND		ND		ND
Foaming Agents (MBAS)	mg/L	0.5			<0.050		<0.050		<0.050		<0.050
Hardness (Total) as CaCO3	mg/L	no standard			55		62		60		60
Iron	µg/L	300	100		ND		ND		ND		ND
Magnesium	mg/L	no standard			6.1		6.8		6.5		6.5
Manganese	µg/L	50	20		ND		ND		ND		ND
Odor @ 60 C	Units	3	1	<1 - 1	<1	<1	<1	<1	<1		
pH	Units	no standard		6.1-8.9	6.5	5.8-7.9	6.6	6.1-7.6	6.5	6.7-8.4	7.6
Potassium	mg/L	no standard			<2.0		<2.0		<2.0		<2.0
Silver	µg/L	100	10		ND		ND		ND		ND
Sodium	mg/L	no standard			20		21		21		20
Specific Conductance	µmhos	900			250		240	157 - 439	277	141-430	261
Sulfate	mg/L	250	0.5		37		35		35		16
Thiobencarb (Bolero)	µg/L	1	1		ND		ND		ND		ND
Total Dissolved Solids	mg/L	500			150		140		140		130
Turbidity	Units	5		0.01-0.15	0.03	0.02-0.10	0.03	0.00-0.23	0.04		
Zinc	mg/L	5.0	0.050		0.180		0.520		0.550		ND
Total Alkalinity (as CaCO3)	mg/L	no standard			41		38		38	40-78	54
Bicarbonate Alkalinity(HCO3)	mg/L	no standard			50		47		46		
Carbonate Alkalinity	mg/L	no standard			<1.8		<1.8		<1.8		
Hydroxide Alkalinity	mg/L	no standard			<1.0		<1.0		<1.0		

DISINFECTION RESIDUAL, PRECURSORS, and BYPRODUCTS

Type of Sample(s)	Parameter	Units	MCL/MRDL	DLR	MRDLG	RESULTS Range	RESULTS Average
Distribution	Chlorine (as total Cl2)	mg/L	4.0**		4	0.04 - 1.70	0.85
Treated Water	Total Organic Carbon (TOC)	mg/L	Treatment Requirement	0.3		1.1 - 2.2	1.5
Source Water	Total Organic Carbon (TOC)	mg/L	Treatment Requirement	0.3		2.1 - 4.4	2.9
Distribution	Total Trihalomethanes	µg/L	80**	0.5		14 - 28	19 #
Distribution	Total Haloacetic Acids (5)	µg/L	60**	2		4.6 - 13	7.9 #
Treated Water	Bromate	µg/L	10*	5		ND-13.0	3.2

** Running Annual Average of distribution system samples. The MCLs are based upon Running Annual Averages.
# This average is a system-wide value, please see the attached summaries for site specific averages.
* Compliance is based on the running annual average computed quarterly, of monthly samples, collected at the entrance to the distribution system

DEFINITIONS and FOOTNOTES:

Plant Effluent, CWR, is finished, treated drinking water.
Raw Water is the Source Water, the California Aqueduct, prior to treatment.
Units: **mg/L** = milligrams per liter, parts per million (ppm)
µg/L = micrograms per liter, parts per billion (ppb)
µmhos = micromhos, a measure of specific conductance
MFL = million fibers per liter
pCi/L = pico Curies per liter
< = less than
> = greater than
ND = none detected above the DLR
NTU = nephelometric turbidity unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.
MCL: Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. MCLs are set by the U.S. Environmental Protection Agency or the California Department of Public Health as close to the PHGs and MCLGs as is economically or technologically feasible.
MRDL: Maximum Residual Disinfectant Level. The level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap.
DLR: Detection Limit for purposes of Reporting.
(DL): Detection limit determined by the Laboratory when no DLR has been established.
MCLG: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.
MRDLG: Maximum Residual Disinfectant Level Goal. The level of a disinfectant added for water treatment below which there is no known or expected risk to health. MRDLGs are set by the U.S. Environmental Protection Agency.
PHG: Public Health Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Office of Environmental Health Hazard Assessment.
Primary Drinking Water Standard: Primary MCLs, specific treatment techniques adopted in lieu of primary MCLs, and monitoring and reporting requirements for MCLs that are specified in regulations.
Secondary Standards: Aesthetic standards established by the California Department of Public Health.
AL: Action Level. There is no MCL, if this level is exceeded, action is required by the Califronia Department of Public Health.
This average is a system-wide value, please see the attached summary for site specific averages.
** Total Trihalomethanes and Haloacetic Acids(5) MCLs an annual running average of distribution system samples.
*** A corrosion inhibitor is added to the treated water before entry into the distribution system
All analyses performed by the ELAP certified laboratories: AVEK Water Agency, BSK Analytical Laboratories, or BSK subcontract lab.

ACTON, EASTSIDE & QUARTZ HILL WATER TREATMENT PLANTS

Distribution System & Disinfection Byproducts
Finished Drinking Water
Monitoring Results

State of California
Drinking Water Program

Department of Public Health

Quarterly TTHM Report for Disinfection Byproducts Compliance Based on Flow-Weighted Averages (in mg/L or ppb)

System Name: Antelope Valley-East Kern Water Agency System No.: 1910045 Year: 2011 Quarter: 4th

	Year:	2007				2008				2009				2010				2011			
	Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
	Sample Date (month/date):	3/15	6/21	9/21	12/20	3/20	6/19	9/18	12/15	3/19	6/18	9/17	12/17	3/18	6/17	9/16	12/16	3/17	6/16	9/15	12/15
Facility 1	Site 1	42.6	58	80	79	64	69	53	45	77	99	66	33	33	32	40	62	39	38	32	27
	Site 2	32.0	47	60	50	53	50	36	70	36	69	27	19	13	21	16	14	20	12	15	13*
	Site 3	24.8	42	48	44	33	39	27	40	110	58	23	21	15	19	13	7.9	21	14	9.2	9.2
	Site 4	43.4	47	54	44	69	44	28	65	43	55	17	16	9.5	14	12	8.7	30	8.9	8.8	8.5
	Quarterly Average	35.7	48.5	60.5	54.3	54.8	50.5	36.0	55.0	66.5	70.3	33.3	22.3	17.6	21.5	20.3	23.2	27.5	18.2	16.3	14.4
Facility 2	Site 5	59.1	47	63	45	15	47	29	16	off	60	39	11	16	31	28	23	off	13	12	1.7
	Site 6	52.5	51	76	51	21	55	31	36	off	71	48	13	19	41	27	26	off	19	15	3.2
	Site 7	80.1	64	84	48	15	70	38	44	off	90	50	20	7.3	52	32	23	off	26	29	2.5
	Site 8	77.7	60	101	59	19	63	38	44	off	84	63	17	23	50	34	38	off	23	25	2.1
	Quarterly Average	67.4	55.5	81.0	50.8	17.5	58.8	34.0	35.0	off	76.3	50.0	15.3	16.3	43.5	30.3	27.5	off	20.3	20.3	2.4
Facility 3	Site 9	116.0	84	109	off	off	35	43	off	off	85	78	off	off	59	38	45	off	48	32	off
	Site 10	119.0	86	99	off	off	35	42	off	off	84	66	off	off	60	34	43	off	50	30	off
	Site 11	96.5	68	92	off	off	27	31	off	off	60	41	off	off	36	26	7.8	off	40	22	off
	Site 12	101.0	76	93	off	off	28	33	off	off	59	38	off	off	35	27	7.9	off	40	22	off
	Quarterly Average	108.1	78.5	98.3	off	off	31.3	37.3	off	off	72.0	55.8	off	off	47.5	31.3	25.9	off	44.5	26.5	off
System-Wide Quarterly Weighted Ave.		39.4	49.6	63.2	54.0	51.2	50.9	35.9	49.1	66.5	70.8	35.0	21.4	17.5	22.9	21.1	23.5	27.5	18.5	16.8	13.6
System-Wide Running Annual Ave.		29.4	34.2	45.0	51.6	54.5	54.8	48.0	46.8	50.6	55.6	55.4	48.4	36.2	24.2	20.7	21.3	23.8	22.7	21.6	19.1
Meets Standard* (check box)		Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐
Number of Samples Taken		12	12	12	8	8	12	12	8	4	12	12	8	8	12	12	12	4	12	12	8

Identify the treatment facility and associated sample locations in the table below. For systems using weighted averages to calculate system-wide quarterly averages (in accordance with an approved monitoring plan), the fraction of flow for each treatment facility should be reported in the box provided following each treatment facility name.

Facility 1: Quartz Hill		0.93	Facility 2: Eastside		0.05	Facility 3: Acton		0.02
Site	Location	fraction of flow	Site	Location	fraction of flow	Site	Location	fraction of flow
1	LVAV		5	E. 116th St.		9	Vincent 1	
2	Ave. M/ 5th St.		6	Ave. R/ 110th St. E.		10	Vincent 2	
3	QHWD		7	E. 177th St.		11	Acton TWR 1	
4	Ave. L-12/ 60th		8	E. 165th St.		12	Acton TWR 2	

Signature

1/3/12
Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

Current Year Comments: The fraction of flow for each treatment facility is calculated quarterly based upon actual flow: 09/15/11 - 12/15/11: Quartz Hill 2566.9MG (0.932), Eastside 146.1MG (0.053). Acton 39.8MG (0.015). Acton WTP shut down beginning Nov. 17. Facility 1, Site 2 sample collected at 10th/N (next nearest sample point) rather than Ave. M/5th St. due to ongoing construction.

State of California
Drinking Water Program

Department of Public Health

Quarterly HAA5 Report for Disinfection Byproducts Compliance Based on Flow-Weighted Averages (in µg/L or ppb)

System Name: Antelope Valley-East Kern Water Agency System No.: 1910045 Year: 2011 Quarter: 4th

	Year:	2007				2008				2009				2010				2011			
	Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
	Sample Date (month/date):	3/15	6/21	9/21	12/20	3/20	6/19	9/18	12/15	3/19	6/18	9/17	12/17	3/18	6/17	9/16	12/16	3/17	6/16	9/15	12/15
Facility 1	Site 1	35.0	16	18	15	16	12	11	6.9	9.2	20	26	11	10	13	16	16	22	7.9	15	8.1
	Site 2	26.7	12	14	7.4	16	7.2	5.8	12.0	8.0	16	9.1	6.0	9.3	7.2	6.8	6.2	8.3	3.7	9.0	4.7*
	Site 3	23.4	11	12	7.6	8	5.8	3.5	7.1	21	13	7.9	6.0	4.9	8.0	5.9	5.6	8.4	3.5	4.5	3.1
	Site 4	22.6	11	12	8.1	17	7.4	4.6	9.7	15	14	4.9	5.6	4.1	6.6	6.0	6.4	15	5.8	4.2	3.5
	Quarterly Average	26.9	12.5	14.0	9.5	14.2	8.1	6.2	8.9	13.3	15.8	12.0	7.2	7.1	8.7	8.7	8.6	13.4	5.2	8.2	4.9
Facility 2	Site 5	27.2	13	14	8.6	3.4	5.1	ND	1.9	off	13	13	4.4	5.4	15	12	8.2	off	3.0	3.8	ND
	Site 6	31.3	14	17	7.4	4.0	7.1	4.1	6.3	off	16	14	4.8	5.6	16	11	9.2	off	3.6	8.8	ND
	Site 7	32.5	1.2	19.0	7.8	2.7	11	4.8	7.3	off	24	14	6.3	1.7	19	15	6.9	off	5.5	12	ND
	Site 8	34.2	16	17	11	3.7	12	5.2	6.8	off	16	16	5.5	7.9	20	15	12	off	4.1	11	ND
	Quarterly Average	31.3	11.1	16.8	8.7	3.5	8.8	3.5	5.6	off	17.3	14.3	5.3	5.2	17.5	13.3	9.1	off	4.1	8.9	ND
Facility 3	Site 9	56.3	20	21	off	off	3.9	6.7	off	off	15	13	off	off	23	15	12	off	13	13	off
	Site 10	59.6	20	22	off	off	3.7	6.5	off	off	15	13	off	off	24	15	13	off	12	11	off
	Site 11	50.6	18	18	off	off	3.3	4.6	off	off	13	8.6	off	off	13	11	6.2	off	8.2	8.5	off
	Site 12	50.9	18	18	off	off	3.4	5.0	off	off	14	8.6	off	off	9.0	11	6.1	off	8.0	10	off
	Quarterly Average	54.4	19.0	19.8	off	off	3.6	5.7	off	off	14.3	10.8	off	off	17.3	13.0	9.3	off	10.3	10.6	off
System-Wide Quarterly Weighted		27.7	12.4	14.4	9.4	13.2	8.1	5.9	7.9	13.3	15.9	12.2	7.0	7.0	9.3	9.1	8.6	13.4	5.2	8.3	4.6
System-Wide Running Annual Ave.		21.3	19.4	18.1	16.0	12.3	11.3	9.2	8.8	8.8	10.8	12.3	12.1	10.5	8.9	8.1	8.5	10.1	9.1	8.9	7.9
Meets Standard (check box)		Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐
Number of Samples Taken		12	12	12	8	8	12	11	8	4	12	12	8	8	12	12	12	4	12	12	8

Identify the treatment facility and associated sample locations in the table below. For systems using weighted averages to calculate system-wide quarterly averages (in accordance with an approved monitoring plan), the fraction of flow for each treatment facility should be reported in the box provided following each treatment facility name.

Facility 1: Quartz Hill		0.93	Facility 2: Eastside		0.05	Facility 3: Acton		0.02
Site	Location	fraction of flow	Site	Location	fraction of flow	Site	Location	fraction of flow
1	LVAV		5	E. 116th St.		9	Vincent 1	
2	Ave. M/ 5th St.		6	Ave. R/ 110th St. E.		10	Vincent 2	
3	QHWD		7	E. 177th St.		11	Acton TWS 1	
4	Ave. L-12/ 60th		8	E. 165th St.		12	Acton TWS 2	

Signature

7/13/12
Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

Current Year Comments: The fraction of flow for each treatment facility is calculated quarterly based upon actual flow: 09/15/11 - 12/15/11: Quartz Hill 2566.9MG (0.932), Eastside 146.1MG (0.053). Acton 39.8MG (0.015). Acton WTP shut down beginning Nov. 17. Facility 1, Site 2 sample collected at 10th/N (next nearest sample point) rather than Ave. M/5th St. due to ongoing construction.

State of California
Drinking Water Program

Department of Public Health

Quarterly Bromate Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: Antelope Valley-East Kern Water Agency System No.: 1910045 Year: 2011 Quarter: 4th

	2010				1st Qtr.				2nd Qtr.				3rd Qtr.				4th Qtr.			
Sample Date (month/date):	1st Q	2nd Q	3rd Q	4th Q	1/12	2/9	3/9	Quarterly Average	4/13	5/11	6/8	Quarterly Average	7/14	8/10	9/14	Quarterly Average	10/12	11/9	12/14	Quarterly Average
Site 1					3.9	3.1	3.2	3.4	2.4	ND	3.8	2.1	2.2	6.1	4.5	4.3	2.7	1.7	3.2	2.5
Site 2					OFF	OFF	OFF		OFF	ND	2.4	1.2	2.2	4.2	3.4	3.3	2.3	3.4	OFF	2.9
Site 3					OFF	OFF	OFF		OFF	1.1	2.2	1.6	1.9	5.2	13.0	6.7	3.5	4.6	OFF	4.1
System Quarterly Average								3.4				1.6				4.7				3.1
Running Annual Average								**3.4**				**2.5**				**3.3**				**3.2**
Meets Standard?* (check box)								Yes ☑ No ☐				Yes ☑ No ☐				Yes ☑ No ☐				Yes ☑ No ☐

Identify the sample locations in the table below.

Site	Sample Location
1	Quartz Hill Clear Well Reservoir
2	Eastside Clear Well Reservoir
3	Acton Clear Well Reservoir

Comments: Samples collected at the entry point to the distribution system for each treatment plant using ozone. "OFF" denotes treatment plant shutdown.

FIRST YEAR OF COMPLIANCE MONITORING

Signature

1/13/12
Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

State of California
Drinking Water Program

Department of Health Services

Quarterly Report for Disinfectant Residuals Compliance For Systems Using Chlorine or Chloramines

System Name: Antelope Valley-East Kern Water Agency System No.: 1910045

Calendar Year: 2011 Quarter: 4th

1st Quarter			
	Month	Number of Samples Taken	Monthly Ave. Chlorine Level (mg/L)
Previous Year	April		0.82
	May		0.87
	June		0.85
	July		0.85
	August		0.91
	September		0.75
	October		0.80
	November		0.83
	December		0.83
Current Year	January	108	0.86
	February	108	0.85
	March	137	0.89
Running Annual Average (RAA):			0.84
Meets standard? (i.e. RAA < MRDL of 4.0 mg/L as Cl2)			YES

2nd Quarter			
	Month	Number of Samples Taken	Monthly Ave. Chlorine Level (mg/L)
Previous Year	July		0.85
	August		0.91
	September		0.75
	October		0.80
	November		0.83
	December		0.83
Current Year	January		0.86
	February		0.85
	March		0.89
	April	115	0.88
	May	153	0.90
	June	122	0.83
Running Annual Average (RAA):			0.85
Meets standard? (i.e. RAA < MRDL of 4.0 mg/L as Cl2)			YES

3rd Quarter			
	Month	Number of Samples Taken	Monthly Ave. Chlorine Level (mg/L)
Previous Yr	October		0.80
	November		0.83
	December		0.83
Current Year	January		0.86
	February		0.85
	March		0.89
	April		0.88
	May		0.90
	June		0.83
	July	124	0.83
	August	154	0.84
	September	124	0.84
Running Annual Average (RAA):			0.85
Meets standard? (i.e. RAA < MRDL of 4.0 mg/L as Cl2)			YES

4th Quarter			
	Month	Number of Samples Taken	Monthly Ave. Chlorine Level (mg/L)
Current Year	January		0.86
	February		0.85
	March		0.89
	April		0.88
	May		0.90
	June		0.83
	July		0.83
	August		0.84
	September		0.84
	October	123	0.81
	November	153	0.85
	December	104	0.81
Running Annual Average (RAA):			0.85
Meets standard? (i.e. RAA < MRDL of 4.0 mg/L as Cl2)			YES

Comments:

Signature: Date: 1/13/12

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Antelope Valley East Kern Water Agency
6500 W. Avenue N
Palmdale, CA 93551

Report Issue Date: 03/28/2011 16:19
Received Date: 03/18/2011
Received Time: 08:30

Lab Sample ID: A1C1448-01
Sample Date: 03/17/2011 09:40
Sample Type: Grab

Sampled by: Eric Kane
Matrix: Water

Sample Description: LVAV (Cal Water)

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**14**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Bromoform	EPA 524.2	**3.6**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Chloroform	EPA 524.2	**9.3**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Dibromochloromethane	EPA 524.2	**13**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Surrogate: Bromofluorobenzene	EPA 524.2	99 %		*Acceptable range: 70-130 %*					
Trihalomethanes by GC-MS									
Total Trihalomethanes	EPA 524.2	**39**		ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA) (2C)	EPA 552.2	**5.2**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Dichloroacetic Acid (DCAA) (2C)	EPA 552.2	**8.3**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	**1.1**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	**3.4**	2.0	ug/L	1	A103158	03/23/11	03/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	**3.8**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	114 %		*Acceptable range: 70-130 %*					
Surrogate: 2,3-Dibromopropionic Acid (2C)	EPA 552.2	107 %		*Acceptable range: 70-130 %*					
Haloacetic Acids by GC-ECD									
Total Haloacetic Acids (HAA)	EPA 552.2	**22**		ug/L					

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Report Issue Date: 03/28/2011 16:19
Received Date: 03/18/2011
Received Time: 08:30

Lab Sample ID: A1C1448-02
Sample Date: 03/17/2011 08:40
Sample Type: Grab

Sampled by: Eric Kane
Matrix: Water

Sample Description: 5th/M

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**6.7**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Bromoform	EPA 524.2	**2.5**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Chloroform	EPA 524.2	**3.0**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Dibromochloromethane	EPA 524.2	**8.6**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Surrogate: Bromofluorobenzene	EPA 524.2	98 %		*Acceptable range: 70-130 %*					
Trihalomethanes by GC-MS									
Total Trihalomethanes	EPA 524.2	**20**		ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA) (2C)	EPA 552.2	**3.7**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Dichloroacetic Acid (DCAA) (2C)	EPA 552.2	**3.3**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A103158	03/23/11	03/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	**1.3**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	115 %		*Acceptable range: 70-130 %*					
Surrogate: 2,3-Dibromopropionic Acid (2C)	EPA 552.2	111 %		*Acceptable range: 70-130 %*					
Haloacetic Acids by GC-ECD									
Total Haloacetic Acids (HAA)	EPA 552.2	**8.3**		ug/L					

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Report Issue Date: 03/28/2011 16:19
Received Date: 03/18/2011
Received Time: 08:30

Lab Sample ID: A1C1448-03
Sample Date: 03/17/2011 09:05
Sample Type: Grab

Sampled by: Eric Kane
Matrix: Water

Sample Description: QHWD(50th/N)

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**6.2**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Bromoform	EPA 524.2	**2.8**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Chloroform	EPA 524.2	**3.3**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Dibromochloromethane	EPA 524.2	**8.5**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Surrogate: Bromofluorobenzene	EPA 524.2	100 %		*Acceptable range: 70-130 %*					
Trihalomethanes by GC-MS									
Total Trihalomethanes	EPA 524.2	21		ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA) (2C)	EPA 552.2	**3.5**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Dichloroacetic Acid (DCAA) (2C)	EPA 552.2	**3.6**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A103158	03/23/11	03/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	**1.3**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	114 %		*Acceptable range: 70-130 %*					
Surrogate: 2,3-Dibromopropionic Acid (2C)	EPA 552.2	111 %		*Acceptable range: 70-130 %*					
Haloacetic Acids by GC-ECD									
Total Haloacetic Acids (HAA)	EPA 552.2	**8.4**		ug/L					

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Report Issue Date: 03/28/2011 16:19
Received Date: 03/18/2011
Received Time: 08:30

Lab Sample ID: A1C1448-04
Sample Date: 03/17/2011 09:15
Sample Type: Grab

Sampled by: Eric Kane
Matrix: Water

Sample Description: L-12/60th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**9.7**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Bromoform	EPA 524.2	**3.0**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Chloroform	EPA 524.2	**5.9**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Dibromochloromethane	EPA 524.2	**11**	0.50	ug/L	1	A103209	03/24/11	03/25/11	
Surrogate: Bromofluorobenzene	EPA 524.2	95 %		*Acceptable range: 70-130 %*					
Trihalomethanes by GC-MS									
Total Trihalomethanes	EPA 524.2	**30**		ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA) (2C)	EPA 552.2	**4.3**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Dichloroacetic Acid (DCAA) (2C)	EPA 552.2	**6.1**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	**2.8**	2.0	ug/L	1	A103158	03/23/11	03/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	**1.9**	1.0	ug/L	1	A103158	03/23/11	03/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	110 %		*Acceptable range: 70-130 %*					
Surrogate: 2,3-Dibromopropionic Acid (2C)	EPA 552.2	109 %		*Acceptable range: 70-130 %*					
Haloacetic Acids by GC-ECD									
Total Haloacetic Acids (HAA)	EPA 552.2	**15**		ug/L					

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Report Issue Date: 06/30/2011 16:50
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1514-01
Sample Date: 06/16/2011 07:49
Sample Type: Grab

Sampled by: Erik Kane / Mark Allgood
Matrix: Water

Sample Description: VIN 1

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**14**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	**8.0**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	**4.6**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	**22**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	101 %		*Acceptable range: 70-130 %*					
Total Trihalomethanes, EPA 524.2		**48**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**7.3**	1.0	ug/L	1	A107406	06/22/11	06/24/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**2.9**	1.0	ug/L	1	A107406	06/22/11	06/24/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	**1.0**	1.0	ug/L	1	A107406	06/22/11	06/24/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107406	06/22/11	06/24/11	
Total Haloacetic Acids, EPA 552.2		**13**	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	**1.4**	1.0	ug/L	1	A107406	06/22/11	06/24/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	86 %		*Acceptable range: 70-130 %*					

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Antelope Valley East Kern Water Agency
6500 W. Avenue N
Palmdale, CA 93551

Report Issue Date: 06/30/2011 16:50
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1514-02
Sample Date: 06/16/2011 07:52
Sample Type: Grab

Sampled by: Erik Kane / Mark Allgood
Matrix: Water

Sample Description: VIN 2

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**14**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	**9.0**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	**4.8**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	**22**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	105 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**50**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**7.5**	1.0	ug/L	1	A107523	06/24/11	06/27/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**2.9**	1.0	ug/L	1	A107523	06/24/11	06/27/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/27/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107523	06/24/11	06/27/11	
Total Haloacetic Acids, EPA 552.2		**12**	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	**1.4**	1.0	ug/L	1	A107523	06/24/11	06/27/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	98 %		*Acceptable range: 70-130 %*					

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Palmdale, CA 93551

Report Issue Date: 06/30/2011 16:50
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1514-03
Sample Date: 06/16/2011 09:00
Sample Type: Grab

Sampled by: Erik Kane / Mark Allgood
Matrix: Water

Sample Description: TWR1

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**10**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	**8.0**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	**3.1**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	**19**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	109 %		*Acceptable range: 70-130 %*					
Total Trihalomethanes, EPA 524.2		**40**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**6.4**	1.0	ug/L	1	A107523	06/24/11	06/27/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**1.8**	1.0	ug/L	1	A107523	06/24/11	06/27/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/27/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107523	06/24/11	06/27/11	
Total Haloacetic Acids, EPA 552.2		**8.2**	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/27/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	100 %		*Acceptable range: 70-130 %*					

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Report Issue Date: 06/30/2011 16:50
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1514-04
Sample Date: 06/16/2011 09:00
Sample Type: Grab
Sampled by: Erik Kane / Mark Allgood
Matrix: Water

Sample Description: TWR2

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	10	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	8.2	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	3.1	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	19	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	111 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		40	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	6.3	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	1.8	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107523	06/24/11	06/28/11	
Total Haloacetic Acids, EPA 552.2		8.0	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	99 %		*Acceptable range: 70-130 %*					

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Report Issue Date: 06/30/2011 16:50
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1514-05
Sample Date: 06/16/2011 07:00
Sample Type: Grab
Sampled by: Erik Kane / Mark Allgood
Matrix: Water

Sample Description: 116TH

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**2.7**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	**3.3**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	**0.86**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	**6.0**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	108 %		*Acceptable range: 70-130 %*					
Total Trihalomethanes, EPA 524.2		**13**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**3.0**	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107523	06/24/11	06/28/11	
Total Haloacetic Acids, EPA 552.2		**3.0**	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	102 %		*Acceptable range: 70-130 %*					

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Report Issue Date: 06/30/2011 16:50
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1514-06
Sample Date: 06/16/2011 07:20
Sample Type: Grab
Sampled by: Erik Kane / Mark Allgood
Matrix: Water

Sample Description: 110th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**4.0**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	**4.9**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	**1.4**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	**8.8**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	110 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**19**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**3.6**	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107523	06/24/11	06/28/11	
Total Haloacetic Acids, EPA 552.2		**3.6**	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	99 %		*Acceptable range: 70-130 %*					

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Report Issue Date: 06/30/2011 16:50
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1514-07
Sample Date: 06/16/2011 07:55
Sample Type: Grab

Sampled by: Erik Kane / Mark Allgood
Matrix: Water

Sample Description: 177th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**5.9**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	**5.9**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	**1.8**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	**12**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	107 %		*Acceptable range: 70-130 %*					
Total Trihalomethanes, EPA 524.2		**26**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**4.4**	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**1.0**	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107523	06/24/11	06/28/11	
Total Haloacetic Acids, EPA 552.2		**5.6**	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	96 %		*Acceptable range: 70-130 %*					

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Report Issue Date: 06/30/2011 16:50
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1514-08
Sample Date: 06/16/2011 07:40
Sample Type: Grab
Sampled by: Erik Kane / Mark Allgood
Matrix: Water

Sample Description: 165th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	5.4	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	5.3	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	1.7	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	11	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	108 %		*Acceptable range: 70-130 %*					
Total Trihalomethanes, EPA 524.2		23	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	4.1	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107523	06/24/11	06/28/11	
Total Haloacetic Acids, EPA 552.2		4.1	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A107523	06/24/11	06/28/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	94 %		*Acceptable range: 70-130 %*					

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Report Issue Date: 06/28/2011 21:37
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1511-01
Sample Date: 06/16/2011 10:40
Sample Type: Grab
Sampled by: John Laux/Josh Ball
Matrix: Water

Sample Description: LVAV (Cal Water)

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**11**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	**6.8**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	**3.8**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	**16**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	105 %		*Acceptable range: 70-130 %*					
Total Trihalomethanes, EPA 524.2		**38**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**5.5**	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**2.4**	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107405	06/22/11	06/24/11	
Total Haloacetic Acids, EPA 552.2		**7.9**	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	87 %		*Acceptable range: 70-130 %*					

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Report Issue Date: 06/28/2011 21:37
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1511-02
Sample Date: 06/16/2011 09:40
Sample Type: Grab

Sampled by: John Laux/Josh Ball
Matrix: Water

Sample Description: 5th/M

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**3.5**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	**2.1**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	**1.3**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	**5.6**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	94 %		*Acceptable range: 70-130 %*					
Total Trihalomethanes, EPA 524.2		**12**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**2.6**	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**1.1**	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107405	06/22/11	06/24/11	
Total Haloacetic Acids, EPA 552.2		**3.7**	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	85 %		*Acceptable range: 70-130 %*					

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Report Issue Date: 06/28/2011 21:37
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1511-03
Sample Date: 06/16/2011 10:00
Sample Type: Grab

Sampled by: John Laux/Josh Ball
Matrix: Water

Sample Description: QHWD (50TH/N)

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**3.8**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	**2.1**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	**1.6**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	**6.2**	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	93 %		*Acceptable range: 70-130 %*					
Total Trihalomethanes, EPA 524.2		**14**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**2.3**	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**1.2**	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107405	06/22/11	06/24/11	
Total Haloacetic Acids, EPA 552.2		**3.5**	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A107405	06/22/11	06/24/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	82 %		*Acceptable range: 70-130 %*					

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Report Issue Date: 06/28/2011 21:37
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1511-04
Sample Date: 06/16/2011 09:15
Sample Type: Grab
Sampled by: John Laux/Josh Ball
Matrix: Water

Sample Description: L-12/60TH

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	2.1	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Bromoform	EPA 524.2	2.0	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Chloroform	EPA 524.2	0.80	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Dibromochloromethane	EPA 524.2	4.0	0.50	ug/L	1	A107313	06/20/11	06/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	108 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		8.9	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	4.4	1.0	ug/L	1	A107406	06/22/11	06/24/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	1.4	1.0	ug/L	1	A107406	06/22/11	06/24/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A107406	06/22/11	06/24/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A107406	06/22/11	06/24/11	
Total Haloacetic Acids, EPA 552.2		5.8	1.0	ug/L					
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A107406	06/22/11	06/24/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	87 %		*Acceptable range: 70-130 %*					

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Report Issue Date: 09/30/2011 14:47
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1335-01
Sample Date: 09/15/2011 06:46
Sample Type: Grab

Sampled by: Terry Brown
Matrix: Water

Sample Description: VIN1

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**9.1**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Bromoform	EPA 524.2	**5.4**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Chloroform	EPA 524.2	**3.8**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Dibromochloromethane	EPA 524.2	**14**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Surrogate: Bromofluorobenzene	EPA 524.2	113 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**32**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**6.7**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**2.8**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	**3.1**	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	99 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**13**	2.0	ug/L					

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Palmdale, CA 93551

Report Issue Date: 09/30/2011 14:47
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1335-02
Sample Date: 09/15/2011 06:45
Sample Type: Grab

Sampled by: Terry Brown
Matrix: Water

Sample Description: VIN2

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**8.8**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Bromoform	EPA 524.2	**4.7**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Chloroform	EPA 524.2	**3.5**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Dibromochloromethane	EPA 524.2	**13**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Surrogate: Bromofluorobenzene	EPA 524.2	99 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**30**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**7.3**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**3.0**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	**1.1**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	109 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**11**	2.0	ug/L					

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Report Issue Date: 09/30/2011 14:47
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1335-03
Sample Date: 09/15/2011 07:01
Sample Type: Grab

Sampled by: Terry Brown
Matrix: Water

Sample Description: TWR1

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**6.2**	0.50	ug/L	1	A111549	09/26/11	09/27/11	
Bromoform	EPA 524.2	**3.7**	0.50	ug/L	1	A111549	09/26/11	09/27/11	
Chloroform	EPA 524.2	**2.2**	0.50	ug/L	1	A111549	09/26/11	09/27/11	
Dibromochloromethane	EPA 524.2	**10**	0.50	ug/L	1	A111549	09/26/11	09/27/11	
Surrogate: Bromofluorobenzene	EPA 524.2	100 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**22**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**6.6**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**1.9**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	106 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**8.5**	2.0	ug/L					

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Report Issue Date: 09/30/2011 14:47
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1335-04
Sample Date: 09/15/2011 07:02
Sample Type: Grab

Sampled by: Terry Brown
Matrix: Water

Sample Description: TWR2

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**6.1**	0.50	ug/L	1	A111549	09/26/11	09/27/11	
Bromoform	EPA 524.2	**3.4**	0.50	ug/L	1	A111549	09/26/11	09/27/11	
Chloroform	EPA 524.2	**2.1**	0.50	ug/L	1	A111549	09/26/11	09/27/11	
Dibromochloromethane	EPA 524.2	**10**	0.50	ug/L	1	A111549	09/26/11	09/27/11	
Surrogate: Bromofluorobenzene	EPA 524.2	97 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**22**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**6.2**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**1.9**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	**2.1**	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	103 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**10**	2.0	ug/L					

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Report Issue Date: 09/30/2011 14:49
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1322-01
Sample Date: 09/15/2011 07:58
Sample Type: Grab

Sampled by: Justin Livesay
Matrix: Water

Sample Description: 116th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**2.7**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Bromoform	EPA 524.2	**2.8**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Chloroform	EPA 524.2	**1.1**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Dibromochloromethane	EPA 524.2	**5.8**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Surrogate: Bromofluorobenzene	EPA 524.2	110 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**12**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**3.8**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	100 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**3.8**	2.0	ug/L					

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Report Issue Date: 09/30/2011 14:49
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1322-02
Sample Date: 09/15/2011 08:12
Sample Type: Grab

Sampled by: Justin Livesay
Matrix: Water

Sample Description: 110th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**3.3**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Bromoform	EPA 524.2	**3.3**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Chloroform	EPA 524.2	**1.3**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Dibromochloromethane	EPA 524.2	**6.8**	0.50	ug/L	1	A111548	09/23/11	09/28/11	
Surrogate: Bromofluorobenzene	EPA 524.2	110 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**15**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**6.5**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**1.1**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	**2.2**	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	110 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**8.8**	2.0	ug/L					

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Report Issue Date: 09/30/2011 14:49
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1322-03
Sample Date: 09/15/2011 08:39
Sample Type: Grab

Sampled by: Justin Livesay
Matrix: Water

Sample Description: 177th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**8.3**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Bromoform	EPA 524.2	**5.0**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Chloroform	EPA 524.2	**3.3**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Dibromochloromethane	EPA 524.2	**12**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Surrogate: Bromofluorobenzene	EPA 524.2	99 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**29**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**6.3**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**2.5**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	**3.3**	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	101 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**12**	2.0	ug/L					

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Report Issue Date: 09/30/2011 14:49
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1322-04
Sample Date: 09/15/2011 08:50
Sample Type: Grab

Sampled by: Justin Livesay
Matrix: Water

Sample Description: 165th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**6.9**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Bromoform	EPA 524.2	**4.5**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Chloroform	EPA 524.2	**2.7**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Dibromochloromethane	EPA 524.2	**11**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Surrogate: Bromofluorobenzene	EPA 524.2	105 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**25**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**6.4**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**2.0**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	**2.4**	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	104 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**11**	2.0	ug/L					

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Report Issue Date: 09/30/2011 14:49
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1322-05
Sample Date: 09/15/2011 12:00
Sample Type: Grab

Sampled by: Justin Livesay
Matrix: Water

Sample Description: LVAV

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**10**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Bromoform	EPA 524.2	**4.0**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Chloroform	EPA 524.2	**5.5**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Dibromochloromethane	EPA 524.2	**13**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Surrogate: Bromofluorobenzene	EPA 524.2	108 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**32**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**5.9**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**3.9**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	**3.8**	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	**1.1**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	105 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**15**	2.0	ug/L					

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Report Issue Date: 09/30/2011 14:49
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1322-06
Sample Date: 09/15/2011 09:55
Sample Type: Grab

Sampled by: Justin Livesay
Matrix: Water

Sample Description: 5th/M

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**4.0**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Bromoform	EPA 524.2	**2.5**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Chloroform	EPA 524.2	**1.9**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Dibromochloromethane	EPA 524.2	**6.6**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Surrogate: Bromofluorobenzene	EPA 524.2	110 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**15**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**5.3**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**1.6**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	**2.1**	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	102 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**9.0**	2.0	ug/L					

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Report Issue Date: 09/30/2011 14:49
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1322-07
Sample Date: 09/15/2011 09:25
Sample Type: Grab

Sampled by: Justin Livesay
Matrix: Water

Sample Description: QHWD (70TH/M-8)

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**2.3**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Bromoform	EPA 524.2	**1.7**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Chloroform	EPA 524.2	**1.1**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Dibromochloromethane	EPA 524.2	**4.1**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Surrogate: Bromofluorobenzene	EPA 524.2	102 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**9.2**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**3.2**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**1.3**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	106 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**4.5**	2.0	ug/L					

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Report Issue Date: 09/30/2011 14:49
Received Date: 09/16/2011
Received Time: 10:20

Lab Sample ID: A1I1322-08
Sample Date: 09/15/2011 09:00
Sample Type: Grab

Sampled by: Justin Livesay
Matrix: Water

Sample Description: L-12/60th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**2.1**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Bromoform	EPA 524.2	**1.5**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Chloroform	EPA 524.2	**1.0**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Dibromochloromethane	EPA 524.2	**4.2**	0.50	ug/L	1	A111548	09/23/11	09/26/11	
Surrogate: Bromofluorobenzene	EPA 524.2	96 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**8.8**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**3.1**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**1.1**	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A111516	09/23/11	09/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A111516	09/23/11	09/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	108 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**4.2**	2.0	ug/L					

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Report Issue Date: 12/29/2011 16:01
Received Date: 12/16/2011
Received Time: 10:23

Lab Sample ID: A1L1253-01
Sample Date: 12/15/2011 08:02
Sample Type: Grab
Sampled by: Alan Morris
Matrix: Water

Sample Description: 116th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	ND	0.50	ug/L	1	A114821	12/20/11	12/20/11	
Bromoform	EPA 524.2	**0.94**	0.50	ug/L	1	A114821	12/20/11	12/20/11	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A114821	12/20/11	12/20/11	
Dibromochloromethane	EPA 524.2	**0.74**	0.50	ug/L	1	A114821	12/20/11	12/20/11	
Surrogate: Bromofluorobenzene	EPA 524.2	112 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**1.7**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A114995	12/24/11	12/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	94 %		*Acceptable range: 70-130 %*					
*Total Haloacetic Acids, EPA 552.2		ND	2.0	ug/L					

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Report Issue Date: 12/29/2011 16:01
Received Date: 12/16/2011
Received Time: 10:23

Lab Sample ID: A1L1253-02
Sample Date: 12/15/2011 08:20
Sample Type: Grab

Sampled by: Alan Morris
Matrix: Water

Sample Description: 110th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**0.69**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Bromoform	EPA 524.2	**1.3**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Dibromochloromethane	EPA 524.2	**1.2**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	100 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**3.2**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	ND	1.0	ug/L	1	A115036	12/27/11	12/28/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	ND	1.0	ug/L	1	A115036	12/27/11	12/28/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A115036	12/27/11	12/28/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A115036	12/27/11	12/28/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A115036	12/27/11	12/28/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	98 %		*Acceptable range: 70-130 %*					
*Total Haloacetic Acids, EPA 552.2		ND	2.0	ug/L					

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Report Issue Date: 12/29/2011 16:01
Received Date: 12/16/2011
Received Time: 10:23

Lab Sample ID: A1L1253-03
Sample Date: 12/15/2011 08:44
Sample Type: Grab
Sampled by: Alan Morris
Matrix: Water

Sample Description: 177th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**0.81**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Bromoform	EPA 524.2	**0.69**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Dibromochloromethane	EPA 524.2	**0.97**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	93 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**2.5**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A114995	12/24/11	12/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	98 %		*Acceptable range: 70-130 %*					
*Total Haloacetic Acids, EPA 552.2		ND	2.0	ug/L					

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Report Issue Date: 12/29/2011 16:01
Received Date: 12/16/2011
Received Time: 10:23

Lab Sample ID: A1L1253-04
Sample Date: 12/15/2011 09:00
Sample Type: Grab
Sampled by: Alan Morris
Matrix: Water

Sample Description: 165th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**0.60**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Bromoform	EPA 524.2	**0.72**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Dibromochloromethane	EPA 524.2	**0.79**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	100 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**2.1**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A114995	12/24/11	12/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	96 %		*Acceptable range: 70-130 %*					
*Total Haloacetic Acids, EPA 552.2		ND	2.0	ug/L					

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Report Issue Date: 12/29/2011 16:01
Received Date: 12/16/2011
Received Time: 10:23

Lab Sample ID: A1L1253-05
Sample Date: 12/15/2011 09:55
Sample Type: Grab
Sampled by: John Laux
Matrix: Water

Sample Description: LVAV

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	6.7	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Bromoform	EPA 524.2	5.8	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Chloroform	EPA 524.2	2.9	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Dibromochloromethane	EPA 524.2	12	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	100 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		27	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	4.8	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	3.3	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A114995	12/24/11	12/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	77 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		8.1	2.0	ug/L					

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Report Issue Date: 12/29/2011 16:01
Received Date: 12/16/2011
Received Time: 10:23

Lab Sample ID: A1L1253-06
Sample Date: 12/15/2011 11:20
Sample Type: Grab
Sampled by: John Laux
Matrix: Water

Sample Description: 10th/N

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**1.9**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Bromoform	EPA 524.2	**5.1**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Chloroform	EPA 524.2	**0.66**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Dibromochloromethane	EPA 524.2	**5.8**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	100 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**13**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**3.6**	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	**1.1**	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A114995	12/24/11	12/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	74 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**4.7**	2.0	ug/L					

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Report Issue Date: 12/29/2011 16:01
Received Date: 12/16/2011
Received Time: 10:23

Lab Sample ID: A1L1253-07
Sample Date: 12/15/2011 10:30
Sample Type: Grab
Sampled by: John Laux
Matrix: Water

Sample Description: QHWD (50th/N)

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**1.4**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Bromoform	EPA 524.2	**3.8**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Dibromochloromethane	EPA 524.2	**4.0**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	100 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**9.2**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**3.1**	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A114995	12/24/11	12/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	76 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**3.1**	2.0	ug/L					

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Report Issue Date: 12/29/2011 16:01
Received Date: 12/16/2011
Received Time: 10:23

Lab Sample ID: A1L1253-08
Sample Date: 12/15/2011 09:30
Sample Type: Grab
Sampled by: John Laux
Matrix: Water

Sample Description: L-12/60th

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Trihalomethanes by GC-MS									
Bromodichloromethane	EPA 524.2	**1.2**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Bromoform	EPA 524.2	**3.7**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Chloroform	EPA 524.2	ND	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Dibromochloromethane	EPA 524.2	**3.6**	0.50	ug/L	1	A114822	12/20/11	12/21/11	
Surrogate: Bromofluorobenzene	EPA 524.2	101 %		*Acceptable range: 70-130 %*					
***Total Trihalomethanes, EPA 524.2**		**8.5**	0.50	ug/L					
Haloacetic Acids by GC-ECD									
Dibromoacetic Acid (DBAA)	EPA 552.2	**3.5**	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Dichloroacetic Acid (DCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monobromoacetic Acid (MBAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Monochloroacetic Acid (MCAA)	EPA 552.2	ND	2.0	ug/L	1	A114995	12/24/11	12/25/11	
Trichloroacetic Acid (TCAA)	EPA 552.2	ND	1.0	ug/L	1	A114995	12/24/11	12/25/11	
Surrogate: 2,3-Dibromopropionic Acid	EPA 552.2	82 %		*Acceptable range: 70-130 %*					
***Total Haloacetic Acids, EPA 552.2**		**3.5**	2.0	ug/L					

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Report Issue Date: 01/20/2011 13:02
Received Date: 01/14/2011
Received Time: 08:16

Lab Sample ID: A1A0929-02
Sample Date: 01/12/2011 08:17
Sample Type: Grab

Sampled by: Terry Brown/Justin Livesay
Matrix: Water

Sample Description: QHWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0039**	0.0010	mg/L	1	A100708	01/18/11	01/18/11	
Bromide	EPA 300.1	**0.12**	0.0050	mg/L	1	A100761	01/19/11	01/19/11	

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Report Issue Date: 02/21/2011 22:41
Received Date: 02/11/2011
Received Time: 08:00

Lab Sample ID: A1B0918-01
Sample Date: 02/09/2011 12:26
Sample Type: Grab

Sampled by: Justin Livesay
Matrix: Water

Sample Description: QHWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0031**	0.0010	mg/L	1	A101764	02/14/11	02/14/11	
Bromide	EPA 300.1	**0.054**	0.0050	mg/L	1	A101970	02/16/11	02/16/11	

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Report Issue Date: 03/21/2011 15:22
Received Date: 03/10/2011
Received Time: 10:00

Lab Sample ID: A1C0841-01
Sample Date: 03/09/2011 08:58
Sample Type: Grab

Sampled by: Kat White/Terry Brown
Matrix: Water

Sample Description: QHWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0032**	0.0010	mg/L	1	A103072	03/18/11	03/18/11	
Bromide	EPA 300.1	**0.067**	0.0050	mg/L	1	A102811	03/11/11	03/11/11	

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Report Issue Date: 04/26/2011 8:51
Received Date: 04/14/2011
Received Time: 10:00

Lab Sample ID: A1D1095-01
Sample Date: 04/13/2011 07:49
Sample Type: Grab

Sampled by: Kat White
Matrix: Water

Sample Description: QHWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0024**	0.0010	mg/L	1	A104355	04/18/11	04/18/11	
Bromide	EPA 300.1	**0.075**	0.010	mg/L	2	A104489	04/20/11	04/20/11	

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Report Issue Date: 05/24/2011 14:18
Received Date: 05/13/2011
Received Time: 08:15

Lab Sample ID: A1E1050-01
Sample Date: 05/12/2011 11:15
Sample Type: Grab

Sampled by: Eric Kane
Matrix: Water

Sample Description: AWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0011**	0.0010	mg/L	1	A105885	05/17/11	05/17/11	
Bromide	EPA 300.1	**0.019**	0.0050	mg/L	1	A105820	05/17/11	05/17/11	

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Report Issue Date: 05/24/2011 14:07
Received Date: 05/12/2011
Received Time: 10:00

Lab Sample ID: A1E0923-03
Sample Date: 05/11/2011 06:31
Sample Type: Grab
Sample Control Qualifiers: SC02
Sample Description: EWTP CWR

Sampled by: Doug Paterson
Matrix: Water

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	ND	0.0010	mg/L	1	A105885	05/17/11	05/17/11	
Bromide	EPA 300.1	**0.019**	0.0050	mg/L	1	A105820	05/17/11	05/17/11	

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Report Issue Date: 05/24/2011 14:07
Received Date: 05/12/2011
Received Time: 10:00

Lab Sample ID: A1E0923-01
Sample Date: 05/11/2011 07:26
Sample Type: Grab
Sample Control Qualifiers: SC02
Sample Description: QHWTP CWR

Sampled by: Justin Livesay
Matrix: Water

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	ND	0.0010	mg/L	1	A105885	05/17/11	05/17/11	
Bromide	EPA 300.1	**0.022**	0.0050	mg/L	1	A105820	05/17/11	05/17/11	

A1E0923 FINAL 05242011 1407

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Report Issue Date: 06/28/2011 21:34
Received Date: 06/17/2011
Received Time: 08:00

Lab Sample ID: A1F1510-01
Sample Date: 06/09/2011 10:50
Sample Type: Grab

Sampled by: Eric Kane
Matrix: Water

Sample Description: AWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0022**	0.0010	mg/L	1	A107298	06/17/11	06/17/11	

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Report Issue Date: 6/23/2011 16:22
Received Date: 06/09/2011
Received Time: 08:00

Lab Sample ID: A1F0823-03
Sample Date: 06/08/2011 07:20
Sample Type: Grab

Sampled by: Doug Paterson
Matrix: Water

Sample Description: EWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0024**	0.0010	mg/L	1	A106996	06/10/11	06/10/11	

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Report Issue Date: 6/23/2011 16:22
Received Date: 06/09/2011
Received Time: 08:00

Lab Sample ID: A1F0823-01
Sample Date: 06/08/2011 09:05
Sample Type: Grab

Sampled by: Justin Livesay
Matrix: Water

Sample Description: QHWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0038**	0.0010	mg/L	1	A106996	06/10/11	06/10/11	

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Report Issue Date: 07/25/2011 11:55
Received Date: 07/15/2011
Received Time: 13:28

Lab Sample ID: A1G1182-04
Sample Date: 07/14/2011 11:30
Sample Type: Grab

Sampled by: Eric Kane
Matrix: Water

Sample Description: AWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0019**	0.0010	mg/L	1	A108587	07/21/11	07/21/11	

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Report Issue Date: 07/25/2011 11:55
Received Date: 07/15/2011
Received Time: 13:28

Lab Sample ID: A1G1182-03
Sample Date: 07/13/2011 06:14
Sample Type: Grab

Sampled by: Doug Paterson
Matrix: Water

Sample Description: EWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0022**	0.0010	mg/L	1	A108587	07/21/11	07/21/11	

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Report Issue Date: 07/25/2011 11:55
Received Date: 07/15/2011
Received Time: 13:28

Lab Sample ID: A1G1182-01
Sample Date: 07/13/2011 12:51
Sample Type: Grab
Sampled by: S. Livesly
Matrix: Water

Sample Description: QHWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0022**	0.0010	mg/L	1	A108587	07/21/11	07/21/11	

A1G1182 FINAL 07252011 1155

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Report Issue Date: 08/22/2011 13:16
Received Date: 08/12/2011
Received Time: 08:30

Lab Sample ID: A1H1232-04
Sample Date: 08/11/2011 10:00
Sample Type: Grab

Sampled by: Kat White
Matrix: Water

Sample Description: AWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0052**	0.0010	mg/L	1	A109808	08/15/11	08/15/11	

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Report Issue Date: 08/22/2011 13:16
Received Date: 08/12/2011
Received Time: 08:30

Lab Sample ID: A1H1232-03
Sample Date: 08/10/2011 08:10
Sample Type: Grab

Sampled by: Kat White
Matrix: Water

Sample Description: EWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0042**	0.0010	mg/L	1	A109808	08/15/11	08/15/11	

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Report Issue Date: 08/22/2011 13:16
Received Date: 08/12/2011
Received Time: 08:30

Lab Sample ID: A1H1232-01
Sample Date: 08/10/2011 10:10
Sample Type: Grab

Sampled by: Kat White
Matrix: Water

Sample Description: QHWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0061**	0.0010	mg/L	1	A109808	08/15/11	08/15/11	

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Report Issue Date: 09/28/2011 13:02
Received Date: 09/15/2011
Received Time: 09:50

Lab Sample ID: A11115-04
Sample Date: 09/14/2011 08:25
Sample Type: Grab

Sampled by: E. Kane
Matrix: Water

Sample Description: AWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.013**	0.0010	mg/L	1	A111571	09/23/11	09/23/11	

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Report Issue Date: 09/28/2011 13:02
Received Date: 09/15/2011
Received Time: 09:50

Lab Sample ID: A1I1115-03
Sample Date: 09/14/2011 07:06
Sample Type: Grab

Sampled by: S. Horn
Matrix: Water

Sample Description: EWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0034**	0.0010	mg/L	1	A111571	09/23/11	09/23/11	

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Report Issue Date: 09/28/2011 13:02
Received Date: 09/15/2011
Received Time: 09:50

Lab Sample ID: A1I1115-01
Sample Date: 09/14/2011 12:55
Sample Type: Grab

Sampled by: K. White
Matrix: Water

Sample Description: QHWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0045**	0.0010	mg/L	1	A111571	09/23/11	09/23/11	

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Report Issue Date: 11/01/2011 17:01
Received Date: 10/14/2011
Received Time: 10:00

Lab Sample ID: A1J1198-04
Sample Date: 10/12/2011 09:24
Sample Type: Grab

Sampled by: Doug Paterson
Matrix: Water

Sample Description: AWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0035**	0.0010	mg/L	1	A113042	10/31/11	10/31/11	

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Report Issue Date: 11/01/2011 17:01
Received Date: 10/14/2011
Received Time: 10:00

Lab Sample ID: A1J1198-03
Sample Date: 10/12/2011 06:36
Sample Type: Grab

Sampled by: Doug Paterson
Matrix: Water

Sample Description: EWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0023**	0.0010	mg/L	1	A113042	10/31/11	10/31/11	

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Report Issue Date: 11/01/2011 17:01
Received Date: 10/14/2011
Received Time: 10:00

Lab Sample ID: A1J1198-01
Sample Date: 10/12/2011 09:28
Sample Type: Grab

Sampled by: Kat White
Matrix: Water

Sample Description: QHWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0027**	0.0010	mg/L	1	A112742	10/21/11	10/21/11	

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Report Issue Date: 11/18/2011 12:23
Received Date: 11/10/2011
Received Time: 08:10

Lab Sample ID: A1K0834-04
Sample Date: 11/09/2011 08:50
Sample Type: Grab

Sampled by: Kat White
Matrix: Water

Sample Description: AWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0046**	0.0010	mg/L	1	A113626	11/15/11	11/15/11	

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Report Issue Date: 11/18/2011 12:23
Received Date: 11/10/2011
Received Time: 08:10

Lab Sample ID: A1K0834-03
Sample Date: 11/09/2011 06:04
Sample Type: Grab

Sampled by: Doug Patterson
Matrix: Water

Sample Description: EWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0034**	0.0010	mg/L	1	A113626	11/15/11	11/15/11	

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Report Issue Date: 11/18/2011 12:23
Received Date: 11/10/2011
Received Time: 08:10

Lab Sample ID: A1K0834-01
Sample Date: 11/09/2011 10:44
Sample Type: Grab

Sampled by: Kat White
Matrix: Water

Sample Description: QHWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0017**	0.0010	mg/L	1	A113626	11/15/11	11/15/11	

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Report Issue Date: 12/29/2011 13:19
Received Date: 12/16/2011
Received Time: 10:23

Lab Sample ID: A1L1252-01
Sample Date: 12/14/2011 09:15
Sample Type: Grab

Sampled by: Kat White
Matrix: Water

Sample Description: QHWTP CWR

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Bromate	EPA 317.0	**0.0032**	0.0010	mg/L	1	A114879	12/20/11	12/20/11	X01

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ACTON WATER TREATMENT PLANT

Plant Effluent
Finished Drinking Water
Monitoring Results

BSK Analytical Laboratories

EDT

Date of Report: 11|05|25|1329
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Eric Kane

Sample ID No.: A1E1049-01
Signature Lab Director:

Date/Time Sample Collected: 11|05|12|1115
Date/Time Sample Received @ Lab : 11|05|13|0815
Date Analyses Completed: 11|05|24

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
Name or Number of Sample Source: ACTON PLANT - TREATED EFFLUENT
System Number: 1910045

User ID: 4TH
Date/Time of Sample: 11|05|12|1115
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-004
Laboratory Code: 5810
Date Analyses Completed: 11|05|24
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1E1049 FINAL 05252011 1329

BSK Analytical Laboratories

EDT

Date of Report: 11|06|28|2132
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Eric Kane

Sample ID No.: A1F1509-01
Signature Lab Director:

Date/Time Sample Collected: 11|06|09|1050
Date/Time Sample Received @ Lab : 11|06|17|0800
Date Analyses Completed: 11|06|27

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - TREATED EFFLUENT

User ID: 4TH
Date/Time of Sample: 11|06|09|1050
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-004
Laboratory Code: 5810
Date Analyses Completed: 11|06|27
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1F1509 FINAL 06282011 2133

BSK Analytical Laboratories

EDT

Date of Report: 11|07|26|1658
Sample ID No.: A1G1244-03
Laboratory Name: BSK Analytical Laboratories
Signature Lab Director:
Name of Sampler: S. Livesly

Date/Time Sample Collected: 11|07|14|1130
Date/Time Sample Received @ Lab : 11|07|15|1338
Date Analyses Completed: 11|07|24

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - TREATED EFFLUENT

User ID: 4TH
Station Number: 1910045-004
Date/Time of Sample: 11|07|14|1130
Laboratory Code: 5810
Submitted by: BSK Analytical Laboratories
Date Analyses Completed: 11|07|24
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

BSK Analytical Laboratories

EDT

Date of Report: 11|08|24|0818
Sample ID No.: A1H1233-03
Laboratory Name: BSK Analytical Laboratories
Signature Lab Director:
Name of Sampler: Kat White

Date/Time Sample Collected: 11|08|10|1000
Date/Time Sample Received @ Lab : 11|08|12|0820
Date Analyses Completed: 11|08|22

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - TREATED EFFLUENT

User ID: 4TH
Station Number: 1910045-004
Date/Time of Sample: 11|08|10|1000
Laboratory Code: 5810
Submitted by: BSK Analytical Laboratories
Date Analyses Completed: 11|08|22
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1H1233 FINAL 08242011 0818

BSK Analytical Laboratories

EDT

Date of Report: 11|09|28|1256
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: E. Kane

Sample ID No.: A1I1114-04
Signature Lab Director:

Date/Time Sample Collected: 11|09|14|0840
Date/Time Sample Received @ Lab : 11|09|15|0950
Date Analyses Completed: 11|09|25

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - TREATED EFFLUENT

User ID: 4TH
Date/Time of Sample: 11|09|14|0840
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-004
Laboratory Code: 5810
Date Analyses Completed: 11|09|25
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

BSK Analytical Laboratories

EDT

Date of Report: 11|10|26|1108
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Kat White

Sample ID No.: A1J1218-03
Signature Lab Director:

Date/Time Sample Collected: 11|10|13|0924
Date/Time Sample Received @ Lab : 11|10|14|1000
Date Analyses Completed: 11|10|18

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - TREATED EFFLUENT

User ID: 4TH
Date/Time of Sample: 11|10|13|0924
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-004
Laboratory Code: 5810
Date Analyses Completed: 11|10|18
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1J1218 FINAL 10262011 1108

BSK Analytical Laboratories

EDT

Date of Report: 11|11|18|1228
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Andrew Atrops

Sample ID No.: A1K0840-03
Signature Lab Director:

Date/Time Sample Collected: 11|11|09|0855
Date/Time Sample Received @ Lab : 11|11|10|0810
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - TREATED EFFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|09|0855
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-004
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1555
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Bill Hagen
Sample ID No.: A1K0266-01
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|0745
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - TREATED EFFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|02|0745
Submitted by: BSK Analytical Laboratories
Station Number: 1910045-004
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

Chain of Custody Notes

Date: 12/14/11
Initials: RLR
Note: Sample A1K0266-05 has three additional Source Codes for state Write-On reporting:1910045-002, 1910045-003 and 1510053-001. The additional state forms will be accommodated by amended reports.

Report Amendments

Date: 12/28/11
Initials: RLR
This amended report supersedes any previous reports issued by the laboratory. Amendments to this report are as follows: Chloride data now included on sample A1K0266-04.

Report Amendments

Date: 12/29/11
Initials: RLR
This amended report supersedes any previous reports issued by the laboratory. Amendments to this report are as follows: includes state form reports for 1910045-003, 005 and 1510053-001.

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Hardness, (Total) as CaCO3	00900	55	
	mg/L	Calcium (Ca) (mg/L)	00916	12	
	mg/L	Magnesium (Mg) (mg/L)	00927	6.1	
	mg/L	Sodium (Na) (mg/L)	00929	20	
	mg/L	Potassium (K) (mg/L)	00937	< 2.0	
		Total Cations Meq/L Value: 1.97			
	mg/L	Alkalinity, (Total) (as CaCO3 equivalents)	00410	41	
	mg/L	Hydroxide (OH) (mg/L)	71830	< 1.0	
	mg/L	Carbonate (CO3) (mg/L)	00445	< 1.8	
	mg/L	Bicarbonate (HCO3) (mg/L)	00440	50	
600	mg/L	Sulfate (SO4) (mg/L)	00945	37	0.5
600	mg/L	Chloride (Cl) (mg/L)	00940	25	
45	mg/L	Nitrate (as NO3) (mg/L)	71850	ND	2.0

A1K0266 FINAL 12302011 1555

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1555
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Bill Hagen
Sample ID No.: A1K0266-01
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|0745
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - TREATED EFFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|02|0745
Submitted by: BSK Analytical Laboratories
Station Number: 1910045-004
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
2	mg/L	Fluoride (F) (Natural-Source)	00951	ND	0.1

Total Anions Meq/L Value: 2.29

15	Units	Color, Apparent (Unfiltered)	00081	< 1.0	
5	NTU	Lab Turbidity (NTU)	82079	< 0.10	
0.5	mg/L	MBAS (mg/L)	38260	< 0.050	
3	TON	Odor Threshold at 60 C (TON)	00086	1.0	1.0
	Std Units	pH (Laboratory) (Std.Units)	00403	7.6	
2200	umho/cm	Specific Conductance (E.C.) (umhos/cm)	00095	250	
1500	mg/L	Total Filterable Residue@180C(TDS)(mg/L)	70300	150	
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50
6	ug/L	Antimony (ug/L)	01097	ND	6.0
10	ug/L	Arsenic (As) (ug/L)	01002	ND	2.0
1000	ug/L	Barium (Ba) (ug/L)	01007	ND	100
4	ug/L	Beryllium (ug/L)	01012	ND	1.0
5	ug/L	Cadmium (Cd) (ug/L)	01027	ND	1.0
50	ug/L	Chromium (Total Cr) (ug/L)	01034	ND	10
1000	ug/L	Copper (Cu) (ug/L)	01042	ND	50
300	ug/L	Iron (Fe) (ug/L)	01045	ND	100
	ug/L	Lead (Pb) (ug/L)	01051	ND	5.0
50	ug/L	Manganese (Mn) (ug/L)	01055	ND	20
2	ug/L	Mercury (Hg) (ug/L)	71900	ND	1.0
100	ug/L	Nickel (ug/L)	01067	ND	10
50	ug/L	Selenium (Se) (ug/L)	01147	ND	5.0
100	ug/L	Silver (Ag) (ug/L)	01077	ND	10
2	ug/L	Thallium (ug/L)	01059	ND	1.0
5000	ug/L	Zinc (Zn) (ug/L)	01092	180	50

ADDITIONAL ANALYSES

	NA	Agressiveness Index	82383	11	
150	ug/L	Cyanide (ug/L)	01291	ND	100
	NA	Langelier Index at 60 C	71813	- 1.2	
1000	ug/L	Nitrite as Nitrogen(N) (ug/L)	00620	ND	400

A1K0266 FINAL 12302011 1555

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1555
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Bill Hagen
Sample ID No.: A1K0266-01
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|0745
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - TREATED EFFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|02|0745
Submitted by: BSK Analytical Laboratories
Station Number: 1910045-004
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
		ADDITIONAL ANALYSES			
6	ug/L	Perchlorate (ug/L)	A-031	ND	4.0

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	REGULATED ORGANIC CHEMICALS				
EPA 525.2	Alachlor (ALANEX)	77825	ND	2	1.0
EPA 525.2	Atrazine (AATREX)	39033	ND	1	0.5
EPA 525.2	Benzo (a) Pyrene	34247	ND	0.2	0.1
EPA 525.2	Di(2-ethylhexyl) Adipate	A-026	ND	400	5.0
EPA 525.2	Diethylhexylphthalate (DEHP)	39100	ND	4	3.0
EPA 525.2	Molinate (ORDRAM)	82199	ND	20	2.0
EPA 525.2	Simazine (PRINCEP)	39055	ND	4	1.0
EPA 525.2	Thiobencarb (BOLERO)	A-001	ND	70	1.0
	UNREGULATED ORGANIC CHEMICALS				
EPA 525.2	Bromacil (HYVAR)	82198	ND		10
EPA 525.2	Butachlor	77860	ND		0.38
EPA 525.2	Diazinon	39570	< 0.25		
EPA 525.2	Dimethoate (CYGON)	38458	< 10		
EPA 525.2	Metolachlor	39356	< 0.50		
EPA 525.2	Metribuzin	81408	< 0.50		
EPA 525.2	Propachlor	38533	ND		0.5

A1K0266 FINAL 12302011 1555

Antelope Valley-East Kern Water Agency
LA System No. 1910045
TOC Removal Running Annual Average

Sample Date	Plant	Alkalinity mgCaCO3/L	Raw TOC mg/L	Treated TOC mg/L	Actual % TOC reduction	Required % TOC reduction	"TOC Removal Ratio" actual % /raquired %
1/12/2011	QHWTP	53.9	3.10	1.55	50.0	35	1.4
"	EWTP	plant off					
"	AWTP	plant off					
2/9/2011	QHWTP	52.6	4.41	2.16	51.0	45	1.1
"	EWTP	plant off					
"	AWTP	plant off					
3/9/2011	QHWTP	50.3	4.01	1.92	52.1	45	1.2
"	EWTP	plant off					
"	AWTP	plant off					
4/13/2011	QHWTP	51.7	3.82	1.83	52.1	35	1.5
"	EWTP	plant off					
"	AWTP	plant off					
5/11/2011	QHWTP	40.8	3.23	1.55	52.0	35	1.5
"	EWTP	41.9	3.58	1.54	57.0	35	1.6
5/12/2011	AWTP	40.6	3.47	1.55	55.3	35	1.6
6/8/2011	QHWTP	54.6	2.87	1.57	45.3	35	1.3
"	EWTP	53.4	3.08	1.71	44.5	35	1.3
6/9/2011	AWTP	56.0	3.04	1.61	47.0	35	1.3
7/13/2011	QHWTP	39.8	2.64	1.26	52.3	35	1.5
"	EWTP	41.0	2.78	1.40	49.6	35	1.4
7/14/2011	AWTP	41.2	2.82	1.28	54.6	35	1.6
8/10/2011	QHWTP	53.6	2.66	1.43	46.2	35	1.3
"	EWTP	54.4	2.87	1.55	46.0	35	1.3
8/11/2011	AWTP	53.5	2.77	1.50	45.8	35	1.3
9/14/2011	QHWTP	57.6	2.41	1.35	44.0	35	1.3
"	EWTP	58.5	2.61	1.55	40.6	35	1.2
"	AWTP	57.6	2.56	1.49	41.8	35	1.2
10/12/2011	QHWTP	65.6	2.17	1.24	42.9	25	1.7
"	EWTP	67.2	2.37	1.42	40.1	25	1.6
10/13/2011	AWTP	66.0	2.40	1.41	41.3	25	1.7
11/9/2011	QHWTP	53.4	2.09	1.09	47.8	35	1.4
"	EWTP	54.1	2.18	1.22	44.0	35	1.3
"	AWTP	54.5	2.19	1.19	45.7	35	1.3
12/14/2011	QHWTP	78.2	2.39	1.44	39.7	25	1.6
"	EWTP	plant off					
"	AWTP	plant off					
	Minimum	39.8	2.1	1.1	39.7		
	Maximum	78.2	4.4	2.2	57.0		
	RAA	53.5	2.9	1.5	47.3		

Running Annual Average (RAA) **1.4**

Title 22 California Code of Regulations, Chapter 15.5, Article 5:
Required percent TOC reduction**

Table 64536.2-A

	Source Water Alkalinity		
Raw TOC	0-60	<60 - 120	>120
>2.0 - 4.0	35.0 %	25.0 %	15.0 %
>4.0 - 8.0	45.0 %	35.0 %	25.0 %
>8.0	50.0 %	40.0 %	30.0 %

**If one or more of the section 64635.4(b) 1-6 conditions are met, the system may assign a monthly value of 1 for the TOC removal ratio in lieu of the calculated va

List condition when used:

1. The system's source water TOC level, prior to any treatment is less than or equal to 2.0 mg/L
2. The system's treated water TOC level is less than or equal to 2.0 mg/L
3. The system's source water SUVA, prior to any treatment, is less than or equal to 2.0 L/mg-m
4. The system's finished water SUVA is less than or equal to 2.0 L/mg-m
5. A system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO3)
6. A system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO3)

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/05/18 Sample ID No.055

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ERIK KANE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/05/12/1110 | Date/Time Sample Received @ Lab:11/05/12/1143 | Date Analyses Completed:11/05/13

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - TREATED EFFLUENT FORCE

User ID: 4TH | Station Number: 1910045-004

Date/Time of Sample: |11|05|12|1110| (YY MM DD TTTT) | Laboratory Code: 6080

Date Analysis completed: |11|05|13| (YY MM DD)

Submitted by:_____ Phone #:_____

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.55	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/06/17 Sample ID No.060

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ERIK KANE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/06/09/1055 | Date/Time Sample Received @ Lab:11/06/09/1135 | Date Analyses Completed:11/06/15

==========

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - TREATED EFFLUENT FORCE

****

* User ID: 4TH Station Number: 1910045-004 *

* Date/Time of Sample: |11|06|09|1055| Laboratory Code: 6080 *

* YY MM DD TTTT YY MM DD *

* Date Analysis completed: |11|06|15| *

* Submitted by:_____ Phone #:_____ *

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PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.61	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/07/26 Sample ID No.078

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ERIK KANE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/07/14/1145 | Date/Time Sample Received @ Lab:11/07/14/1215 | Date Analyses Completed:11/07/25

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - TREATED EFFLUENT FORCE

User ID: 4TH

Station Number: 1910045-004

Date/Time of Sample: |11|07|14|1145|
YY MM DD TTTT

Laboratory Code: 6080
YY MM DD

Date Analysis completed: |11|07|25|

Submitted by:

Phone #:

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.28	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/08/18 Sample ID No.096

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ERIK KANE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/08/11/1013 | Date/Time Sample Received @ Lab:11/08/11/1053 | Date Analyses Completed:11/08/17

==========

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - TREATED EFFLUENT FORCE

****

* User ID: 4TH Station Number: 1910045-004 *

* Date/Time of Sample: |11|08|11|1013| Laboratory Code: 6080 *

* YY MM DD TTTT YY MM DD *

* Date Analysis completed: |11|08|17| *

* Submitted by:_____ Phone #:_____ *

****

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.50	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/09/29 Sample ID No.114

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ERIC KANE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/09/14/0840 | Date/Time Sample Received @ Lab:11/09/14/0938 | Date Analyses Completed:11/09/23

==========

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - TREATED EFFLUENT

****

* User ID: 4TH Station Number: 1910045-004 *

* Date/Time of Sample: |11|09|14|0840| Laboratory Code: 6080 *

* YY MM DD TTTT YY MM DD *

* Date Analysis completed: |11|09|23| *

* Submitted by:_____ Phone #:_____ *

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PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.49	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/10/24 Sample ID No.133

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:Andrew Atrops Employed By: AVEK Water Agency

Date/Time Sample Collected:11/10/13/0916 | Date/Time Sample Received @ Lab:11/10/13/1013 | Date Analyses Completed:11/10/20

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - TREATED EFFLUENT

User ID: 4TH

Station Number: 1910045-004

Date/Time of Sample: |11|10|13|0916|
YY MM DD TTTT

Laboratory Code: 6080
YY MM DD

Date Analysis completed: |11|10|20|

Submitted by:

Phone #:

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.41	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/12/02 Sample ID No.152

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ANDREW ATROPS Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/11/09/0845 | Date/Time Sample Received @ Lab:11/11/09/0949 | Date Analyses Completed:11/12/01

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - TREATED EFFLUENT

User ID: 4TH

Station Number: 1910045-004

Date/Time of Sample: |11|11|09|0845|
YY MM DD TTTT

Laboratory Code: 6080

YY MM DD

Date Analysis completed: |11|12|01|

Submitted by:

Phone #:

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.19	0.30

+ Indicates Secondary Drinking Water Standards

ACTON WATER TREATMENT PLANT

Plant Influent
Untreated Source Water
Monitoring Results

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|03|11|1329
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Kat White

Sample ID No.: A1C0821-01
Signature Lab Director:

Date/Time Sample Collected: 11|03|09|1400
Date/Time Sample Received @ Lab : 11|03|10|1000
Date Analyses Completed: 11|03|10

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
Name or Number of Sample Source: ACTON PLANT - INFLUENT
System Number: 1910045

User ID: 4TH
Date/Time of Sample: 11|03|09|1400
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-003
Laboratory Code: 5810
Date Analyses Completed: 11|03|10
Phone #: 559-497-2888

Report Amendments

Date: 3/11/11

Initials: PJE

This amended report supersedes any previous reports issued by the laboratory. Amendments to this report are as follows: Report amended to send state data to the following PS codes: 1910045-002, 1910045-005, 1910045-003, and 1510053-001.

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	3.2	2.0

Total Anions Meq/L Value: 0.05

A1C0821 FINAL 03112011 1329

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|06|28|1115
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Justin Livesay

Sample ID No.: A1F0795-04
Signature Lab Director:

Date/Time Sample Collected: 11|06|08|1407
Date/Time Sample Received @ Lab : 11|06|09|0800
Date Analyses Completed: 11|06|10

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - INFLUENT

User ID: 4TH
Date/Time of Sample: 11|06|08|1407
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-003
Laboratory Code: 5810
Date Analyses Completed: 11|06|10
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	2.0	2.0

Total Anions Meq/L Value: 0.03

A1F0795 FINAL 06282011 1115

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|09|30|1013
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Justin Livesay

Sample ID No.: A1I1271-01
Signature Lab Director:

Date/Time Sample Collected: 11|09|15|1431
Date/Time Sample Received @ Lab : 11|09|16|1020
Date Analyses Completed: 11|09|16

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
Name or Number of Sample Source: ACTON PLANT - INFLUENT
System Number: 1910045

User ID: 4TH
Date/Time of Sample: 11|09|15|1431
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-003
Laboratory Code: 5810
Date Analyses Completed: 11|09|16
Phone #: 559-497-2888

Chain of Custody Notes

Date: 9/29/11
Initials: RLR
Note: Data is reported to four ps codes EDT: 1910045-002, 1910045-005, 1910045-003 and 1510053-001. Subsequent amended write on report hardcopies reflect the report being generated multiple times to accommodate this request.

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	ND	2.0

Total Anions Meq/L Value: 0.00

A1I1271 FINAL 09302011 1013

BSK Analytical Laboratories

Amended

EDT

Date of Report: 12|01|10|0959
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: k. White

Sample ID No.: A1L1169-03
Signature Lab Director:

Date/Time Sample Collected: 11|12|15|1216
Date/Time Sample Received @ Lab : 11|12|16|1023
Date Analyses Completed: 11|12|16

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - INFLUENT

User ID: 4TH
Date/Time of Sample: 11|12|15|1216
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-003
Laboratory Code: 5810
Date Analyses Completed: 11|12|16
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	3.6	2.0

Total Anions Meq/L Value: 0.06

A1L1169 FINAL 01102012 0959

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1547
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Client
Sample ID No.: A1K0266-05
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|1307
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - INFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|02|1307
Submitted by: BSK Analytical Laboratories
Station Number: 1910045-003
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Hardness, (Total) as CaCO3	00900	60	
	mg/L	Calcium (Ca) (mg/L)	00916	13	
	mg/L	Magnesium (Mg) (mg/L)	00927	6.5	
	mg/L	Sodium (Na) (mg/L)	00929	20	
	mg/L	Potassium (K) (mg/L)	00937	< 2.0	
Total Cations Meq/L Value:		2.05			
	mg/L	Alkalinity, (Total) (as CaCO3 equivalents)	00410	58	
	mg/L	Hydroxide (OH) (mg/L)	71830	< 1.0	
	mg/L	Carbonate (CO3) (mg/L)	00445	< 1.8	
	mg/L	Bicarbonate (HCO3) (mg/L)	00440	71	
600	mg/L	Sulfate (SO4) (mg/L)	00945	16	0.5
600	mg/L	Chloride (Cl) (mg/L)	00940	22	
45	mg/L	Nitrate (as NO3) (mg/L)	71850	2.2	2.0
2	mg/L	Fluoride (F) (Natural-Source)	00951	ND	0.1
Total Anions Meq/L Value:		2.15			
15	Units	Color, Apparent (Unfiltered)	00081	10	
5	NTU	Lab Turbidity (NTU)	82079	0.47	
0.5	mg/L	MBAS (mg/L)	38260	< 0.050	
3	TON	Odor Threshold at 60 C (TON)	00086	1.0	1.0
	Std Units	pH (Laboratory) (Std.Units)	00403	8.2	
2200	umho/cm	Specific Conductance (E.C.) (umhos/cm)	00095	220	
1500	mg/L	Total Filterable Residue@180C(TDS)(mg/L)	70300	130	
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50
6	ug/L	Antimony (ug/L)	01097	ND	6.0
10	ug/L	Arsenic (As) (ug/L)	01002	ND	2.0
1000	ug/L	Barium (Ba) (ug/L)	01007	ND	100
4	ug/L	Beryllium (ug/L)	01012	ND	1.0
5	ug/L	Cadmium (Cd) (ug/L)	01027	ND	1.0
50	ug/L	Chromium (Total Cr) (ug/L)	01034	ND	10
1000	ug/L	Copper (Cu) (ug/L)	01042	ND	50

A1K0266 FINAL 12302011 1547

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1547 **Sample ID No.:** A1K0266-05
Laboratory Name: BSK Analytical Laboratories **Signature Lab Director:**
Name of Sampler: Client

Date/Time Sample Collected: 11|11|02|1307 **Date/Time Sample Received @ Lab :** 11|11|03|0800 **Date Analyses Completed:** 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY **System Number:** 1910045
Name or Number of Sample Source: ACTON PLANT - INFLUENT

User ID: 4TH **Station Number:** 1910045-003
Date/Time of Sample: 11|11|02|1307 **Laboratory Code:** 5810
Submitted by: BSK Analytical Laboratories **Date Analyses Completed:** 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
300	ug/L	Iron (Fe) (ug/L)	01045	ND	100
	ug/L	Lead (Pb) (ug/L)	01051	ND	5.0
50	ug/L	Manganese (Mn) (ug/L)	01055	ND	20
2	ug/L	Mercury (Hg) (ug/L)	71900	ND	1.0
100	ug/L	Nickel (ug/L)	01067	ND	10
50	ug/L	Selenium (Se) (ug/L)	01147	ND	5.0
100	ug/L	Silver (Ag) (ug/L)	01077	ND	10
2	ug/L	Thallium (ug/L)	01059	ND	1.0
5000	ug/L	Zinc (Zn) (ug/L)	01092	ND	50

ADDITIONAL ANALYSES

	NA	Agressiveness Index	82383	11	
150	ug/L	Cyanide (ug/L)	01291	ND	100
	NA	Langelier Index at 60 C	71813	- 0.42	
1000	ug/L	Nitrite as Nitrogen(N) (ug/L)	00620	ND	400
6	ug/L	Perchlorate (ug/L)	A-031	ND	4.0

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	REGULATED ORGANIC CHEMICALS				
EPA 524.2	Bromodichloromethane	32101	ND		1.0
EPA 524.2	Bromoform	32104	ND		1.0
EPA 524.2	Chloroform (Trichloromethane)	32106	ND		1.0
EPA 524.2	Dibromochloromethane	32105	ND		1.0
EPA 524.2a	Total Trihalomethanes (TTHMs)	82080	< 0.50	80	
	REGULATED ORGANIC CHEMICALS				
EPA 524.2	1,1,1-Trichloroethane (1,1,1-TCA)	34506	ND	200	0.5
EPA 524.2	1,1,2,2-Tetrachloroethane	34516	ND	1	0.5
EPA 524.2	1,1,2-Trichloroethane (1,1,2-TCA)	34511	ND	5	0.5
EPA 524.2	1,1-Dichloroethane (1,1-DCA)	34496	ND	5	0.5
EPA 524.2	1,1-Dichloroethylene (1,1-DCE)	34501	ND	6	0.5
EPA 524.2	1,2,4-Trichlorobenzene	34551	ND	5	0.5
EPA 524.2	1,2-Dichlorobenzene (o-DCB)	34536	ND	600	0.5

A1K0266 FINAL 12302011 1547

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1547 **Sample ID No.:** A1K0266-05
Laboratory Name: BSK Analytical Laboratories **Signature Lab Director:**
Name of Sampler: Client

Date/Time Sample Collected: 11|11|02|1307 **Date/Time Sample Received @ Lab :** 11|11|03|0800 **Date Analyses Completed:** 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY **System Number:** 1910045
Name or Number of Sample Source: ACTON PLANT - INFLUENT

User ID: 4TH **Station Number:** 1910045-003
Date/Time of Sample: 11|11|02|1307 **Laboratory Code:** 5810
Submitted by: BSK Analytical Laboratories **Date Analyses Completed:** 11|11|14
Phone #: 559-497-2888

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	REGULATED ORGANIC CHEMICALS				
EPA 524.2	1,2-Dichloroethane (1,2-DCA)	34531	ND	0.5	0.5
EPA 524.2	1,2-Dichloropropane	34541	ND	5	0.5
EPA 524.2	1,4-Dichlorobenzene (p-DCB)	34571	ND	5	0.5
EPA 524.2	Benzene	34030	ND	1	0.5
EPA 524.2	Carbon Tetrachloride	32102	ND	0.5	0.5
EPA 524.2	cis-1,2-Dichloroethylene (c-1,2-DCE)	77093	ND	6	0.5
EPA 524.2	cis-1,3-Dichloropropene (D-D)	34704	ND	0.5	0.5
EPA 524.2	Dichloromethane (Methylene Chloride)	34423	ND	5	0.5
EPA 524.2	Ethyl Benzene	34371	ND	300	0.5
EPA 524.2	m,p-Xylene	A-014	ND		0.5
EPA 524.2	Methyl tert-Butyl Ether(MTBE)	46491	ND	5	3.0
EPA 524.2	Monochlorobenzene (Chlorobenzene)	34301	ND	70	0.5
EPA 524.2	o-Xylene	77135	ND		0.5
EPA 524.2	Styrene	77128	ND	100	0.5
EPA 524.2	Tetrachloroethylene (PCE)	34475	ND	5	0.5
EPA 524.2	Toluene	34010	ND	150	0.5
EPA 524.2	trans-1,2-Dichloroethylene (t-1,2-DCE)	34546	ND	10	0.5
EPA 524.2	trans-1,3-Dichloropropene	34699	ND	0.5	0.5
EPA 524.2	Trichloroethylene (TCE)	39180	ND	5	0.5
EPA 524.2	Trichlorofluoromethane (FREON 11)	34488	ND	150	5.0
EPA 524.2	Trichlorotrifluoroethane (FREON 113)	81611	ND	1200	10
EPA 524.2	Vinyl Chloride (VC)	39175	ND	0.5	0.5
EPA 524.2a	Total 1,3-Dichloropropene	34561	ND	0.5	0.5
EPA 524.2a	Total Xylenes (m,p, & o)	81551	< 0.50	1750	
EPA 525.2	Alachlor (ALANEX)	77825	ND	2	1.0
EPA 525.2	Atrazine (AATREX)	39033	ND	1	0.5
EPA 525.2	Benzo (a) Pyrene	34247	ND	0.2	0.1
EPA 525.2	Di(2-ethylhexyl) Adipate	A-026	ND	400	5.0
EPA 525.2	Diethylhexylphthalate (DEHP)	39100	ND	4	3.0
EPA 525.2	Molinate (ORDRAM)	82199	ND	20	2.0
EPA 525.2	Simazine (PRINCEP)	39055	ND	4	1.0
EPA 525.2	Thiobencarb (BOLERO)	A-001	ND	70	1.0

UNREGULATED ORGANIC CHEMICALS

A1K0266 FINAL 12302011 1547

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1547
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Client

Sample ID No.: A1K0266-05
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|1307
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - INFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|02|1307
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-003
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	UNREGULATED ORGANIC CHEMICALS				
EPA 524.2	1,1,1,2-Tetrachloroethane	77562	ND		0.5
EPA 524.2	1,1-Dichloropropene	77168	ND		0.5
EPA 524.2	1,2,3-Trichlorobenzene	77613	ND		0.5
EPA 524.2	1,2,4-Trimethylbenzene	77222	< 0.50		
EPA 524.2	1,3,5-Trimethylbenzene	77226	ND		0.5
EPA 524.2	1,3-Dichlorobenzene (m-DCB)	34566	ND		0.5
EPA 524.2	1,3-Dichloropropane	77173	ND		0.5
EPA 524.2	2,2-Dichloropropane	77170	ND		0.5
EPA 524.2	2-Chlorotoluene	A-008	ND		0.5
EPA 524.2	4-Chlorotoluene	A-009	ND		0.5
EPA 524.2	Acetone	81552	< 10		
EPA 524.2	Bromobenzene	81555	ND		0.5
EPA 524.2	Bromochloromethane	A-012	ND		0.5
EPA 524.2	Bromomethane (Methyl Bromide)	34413	ND		0.5
EPA 524.2	Chloroethane	34311	ND		0.5
EPA 524.2	Chloromethane (Methyl Chloride)	34418	ND		0.5
EPA 524.2	Dibromomethane	77596	ND		0.5
EPA 524.2	Dichlorodifluoromethane (Freon 12)	34668	ND		0.5
EPA 524.2	Diisopropyl Ether (DIPE)	A-036	ND		3.0
EPA 524.2	Ethyl tert-Butyl Ether (ETBE)	A-033	ND		3.0
EPA 524.2	Hexachlorobutadiene	34391	ND		0.5
EPA 524.2	Isopropylbenzene (Cumene)	77223	ND		0.5
EPA 524.2	Mesitylene (1,3,5-Trimethylbenzene)	77226	ND		0.5
EPA 524.2	Methyl Ethyl Ketone (MEK, Butanone)	81595	ND		5.0
EPA 524.2	Methyl Isobutyl Ketone (MIBK)	81596	ND		5.0
EPA 524.2	Naphthalene	34696	ND		0.5
EPA 524.2	n-Butylbenzene	A-010	ND		0.5
EPA 524.2	n-Propylbenzene	77224	ND		0.5
EPA 524.2	p-Isopropyltoluene	A-011	< 0.50		
EPA 524.2	sec-Butylbenzene	77350	ND		0.5
EPA 524.2	tert-Amyl Methyl Ether (TAME)	A-034	ND		3.0
EPA 524.2	tert-Butyl Alcohol (TBA)	77035	ND		2.0
EPA 524.2	tert-Butylbenzene	77353	ND		0.5
EPA 525.2	Bromacil (HYVAR)	82198	ND		10

A1K0266 FINAL 12302011 1547

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1547
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Client

Sample ID No.: A1K0266-05
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|1307
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: ACTON PLANT - INFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|02|1307
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-003
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	UNREGULATED ORGANIC CHEMICALS				
EPA 525.2	Butachlor	77860	ND		0.38
EPA 525.2	Diazinon	39570	< 0.25		
EPA 525.2	Dimethoate (CYGON)	38458	< 10		
EPA 525.2	Metolachlor	39356	< 0.50		
EPA 525.2	Metribuzin	81408	< 0.50		
EPA 525.2	Propachlor	38533	ND		0.5

A1K0266 FINAL 12302011 1547

RADIOACTIVITY ANALYSIS (9/99)

Date of Report: 11/12/05 Sample ID No.305760100 1/K0266
Laboratory Signature, Lab
Name: PACE ANALYTICAL SERVICES, INC-GREENSBURG Director:
Name of Sampler:client Employed By: client
Date/Time Sample Collected:11/11/02/1307 Date/Time Sample Received @ Lab:11/11/14/0950 Date Analyses Completed:11/12/02

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY System Number: 1910045
Name or Number of Sample Source:ACTON PLANT - INFLUENT

User ID: 4TH Station Number: 1910045-003
Date/Time of Sample: |11|11|02|1307| (YY MM DD TTTT) Laboratory Code: 0010
Date Analysis completed: |11|12|02| (YY MM DD)
Submitted by: Phone #:

MCL	REPORT UNITS	CHEMICAL	STORET CODE	ANALYSES RESULTS	DLR
	pCi/L	TITLE 22 CALIFORNIA CODE OF REGULATIONS			
	pCi/L	SECTION 64442 (22 CCR 64442)			
15	pCi/L	Gross Alpha	01501		3.0
	pCi/L	Gross Alpha Counting Error	01502		
	pCi/L	Gross Alpha MDA95 *	A-072		
20	pCi/L	Uranium	28012		1.0
	pCi/L	Uranium Counting Error	A-028		
	pCi/L	Uranium MDA95	A-073		
	pCi/L	Radium 226	09501		1.0
	pCi/L	Radium 226 Counting Error	09502		
	pCi/L	Radium 226 MDA95	A-074		
	pCi/L	Radium 228	11501		1.0
	pCi/L	Radium 228 Counting Error	11502		
	pCi/L	Radium 228 MDA95	A-075		
5	pCi/L	Ra 226 + Ra 228, Combined	11503		
	pCi/L	Ra 226 + Ra 228 Counting Error, Combined	11504		
	pCi/L	Ra 226 + Ra 229 MDA95, Combined	A-076		
	pCi/L	RADIUM, TOTAL, (FOR NTNC ONLY, BY 903.0)			
	pCi/L	Radium, Total	A-080		
	pCi/L	Radium, Total, Counting Error	A-081		
	pCi/L	Radium, Total, MDA95	A-082		
	pCi/L	TITLE 22 CALIFORNIA CODE OF REGULATIONS			
	pCi/L	SECTION 64443 (22 CCR 64443)			
50	pCi/L	Gross Beta	03501	< 4.0	4.0
	pCi/L	Gross Beta Counting Error	03502	1.06	

	pCi/L	Gross Beta MDA95	A-077		
4	pCi/L	Gross Beta, Calculated Dose Equivalent *	A-071		
8	pCi/L	Strontium 90	13501	< 2.0	2.0
	pCi/L	Strontium 90 Counting Error	13502	0.192	
	pCi/L	Strontium 90 MDA95	A-078		
20000	pCi/L	Tritium	07000	< 1000	1000
	pCi/L	Tritium Counting Error	07001	115	
	pCi/L	Tritium MDA95	A-079		
	pCi/L	RADON			
	pCi/L	Radon 222	82303		100.0
	pCi/L	Radon 222 Counting Error	82302		
	pCi/L				
	pCi/L	*MDA95 is Minimum Detectable Activity at			
	pCi/L	the 95% confidence level, per			
	pCi/L	22 CCR 64442 and 64443.			
	pCi/L				
	pCi/L	**Gross Beta, Calculated Total Body or			
	pCi/L	Organ Dose Equivalent, Per 22 CCR 64443			
	pCi/L				

Antelope Valley-East Kern Water Agency
LA System No. 1910045
TOC Removal Running Annual Average

Sample Date	Plant	Alkalinity mgCaCO3/L	Raw TOC mg/L	Treated TOC mg/L	Actual % TOC reduction	Required % TOC reduction	"TOC Removal Ratio" actual % /required %
1/12/2011	QHWTP	53.9	3.10	1.55	50.0	35	1.4
"	EWTP	plant off					
"	AWTP	plant off					
2/9/2011	QHWTP	52.6	4.41	2.16	51.0	45	1.1
"	EWTP	plant off					
"	AWTP	plant off					
3/9/2011	QHWTP	50.3	4.01	1.92	52.1	45	1.2
"	EWTP	plant off					
"	AWTP	plant off					
4/13/2011	QHWTP	51.7	3.82	1.83	52.1	35	1.5
"	EWTP	plant off					
"	AWTP	plant off					
5/11/2011	QHWTP	40.8	3.23	1.55	52.0	35	1.5
"	EWTP	41.9	3.58	1.54	57.0	35	1.6
5/12/2011	AWTP	40.6	3.47	1.55	55.3	35	1.6
6/8/2011	QHWTP	54.6	2.87	1.57	45.3	35	1.3
"	EWTP	53.4	3.08	1.71	44.5	35	1.3
6/9/2011	AWTP	56.0	3.04	1.61	47.0	35	1.3
7/13/2011	QHWTP	39.8	2.64	1.26	52.3	35	1.5
"	EWTP	41.0	2.78	1.40	49.6	35	1.4
7/14/2011	AWTP	41.2	2.82	1.28	54.6	35	1.6
8/10/2011	QHWTP	53.6	2.66	1.43	46.2	35	1.3
"	EWTP	54.4	2.87	1.55	46.0	35	1.3
8/11/2011	AWTP	53.5	2.77	1.50	45.8	35	1.3
9/14/2011	QHWTP	57.6	2.41	1.35	44.0	35	1.3
"	EWTP	58.5	2.61	1.55	40.6	35	1.2
"	AWTP	57.6	2.56	1.49	41.8	35	1.2
10/12/2011	QHWTP	65.6	2.17	1.24	42.9	25	1.7
"	EWTP	67.2	2.37	1.42	40.1	25	1.6
10/13/2011	AWTP	66.0	2.40	1.41	41.3	25	1.7
11/9/2011	QHWTP	53.4	2.09	1.09	47.8	35	1.4
"	EWTP	54.1	2.18	1.22	44.0	35	1.3
"	AWTP	54.5	2.19	1.19	45.7	35	1.3
12/14/2011	QHWTP	78.2	2.39	1.44	39.7	25	1.6
"	EWTP	plant off					
"	AWTP	plant off					
	Minimum	39.8	2.1	1.1	39.7		
	Maximum	78.2	4.4	2.2	57.0		
	RAA	53.5	2.9	1.5	47.3		

Running Annual Average (RAA) **1.4**

Title 22 California Code of Regulations, Chapter 15.5, Article 5:
Required percent TOC reduction**

Table 64536.2-A

	Source Water Alkalinity		
Raw TOC	0-60	<60 - 120	>120
>2.0 - 4.0	35.0 %	25.0 %	15.0 %
>4.0 - 8.0	45.0 %	35.0 %	25.0 %
>8.0	50.0 %	40.0 %	30.0 %

**If one or more of the section 64636.4(b) 1-6 conditions are met, the system may assign a monthly value of 1 for the TOC removal ratio in lieu of the calculated va
List condition when used:

1. The system's source water TOC level, prior to any treatment is less than or equal to 2.0 mg/L
2. The system's treated water TOC level is less than or equal to 2.0 mg/L
3. The system's source water SUVA, prior to any treatment, is less than or equal to 2.0 L/mg-m
4. The system's finished water SUVA is less than or equal to 2.0 L/mg-m
5. A system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO3)
6. A system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO3)

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/05/18 Sample ID No.056

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ERIK KANE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/05/12/1115 | Date/Time Sample Received @ Lab:11/05/12/1143 | Date Analyses Completed:11/05/18

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - INFLUENT

User ID: 4TH | Station Number: 1910045-003

Date/Time of Sample: |11|05|12|1115| (YY MM DD TTTT) | Laboratory Code: 6080

Date Analysis completed: |11|05|18| (YY MM DD)

Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	40.6	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	3.47	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/06/17 Sample ID No.061

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ERIK KANE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/06/09/1040 | Date/Time Sample Received @ Lab:11/06/09/1135 | Date Analyses Completed:11/06/15

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - INFLUENT

User ID: 4TH | Station Number: 1910045-003

Date/Time of Sample: |11|06|09|1040| (YY MM DD TTTT) | Laboratory Code: 6080

Date Analysis completed: |11|06|15| (YY MM DD)

Submitted by: | Phone #:

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	56.0	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	3.04	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/07/26 Sample ID No.079

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ERIK KANE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/07/14/1140 | Date/Time Sample Received @ Lab:11/07/14/1215 | Date Analyses Completed:11/07/25

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - INFLUENT

User ID: 4TH

Station Number: 1910045-003

Date/Time of Sample: |11|07|14|1140| (YY MM DD TTTT)

Laboratory Code: 6080

Date Analysis completed: |11|07|25| (YY MM DD)

Submitted by:

Phone #:

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	41.2	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

ADDITIONAL ANALYSES

079

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.82	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/08/18 Sample ID No.097

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ERIK KANE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/08/11/1005 | Date/Time Sample Received @ Lab:11/08/11/1053 | Date Analyses Completed:11/08/17

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - INFLUENT

User ID: 4TH

Station Number: 1910045-003

Date/Time of Sample: |11|08|11|1005| YY MM DD TTTT

Laboratory Code: 6080 YY MM DD

Date Analysis completed: |11|08|17|

Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	53.5	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

ADDITIONAL ANALYSES

097

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.77	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/09/29 Sample ID No.115

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ERIC KANE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/09/14/0835 | Date/Time Sample Received @ Lab:11/09/14/0938 | Date Analyses Completed:11/09/23

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - INFLUENT

User ID: 4TH | Station Number: 1910045-003

Date/Time of Sample: |11|09|14|0835| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|09|23|

Submitted by: _____ Phone #: _____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	57.6	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081	<	
3	TON	Odor Threshold at 60 C (TON)	00086	<	1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.56	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/10/24 Sample ID No.134

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:Andrew Atrops Employed By: AVEK Water Agency

Date/Time Sample Collected:11/10/13/0921 Date/Time Sample Received @ Lab:11/10/13/1013 Date Analyses Completed:11/10/20

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - INFLUENT

User ID: 4TH Station Number: 1910045-003

Date/Time of Sample: |11|10|13|0921| (YY MM DD TTTT) Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|10|20|

Submitted by: _____ Phone #: _____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	66.0	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.40	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/12/02 Sample ID No.153

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:ANDREW ATROPS Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/11/09/0847 | Date/Time Sample Received @ Lab:11/11/09/0949 | Date Analyses Completed:11/12/01

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:ACTON PLANT - INFLUENT

User ID: 4TH | Station Number: 1910045-003

Date/Time of Sample: |11|11|09|0847| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|12|01|

Submitted by: _____ Phone #: _____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	54.5	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.19	0.30

+ Indicates Secondary Drinking Water Standards

EASTSIDE WATER TREATMENT PLANT

Plant Effluent
Finished Drinking Water
Monitoring Results

BSK Analytical Laboratories

EDT

Date of Report: 11|05|23|1126
Sample ID No.: A1E0914-01
Laboratory Name: BSK Analytical Laboratories
Signature Lab Director:
Name of Sampler: Doug Paterson

Date/Time Sample Collected: 11|05|11|0630
Date/Time Sample Received @ Lab : 11|05|12|1000
Date Analyses Completed: 11|05|22

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - TREATED EFFLUENT

User ID: 4TH
Station Number: 1910045-006
Date/Time of Sample: 11|05|11|0630
Laboratory Code: 5810
Date Analyses Completed: 11|05|22
Submitted by: BSK Analytical Laboratories
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1E0914 FINAL 05232011 1126

BSK Analytical Laboratories

EDT

Date of Report: 11|06|23|1703 **Sample ID No.:** A1F0795-01
Laboratory Name: BSK Analytical Laboratories **Signature Lab Director:**
Name of Sampler: Doug Paterson

Date/Time Sample Collected: 11|06|08|0720 **Date/Time Sample Received @ Lab :** 11|06|09|0800 **Date Analyses Completed:** 11|06|19

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY **System Number:** 1910045
Name or Number of Sample Source: EASTSIDE PLANT - TREATED EFFLUENT

User ID: 4TH **Station Number:** 1910045-006
Date/Time of Sample: 11|06|08|0720 **Laboratory Code:** 5810
Submitted by: BSK Analytical Laboratories **Date Analyses Completed:** 11|06|19
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1F0795 FINAL 06232011 1703

BSK Analytical Laboratories

EDT

Date of Report: 11|07|26|1658
Sample ID No.: A1G1244-01
Laboratory Name: BSK Analytical Laboratories
Signature Lab Director:
Name of Sampler: Doug Paterson

Date/Time Sample Collected: 11|07|13|0631
Date/Time Sample Received @ Lab : 11|07|15|1338
Date Analyses Completed: 11|07|24

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - TREATED EFFLUENT

User ID: 4TH
Station Number: 1910045-006
Date/Time of Sample: 11|07|13|0631
Laboratory Code: 5810
Submitted by: BSK Analytical Laboratories
Date Analyses Completed: 11|07|24
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1G1244 FINAL 07262011 1658

BSK Analytical Laboratories

EDT

Date of Report: 11|08|24|0818
Sample ID No.: A1H1233-01
Laboratory Name: BSK Analytical Laboratories
Signature Lab Director:
Name of Sampler: Kat White

Date/Time Sample Collected: 11|08|10|0810
Date/Time Sample Received @ Lab : 11|08|12|0820
Date Analyses Completed: 11|08|22

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - TREATED EFFLUENT

User ID: 4TH
Station Number: 1910045-006
Date/Time of Sample: 11|08|10|0810
Laboratory Code: 5810
Submitted by: BSK Analytical Laboratories
Date Analyses Completed: 11|08|22
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

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BSK Analytical Laboratories

EDT

Date of Report: 11|09|28|1256
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: S. Horn

Sample ID No.: A1I1114-01
Signature Lab Director:

Date/Time Sample Collected: 11|09|14|0705
Date/Time Sample Received @ Lab : 11|09|15|0950
Date Analyses Completed: 11|09|25

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - TREATED EFFLUENT

User ID: 4TH
Date/Time of Sample: 11|09|14|0705
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-006
Laboratory Code: 5810
Date Analyses Completed: 11|09|25
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1I1114 FINAL 09282011 1256

BSK Analytical Laboratories

EDT

Date of Report: 11|10|26|1108
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Doug Patterson

Sample ID No.: A1J1218-01
Signature Lab Director:

Date/Time Sample Collected: 11|10|12|0636
Date/Time Sample Received @ Lab : 11|10|14|1000
Date Analyses Completed: 11|10|18

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - TREATED EFFLUENT

User ID: 4TH
Date/Time of Sample: 11|10|12|0636
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-006
Laboratory Code: 5810
Date Analyses Completed: 11|10|18
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

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EDT

Date of Report: 11|11|18|1228
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Doug Patterson

Sample ID No.: A1K0840-01
Signature Lab Director:

Date/Time Sample Collected: 11|11|09|0605
Date/Time Sample Received @ Lab : 11|11|10|0810
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - TREATED EFFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|09|0605
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-006
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1K0840 FINAL 11182011 1228

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1555
Sample ID No.: A1K0266-02
Laboratory Name: BSK Analytical Laboratories
Signature Lab Director:
Name of Sampler: Doug Patterson

Date/Time Sample Collected: 11|11|02|0719
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - TREATED EFFLUENT

User ID: 4TH
Station Number: 1910045-006
Date/Time of Sample: 11|11|02|0719
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Submitted by: BSK Analytical Laboratories
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Hardness, (Total) as CaCO3	00900	62	
	mg/L	Calcium (Ca) (mg/L)	00916	14	
	mg/L	Magnesium (Mg) (mg/L)	00927	6.8	
	mg/L	Sodium (Na) (mg/L)	00929	21	
	mg/L	Potassium (K) (mg/L)	00937	< 2.0	
Total Cations Meq/L Value:		2.17			
	mg/L	Alkalinity, (Total) (as CaCO3 equivalents)	00410	38	
	mg/L	Hydroxide (OH) (mg/L)	71830	< 1.0	
	mg/L	Carbonate (CO3) (mg/L)	00445	< 1.8	
	mg/L	Bicarbonate (HCO3) (mg/L)	00440	47	
600	mg/L	Sulfate (SO4) (mg/L)	00945	35	0.5
600	mg/L	Chloride (Cl) (mg/L)	00940	23	
45	mg/L	Nitrate (as NO3) (mg/L)	71850	2.0	2.0
2	mg/L	Fluoride (F) (Natural-Source)	00951	ND	0.1
Total Anions Meq/L Value:		2.18			
15	Units	Color, Apparent (Unfiltered)	00081	< 1.0	
5	NTU	Lab Turbidity (NTU)	82079	< 0.10	
0.5	mg/L	MBAS (mg/L)	38260	< 0.050	
3	TON	Odor Threshold at 60 C (TON)	00086	1.0	1.0
	Std Units	pH (Laboratory) (Std.Units)	00403	7.5	
2200	umho/cm	Specific Conductance (E.C.) (umhos/cm)	00095	240	
1500	mg/L	Total Filterable Residue@180C(TDS)(mg/L)	70300	140	
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50
6	ug/L	Antimony (ug/L)	01097	ND	6.0
10	ug/L	Arsenic (As) (ug/L)	01002	ND	2.0
1000	ug/L	Barium (Ba) (ug/L)	01007	ND	100
4	ug/L	Beryllium (ug/L)	01012	ND	1.0
5	ug/L	Cadmium (Cd) (ug/L)	01027	ND	1.0
50	ug/L	Chromium (Total Cr) (ug/L)	01034	ND	10
1000	ug/L	Copper (Cu) (ug/L)	01042	ND	50

A1K0266 FINAL 12302011 1555

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1555 **Sample ID No.:** A1K0266-02
Laboratory Name: BSK Analytical Laboratories **Signature Lab Director:**
Name of Sampler: Doug Patterson

Date/Time Sample Collected: 11|11|02|0719 **Date/Time Sample Received @ Lab :** 11|11|03|0800 **Date Analyses Completed:** 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY **System Number:** 1910045
Name or Number of Sample Source: EASTSIDE PLANT - TREATED EFFLUENT

User ID: 4TH **Station Number:** 1910045-006
Date/Time of Sample: 11|11|02|0719 **Laboratory Code:** 5810
Submitted by: BSK Analytical Laboratories **Date Analyses Completed:** 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
300	ug/L	Iron (Fe) (ug/L)	01045	ND	100
	ug/L	Lead (Pb) (ug/L)	01051	ND	5.0
50	ug/L	Manganese (Mn) (ug/L)	01055	ND	20
2	ug/L	Mercury (Hg) (ug/L)	71900	ND	1.0
100	ug/L	Nickel (ug/L)	01067	ND	10
50	ug/L	Selenium (Se) (ug/L)	01147	ND	5.0
100	ug/L	Silver (Ag) (ug/L)	01077	ND	10
2	ug/L	Thallium (ug/L)	01059	ND	1.0
5000	ug/L	Zinc (Zn) (ug/L)	01092	520	50

ADDITIONAL ANALYSES

	NA	Agressiveness Index	82383	11	
150	ug/L	Cyanide (ug/L)	01291	ND	100
	NA	Langelier Index at 60 C	71813	- 1.3	
1000	ug/L	Nitrite as Nitrogen(N) (ug/L)	00620	ND	400
6	ug/L	Perchlorate (ug/L)	A-031	ND	4.0

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	REGULATED ORGANIC CHEMICALS				
EPA 525.2	Alachlor (ALANEX)	77825	ND	2	1.0
EPA 525.2	Atrazine (AATREX)	39033	ND	1	0.5
EPA 525.2	Benzo (a) Pyrene	34247	ND	0.2	0.1
EPA 525.2	Di(2-ethylhexyl) Adipate	A-026	ND	400	5.0
EPA 525.2	Diethylhexylphthalate (DEHP)	39100	ND	4	3.0
EPA 525.2	Molinate (ORDRAM)	82199	ND	20	2.0
EPA 525.2	Simazine (PRINCEP)	39055	ND	4	1.0
EPA 525.2	Thiobencarb (BOLERO)	A-001	ND	70	1.0
	UNREGULATED ORGANIC CHEMICALS				
EPA 525.2	Bromacil (HYVAR)	82198	ND		10
EPA 525.2	Butachlor	77860	ND		0.38
EPA 525.2	Diazinon	39570	< 0.25		
EPA 525.2	Dimethoate (CYGON)	38458	< 10		

A1K0266 FINAL 12302011 1555

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1555
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Doug Patterson
Sample ID No.: A1K0266-02
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|0719
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - TREATED EFFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|02|0719
Submitted by: BSK Analytical Laboratories
Station Number: 1910045-006
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	UNREGULATED ORGANIC CHEMICALS				
EPA 525.2	Metolachlor	39356	< 0.50		
EPA 525.2	Metribuzin	81408	< 0.50		
EPA 525.2	Propachlor	38533	ND		0.5

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Antelope Valley-East Kern Water Agency
LA System No. 1910045
TOC Removal Running Annual Average

Sample Date	Plant	Alkalinity mgCaCO3/L	Raw TOC mg/L	Treated TOC mg/L	Actual % TOC reduction	Required % TOC reduction	"TOC Removal Ratio" actual % /required %
1/12/2011	QHWTP	53.9	3.10	1.55	50.0	35	1.4
"	EWTP	plant off					
"	AWTP	plant off					
2/9/2011	QHWTP	52.6	4.41	2.16	51.0	45	1.1
"	EWTP	plant off					
"	AWTP	plant off					
3/9/2011	QHWTP	50.3	4.01	1.92	52.1	45	1.2
"	EWTP	plant off					
"	AWTP	plant off					
4/13/2011	QHWTP	51.7	3.82	1.83	52.1	35	1.5
"	EWTP	plant off					
"	AWTP	plant off					
5/11/2011	QHWTP	40.8	3.23	1.55	52.0	35	1.5
"	EWTP	41.9	3.58	1.54	57.0	35	1.6
5/12/2011	AWTP	40.6	3.47	1.55	55.3	35	1.6
6/8/2011	QHWTP	54.6	2.87	1.57	45.3	35	1.3
"	EWTP	53.4	3.08	1.71	44.5	35	1.3
6/9/2011	AWTP	56.0	3.04	1.61	47.0	35	1.3
7/13/2011	QHWTP	39.8	2.64	1.26	52.3	35	1.5
"	EWTP	41.0	2.78	1.40	49.6	35	1.4
7/14/2011	AWTP	41.2	2.82	1.28	54.6	35	1.6
8/10/2011	QHWTP	53.6	2.66	1.43	46.2	35	1.3
"	EWTP	54.4	2.87	1.55	46.0	35	1.3
8/11/2011	AWTP	53.5	2.77	1.50	45.8	35	1.3
9/14/2011	QHWTP	57.6	2.41	1.35	44.0	35	1.3
"	EWTP	58.5	2.61	1.55	40.6	35	1.2
"	AWTP	57.6	2.56	1.49	41.8	35	1.2
10/12/2011	QHWTP	65.6	2.17	1.24	42.9	25	1.7
"	EWTP	67.2	2.37	1.42	40.1	25	1.6
10/13/2011	AWTP	66.0	2.40	1.41	41.3	25	1.7
11/9/2011	QHWTP	53.4	2.09	1.09	47.8	35	1.4
"	EWTP	54.1	2.18	1.22	44.0	35	1.3
"	AWTP	54.5	2.19	1.19	45.7	35	1.3
12/14/2011	QHWTP	78.2	2.39	1.44	39.7	25	1.6
"	EWTP	plant off					
"	AWTP	plant off					
	Minimum	39.8	2.1	1.1	39.7		
	Maximum	78.2	4.4	2.2	57.0		
	RAA	53.5	2.9	1.5	47.3		

Running Annual Average (RAA) **1.4**

Title 22 California Code of Regulations, Chapter 15.5, Article 5:
Required percent TOC reduction**

Table 64536.2-A

Raw TOC	Source Water Alkalinity 0-60	<60 - 120	>120
>2.0 - 4.0	35.0 %	25.0 %	15.0 %
>4.0 - 8.0	45.0 %	35.0 %	25.0 %
>8.0	50.0 %	40.0 %	30.0 %

**If one or more of the section 64636.4(b) 1-6 conditions are met, the system may assign a monthly value of 1 for the TOC removal ratio in lieu of the calculated va
List condition when used:

1. The system's source water TOC level, prior to any treatment is less than or equal to 2.0 mg/L
2. The system's treated water TOC level is less than or equal to 2.0 mg/L
3. The system's source water SUVA, prior to any treatment, is less than or equal to 2.0 L/mg-m
4. The system's finished water SUVA is less than or equal to 2.0 L/mg-m
5. A system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO3)
6. A system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO3)

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/05/18 Sample ID No.031

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:DOUG PATTERSON Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/05/11/0640 | Date/Time Sample Received @ Lab:11/05/11/0857 | Date Analyses Completed:11/05/13

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - TREATED EFFLUENT FORCE

User ID: 4TH | Station Number: 1910045-006

Date/Time of Sample: |11|05|11|0640| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|05|13|

Submitted by: | Phone #:

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.54	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/06/17 Sample ID No.064

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:STEVE HORN Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/06/08/0727 | Date/Time Sample Received @ Lab:11/06/08/1005 | Date Analyses Completed:11/06/15

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - TREATED EFFLUENT FORCE

User ID: 4TH | Station Number: 1910045-006

Date/Time of Sample: |11|06|08|0727| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|06|15|

Submitted by:_____ Phone #:_____

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.71	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/07/26 Sample ID No.082

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:DOUG PATERSON Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/07/13/0625 | Date/Time Sample Received @ Lab:11/07/13/0815 | Date Analyses Completed:11/07/25

==========

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - TREATED EFFLUENT FORCE

****

* User ID: 4TH Station Number: 1910045-006 *

* Date/Time of Sample: |11|07|13|0625| Laboratory Code: 6080 *

* YY MM DD TTTT YY MM DD *

* Date Analysis completed: |11|07|25| *

* Submitted by:_____ Phone #:_____ *

****

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.40	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/08/18 Sample ID No.100

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:STEVE HORN Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/08/10/0820 | Date/Time Sample Received @ Lab:11/08/10/1009 | Date Analyses Completed:11/08/17

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - TREATED EFFLUENT FORCE

User ID: 4TH | Station Number: 1910045-006

Date/Time of Sample: |11|08|10|0820| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|08|17|

Submitted by:_____ Phone #:_____

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.55	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/09/29 Sample ID No.118

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:STEVE HORN Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/09/14/0720 | Date/Time Sample Received @ Lab:11/09/14/1115 | Date Analyses Completed:11/09/23

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - TREATED EFFLUENT

User ID: 4TH | Station Number: 1910045-006

Date/Time of Sample: |11|09|14|0720| (YY MM DD TTTT) | Laboratory Code: 6080

Date Analysis completed: |11|09|23| (YY MM DD)

Submitted by: _____ Phone #: _____

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.55	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/10/24 Sample ID No.137

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:Steve Horn Employed By: AVEK Water Agency

Date/Time Sample Collected:11/10/12/0630 | Date/Time Sample Received @ Lab:11/10/12/0930 | Date Analyses Completed:11/10/20

==========

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - TREATED EFFLUENT

****

* User ID: 4TH Station Number: 1910045-006 *

* Date/Time of Sample: |11|10|12|0630| Laboratory Code: 6080 *

* YY MM DD TTTT YY MM DD *

* Date Analysis completed: |11|10|20| *

* Submitted by:_____ Phone #:_____ *

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PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.42	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/12/02 Sample ID No.156

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:DOUG PATERSON Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/11/09/0617 | Date/Time Sample Received @ Lab:11/11/09/0826 | Date Analyses Completed:11/12/01

==========

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - TREATED EFFLUENT

****

* User ID: 4TH Station Number: 1910045-006 *

* Date/Time of Sample: |11|11|09|0617| Laboratory Code: 6080 *

* YY MM DD TTTT YY MM DD *

* Date Analysis completed: |11|12|01| *

* Submitted by:_____ Phone #:_____ *

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PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.22	0.30

\+ Indicates Secondary Drinking Water Standards

EASTSIDE WATER TREATMENT PLANT

Plant Influent
Untreated Source Water
Monitoring Results

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|03|11|1327
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Kat White

Sample ID No.: A1C0821-01
Signature Lab Director:

Date/Time Sample Collected: 11|03|09|1400
Date/Time Sample Received @ Lab : 11|03|10|1000
Date Analyses Completed: 11|03|10

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
Name or Number of Sample Source: EASTSIDE PLANT - INFLUENT
System Number: 1910045

User ID: 4TH
Date/Time of Sample: 11|03|09|1400
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-005
Laboratory Code: 5810
Date Analyses Completed: 11|03|10
Phone #: 559-497-2888

Report Amendments

Date: 3/11/11

Initials: PJE

This amended report supersedes any previous reports issued by the laboratory. Amendments to this report are as follows: Report amended to send state data to the following PS codes: 1910045-002, 1910045-005, 1910045-003, and 1510053-001.

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	3.2	2.0

Total Anions Meq/L Value: 0.05

A1C0821 RECREATE 03112011 1328

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|06|28|1111
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Justin Livesay

Sample ID No.: A1F0795-04
Signature Lab Director: Jeffrey D. Forlayn

Date/Time Sample Collected: 11|06|08|1407
Date/Time Sample Received @ Lab : 11|06|09|0800
Date Analyses Completed: 11|06|10

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - INFLUENT

User ID: 4TH
Date/Time of Sample: 11|06|08|1407
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-005
Laboratory Code: 5810
Date Analyses Completed: 11|06|10
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	2.0	2.0

Total Anions Meq/L Value: 0.03

A1F0795 FINAL 06282011 1111

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|09|30|1011
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Justin Livesay

Sample ID No.: A1|1271-01
Signature Lab Director:

Date/Time Sample Collected: 11|09|15|1431
Date/Time Sample Received @ Lab : 11|09|16|1020
Date Analyses Completed: 11|09|16

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
Name or Number of Sample Source: EASTSIDE PLANT - INFLUENT
System Number: 1910045

User ID: 4TH
Date/Time of Sample: 11|09|15|1431
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-005
Laboratory Code: 5810
Date Analyses Completed: 11|09|16
Phone #: 559-497-2888

Chain of Custody Notes

Date: 9/29/11
Initials: RLR
Note: Data is reported to four ps codes EDT: 1910045-002, 1910045-005, 1910045-003 and 1510053-001. Subsequent amended write on report hardcopies reflect the report being generated multiple times to accommodate this request.

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	ND	2.0

Total Anions Meq/L Value: 0.00

A111271 FINAL 09302011 1011

BSK Analytical Laboratories

Amended

EDT

Date of Report: 12|01|10|0957
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: k. White

Sample ID No.: A1L1169-03
Signature Lab Director:

Date/Time Sample Collected: 11|12|15|1216
Date/Time Sample Received @ Lab : 11|12|16|1023
Date Analyses Completed: 11|12|16

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - INFLUENT

User ID: 4TH
Date/Time of Sample: 11|12|15|1216
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-005
Laboratory Code: 5810
Date Analyses Completed: 11|12|16
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	3.6	2.0

Total Anions Meq/L Value: 0.06

A1L1169 FINAL 01102012 0957

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1531
Sample ID No.: A1K0266-05
Laboratory Name: BSK Analytical Laboratories
Signature Lab Director:
Name of Sampler: Client

Date/Time Sample Collected: 11|11|02|1307
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - INFLUENT

User ID: 4TH
Station Number: 1910045-005
Date/Time of Sample: 11|11|02|1307
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Submitted by: BSK Analytical Laboratories
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Hardness, (Total) as CaCO3	00900	60	
	mg/L	Calcium (Ca) (mg/L)	00916	13	
	mg/L	Magnesium (Mg) (mg/L)	00927	6.5	
	mg/L	Sodium (Na) (mg/L)	00929	20	
	mg/L	Potassium (K) (mg/L)	00937	< 2.0	
Total Cations Meq/L Value:		2.05			
	mg/L	Alkalinity, (Total) (as CaCO3 equivalents)	00410	58	
	mg/L	Hydroxide (OH) (mg/L)	71830	< 1.0	
	mg/L	Carbonate (CO3) (mg/L)	00445	< 1.8	
	mg/L	Bicarbonate (HCO3) (mg/L)	00440	71	
600	mg/L	Sulfate (SO4) (mg/L)	00945	16	0.5
600	mg/L	Chloride (Cl) (mg/L)	00940	22	
45	mg/L	Nitrate (as NO3) (mg/L)	71850	2.2	2.0
2	mg/L	Fluoride (F) (Natural-Source)	00951	ND	0.1
Total Anions Meq/L Value:		2.15			
15	Units	Color, Apparent (Unfiltered)	00081	10	
5	NTU	Lab Turbidity (NTU)	82079	0.47	
0.5	mg/L	MBAS (mg/L)	38260	< 0.050	
3	TON	Odor Threshold at 60 C (TON)	00086	1.0	1.0
	Std Units	pH (Laboratory) (Std.Units)	00403	8.2	
2200	umho/cm	Specific Conductance (E.C.) (umhos/cm)	00095	220	
1500	mg/L	Total Filterable Residue@180C(TDS)(mg/L)	70300	130	
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50
6	ug/L	Antimony (ug/L)	01097	ND	6.0
10	ug/L	Arsenic (As) (ug/L)	01002	ND	2.0
1000	ug/L	Barium (Ba) (ug/L)	01007	ND	100
4	ug/L	Beryllium (ug/L)	01012	ND	1.0
5	ug/L	Cadmium (Cd) (ug/L)	01027	ND	1.0
50	ug/L	Chromium (Total Cr) (ug/L)	01034	ND	10
1000	ug/L	Copper (Cu) (ug/L)	01042	ND	50

A1K0266 FINAL 12302011 1532

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1531
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Client

Sample ID No.: A1K0266-05
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|1307
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - INFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|02|1307
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-005
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
300	ug/L	Iron (Fe) (ug/L)	01045	ND	100
	ug/L	Lead (Pb) (ug/L)	01051	ND	5.0
50	ug/L	Manganese (Mn) (ug/L)	01055	ND	20
2	ug/L	Mercury (Hg) (ug/L)	71900	ND	1.0
100	ug/L	Nickel (ug/L)	01067	ND	10
50	ug/L	Selenium (Se) (ug/L)	01147	ND	5.0
100	ug/L	Silver (Ag) (ug/L)	01077	ND	10
2	ug/L	Thallium (ug/L)	01059	ND	1.0
5000	ug/L	Zinc (Zn) (ug/L)	01092	ND	50

ADDITIONAL ANALYSES

	NA	Agressiveness Index	82383	11	
150	ug/L	Cyanide (ug/L)	01291	ND	100
	NA	Langelier Index at 60 C	71813	- 0.42	
1000	ug/L	Nitrite as Nitrogen(N) (ug/L)	00620	ND	400
6	ug/L	Perchlorate (ug/L)	A-031	ND	4.0

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	REGULATED ORGANIC CHEMICALS				
EPA 524.2	Bromodichloromethane	32101	ND		1.0
EPA 524.2	Bromoform	32104	ND		1.0
EPA 524.2	Chloroform (Trichloromethane)	32106	ND		1.0
EPA 524.2	Dibromochloromethane	32105	ND		1.0
EPA 524.2a	Total Trihalomethanes (TTHMs)	82080	< 0.50	80	
	REGULATED ORGANIC CHEMICALS				
EPA 524.2	1,1,1-Trichloroethane (1,1,1-TCA)	34506	ND	200	0.5
EPA 524.2	1,1,2,2-Tetrachloroethane	34516	ND	1	0.5
EPA 524.2	1,1,2-Trichloroethane (1,1,2-TCA)	34511	ND	5	0.5
EPA 524.2	1,1-Dichloroethane (1,1-DCA)	34496	ND	5	0.5
EPA 524.2	1,1-Dichloroethylene (1,1-DCE)	34501	ND	6	0.5
EPA 524.2	1,2,4-Trichlorobenzene	34551	ND	5	0.5
EPA 524.2	1,2-Dichlorobenzene (o-DCB)	34536	ND	600	0.5

A1K0266 FINAL 12302011 1532

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1531
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Client

Sample ID No.: A1K0266-05
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|1307
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - INFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|02|1307
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-005
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	REGULATED ORGANIC CHEMICALS				
EPA 524.2	1,2-Dichloroethane (1,2-DCA)	34531	ND	0.5	0.5
EPA 524.2	1,2-Dichloropropane	34541	ND	5	0.5
EPA 524.2	1,4-Dichlorobenzene (p-DCB)	34571	ND	5	0.5
EPA 524.2	Benzene	34030	ND	1	0.5
EPA 524.2	Carbon Tetrachloride	32102	ND	0.5	0.5
EPA 524.2	cis-1,2-Dichloroethylene (c-1,2-DCE)	77093	ND	6	0.5
EPA 524.2	cis-1,3-Dichloropropene (D-D)	34704	ND	0.5	0.5
EPA 524.2	Dichloromethane (Methylene Chloride)	34423	ND	5	0.5
EPA 524.2	Ethyl Benzene	34371	ND	300	0.5
EPA 524.2	m,p-Xylene	A-014	ND		0.5
EPA 524.2	Methyl tert-Butyl Ether(MTBE)	46491	ND	5	3.0
EPA 524.2	Monochlorobenzene (Chlorobenzene)	34301	ND	70	0.5
EPA 524.2	o-Xylene	77135	ND		0.5
EPA 524.2	Styrene	77128	ND	100	0.5
EPA 524.2	Tetrachloroethylene (PCE)	34475	ND	5	0.5
EPA 524.2	Toluene	34010	ND	150	0.5
EPA 524.2	trans-1,2-Dichloroethylene (t-1,2-DCE)	34546	ND	10	0.5
EPA 524.2	trans-1,3-Dichloropropene	34699	ND	0.5	0.5
EPA 524.2	Trichloroethylene (TCE)	39180	ND	5	0.5
EPA 524.2	Trichlorofluoromethane (FREON 11)	34488	ND	150	5.0
EPA 524.2	Trichlorotrifluoroethane (FREON 113)	81611	ND	1200	10
EPA 524.2	Vinyl Chloride (VC)	39175	ND	0.5	0.5
EPA 524.2a	Total 1,3-Dichloropropene	34561	ND	0.5	0.5
EPA 524.2a	Total Xylenes (m,p, & o)	81551	< 0.50	1750	
EPA 525.2	Alachlor (ALANEX)	77825	ND	2	1.0
EPA 525.2	Atrazine (AATREX)	39033	ND	1	0.5
EPA 525.2	Benzo (a) Pyrene	34247	ND	0.2	0.1
EPA 525.2	Di(2-ethylhexyl) Adipate	A-026	ND	400	5.0
EPA 525.2	Diethylhexylphthalate (DEHP)	39100	ND	4	3.0
EPA 525.2	Molinate (ORDRAM)	82199	ND	20	2.0
EPA 525.2	Simazine (PRINCEP)	39055	ND	4	1.0
EPA 525.2	Thiobencarb (BOLERO)	A-001	ND	70	1.0
	UNREGULATED ORGANIC CHEMICALS				

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1531
Sample ID No.: A1K0266-05
Laboratory Name: BSK Analytical Laboratories
Signature Lab Director:
Name of Sampler: Client

Date/Time Sample Collected: 11|11|02|1307
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - INFLUENT

User ID: 4TH
Station Number: 1910045-005
Date/Time of Sample: 11|11|02|1307
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Submitted by: BSK Analytical Laboratories
Phone #: 559-497-2888

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	UNREGULATED ORGANIC CHEMICALS				
EPA 524.2	1,1,1,2-Tetrachloroethane	77562	ND		0.5
EPA 524.2	1,1-Dichloropropene	77168	ND		0.5
EPA 524.2	1,2,3-Trichlorobenzene	77613	ND		0.5
EPA 524.2	1,2,4-Trimethylbenzene	77222	< 0.50		
EPA 524.2	1,3,5-Trimethylbenzene	77226	ND		0.5
EPA 524.2	1,3-Dichlorobenzene (m-DCB)	34566	ND		0.5
EPA 524.2	1,3-Dichloropropane	77173	ND		0.5
EPA 524.2	2,2-Dichloropropane	77170	ND		0.5
EPA 524.2	2-Chlorotoluene	A-008	ND		0.5
EPA 524.2	4-Chlorotoluene	A-009	ND		0.5
EPA 524.2	Acetone	81552	< 10		
EPA 524.2	Bromobenzene	81555	ND		0.5
EPA 524.2	Bromochloromethane	A-012	ND		0.5
EPA 524.2	Bromomethane (Methyl Bromide)	34413	ND		0.5
EPA 524.2	Chloroethane	34311	ND		0.5
EPA 524.2	Chloromethane (Methyl Chloride)	34418	ND		0.5
EPA 524.2	Dibromomethane	77596	ND		0.5
EPA 524.2	Dichlorodifluoromethane (Freon 12)	34668	ND		0.5
EPA 524.2	Diisopropyl Ether (DIPE)	A-036	ND		3.0
EPA 524.2	Ethyl tert-Butyl Ether (ETBE)	A-033	ND		3.0
EPA 524.2	Hexachlorobutadiene	34391	ND		0.5
EPA 524.2	Isopropylbenzene (Cumene)	77223	ND		0.5
EPA 524.2	Mesitylene (1,3,5-Trimethylbenzene)	77226	ND		0.5
EPA 524.2	Methyl Ethyl Ketone (MEK, Butanone)	81595	ND		5.0
EPA 524.2	Methyl Isobutyl Ketone (MIBK)	81596	ND		5.0
EPA 524.2	Naphthalene	34696	ND		0.5
EPA 524.2	n-Butylbenzene	A-010	ND		0.5
EPA 524.2	n-Propylbenzene	77224	ND		0.5
EPA 524.2	p-Isopropyltoluene	A-011	< 0.50		
EPA 524.2	sec-Butylbenzene	77350	ND		0.5
EPA 524.2	tert-Amyl Methyl Ether (TAME)	A-034	ND		3.0
EPA 524.2	tert-Butyl Alcohol (TBA)	77035	ND		2.0
EPA 524.2	tert-Butylbenzene	77353	ND		0.5
EPA 525.2	Bromacil (HYVAR)	82198	ND		10

A1K0266 FINAL 12302011 1532

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1531
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Client

Sample ID No.: A1K0266-05
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|1307
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: EASTSIDE PLANT - INFLUENT

User ID: 4TH
Date/Time of Sample: 11|11|02|1307
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-005
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	UNREGULATED ORGANIC CHEMICALS				
EPA 525.2	Butachlor	77860	ND		0.38
EPA 525.2	Diazinon	39570	< 0.25		
EPA 525.2	Dimethoate (CYGON)	38458	< 10		
EPA 525.2	Metolachlor	39356	< 0.50		
EPA 525.2	Metribuzin	81408	< 0.50		
EPA 525.2	Propachlor	38533	ND		0.5

A1K0266 FINAL 12302011 1532

RADIOACTIVITY ANALYSIS (9/99)

Date of Report: 11/12/05 Sample ID No.3057601001/K0288
Laboratory Signature Lab
Name: PACE ANALYTICAL SERVICES, INC-GREENSBURG Director:
Name of Sampler:client Employed By: client
Date/Time Sample Collected:11/11/02/1307 Date/Time Sample Received @ Lab:11/11/14/0950 Date Analyses Completed:11/12/02

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY System Number: 1910045
Name or Number of Sample Source:EASTSIDE PLANT - INFLUENT

User ID: 4TH Station Number: 1910045-005
Date/Time of Sample: |11|11|02|1307| (YY MM DD TTTT) Laboratory Code: 0010
Date Analysis completed: |11|12|02| (YY MM DD)
Submitted by: Phone #:

MCL	REPORT UNITS	CHEMICAL	STORET CODE	ANALYSES RESULTS	DLR
	pCi/L	TITLE 22 CALIFORNIA CODE OF REGULATIONS			
	pCi/L	SECTION 64442 (22 CCR 64442)			
15	pCi/L	Gross Alpha	01501		3.0
	pCi/L	Gross Alpha Counting Error	01502		
	pCi/L	Gross Alpha MDA95 *	A-072		
20	pCi/L	Uranium	28012		1.0
	pCi/L	Uranium Counting Error	A-028		
	pCi/L	Uranium MDA95	A-073		
	pCi/L	Radium 226	09501		1.0
	pCi/L	Radium 226 Counting Error	09502		
	pCi/L	Radium 226 MDA95	A-074		
	pCi/L	Radium 228	11501		1.0
	pCi/L	Radium 228 Counting Error	11502		
	pCi/L	Radium 228 MDA95	A-075		
5	pCi/L	Ra 226 + Ra 228, Combined	11503		
	pCi/L	Ra 226 + Ra 228 Counting Error, Combined	11504		
	pCi/L	Ra 226 + Ra 229 MDA95, Combined	A-076		
	pCi/L	RADIUM, TOTAL, (FOR NTNC ONLY, BY 903.0)			
	pCi/L	Radium, Total	A-080		
	pCi/L	Radium, Total, Counting Error	A-081		
	pCi/L	Radium, Total, MDA95	A-082		
	pCi/L	TITLE 22 CALIFORNIA CODE OF REGULATIONS			
	pCi/L	SECTION 64443 (22 CCR 64443)			
50	pCi/L	Gross Beta	03501	< 4.0	4.0
	pCi/L	Gross Beta Counting Error	03502	1.06	

	pCi/L	Gross Beta MDA95	A-077		
4	pCi/L	Gross Beta, Calculated Dose Equivalent *	A-071		
8	pCi/L	Strontium 90	13501	< 2.0	2.0
	pCi/L	Strontium 90 Counting Error	13502	0.192	
	pCi/L	Strontium 90 MDA95	A-078		
20000	pCi/L	Tritium	07000	< 1000	1000
	pCi/L	Tritium Counting Error	07001	115	
	pCi/L	Tritium MDA95	A-079		
	pCi/L	RADON			
	pCi/L	Radon 222	82303		100.0
	pCi/L	Radon 222 Counting Error	82302		
	pCi/L				
	pCi/L	*MDA95 is Minimum Detectable Activity at			
	pCi/L	the 95% confidence level, per			
	pCi/L	22 CCR 64442 and 64443.			
	pCi/L				
	pCi/L	**Gross Beta, Calculated Total Body or			
	pCi/L	Organ Dose Equivalent, Per 22 CCR 64443			
	pCi/L				

Antelope Valley-East Kern Water Agency
LA System No. 1910045
TOC Removal Running Annual Average

Sample Date	Plant	Alkalinity mgCaCO3/L	Raw TOC mg/L	Treated TOC mg/L	Actual % TOC reduction	Required % TOC reduction	"TOC Removal Ratio" actual % /required %
1/12/2011	QHWTP	53.9	3.10	1.55	50.0	35	1.4
"	EWTP	plant off					
"	AWTP	plant off					
2/9/2011	QHWTP	52.6	4.41	2.16	51.0	45	1.1
"	EWTP	plant off					
"	AWTP	plant off					
3/9/2011	QHWTP	50.3	4.01	1.92	52.1	45	1.2
"	EWTP	plant off					
"	AWTP	plant off					
4/13/2011	QHWTP	51.7	3.82	1.83	52.1	35	1.5
"	EWTP	plant off					
"	AWTP	plant off					
5/11/2011	QHWTP	40.8	3.23	1.55	52.0	35	1.5
"	EWTP	41.9	3.58	1.54	57.0	35	1.6
5/12/2011	AWTP	40.6	3.47	1.55	55.3	35	1.6
6/8/2011	QHWTP	54.6	2.87	1.57	45.3	35	1.3
"	EWTP	53.4	3.08	1.71	44.5	35	1.3
6/9/2011	AWTP	56.0	3.04	1.61	47.0	35	1.3
7/13/2011	QHWTP	39.8	2.64	1.26	52.3	35	1.5
"	EWTP	41.0	2.78	1.40	49.6	35	1.4
7/14/2011	AWTP	41.2	2.82	1.28	54.6	35	1.6
8/10/2011	QHWTP	53.6	2.66	1.43	46.2	35	1.3
"	EWTP	54.4	2.87	1.55	46.0	35	1.3
8/11/2011	AWTP	53.5	2.77	1.50	45.8	35	1.3
9/14/2011	QHWTP	57.6	2.41	1.35	44.0	35	1.3
"	EWTP	58.5	2.61	1.55	40.6	35	1.2
"	AWTP	57.6	2.56	1.49	41.8	35	1.2
10/12/2011	QHWTP	65.6	2.17	1.24	42.9	25	1.7
"	EWTP	67.2	2.37	1.42	40.1	25	1.6
10/13/2011	AWTP	66.0	2.40	1.41	41.3	25	1.7
11/9/2011	QHWTP	53.4	2.09	1.09	47.8	35	1.4
"	EWTP	54.1	2.18	1.22	44.0	35	1.3
"	AWTP	54.5	2.19	1.19	45.7	35	1.3
12/14/2011	QHWTP	78.2	2.39	1.44	39.7	25	1.6
"	EWTP	plant off					
"	AWTP	plant off					
	Minimum	39.8	2.1	1.1	39.7		
	Maximum	78.2	4.4	2.2	57.0		
	RAA	53.5	2.9	1.5	47.3		

Running Annual Average (RAA) **1.4**

Title 22 California Code of Regulations, Chapter 15.5, Article 5:
Required percent TOC reduction**

Table 64536.2-A

Raw TOC	Source Water Alkalinity 0-60	<60 - 120	>120
>2.0 - 4.0	35.0 %	25.0 %	15.0 %
>4.0 - 8.0	45.0 %	35.0 %	25.0 %
>8.0	50.0 %	40.0 %	30.0 %

**If one or more of the section 64536.4(b) 1-6 conditions are met, the system may assign a monthly value of 1 for the TOC removal ratio in lieu of the calculated va
List condition when used:

1. The system's source water TOC level, prior to any treatment is less than or equal to 2.0 mg/L
2. The system's treated water TOC level is less than or equal to 2.0 mg/L
3. The system's source water SUVA, prior to any treatment, is less than or equal to 2.0 L/mg-m
4. The system's finished water SUVA is less than or equal to 2.0 L/mg-m
5. A system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO3)
6. A system practicing enhanced softening lowars alkalinity below 60 mg/L (as CaCO3)

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/05/18 Sample ID No.032

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:DOUG PATTERSON Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/05/11/0645 | Date/Time Sample Received @ Lab:11/05/11/0857 | Date Analyses Completed:11/05/18

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - INFLUENT

User ID: 4TH

Station Number: 1910045-005

Date/Time of Sample: |11|05|11|0645| (YY MM DD TTTT)

Laboratory Code: 6080

Date Analysis completed: |11|05|18| (YY MM DD)

Submitted by:

Phone #:

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	41.9	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

ADDITIONAL ANALYSES 032

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	3.58	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/06/17 Sample ID No.065

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:STEVE HORN Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/06/08/0720 | Date/Time Sample Received @ Lab:11/06/08/1005 | Date Analyses Completed:11/06/15

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - INFLUENT

User ID: 4TH | Station Number: 1910045-005

Date/Time of Sample: |11|06|08|0720| (YY MM DD TTTT) | Laboratory Code: 6080

Date Analysis completed: |11|06|15| (YY MM DD)

Submitted by: _____ Phone #: _____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	53.4	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

ADDITIONAL ANALYSES

065

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	3.08	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/07/26 Sample ID No.083

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:DOUG PATERSON Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/07/13/0630 | Date/Time Sample Received @ Lab:11/07/13/0815 | Date Analyses Completed:11/07/25

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - INFLUENT

User ID: 4TH | Station Number: 1910045-005

Date/Time of Sample: |11|07|13|0630| (YY MM DD TTTT) | Laboratory Code: 6080

Date Analysis completed: |11|07|25| (YY MM DD)

Submitted by: _____ Phone #: _____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	41.0	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

ADDITIONAL ANALYSES

083

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.78	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/08/18 Sample ID No.101

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:STEVE HORN Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/08/10/0820 | Date/Time Sample Received @ Lab:11/08/10/1009 | Date Analyses Completed:11/08/17

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - INFLUENT

User ID: 4TH | Station Number: 1910045-005

Date/Time of Sample: |11|08|10|0820| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|08|17|

Submitted by: _____ Phone #: _____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	54.4	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.87	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/09/29 Sample ID No.119

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:STEVE HORN Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/09/14/0705 | Date/Time Sample Received @ Lab:11/09/14/1115 | Date Analyses Completed:11/09/23

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - INFLUENT

User ID: 4TH | Station Number: 1910045-005

Date/Time of Sample: |11|09|14|0705| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|09|23|

Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	58.5	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081	<	
3	TON	Odor Threshold at 60 C (TON)	00086	<	1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.61	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/10/24 Sample ID No.138

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:Steve Horn Employed By: AVEK Water Agency

Date/Time Sample Collected:11/10/12/0620 | Date/Time Sample Received @ Lab:11/10/12/0930 | Date Analyses Completed:11/10/20

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - INFLUENT

User ID: 4TH | Station Number: 1910045-005

Date/Time of Sample: |11|10|12|0620| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|10|20|

Submitted by: _____ Phone #: _____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	67.2	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.37	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/12/02 Sample ID No.157

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:DOUG PATERSON Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/11/09/0609 | Date/Time Sample Received @ Lab:11/11/09/0826 | Date Analyses Completed:11/12/01

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:EASTSIDE PLANT - INFLUENT

User ID: 4TH | Station Number: 1910045-005

Date/Time of Sample: |11|11|09|0609| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|12|01|

Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	54.1	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.18	0.30

+ Indicates Secondary Drinking Water Standards

QUARTZ HILL
WATER TREATMENT PLANT

Plant Effluent
Finished Drinking Water
Monitoring Results

BSK Analytical Laboratories

EDT

Date of Report: 11|01|26|0926
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Kat White

Sample ID No.: A1A0928-01
Signature Lab Director:

Date/Time Sample Collected: 11|01|12|0814
Date/Time Sample Received @ Lab : 11|01|14|0816
Date Analyses Completed: 11|01|25

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|01|12|0814
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|01|25
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

BSK Analytical Laboratories

EDT

Date of Report: 11|02|22|1205
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Kat White

Sample ID No.: A1B0919-01
Signature Lab Director:

Date/Time Sample Collected: 11|02|09|1050
Date/Time Sample Received @ Lab : 11|02|11|0800
Date Analyses Completed: 11|02|17

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|02|09|1050
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|02|17
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1B0919 FINAL 02222011 1205

BSK Analytical Laboratories

EDT

Date of Report: 11|03|28|1107
Sample ID No.: A1C1476-02
Laboratory Name: BSK Analytical Laboratories
Signature Lab Director:
Name of Sampler: Kat White/Ray Rodriguez

Date/Time Sample Collected: 11|03|09|0845
Date/Time Sample Received @ Lab : 11|03|18|0830
Date Analyses Completed: 11|03|27

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Station Number: 1910045-001
Date/Time of Sample: 11|03|09|0845
Laboratory Code: 5810
Submitted by: BSK Analytical Laboratories
Date Analyses Completed: 11|03|27
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

1414 Stanislaus Street Fresno, CA 93706 (559) 497-2888 FAX (559) 485-6935 www.bsklabs.com

BSK Analytical Laboratories

EDT

Date of Report: 11|04|25|1108
Sample ID No.: A1D1094-01
Laboratory Name: BSK Analytical Laboratories
Signature Lab Director:
Name of Sampler: Kat White

Date/Time Sample Collected: 11|04|13|0740
Date/Time Sample Received @ Lab : 11|04|14|1000
Date Analyses Completed: 11|04|23

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Station Number: 1910045-001
Date/Time of Sample: 11|04|13|0740
Laboratory Code: 5810
Date Analyses Completed: 11|04|23
Submitted by: BSK Analytical Laboratories
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1D1094 FINAL 04252011 1108

BSK Analytical Laboratories

EDT

Date of Report: 11|05|23|1126
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Kat White

Sample ID No.: A1E0914-02
Signature Lab Director:

Date/Time Sample Collected: 11|05|11|0926
Date/Time Sample Received @ Lab : 11|05|12|1000
Date Analyses Completed: 11|05|22

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|05|11|0926
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|05|22
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

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BSK Analytical Laboratories

EDT

Date of Report: 11|06|23|1703
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Justin Livesay

Sample ID No.: A1F0795-02
Signature Lab Director:

Date/Time Sample Collected: 11|06|08|0908
Date/Time Sample Received @ Lab : 11|06|09|0800
Date Analyses Completed: 11|06|19

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|06|08|0908
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|06|19
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

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BSK Analytical Laboratories

EDT

Date of Report: 11|07|26|1658
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Eric Kane

Sample ID No.: A1G1244-02
Signature Lab Director:

Date/Time Sample Collected: 11|07|13|1249
Date/Time Sample Received @ Lab : 11|07|15|1338
Date Analyses Completed: 11|07|24

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|07|13|1249
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|07|24
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1G1244 FINAL 07262011 1658

BSK Analytical Laboratories

EDT

Date of Report: 11|08|24|0818
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Kat White

Sample ID No.: A1H1233-02
Signature Lab Director:

Date/Time Sample Collected: 11|08|10|1039
Date/Time Sample Received @ Lab : 11|08|12|0820
Date Analyses Completed: 11|08|22

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|08|10|1039
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|08|22
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1H1233 FINAL 08242011 0818

BSK Analytical Laboratories

EDT

Date of Report: 11|09|28|1256
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: K. White

Sample ID No.: A1I1114-02
Signature Lab Director:

Date/Time Sample Collected: 11|09|14|1252
Date/Time Sample Received @ Lab : 11|09|15|0950
Date Analyses Completed: 11|09|25

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|09|14|1252
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|09|25
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

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BSK Analytical Laboratories

EDT

Date of Report: 11|10|26|1108
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Kat White

Sample ID No.: A1J1218-02
Signature Lab Director:

Date/Time Sample Collected: 11|10|12|0928
Date/Time Sample Received @ Lab : 11|10|14|1000
Date Analyses Completed: 11|10|18

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|10|12|0928
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|10|18
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

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BSK Analytical Laboratories

EDT

Date of Report: 11|11|18|1228
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Kat White

Sample ID No.: A1K0840-02
Signature Lab Director:

Date/Time Sample Collected: 11|11|09|1040
Date/Time Sample Received @ Lab : 11|11|10|0810
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|11|09|1040
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

A1K0840 FINAL 11182011 1228

BSK Analytical Laboratories

EDT

Date of Report: 12|01|03|1521
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: k. White

Sample ID No.: A1L1169-01
Signature Lab Director:

Date/Time Sample Collected: 11|12|14|0835
Date/Time Sample Received @ Lab : 11|12|16|1023
Date Analyses Completed: 11|12|21

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|12|14|0835
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|12|21
Phone #: 559-497-2888

Chain of Custody Notes

Date: 1/3/12
Initials: RLR
Note: Raw sample data to be uploaded EDT to 4 different ps codes: 1910045-002, 1910045-005, 1910045-003 and 1510053-001. Multiple uploads will be accommodated by three amended reports.

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50

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BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1555 **Sample ID No.:** A1K0266-03
Laboratory Name: BSK Analytical Laboratories **Signature Lab Director:**
Name of Sampler: Client

Date/Time Sample Collected: 11|11|02|1300 **Date/Time Sample Received @ Lab :** 11|11|03|0800 **Date Analyses Completed:** 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY **System Number:** 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH **Station Number:** 1910045-001
Date/Time of Sample: 11|11|02|1300 **Laboratory Code:** 5810
Date Analyses Completed: 11|11|14
Submitted by: BSK Analytical Laboratories **Phone #:** 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Hardness, (Total) as CaCO3	00900	60	
	mg/L	Calcium (Ca) (mg/L)	00916	13	
	mg/L	Magnesium (Mg) (mg/L)	00927	6.5	
	mg/L	Sodium (Na) (mg/L)	00929	21	
	mg/L	Potassium (K) (mg/L)	00937	< 2.0	
Total Cations Meq/L Value: 2.10					
	mg/L	Alkalinity, (Total) (as CaCO3 equivalents)	00410	38	
	mg/L	Hydroxide (OH) (mg/L)	71830	< 1.0	
	mg/L	Carbonate (CO3) (mg/L)	00445	< 1.8	
	mg/L	Bicarbonate (HCO3) (mg/L)	00440	46	
600	mg/L	Sulfate (SO4) (mg/L)	00945	35	0.5
600	mg/L	Chloride (Cl) (mg/L)	00940	24	
45	mg/L	Nitrate (as NO3) (mg/L)	71850	2.2	2.0
2	mg/L	Fluoride (F) (Natural-Source)	00951	ND	0.1
Total Anions Meq/L Value: 2.19					
15	Units	Color, Apparent (Unfiltered)	00081	< 1.0	
5	NTU	Lab Turbidity (NTU)	82079	< 0.10	
0.5	mg/L	MBAS (mg/L)	38260	< 0.050	
3	TON	Odor Threshold at 60 C (TON)	00086	1.0	1.0
	Std Units	pH (Laboratory) (Std.Units)	00403	7.6	
2200	umho/cm	Specific Conductance (E.C.) (umhos/cm)	00095	230	
1500	mg/L	Total Filterable Residue@180C(TDS)(mg/L)	70300	140	
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50
6	ug/L	Antimony (ug/L)	01097	ND	6.0
10	ug/L	Arsenic (As) (ug/L)	01002	ND	2.0
1000	ug/L	Barium (Ba) (ug/L)	01007	ND	100
4	ug/L	Beryllium (ug/L)	01012	ND	1.0
5	ug/L	Cadmium (Cd) (ug/L)	01027	ND	1.0
50	ug/L	Chromium (Total Cr) (ug/L)	01034	ND	10
1000	ug/L	Copper (Cu) (ug/L)	01042	ND	50

A1K0266 FINAL 12302011 1555

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1555
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Client

Sample ID No.: A1K0266-03
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|1300
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|11|02|1300
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
300	ug/L	Iron (Fe) (ug/L)	01045	ND	100
	ug/L	Lead (Pb) (ug/L)	01051	ND	5.0
50	ug/L	Manganese (Mn) (ug/L)	01055	ND	20
2	ug/L	Mercury (Hg) (ug/L)	71900	ND	1.0
100	ug/L	Nickel (ug/L)	01067	ND	10
50	ug/L	Selenium (Se) (ug/L)	01147	ND	5.0
100	ug/L	Silver (Ag) (ug/L)	01077	ND	10
2	ug/L	Thallium (ug/L)	01059	ND	1.0
5000	ug/L	Zinc (Zn) (ug/L)	01092	550	50

ADDITIONAL ANALYSES

	NA	Agressiveness Index	82383	11	
150	ug/L	Cyanide (ug/L)	01291	ND	100
	NA	Langelier Index at 60 C	71813	- 1.2	
1000	ug/L	Nitrite as Nitrogen(N) (ug/L)	00620	ND	400
6	ug/L	Perchlorate (ug/L)	A-031	ND	4.0

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	REGULATED ORGANIC CHEMICALS				
EPA 525.2	Alachlor (ALANEX)	77825	ND	2	1.0
EPA 525.2	Atrazine (AATREX)	39033	ND	1	0.5
EPA 525.2	Benzo (a) Pyrene	34247	ND	0.2	0.1
EPA 525.2	Di(2-ethylhexyl) Adipate	A-026	ND	400	5.0
EPA 525.2	Diethylhexylphthalate (DEHP)	39100	ND	4	3.0
EPA 525.2	Molinate (ORDRAM)	82199	ND	20	2.0
EPA 525.2	Simazine (PRINCEP)	39055	ND	4	1.0
EPA 525.2	Thiobencarb (BOLERO)	A-001	ND	70	1.0
	UNREGULATED ORGANIC CHEMICALS				
EPA 525.2	Bromacil (HYVAR)	82198	ND		10
EPA 525.2	Butachlor	77860	ND		0.38
EPA 525.2	Diazinon	39570	< 0.25		
EPA 525.2	Dimethoate (CYGON)	38458	< 10		

A1K0266 FINAL 12302011 1555

BSK Analytical Laboratories

Amended

EDT

Date of Report: 11|12|30|1555
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Client

Sample ID No.: A1K0266-03
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|1300
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH
Date/Time of Sample: 11|11|02|1300
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-001
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	UNREGULATED ORGANIC CHEMICALS				
EPA 525.2	Metolachlor	39356	< 0.50		
EPA 525.2	Metribuzin	81408	< 0.50		
EPA 525.2	Propachlor	38533	ND		0.5

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Antelope Valley-East Kern Water Agency
LA System No. 1910045
TOC Removal Running Annual Average

Sample Date	Plant	Alkalinity mgCaCO3/L	Raw TOC mg/L	Treated TOC mg/L	Actual % TOC reduction	Required % TOC reduction	"TOC Removal Ratio" actual % /required %
1/12/2011	QHWTP	53.9	3.10	1.55	50.0	35	1.4
"	EWTP	plant off					
"	AWTP	plant off					
2/9/2011	QHWTP	52.6	4.41	2.16	51.0	45	1.1
"	EWTP	plant off					
"	AWTP	plant off					
3/9/2011	QHWTP	50.3	4.01	1.92	52.1	45	1.2
"	EWTP	plant off					
"	AWTP	plant off					
4/13/2011	QHWTP	51.7	3.82	1.83	52.1	35	1.5
"	EWTP	plant off					
"	AWTP	plant off					
5/11/2011	QHWTP	40.8	3.23	1.55	52.0	35	1.5
"	EWTP	41.9	3.58	1.54	57.0	35	1.6
5/12/2011	AWTP	40.6	3.47	1.55	55.3	35	1.6
6/8/2011	QHWTP	54.6	2.87	1.57	45.3	35	1.3
"	EWTP	53.4	3.08	1.71	44.5	35	1.3
6/9/2011	AWTP	56.0	3.04	1.61	47.0	35	1.3
7/13/2011	QHWTP	39.8	2.64	1.26	52.3	35	1.5
"	EWTP	41.0	2.78	1.40	49.6	35	1.4
7/14/2011	AWTP	41.2	2.82	1.28	54.6	35	1.6
8/10/2011	QHWTP	53.6	2.66	1.43	46.2	35	1.3
"	EWTP	54.4	2.87	1.55	46.0	35	1.3
8/11/2011	AWTP	53.5	2.77	1.50	45.8	35	1.3
9/14/2011	QHWTP	57.6	2.41	1.35	44.0	35	1.3
"	EWTP	58.5	2.61	1.55	40.6	35	1.2
"	AWTP	57.6	2.56	1.49	41.8	35	1.2
10/12/2011	QHWTP	65.6	2.17	1.24	42.9	25	1.7
"	EWTP	67.2	2.37	1.42	40.1	25	1.6
10/13/2011	AWTP	66.0	2.40	1.41	41.3	25	1.7
11/9/2011	QHWTP	53.4	2.09	1.09	47.8	35	1.4
"	EWTP	54.1	2.18	1.22	44.0	35	1.3
"	AWTP	54.5	2.19	1.19	45.7	35	1.3
12/14/2011	QHWTP	78.2	2.39	1.44	39.7	25	1.6
"	EWTP	plant off					
"	AWTP	plant off					
	Minimum	39.8	2.1	1.1	39.7		
	Maximum	78.2	4.4	2.2	57.0		
	RAA	53.5	2.9	1.5	47.3		

Running Annual Average (RAA) **1.4**

Title 22 California Code of Regulations, Chapter 15.5, Article 5:
Required percent TOC reduction**

Table 64536.2-A

	Source Water Alkalinity		
Raw TOC	0-60	<60 - 120	>120
>2.0 - 4.0	35.0 %	25.0 %	15.0 %
>4.0 - 8.0	45.0 %	35.0 %	25.0 %
>8.0	50.0 %	40.0 %	30.0 %

**If one or more of the section 64636.4(b) 1-6 conditions are met, the system may assign a monthly value of 1 for the TOC removal ratio in lieu of the calculated va
List condition when used:

1. The system's source water TOC level, prior to any treatment is less than or equal to 2.0 mg/L
2. The system's treated water TOC level is less than or equal to 2.0 mg/L
3. The system's source water SUVA, prior to any treatment, is less than or equal to 2.0 L/mg-m
4. The system's finished water SUVA is less than or equal to 2.0 L/mg-m
5. A system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO3)
6. A system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO3)

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/01/24 Sample ID No.001

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:JUSTIN LIVESAY Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/01/12/0815 Date/Time Sample Received @ Lab:11/01/12/0821 Date Analyses Completed:11/01/21

==========

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

****

* User ID: 4TH Station Number: 1910045-001 *

* Date/Time of Sample: |11|01|12|0815| Laboratory Code: 6080 *

* YY MM DD TTTT YY MM DD *

* Date Analysis completed: |11|01|21| *

* Submitted by:_____ Phone #:_____ *

****

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.55	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/02/22 Sample ID No.010

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/02/09/1052 | Date/Time Sample Received @ Lab:11/02/09/1055 | Date Analyses Completed:11/02/14

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH

Station Number: 1910045-001

Date/Time of Sample: |11|02|09|1052|
YY MM DD TTTT

Laboratory Code: 6080
YY MM DD

Date Analysis completed: |11|02|14|

Submitted by:

Phone #:

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.16	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/03/18 Sample ID No.020

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/03/09/0845 | Date/Time Sample Received @ Lab:11/03/09/0900 | Date Analyses Completed:11/03/17

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH

Station Number: 1910045-001

Date/Time of Sample: |11|03|09|0845|
YY MM DD TTTT

Laboratory Code: 6080
YY MM DD

Date Analysis completed: |11|03|17|

Submitted by:

Phone #:

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.92	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/04/21 Sample ID No.035

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/04/13/0745 | Date/Time Sample Received @ Lab:11/04/13/0749 | Date Analyses Completed:11/04/20

==========

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

****

* User ID: 4TH Station Number: 1910045-001 *

* Date/Time of Sample: |11|04|13|0745| Laboratory Code: 6080 *

* YY MM DD TTTT YY MM DD *

* Date Analysis completed: |11|04|20| *

* Submitted by:_____ Phone #:_____ *

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PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.83	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/05/18 Sample ID No.045

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/05/11/0936 | Date/Time Sample Received @ Lab:11/05/11/1000 | Date Analyses Completed:11/05/13

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH

Station Number: 1910045-001

Date/Time of Sample: |11|05|11|0936|
YY MM DD TTTT

Laboratory Code: 6080

Date Analysis completed: |11|05|13|
YY MM DD

Submitted by:_____

Phone #:_____

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.55	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/06/17 Sample ID No.068

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:JUSTIN LIVESAY Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/06/08/0900 | Date/Time Sample Received @ Lab:11/06/08/0900 | Date Analyses Completed:11/06/15

==========

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

****

* User ID: 4TH Station Number: 1910045-001 *

* Date/Time of Sample: |11|06|08|0900| Laboratory Code: 6080 *

* YY MM DD TTTT YY MM DD *

* Date Analysis completed: |11|06|15| *

* Submitted by:_____ Phone #:_____ *

****

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.57	0.30

\+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/07/26 Sample ID No.086

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:JUSTIN LIVESAY Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/07/13/1255 | Date/Time Sample Received @ Lab:11/07/13/1255 | Date Analyses Completed:11/07/25

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System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

****

* User ID: 4TH Station Number: 1910045-001 *

* Date/Time of Sample: |11|07|13|1255| Laboratory Code: 6080 *

* YY MM DD TTTT YY MM DD *

* Date Analysis completed: |11|07|25| *

* Submitted by:_____ Phone #:_____ *

****

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.26	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/08/18 Sample ID No.104

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/08/10/0843 | Date/Time Sample Received @ Lab:11/08/10/0843 | Date Analyses Completed:11/08/17

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH

Station Number: 1910045-001

Date/Time of Sample: |11|08|10|0843|
YY MM DD TTTT

Laboratory Code: 6080
YY MM DD

Date Analysis completed: |11|08|17|

Submitted by:

Phone #:

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.43	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/09/29 Sample ID No.122

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/09/14/1301 | Date/Time Sample Received @ Lab:11/09/14/1308 | Date Analyses Completed:11/09/23

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH | Station Number: 1910045-001

Date/Time of Sample: |11|09|14|1301| (YY MM DD TTTT) | Laboratory Code: 6080

Date Analysis completed: |11|09|23| (YY MM DD)

Submitted by:_____ Phone #:_____

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.35	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/10/24 Sample ID No.141

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:Kat White Employed By: AVEK Water Agency

Date/Time Sample Collected:11/10/12/0806 Date/Time Sample Received @ Lab:11/10/12/0830 Date Analyses Completed:11/10/20

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH Station Number: 1910045-001

Date/Time of Sample: |11|10|12|0806| YY MM DD TTTT Laboratory Code: 6080 YY MM DD

Date Analysis completed: |11|10|20|

Submitted by: Phone #:

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.24	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/12/02 Sample ID No.160

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/11/09/1041 | Date/Time Sample Received @ Lab:11/11/09/1047 | Date Analyses Completed:11/12/01

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH

Station Number: 1910045-001

Date/Time of Sample: |11|11|09|1041| YY MM DD TTTT

Laboratory Code: 6080

Date Analysis completed: |11|12|01| YY MM DD

Submitted by:_____ Phone #:_____

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.09	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 12/01/17 Sample ID No.179

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/12/14/0845 Date/Time Sample Received @ Lab:11/12/14/0855 Date Analyses Completed:12/01/16

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - CLEAR WELL - TREATED

User ID: 4TH Station Number: 1910045-001

Date/Time of Sample: |11|12|14|0845| YY MM DD TTTT Laboratory Code: 6080 YY MM DD

Date Analysis completed: |12|01|16|

Submitted by: Phone #:

PAGE 1 OF 1

ADDITIONAL ANALYSES

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	1.44	0.30

+ Indicates Secondary Drinking Water Standards

QUARTZ HILL
WATER TREATMENT PLANT

Plant Influent
Untreated Source Water
Monitoring Results

BSK Analytical Laboratories

EDT

Date of Report: 11|03|11|1324
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Kat White

Sample ID No.: A1C0821-01
Signature Lab Director:

Date/Time Sample Collected: 11|03|09|1400
Date/Time Sample Received @ Lab : 11|03|10|1000
Date Analyses Completed: 11|03|10

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - RAW

User ID: 4TH
Date/Time of Sample: 11|03|09|1400
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-002
Laboratory Code: 5810
Date Analyses Completed: 11|03|10
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	3.2	2.0

Total Anions Meq/L Value: 0.05

A1C0821 FINAL 03112011 1324

BSK Analytical Laboratories

EDT

Date of Report: 11|06|23|1703
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Justin Livesay

Sample ID No.: A1F0795-04
Signature Lab Director:

Date/Time Sample Collected: 11|06|08|1407
Date/Time Sample Received @ Lab : 11|06|09|0800
Date Analyses Completed: 11|06|10

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
Name or Number of Sample Source: QUARTZ HILL WTP - RAW
System Number: 1910045

User ID: 4TH
Date/Time of Sample: 11|06|08|1407
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-002
Laboratory Code: 5810
Date Analyses Completed: 11|06|10
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	2.0	2.0

Total Anions Meq/L Value: 0.03

A1F0795 FINAL 06232011 1703

BSK Analytical Laboratories

EDT

Date of Report: 11|09|30|0938
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Justin Livesay

Sample ID No.: A1I1271-01
Signature Lab Director:

Date/Time Sample Collected: 11|09|15|1431
Date/Time Sample Received @ Lab : 11|09|16|1020
Date Analyses Completed: 11|09|16

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
Name or Number of Sample Source: QUARTZ HILL WTP - RAW
System Number: 1910045

User ID: 4TH
Date/Time of Sample: 11|09|15|1431
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-002
Laboratory Code: 5810
Date Analyses Completed: 11|09|16
Phone #: 559-497-2888

Chain of Custody Notes

Date: 9/29/11
Initials: RLR
Note: Data is reported to four ps codes EDT: 1910045-002, 1910045-005, 1910045-003 and 1510053-001. Subsequent amended write on report hardcopies reflect the report being generated multiple times to accommodate this request.

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	ND	2.0

Total Anions Meq/L Value: 0.00

A1I1271 FINAL 09302011 0938

BSK Analytical Laboratories

EDT

Date of Report: 12|01|03|1521
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: k. White

Sample ID No.: A1L1169-03
Signature Lab Director:

Date/Time Sample Collected: 11|12|15|1216
Date/Time Sample Received @ Lab : 11|12|16|1023
Date Analyses Completed: 11|12|16

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - RAW

User ID: 4TH
Date/Time of Sample: 11|12|15|1216
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-002
Laboratory Code: 5810
Date Analyses Completed: 11|12|16
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
45	mg/L	Nitrate (as NO3) (mg/L)	71850	3.6	2.0

Total Anions Meq/L Value: 0.06

A1L1169 FINAL 01032012 1521

BSK Analytical Laboratories

EDT

Date of Report: 11|12|14|1535
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Client

Sample ID No.: A1K0266-05
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|1307
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - RAW

User ID: 4TH
Date/Time of Sample: 11|11|02|1307
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-002
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Hardness, (Total) as CaCO3	00900	60	
	mg/L	Calcium (Ca) (mg/L)	00916	13	
	mg/L	Magnesium (Mg) (mg/L)	00927	6.5	
	mg/L	Sodium (Na) (mg/L)	00929	20	
	mg/L	Potassium (K) (mg/L)	00937	< 2.0	
Total Cations Meq/L Value:		2.05			
	mg/L	Alkalinity, (Total) (as CaCO3 equivalents)	00410	58	
	mg/L	Hydroxide (OH) (mg/L)	71830	< 1.0	
	mg/L	Carbonate (CO3) (mg/L)	00445	< 1.8	
	mg/L	Bicarbonate (HCO3) (mg/L)	00440	71	
600	mg/L	Sulfate (SO4) (mg/L)	00945	16	0.5
600	mg/L	Chloride (Cl) (mg/L)	00940	22	
45	mg/L	Nitrate (as NO3) (mg/L)	71850	2.2	2.0
2	mg/L	Fluoride (F) (Natural-Source)	00951	ND	0.1
Total Anions Meq/L Value:		2.15			
15	Units	Color, Apparent (Unfiltered)	00081	10	
5	NTU	Lab Turbidity (NTU)	82079	0.47	
0.5	mg/L	MBAS (mg/L)	38260	< 0.050	
3	TON	Odor Threshold at 60 C (TON)	00086	1.0	1.0
	Std Units	pH (Laboratory) (Std.Units)	00403	8.2	
2200	umho/cm	Specific Conductance (E.C.) (umhos/cm)	00095	220	
1500	mg/L	Total Filterable Residue@180C(TDS)(mg/L)	70300	130	
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50
6	ug/L	Antimony (ug/L)	01097	ND	6.0
10	ug/L	Arsenic (As) (ug/L)	01002	ND	2.0
1000	ug/L	Barium (Ba) (ug/L)	01007	ND	100
4	ug/L	Beryllium (ug/L)	01012	ND	1.0
5	ug/L	Cadmium (Cd) (ug/L)	01027	ND	1.0
50	ug/L	Chromium (Total Cr) (ug/L)	01034	ND	10
1000	ug/L	Copper (Cu) (ug/L)	01042	ND	50
300	ug/L	Iron (Fe) (ug/L)	01045	ND	100
	ug/L	Lead (Pb) (ug/L)	01051	ND	5.0

A1K0266 FINAL 12142011 1536

BSK Analytical Laboratories

EDT

Date of Report: 11|12|14|1535
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Client

Sample ID No.: A1K0266-05
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|1307
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - RAW

User ID: 4TH
Date/Time of Sample: 11|11|02|1307
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-002
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
50	ug/L	Manganese (Mn) (ug/L)	01055	ND	20
2	ug/L	Mercury (Hg) (ug/L)	71900	ND	1.0
100	ug/L	Nickel (ug/L)	01067	ND	10
50	ug/L	Selenium (Se) (ug/L)	01147	ND	5.0
100	ug/L	Silver (Ag) (ug/L)	01077	ND	10
2	ug/L	Thallium (ug/L)	01059	ND	1.0
5000	ug/L	Zinc (Zn) (ug/L)	01092	ND	50

ADDITIONAL ANALYSES

	NA	Agressiveness Index	82383	11	
150	ug/L	Cyanide (ug/L)	01291	ND	100
	NA	Langelier Index at 60 C	71813	- 0.42	
1000	ug/L	Nitrite as Nitrogen(N) (ug/L)	00620	ND	400
6	ug/L	Perchlorate (ug/L)	A-031	ND	4.0

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	REGULATED ORGANIC CHEMICALS				
EPA 524.2	Bromodichloromethane	32101	ND		1.0
EPA 524.2	Bromoform	32104	ND		1.0
EPA 524.2	Chloroform (Trichloromethane)	32106	ND		1.0
EPA 524.2	Dibromochloromethane	32105	ND		1.0
EPA 524.2a	Total Trihalomethanes (TTHMs)	82080	< 0.50	80	
	REGULATED ORGANIC CHEMICALS				
EPA 524.2	1,1,1-Trichloroethane (1,1,1-TCA)	34506	ND	200	0.5
EPA 524.2	1,1,2,2-Tetrachloroethane	34516	ND	1	0.5
EPA 524.2	1,1,2-Trichloroethane (1,1,2-TCA)	34511	ND	5	0.5
EPA 524.2	1,1-Dichloroethane (1,1-DCA)	34496	ND	5	0.5
EPA 524.2	1,1-Dichloroethylene (1,1-DCE)	34501	ND	6	0.5
EPA 524.2	1,2,4-Trichlorobenzene	34551	ND	5	0.5
EPA 524.2	1,2-Dichlorobenzene (o-DCB)	34536	ND	600	0.5
EPA 524.2	1,2-Dichloroethane (1,2-DCA)	34531	ND	0.5	0.5
EPA 524.2	1,2-Dichloropropane	34541	ND	5	0.5
EPA 524.2	1,4-Dichlorobenzene (p-DCB)	34571	ND	5	0.5
EPA 524.2	Benzene	34030	ND	1	0.5

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BSK Analytical Laboratories

EDT

Date of Report: 11|12|14|1535
Laboratory Name: BSK Analytical Laboratories
Name of Sampler: Client

Sample ID No.: A1K0266-05
Signature Lab Director:

Date/Time Sample Collected: 11|11|02|1307
Date/Time Sample Received @ Lab : 11|11|03|0800
Date Analyses Completed: 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY
System Number: 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - RAW

User ID: 4TH
Date/Time of Sample: 11|11|02|1307
Submitted by: BSK Analytical Laboratories

Station Number: 1910045-002
Laboratory Code: 5810
Date Analyses Completed: 11|11|14
Phone #: 559-497-2888

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	REGULATED ORGANIC CHEMICALS				
EPA 524.2	Carbon Tetrachloride	32102	ND	0.5	0.5
EPA 524.2	cis-1,2-Dichloroethylene (c-1,2-DCE)	77093	ND	6	0.5
EPA 524.2	cis-1,3-Dichloropropene (D-D)	34704	ND	0.5	0.5
EPA 524.2	Dichloromethane (Methylene Chloride)	34423	ND	5	0.5
EPA 524.2	Ethyl Benzene	34371	ND	300	0.5
EPA 524.2	m,p-Xylene	A-014	ND		0.5
EPA 524.2	Methyl tert-Butyl Ether(MTBE)	46491	ND	5	3.0
EPA 524.2	Monochlorobenzene (Chlorobenzene)	34301	ND	70	0.5
EPA 524.2	o-Xylene	77135	ND		0.5
EPA 524.2	Styrene	77128	ND	100	0.5
EPA 524.2	Tetrachloroethylene (PCE)	34475	ND	5	0.5
EPA 524.2	Toluene	34010	ND	150	0.5
EPA 524.2	trans-1,2-Dichloroethylene (t-1,2-DCE)	34546	ND	10	0.5
EPA 524.2	trans-1,3-Dichloropropene	34699	ND	0.5	0.5
EPA 524.2	Trichloroethylene (TCE)	39180	ND	5	0.5
EPA 524.2	Trichlorofluoromethane (FREON 11)	34488	ND	150	5.0
EPA 524.2	Trichlorotrifluoroethane (FREON 113)	81611	ND	1200	10
EPA 524.2	Vinyl Chloride (VC)	39175	ND	0.5	0.5
EPA 524.2a	Total 1,3-Dichloropropene	34561	ND	0.5	0.5
EPA 524.2a	Total Xylenes (m,p, & o)	81551	< 0.50	1750	
EPA 525.2	Alachlor (ALANEX)	77825	ND	2	1.0
EPA 525.2	Atrazine (AATREX)	39033	ND	1	0.5
EPA 525.2	Benzo (a) Pyrene	34247	ND	0.2	0.1
EPA 525.2	Di(2-ethylhexyl) Adipate	A-026	ND	400	5.0
EPA 525.2	Diethylhexylphthalate (DEHP)	39100	ND	4	3.0
EPA 525.2	Molinate (ORDRAM)	82199	ND	20	2.0
EPA 525.2	Simazine (PRINCEP)	39055	ND	4	1.0
EPA 525.2	Thiobencarb (BOLERO)	A-001	ND	70	1.0
	UNREGULATED ORGANIC CHEMICALS				
EPA 524.2	1,1,1,2-Tetrachloroethane	77562	ND		0.5
EPA 524.2	1,1-Dichloropropene	77168	ND		0.5
EPA 524.2	1,2,3-Trichlorobenzene	77613	ND		0.5
EPA 524.2	1,2,4-Trimethylbenzene	77222	< 0.50		
EPA 524.2	1,3,5-Trimethylbenzene	77226	ND		0.5
EPA 524.2	1,3-Dichlorobenzene (m-DCB)	34566	ND		0.5

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BSK Analytical Laboratories

EDT

Date of Report: 11|12|14|1535 **Sample ID No.:** A1K0266-05
Laboratory Name: BSK Analytical Laboratories **Signature Lab Director:**
Name of Sampler: Client

Date/Time Sample Collected: 11|11|02|1307 **Date/Time Sample Received @ Lab :** 11|11|03|0800 **Date Analyses Completed:** 11|11|14

System Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY **System Number:** 1910045
Name or Number of Sample Source: QUARTZ HILL WTP - RAW

User ID: 4TH **Station Number:** 1910045-002
Date/Time of Sample: 11|11|02|1307 **Laboratory Code:** 5810
Submitted by: BSK Analytical Laboratories **Date Analyses Completed:** 11|11|14
Phone #: 559-497-2888

TEST METHOD	CHEMICAL	ENTRY #	ANALYSES RESULTS	MCL µG/L	DLR µG/L
	UNREGULATED ORGANIC CHEMICALS				
EPA 524.2	1,3-Dichloropropane	77173	ND		0.5
EPA 524.2	2,2-Dichloropropane	77170	ND		0.5
EPA 524.2	2-Chlorotoluene	A-008	ND		0.5
EPA 524.2	4-Chlorotoluene	A-009	ND		0.5
EPA 524.2	Acetone	81552	< 10		
EPA 524.2	Bromobenzene	81555	ND		0.5
EPA 524.2	Bromochloromethane	A-012	ND		0.5
EPA 524.2	Bromomethane (Methyl Bromide)	34413	ND		0.5
EPA 524.2	Chloroethane	34311	ND		0.5
EPA 524.2	Chloromethane (Methyl Chloride)	34418	ND		0.5
EPA 524.2	Dibromomethane	77596	ND		0.5
EPA 524.2	Dichlorodifluoromethane (Freon 12)	34668	ND		0.5
EPA 524.2	Diisopropyl Ether (DIPE)	A-036	ND		3.0
EPA 524.2	Ethyl tert-Butyl Ether (ETBE)	A-033	ND		3.0
EPA 524.2	Hexachlorobutadiene	34391	ND		0.5
EPA 524.2	Isopropylbenzene (Cumene)	77223	ND		0.5
EPA 524.2	Mesitylene (1,3,5-Trimethylbenzene)	77226	ND		0.5
EPA 524.2	Methyl Ethyl Ketone (MEK, Butanone)	81595	ND		5.0
EPA 524.2	Methyl Isobutyl Ketone (MIBK)	81596	ND		5.0
EPA 524.2	Naphthalene	34696	ND		0.5
EPA 524.2	n-Butylbenzene	A-010	ND		0.5
EPA 524.2	n-Propylbenzene	77224	ND		0.5
EPA 524.2	p-Isopropyltoluene	A-011	< 0.50		
EPA 524.2	sec-Butylbenzene	77350	ND		0.5
EPA 524.2	tert-Amyl Methyl Ether (TAME)	A-034	ND		3.0
EPA 524.2	tert-Butyl Alcohol (TBA)	77035	ND		2.0
EPA 524.2	tert-Butylbenzene	77353	ND		0.5
EPA 525.2	Bromacil (HYVAR)	82198	ND		10
EPA 525.2	Butachlor	77860	ND		0.38
EPA 525.2	Diazinon	39570	< 0.25		
EPA 525.2	Dimethoate (CYGON)	38458	< 10		
EPA 525.2	Metolachlor	39356	< 0.50		
EPA 525.2	Metribuzin	81408	< 0.50		
EPA 525.2	Propachlor	38533	ND		0.5

A1K0266 FINAL 12142011 1536

RADIOACTIVITY ANALYSIS (9/99)

Date of Report: 11/12/05 Sample ID No.B057601001/K0266
Laboratory Signature Lab
Name: PACE ANALYTICAL SERVICES, INC-GREENSBURG Director:
Name of Sampler:client Employed By: client
Date/Time Sample Collected:11/11/02/1307 Date/Time Sample Received @ Lab:11/11/14/0950 Date Analyses Completed:11/12/02

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY System Number: 1910045
Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH Station Number: 1910045-002
Date/Time of Sample: |11|11|02|1307| YY MM DD TTTT Laboratory Code: 0010 YY MM DD
Date Analysis completed: |11|12|02|
Submitted by: Phone #:

MCL	REPORT UNITS	CHEMICAL	STORET CODE	ANALYSES RESULTS	DLR
	pCi/L	TITLE 22 CALIFORNIA CODE OF REGULATIONS			
	pCi/L	SECTION 64442 (22 CCR 64442)			
15	pCi/L	Gross Alpha	01501		3.0
	pCi/L	Gross Alpha Counting Error	01502		
	pCi/L	Gross Alpha MDA95 *	A-072		
20	pCi/L	Uranium	28012		1.0
	pCi/L	Uranium Counting Error	A-028		
	pCi/L	Uranium MDA95	A-073		
	pCi/L	Radium 226	09501		1.0
	pCi/L	Radium 226 Counting Error	09502		
	pCi/L	Radium 226 MDA95	A-074		
	pCi/L	Radium 228	11501		1.0
	pCi/L	Radium 228 Counting Error	11502		
	pCi/L	Radium 228 MDA95	A-075		
5	pCi/L	Ra 226 + Ra 228, Combined	11503		
	pCi/L	Ra 226 + Ra 228 Counting Error, Combined	11504		
	pCi/L	Ra 226 + Ra 229 MDA95, Combined	A-076		
	pCi/L	RADIUM, TOTAL, (FOR NTNC ONLY, BY 903.0)			
	pCi/L	Radium, Total	A-080		
	pCi/L	Radium, Total, Counting Error	A-081		
	pCi/L	Radium, Total, MDA95	A-082		
	pCi/L	TITLE 22 CALIFORNIA CODE OF REGULATIONS			
	pCi/L	SECTION 64443 (22 CCR 64443)			
50	pCi/L	Gross Beta	03501	< 4.0	4.0
	pCi/L	Gross Beta Counting Error	03502	1.06	

	pCi/L	Gross Beta MDA95	A-077		
4	pCi/L	Gross Beta, Calculated Dose Equivalent *	A-071		
8	pCi/L	Strontium 90	13501	< 2.0	2.0
	pCi/L	Strontium 90 Counting Error	13502	0.192	
	pCi/L	Strontium 90 MDA95	A-078		
20000	pCi/L	Tritium	07000	< 1000	1000
	pCi/L	Tritium Counting Error	07001	115	
	pCi/L	Tritium MDA95	A-079		
	pCi/L	RADON			
	pCi/L	Radon 222	82303		100.0
	pCi/L	Radon 222 Counting Error	82302		
	pCi/L				
	pCi/L	*MDA95 is Minimum Detectable Activity at			
	pCi/L	the 95% confidence level, per			
	pCi/L	22 CCR 64442 and 64443.			
	pCi/L				
	pCi/L	**Gross Beta, Calculated Total Body or			
	pCi/L	Organ Dose Equivalent, Per 22 CCR 64443			
	pCi/L				

Antelope Valley-East Kern Water Agency
LA System No. 1910045
TOC Removal Running Annual Average

Sample Date	Plant	Alkalinity mgCaCO3/L	Raw TOC mg/L	Treated TOC mg/L	Actual % TOC reduction	Required % TOC reduction	"TOC Removal Ratio" actual % /required %
1/12/2011	QHWTP	53.9	3.10	1.55	50.0	35	1.4
"	EWTP	plant off					
"	AWTP	plant off					
2/9/2011	QHWTP	52.6	4.41	2.16	51.0	45	1.1
"	EWTP	plant off					
"	AWTP	plant off					
3/9/2011	QHWTP	50.3	4.01	1.92	52.1	45	1.2
"	EWTP	plant off					
"	AWTP	plant off					
4/13/2011	QHWTP	51.7	3.82	1.83	52.1	35	1.5
"	EWTP	plant off					
"	AWTP	plant off					
5/11/2011	QHWTP	40.8	3.23	1.55	52.0	35	1.5
"	EWTP	41.9	3.58	1.54	57.0	35	1.6
5/12/2011	AWTP	40.6	3.47	1.55	55.3	35	1.6
6/8/2011	QHWTP	54.6	2.87	1.57	45.3	35	1.3
"	EWTP	53.4	3.08	1.71	44.5	35	1.3
6/9/2011	AWTP	56.0	3.04	1.61	47.0	35	1.3
7/13/2011	QHWTP	39.8	2.64	1.26	52.3	35	1.5
"	EWTP	41.0	2.78	1.40	49.6	35	1.4
7/14/2011	AWTP	41.2	2.82	1.28	54.6	35	1.6
8/10/2011	QHWTP	53.6	2.66	1.43	46.2	35	1.3
"	EWTP	54.4	2.87	1.55	46.0	35	1.3
8/11/2011	AWTP	53.5	2.77	1.50	45.8	35	1.3
9/14/2011	QHWTP	57.6	2.41	1.35	44.0	35	1.3
"	EWTP	58.5	2.61	1.55	40.6	35	1.2
"	AWTP	57.6	2.56	1.49	41.8	35	1.2
10/12/2011	QHWTP	65.6	2.17	1.24	42.9	25	1.7
"	EWTP	67.2	2.37	1.42	40.1	25	1.6
10/13/2011	AWTP	66.0	2.40	1.41	41.3	25	1.7
11/9/2011	QHWTP	53.4	2.09	1.09	47.8	35	1.4
"	EWTP	54.1	2.18	1.22	44.0	35	1.3
"	AWTP	54.5	2.19	1.19	45.7	35	1.3
12/14/2011	QHWTP	78.2	2.39	1.44	39.7	25	1.6
"	EWTP	plant off					
"	AWTP	plant off					
	Minimum	39.8	2.1	1.1	39.7		
	Maximum	78.2	4.4	2.2	57.0		
	RAA	53.5	2.9	1.5	47.3		

Running Annual Average (RAA) **1.4**

Title 22 California Code of Regulations, Chapter 15.5, Article 5:
Required percent TOC reduction**

Table 64536.2-A — Source Water Alkalinity

Raw TOC	0-60	<60 - 120	>120
>2.0 - 4.0	35.0 %	25.0 %	15.0 %
>4.0 - 8.0	45.0 %	35.0 %	25.0 %
>8.0	50.0 %	40.0 %	30.0 %

**If one or more of the section 64636.4(b) 1-6 conditions are met, the system may assign a monthly value of 1 for the TOC removal ratio in lieu of the calculated va
List condition when used:

1. The system's source water TOC level, prior to any treatment is less than or equal to 2.0 mg/L
2. The system's treated water TOC level is less than or equal to 2.0 mg/L
3. The system's source water SUVA, prior to any treatment, is less than or equal to 2.0 L/mg-m
4. The system's finished water SUVA is less than or equal to 2.0 L/mg-m
5. A system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO3)
6. A system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO3)

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/01/24 Sample ID No.004

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:JUSTIN LIVESAY Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/01/12/0820 | Date/Time Sample Received @ Lab:11/01/12/0821 | Date Analyses Completed:11/01/21

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH | Station Number: 1910045-002

Date/Time of Sample: |11|01|12|0820| (YY MM DD TTTT) | Laboratory Code: 6080

Date Analysis completed: |11|01|21| (YY MM DD)

Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	53.9	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

ADDITIONAL ANALYSES 004

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	3.10	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/02/22 Sample ID No.011

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/02/09/1054 | Date/Time Sample Received @ Lab:11/02/09/1055 | Date Analyses Completed:11/02/14

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH | Station Number: 1910045-002

Date/Time of Sample: |11|02|09|1054| (YY MM DD TTTT) | Laboratory Code: 6080

Date Analysis completed: |11|02|14| (YY MM DD)

Submitted by: _____ Phone #: _____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	52.6	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

ADDITIONAL ANALYSES

011

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	4.41	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/03/18 Sample ID No.021

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/03/09/0843 | Date/Time Sample Received @ Lab:11/03/09/0900 | Date Analyses Completed:11/03/17

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH | Station Number: 1910045-002

Date/Time of Sample: |11|03|09|0843| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|03|17|

Submitted by: _____ Phone #: _____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	50.3	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

ADDITIONAL ANALYSES 021

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	4.01	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/04/21 Sample ID No.036

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/04/13/0742 Date/Time Sample Received @ Lab:11/04/13/0749 Date Analyses Completed:11/04/20

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH Station Number: 1910045-002

Date/Time of Sample: |11|04|13|0742| YY MM DD TTTT Laboratory Code: 6080 YY MM DD

Date Analysis completed: |11|04|20|

Submitted by: Phone #:

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	51.7	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

ADDITIONAL ANALYSES

036

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	3.82	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/05/18 Sample ID No.046

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/05/11/0926 | Date/Time Sample Received @ Lab:11/05/11/1000 | Date Analyses Completed:11/05/18

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH | Station Number: 1910045-002

Date/Time of Sample: |11|05|11|0926| (YY MM DD TTTT) | Laboratory Code: 6080

Date Analysis completed: |11|05|18| (YY MM DD)

Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	40.8	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

ADDITIONAL ANALYSES 046

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	3.23	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/06/17 Sample ID No.069

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:JUSTIN LIVESAY Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/06/08/0900 | Date/Time Sample Received @ Lab:11/06/08/0900 | Date Analyses Completed:11/06/15

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH | Station Number: 1910045-002

Date/Time of Sample: |11|06|08|0900| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|06|15|

Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	54.6	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.87	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/07/26 Sample ID No.087

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:JUSTIN LIVESAY Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/07/13/1255 | Date/Time Sample Received @ Lab:11/07/13/1255 | Date Analyses Completed:11/07/25

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH | Station Number: 1910045-002

Date/Time of Sample: |11|07|13|1255| (YY MM DD TTTT) | Laboratory Code: 6080

Date Analysis completed: |11|07|25| (YY MM DD)

Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	39.8	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.64	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/08/18 Sample ID No.105

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/08/10/0839 | Date/Time Sample Received @ Lab:11/08/10/0843 | Date Analyses Completed:11/08/17

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY

System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH

Station Number: 1910045-002

Date/Time of Sample: |11|08|10|0839|
YY MM DD TTTT

Laboratory Code: 6080
YY MM DD

Date Analysis completed: |11|08|17|

Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	53.6	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.66	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/09/29 Sample ID No.123

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/09/14/1305 | Date/Time Sample Received @ Lab:11/09/14/1308 | Date Analyses Completed:11/09/23

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH | Station Number: 1910045-002

Date/Time of Sample: |11|09|14|1305| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|09|23|

Submitted by: _____ Phone #: _____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	57.6	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081	<	
3	TON	Odor Threshold at 60 C (TON)	00086	<	1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.41	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/10/24 Sample ID No.142

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director: _____

Name of Sampler:Chris Brundage Employed By: AVEK Water Agency

Date/Time Sample Collected:11/10/12/0825 | Date/Time Sample Received @ Lab:11/10/12/0830 | Date Analyses Completed:11/10/20

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH | Station Number: 1910045-002

Date/Time of Sample: |11|10|12|0825| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |11|10|20|

Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	65.6	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.17	0.30

+ Indicates Secondary Drinking Water Standards

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 11/12/02 Sample ID No.161

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/11/09/1042 Date/Time Sample Received @ Lab:11/11/09/1047 Date Analyses Completed:11/12/01

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH Station Number: 1910045-002

Date/Time of Sample: |11|11|09|1042| YY MM DD TTTT Laboratory Code: 6080 YY MM DD

Date Analysis completed: |11|12|01|

Submitted by: Phone #:

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	53.4	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.09	0.30

+ Indicates Secondary Drinking Water Standards

EDT

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 12/01/17 Sample ID No.180

Laboratory Signature Lab

Name: ANTELOPE VALLEY-EAST KERN WATER AGENCY Director:

Name of Sampler:KAT WHITE Employed By: AVEK WATER AGENCY

Date/Time Sample Collected:11/12/14/0836 | Date/Time Sample Received @ Lab:11/12/14/0855 | Date Analyses Completed:12/01/16

System Name:ANTELOPE VALLEY-EAST KERN WATER AGENCY | System Number: 1910045

Name or Number of Sample Source:QUARTZ HILL WTP - RAW

User ID: 4TH | Station Number: 1910045-002

Date/Time of Sample: |11|12|14|0836| (YY MM DD TTTT) | Laboratory Code: 6080 (YY MM DD)

Date Analysis completed: |12|01|16|

Submitted by: _____ Phone #: _____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900		
	mg/L	Calcium (Ca) (mg/L)	00916		
	mg/L	Magnesium (Mg) (mg/L)	00927		
	mg/L	Sodium (NA) (mg/L)	00929		
	mg/L	Potassium (K) (mg/L)	00937		
Total Cations		Meq/L Value:			
	mg/L	Total Alkalinity (AS CaCO3) (mg/L)	00410	78.2	
	mg/L	Hydroxide (OH) (mg/L)	71830		
	mg/L	Carbonate (CO3) (mg/L)	00445		
	mg/L	Bicarbonate (HCO3) (mg/L)	00440		
*	mg/L+	Sulfate (SO4) (mg/L)	00945		.5
*	mg/L+	Chloride (Cl) (mg/L)	00940		
45	mg/L	Nitrate (as NO3) (mg/L)	71850		2.0
2 .	mg/L	Fluoride (F) (Natural-Source)	00951		.1
Total Anions		Meq/L Value:			
	Std.Units+	PH (Laboratory) (Std.Units)	00403		
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095		
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300		
15	Units	Apparent Color (Unfiltered) (Units)	00081		
3	TON	Odor Threshold at 60 C (TON)	00086		1.
5	NTU	Lab Turbidity (NTU)	82079		
0.5	mg/L+	MBAS (mg/L)	38260		

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

ADDITIONAL ANALYSES

180

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Organic Carbon (TOC) (mg/L)	00680	2.39	0.30

+ Indicates Secondary Drinking Water Standards