FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1

CITY OF VALDEZ, ALASKA

VALDEZ-CORDOVA CENSUS AREA

COMMUNITY NAME	COMMUNITY NUMBER
CITY OF VALDEZ	020094

PRELIMINARY
9/15/2016

FEMA

MAP REVISED:

FLOOD INSURANCE STUDY NUMBER
020094V000A

Version Number 2.3.3.2

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Published Separately

FLOOD INSURANCE STUDY REPORT
CITY OF VALDEZ, ALASKA
VALDEZ-CORDOVA CENSUS AREA

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60.3, *Criteria for land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal Government. Congress also recognized that most of these floodprone buildings were built by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as "Post-FIRM" buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community's regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of City of Valdez, Alaska.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the 8-digit Hydrologic Unit Codes (HUC-8) sub-basins affecting each, are shown in Table 1. The Flood Insurance Rate Map (FIRM) panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

The location of flood hazard data for participating communities in multiple jurisdictions is also indicated in the table.

Jurisdictions that have no identified SFHAs as of the effective date of this study are indicated in the table. Changed conditions in these communities (such as urbanization or annexation) or the availability of new scientific or technical data about flood hazards could make it necessary to determine SFHAs in these jurisdictions in the future.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
City of Valdez	020094	19020201	0200940025D*, 0200940050D*, 0200940075D*, 0200940100D*, 0200940119D, 0200940120D, 0200940125D*, 0200940129D, 0200940130D*, 0200940135D*, 0200940136D, 0200940137D, 0200940138D, 0200940139D, 0200940143D, 0200940144D, 0200940145D*, 0200940163D*, 0200940164D, 0200940165D*, 0200940168D, 0200940170D, 0200940200D*, 0200940225D*, 0200940233D, 0200940263D, 0200940264D, 0200940275D, 0200940280D, 0200940283D, 0200940286D, 0200940287D, 0200940288D, 0200940289D, 0200940300D, 0200940301D, 0200940302D, 0200940303D, 0200940304D, 0200940308D, 0200940309D, 0200940310D, 0200940325D, 0200940328D, 0200940329D, 0200940330D, 0200940333D, 0200940335D, 0200940336D, 0200940337D, 0200940340D*, 0200940341D, 0200940342D, 0200940345D*, 0200940355D, 0200940360D, 0200940361D, 0200940362D, 0200940365D*, 0200940370D, 0200940400D*	

*Panel not Printed

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1% annual chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1% annual chance and 0.2% annual chance floodplains; and 1% annual chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

  It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 31, "Map Repositories," within this FIS Report.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

- FEMA does not impose floodplain management requirements or special insurance ratings based on Limit of Moderate Wave Action (LiMWA) delineations at this time. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. If the LiMWA is shown on the FIRM, it is being provided by FEMA as information only. For communities that do adopt Zone VE building standards in the area defined by the LiMWA, additional Community Rating System (CRS) credits are available. Refer to Section 2.5.4 for additional information about the LiMWA.

  The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Visit the FEMA Web site at http://www.fema.gov or contact your appropriate FEMA Regional Office for more information about this program.

- Previous FIS Reports and FIRMs may have included levees that were accredited as providing protection from the 1% annual chance flood based on the information available and the mapping standards of the NFIP at that time. 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."

Please also note that FEMA has identified one or more levees in this jurisdiction that have not been demonstrated by the community or levee owner to meet the requirements provided 1-percent-annual-chance flood protection. As such, there are temporary actions are being taken until such a time as FEMA is able to initiate a new flood risk project to apply new levee analysis and mapping procedures to leveed areas. These temporary actions involve using the flood hazard data shown on the previous effective FIRM exactly as shown on the prior FIRM and identifying the area with bounding lines and special map notes. If a vertical datum conversion was executed for the county, then the Base Flood Elevations shown on the FIRM will now reflect elevations referenced to the North American Vertical Datum of 1988 (NAVD 1988). These levees are on FIRM panels 0200940335D, 0200940342D, 0200940355D, and 0200940361D, on the Lowe River are identified on the FIRM panels as potential areas of flood hazard data changes based on further review. Please refer to Section 4.4 of this FIS report for more information.

- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at http://www.fema.gov.

Figure 1: FIRM Panel Index

1 inch = 3 miles

Miles
0 1.5 3 6

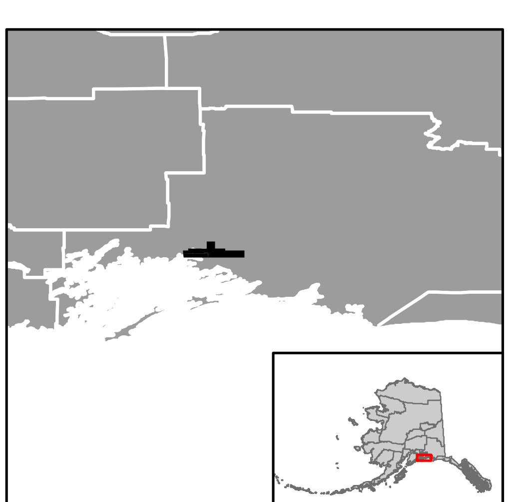
Map Projection:
NAD 1983 StatePlane Alaska 3 FIPS 5003 Feet
North American Datum of 1983

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTP://MSC.FEMA.GOV

SEE FIS REPORT FOR ADDITIONAL INFORMATION

* NO SPECIAL FLOOD HAZARD AREA



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

CITY OF VALDEZ, ALASKA VALDEZ-CORDOVA CENSUS AREA

PANELS PRINTED:
0119, 0120, 0129, 0136, 0137, 0138, 0139, 0143, 0144, 0164, 0168, 0170, 0233, 0263, 0264, 0275, 0280, 0283, 0286,0287,0288, 0289, 0300, 0301, 0302, 0303, 0304, 0308, 0309,0310, 0325, 0328, 0329, 0330, 0333, 0335, 0336, 0337, 0341, 0342, 0360, 0361, 0362, 0370

FEMA

MAP NUMBER
020094IND0A

MAP REVISED

Figure 2: FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates, refer to Table 28 in this FIS Report.

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

PRELIMINARY FIS REPORT: FEMA maintains information about map features, such as street locations as names, in or near designated flood hazard areas. Requests to revise information in or near designated flood hazard areas may be provided to FEMA during the community review period, at the final Consultation Coordination Officer's meeting, or during the statutory 90-day appeal period. Approved requests for changes will be shown on the final printed FIRM.

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

Coastal Base Flood Elevations shown on the map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the FIS 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 the FIRM.

FLOODWAY INFORMATION: 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 FIS Report for this jurisdiction.

Figure 2: FIRM Notes to Users *(continued)*

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

PROJECTION INFORMATION: The projection used in the preparation of the map was State Plane Transverse Mercator, Alaska 3 Zone. The horizontal datum was North American Datum 1983. Differences in datum, spheroid, projection or State Plane 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 the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to NAVD88. 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 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, Maryland 20910-3282
(301) 713-3242

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 31 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM was provided in digital format by Aero-Metric, Inc. This information was derived from digital orthophotography at a 1.5-foot resolution from photography dated 2009. For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.

The 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 may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the 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 the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within City of Valdez, Alaska (Independent City), corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 28 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

Figure 2: FIRM Notes to Users *(continued)*

SPECIAL NOTES FOR SPECIFIC FIRM PANELS This Notes to Users section was created specifically for City of Valdez, Alaska (Independent City), effective September 9, 9999. **ATTENTION:** The levee, dike or other structure that impacts flood hazards inside this boundary has not been shown to comply with Section 65.10 of the NFIP Regulations. As such, this FIRM panel will be revised at a later date to update the flood hazard information associated with this structure.
FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: *The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood. 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. See note for specific types. If the floodway is too narrow to be shown, a note is shown.*

	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone, either at cross section locations or as static whole-foot elevations that apply throughout the zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% 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 hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were 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	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.
	Regulatory Floodway determined in Zone AE.

Figure 3: Map Legend for FIRM *(continued)*

OTHER AREAS OF FLOOD HAZARD	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.
	Zone X Protected by Accredited Levee: Areas protected by an accredited levee, dike or other flood control structures. See Notes to Users for important information.
OTHER AREAS	
	Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible
NO SCREEN	Unshaded Zone X: Areas determined to be outside the 0.2% annual chance floodplain
FLOOD HAZARD AND OTHER BOUNDARY LINES	
	Flood Zone Boundary (white line)
	Limit of Study
	Jurisdiction Boundary
	Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet
GENERAL STRUCTURES	
Aqueduct *Channel* *Culvert* *Storm Sewer*	Channel, Culvert, Aqueduct, or Storm Sewer
Dam *Jetty* *Weir*	Dam, Jetty, Weir
	Levee, Dike or Floodwall accredited or provisionally accredited to provide protection from the 1% annual chance flood
	Levee, Dike or Floodwall not accredited to provide protection from the 1% annual chance flood.
Bridge	Bridge

Figure 3: Map Legend for FIRM *(continued)*

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AND OTHERWISE PROTECTED AREAS (OPA): *CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas. See Notes to Users for important information.*	
CBRS AREA 09/30/2009	Coastal Barrier Resources System Area: Labels are shown to clarify where this area shares a boundary with an incorporated area or overlaps with the floodway.
OTHERWISE PROTECTED AREA 09/30/2009	Otherwise Protected Area
REFERENCE MARKERS	
22.0	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
B 20.2	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
5280 21.1	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
17.5	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
8	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
513	Base Flood Elevation Line (shown for flooding sources for which no cross sections or profile are available)
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity

Figure 3: Map Legend for FIRM *(continued)*

BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
234	Interstate Highway
234	U.S. Highway
234	State Highway
234	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
RAILROAD	Railroad
————————	Horizontal Reference Grid Line
—	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
^{42}76^{000m}E	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16’ 52.5”	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1% annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2% annual chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and City of Valdez as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1% annual chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 23), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1% and 0.2% annual chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1% annual chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary is shown on the FIRM. Figure 3, "Map Legend for FIRM", describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within City of Valdez, respectively.

Table 2, "Flooding Sources Included in this FIS Report," lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 13. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1% annual chance floodplain corresponds to the SFHAs. The 0.2% annual chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

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. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Within this jurisdiction, there are one or more levees that have not been demonstrated by the communities or levee owners to meet the requirements of 44CFR Part 65.10 of the NFIP regulations (44 CFR 65.10) as it relates to the levee's capacity to provide 1-percent-annual-chance flood protection. As such, the floodplain boundaries in this area are subject to change.

Please refer to Section 4.4 of this FIS for more information on how this may affect the floodplain boundaries shown on the FIRM.

2.2 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 balancing floodplain development against increasing flood hazard. With this approach, the area of the 1% annual chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1% annual chance flood. The floodway fringe is the area between the floodway and the 1% annual chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water-surface elevation of the 1% annual chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. require communities in Flood County to limit increases caused by encroachment to 0.5 foot and several communities have adopted additional restrictions. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic

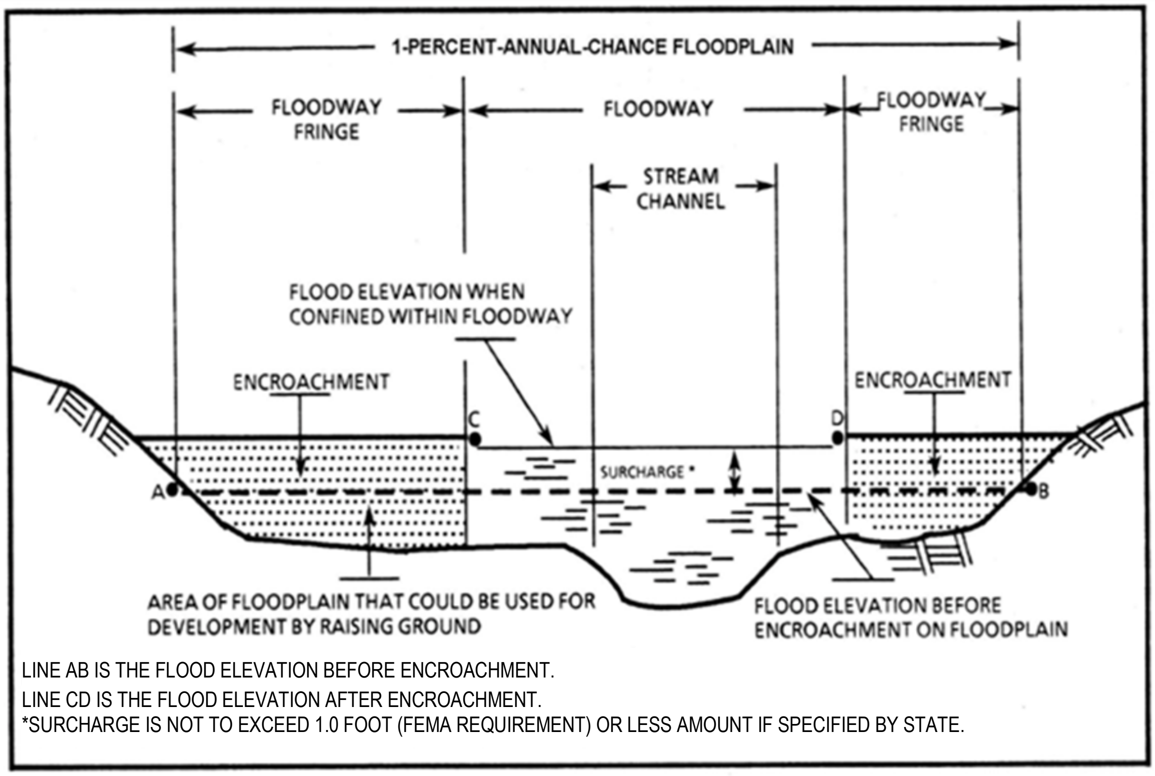


Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Allison Creek	City of Valdez	Confluence with Port of Valdez	Approximately 2.0 miles upstream of confluence with Port Valdez	19020201	1.9		N	A	2015
Browns Creek	City of Valdez	Confluence with Lowe River	Approximately 1.5 miles upstream of Taps Access Road	19020201	1.9		N	A	2015
Canyon Slough	City of Valdez	Confluence with Lowe River	Approximately 0.6 miles upstream of confluence with Lowe River	19020201	0.7		N	A	2015
Canyon Slough T1	City of Valdez	Confluence with Canyon Slough	Approximately 1.4 miles upstream of confluence with Canyon Slough	19020201	1.4		N	A	2015
Canyon Slough T2	City of Valdez	Confluence with Canyon Slough	Approximately 1.0 miles upstream of confluence with Canyon Slough	19020201	1.0		N	A	2015
Corbin Creek	City of Valdez	At Richardson Highway Bridge	Approximately 4.5 miles upstream of Richardson Highway Bridge	19020201	4.5		N	A	2015
Lowe River	City of Valdez	From confluence with Port of Valdez	To approximately 11.8 miles upstream of confluence with Port of Valdez	19020201	11.8		Y	AE	2015

Table 2: Flooding Sources Included in this FIS Report *(continued)*

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Lowe River	City of Valdez	Approximately 0.8 miles downstream of 4APL1 Road bridge	Approximately 0.8 miles upstream of 4APL1 Road bridge	19020201	1.7		N	A	2015
Lowe River T1	City of Valdez	Confluence with Lowe River	Approximately 0.6 miles upstream of confluence with Lowe River	19020201	0.6		N	A	2015
Mineral Creek	City of Valdez	Approximately 1.8 miles upstream of Mineral Creek bridge	Approximately 3.8 miles upstream of Mineral Creek bridge	19020201	2.0		N	A	2015
Mineral Creek	City of Valdez	At confluence with Port Valdez	Approximately 1.9 miles upstream of Mineral Creek Road	19020201	3.7		Y	AE	2015
Port of Valdez	City of Valdez	Approximately 2.4 miles west of confluence with Mineral Creek.	Approximately 6.2 miles west of confluence with Salmon Creek.	19020201	33.4		N	AE, VE	2015
Robe River	City of Valdez	From confluence with Port of Valdez	To approximately 2.3 miles upstream of confluence with Port of Valdez	19020201	2.2		Y	AE	2015
Robe River	City of Valdez	Approximately 0.3 miles upstream of Richardson Highway	Approximately 4.0 miles upstream of Richardson Highway	19020201	3.7		N	A	2015

Table 2: Flooding Sources Included in this FIS Report *(continued)*

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Robe River T1	City of Valdez	Confluence with Robe River	Approximately 0.2 miles upstream of Richardson Highway	19020201	0.4		N	A	2015
Salmon Creek	City of Valdez	Confluence with Port of Valdez	Approximately 2.2 miles upstream of confluence with Port Valdez	19020201	2.2		N	A	2015
Sawmill Creek	City of Valdez	Confluence with Port of Valdez	Approximately 0.8 miles upstream of confluence with Port Valdez	19020201	0.8		N	A	2015
Slater Creek	City of Valdez	Confluence with Valdez Glacier Stream	Approximately 1.5 miles upstream of confluence with Valdez Glacier Stream	19020201	1.5		N	A	2015
Solomon Gulch	City of Valdez	Confluence with Port of Valdez	Approximately 0.8 miles upstream of Solomon Lake Dam Overflow	19020201	1.9		N	A	2015
Sulphide Gulch	City of Valdez	Confluence with Lowe River	Approximately 1.0 miles upstream of confluence with Lowe River	19020201	1.1		N	A	2015
Unnamed T1	City of Valdez	Confluence with Robe River	Approximately 0.6 miles upstream of confluence with Robe River	19020201	0.6		N	A	2015

Table 2: Flooding Sources Included in this FIS Report *(continued)*

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Unnamed T2	City of Valdez	Confluence with Port of Valdez	Approximately 730 feet upstream of Richardson Highway	19020201	0.9		N	A	2015
Unnamed T3.1	City of Valdez	Confluence with Port of Valdez	Approximately 0.2 miles upstream of confluence with Port Valdez	19020201	1.0		N	A	2015
Unnamed T4	City of Valdez	Confluence with Port of Valdez	Approximately 0.2 miles upstream of Richardson Highway	19020201	0.7		N	A	2015
Unnamed T4	City of Valdez	Confluence with Port of Valdez	At confluence with Unnamed T4.1	19020201	0.1		N	A	2015
Unnamed T4.1	City of Valdez	Confluence with Port of Valdez	Approximately 540 feet upstream of McKinley Street	19020201	0.2		N	A	2015
Unnamed T5	City of Valdez	Confluence with Port of Valdez	Approximately 0.3 miles upstream of Richardson Highway	19020201	0.9		N	A	2015
Unnamed T6	City of Valdez	Confluence with Port of Valdez	Approximately 0.2 miles upstream of confluence with Port Valdez	19020201	0.5		N	A	2015
Unnamed T7	City of Valdez	Confluence with Port of Valdez	Approximately 430 feet upstream of confluence with Port Valdez	19020201	0.4		N	A	2015

Table 2: Flooding Sources Included in this FIS Report *(continued)*

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Valdez Glacier	City of Valdez	From confluence with Port of Valdez	To approximately 4.6 miles upstream of confluence with Port of Valdez	19020201	4.7		Y	AE	2015
Valdez Glacier Stream	City of Valdez	Approximately 0.7 miles upstream of confluence with Slater Creek	Approximately 2.7 miles upstream of confluence with Slater Creek	19020201	2.0		N	A	2015

Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 24, "Floodway Data."

All floodways that were developed for this FIS project are shown on the FIRM using the symbology described in Figure 3. In cases where the floodway and l% annual chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The Base Flood Elevation (BFE) is the elevation of the 1% annual chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. BFEs 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 Report in conjunction with the data shown on the FIRM.

2.4 Non-Encroachment Zones

Some States and communities use non-encroachment zones to manage floodplain development. While not a FEMA designated floodway, the non-encroachment zone represents that area around the stream that should be reserved to convey the 1% annual chance flood event.

2.5 Coastal Flood Hazard Areas

For most areas along rivers, streams, and small lakes, BFEs and floodplain boundaries are based on the amount of water expected to enter the area during a 1% annual chance flood and the geometry of the floodplain. Floods in these areas are typically caused by storm events. However, for areas on or near ocean coasts, large rivers, or large bodies of water, BFE and floodplain boundaries may need to be based on additional components, including storm surges and waves. Communities on or near ocean coasts face flood hazards caused by offshore seismic events as well as storm events.

Coastal flooding sources that are included in this FIS project are shown in Table 2.

2.5.1 Water Elevations and the Effects of Waves

Specific terminology is used in coastal analyses to indicate which components have been included in evaluating flood hazards.

The stillwater elevation (SWEL or still water level) is the surface of the water resulting from astronomical tides, storm surge, and freshwater inputs, but excluding wave setup contribution or the effects of waves.

- *Astronomical tides* are periodic rises and falls in large bodies of water caused by the rotation of the earth and by the gravitational forces exerted by the earth, moon and sun.
- *Storm surge* is the additional water depth that occurs during large storm events. These events can bring air pressure changes and strong winds that force water up against the shore.
- *Freshwater inputs* include rainfall that falls directly on the body of water, runoff from surfaces and overland flow, and inputs from rivers.

The 1% annual chance stillwater elevation is the stillwater elevation that has been calculated for a storm surge from a 1% annual chance storm. The 1% annual chance storm surge can be determined from analyses of tidal gage records, statistical study of regional historical storms, or other modeling approaches. Stillwater elevations for storms of other frequencies can be developed using similar approaches.

The total stillwater elevation (also referred to as the mean water level) is the stillwater elevation plus wave setup contribution but excluding the effects of waves.

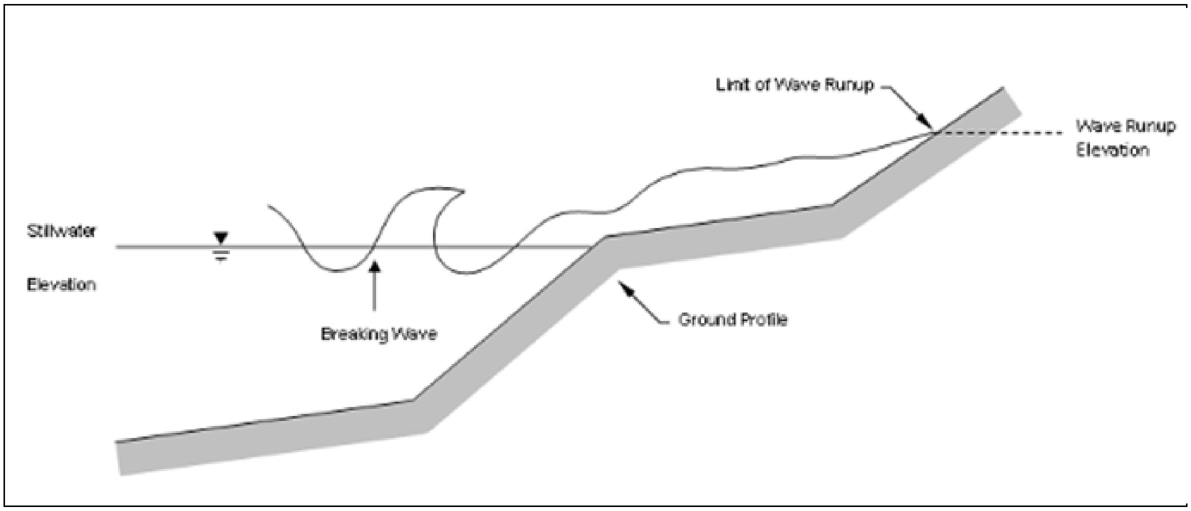
- *Wave setup* is the increase in stillwater elevation at the shoreline caused by the reduction of waves in shallow water. It occurs as breaking wave momentum is transferred to the water column.

Like the stillwater elevation, the total stillwater elevation is based on a storm of a particular frequency, such as the 1% annual chance storm. Wave setup is typically estimated using standard engineering practices or calculated using models, since tidal gages are often sited in areas sheltered from wave action and do not capture this information.

Coastal analyses may examine the effects of overland waves by analyzing storm-induced erosion, overland wave propagation, wave runup, and/or wave overtopping.

- *Storm-induced erosion* is the modification of existing topography by erosion caused by a specific storm event, as opposed to general erosion that occurs at a more constant rate.
- *Overland wave propagation* describes the combined effects of variation in ground elevation, vegetation, and physical features on wave characteristics as waves move onshore.
- *Wave runup* is the uprush of water from wave action on a shore barrier. It is a function of the roughness and geometry of the shoreline at the point where the stillwater elevation intersects the land.
- *Wave overtopping* refers to wave runup that occurs when waves pass over the crest of a barrier.

Figure 5: Wave Runup Transect Schematic



2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

For coastal communities along the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, and the Caribbean Sea, flood hazards must take into account how storm surges, waves, and extreme tides interact with factors such as topography and vegetation. Storm surge and waves must also be considered in assessing flood risk for certain communities on rivers or large inland bodies of water.

Beyond areas that are affected by waves and tides, coastal communities can also have riverine floodplains with designated floodways, as described in previous sections.

Floodplain Boundaries

In many coastal areas, storm surge is the principle component of flooding. The extent of the 1% annual chance floodplain in these areas is derived from the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1% annual chance storm. The methods that were used for calculation of total stillwater elevations for coastal areas are described in Section 5.3 of this FIS Report. Location of total stillwater elevations for coastal areas are shown in Figure 8, "1% Annual Chance Total Stillwater Levels for Coastal Areas."

In some areas, the 1% annual chance floodplain is determined based on the limit of wave runup or wave overtopping for the 1% annual chance storm surge. The methods that were used for calculation of wave hazards are described in Section 5.3 of this FIS Report.

Table 26 presents the types of coastal analyses that were used in mapping the 1% annual chance floodplain in coastal areas.

Coastal BFEs

Coastal BFEs are calculated as the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1% annual chance storm plus the additional flood hazard from overland wave effects (storm-induced erosion, overland wave propagation, wave runup and wave overtopping).

Where they apply, coastal BFEs are calculated along transects extending from offshore to the limit of coastal flooding onshore. Results of these analyses are accurate until local topography, vegetation, or development type and density within the community undergoes major changes.

Parameters that were included in calculating coastal BFEs for each transect included in this FIS Report are presented in Table 17, "Coastal Transect Parameters." The locations of transects are shown in Figure 9, "Transect Location Map." More detailed information about the methods used in coastal analyses and the results of intermediate steps in the coastal analyses are presented in Section 5.3 of this FIS Report. Additional information on specific mapping methods is provided in Section 6.4 of this FIS Report.

2.5.3 Coastal High Hazard Areas

Certain areas along the open coast and other areas may have higher risk of experiencing structural damage caused by wave action and/or high-velocity water during the 1% annual chance flood. These areas will be identified on the FIRM as Coastal High Hazard Areas.

- *Coastal High Hazard Area (CHHA)* is a SFHA extending from offshore to the inland limit of the primary frontal dune (PFD) or any other area subject to damages caused by wave action and/or high-velocity water during the 1% annual chance flood.

- *Primary Frontal Dune (PFD)* is a continuous or nearly continuous mound or ridge of sand with relatively steep slopes immediately landward and adjacent to the beach. The PFD is subject to erosion and overtopping from high tides and waves during major coastal storms.

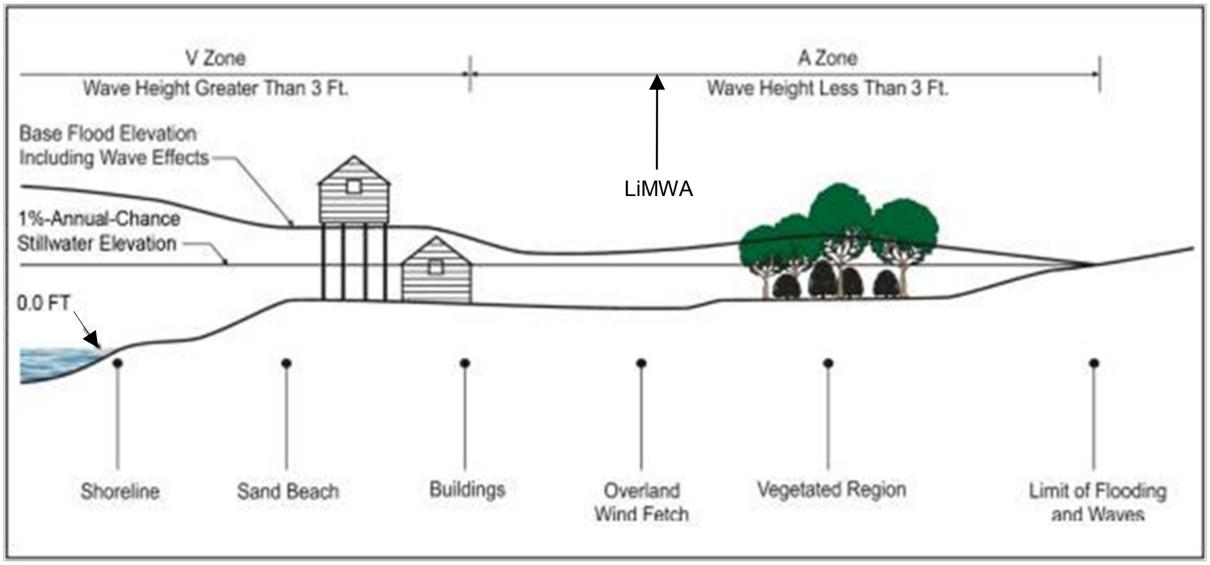
CHHAs are designated as "V" zones (for "velocity wave zones") and are subject to more stringent regulatory requirements and a different flood insurance rate structure. The areas of greatest risk are shown as VE on the FIRM. Zone VE is further subdivided into elevation zones and shown with BFEs on the FIRM.

The landward limit of the PFD occurs at a point where there is a distinct change from a relatively steep slope to a relatively mild slope; this point represents the landward extension of Zone VE. Areas of lower risk in the CHHA are designated with Zone V on the FIRM. More detailed information about the identification and designation of Zone VE is presented in Section 6.4 of this FIS Report.

Areas that are not within the CHHA but are SFHAs may still be impacted by coastal flooding and damaging waves; these areas are shown as "A" zones on the FIRM.

Figure 6, "Coastal Transect Schematic," illustrates the relationship between the base flood elevation, the 1% annual chance stillwater elevation, and the ground profile as well as the location of the Zone VE and Zone AE areas in an area without a PFD subject to overland wave propagation. This figure also illustrates energy dissipation and regeneration of a wave as it moves inland.

Figure 6: Coastal Transect Schematic



Methods used in coastal analyses in this FIS project are presented in Section 5.3 and mapping methods are provided in Section 6.4 of this FIS Report.

Coastal floodplains are shown on the FIRM using the symbology described in Figure 3, "Map Legend for FIRM." In many cases, the BFE on the FIRM is higher than the stillwater elevations shown in Table 17 due to the presence of wave effects. The higher elevation should be used for construction and/or floodplain management purposes.

2.5.4 Limit of Moderate Wave Action

This section is not applicable to this Flood Risk Project.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, "Map Legend for FIRM." Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1% annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2% annual chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in the unincorporated and incorporated areas of City of Valdez.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
City of Valdez	A, AE, VE, X

3.2 Coastal Barrier Resources System

The Coastal Barrier Resources Act (CBRA) of 1982 was established by Congress to create areas along the Atlantic and Gulf coasts and the Great Lakes, where restrictions for Federal financial assistance including flood insurance are prohibited. In 1990, Congress passed the Coastal Barrier Improvement Act (CBIA), which increased the extent of areas established by the CBRA and added "Otherwise Protected Areas" (OPA) to the system. These areas are collectively referred to as the John. H Chafee Coastal Barrier Resources System (CBRS). The CBRS boundaries that have been identified in the project area are in Table 4, "Coastal Barrier Resource System Information."

Table 4: Coastal Barrier Resources System Information

[Not Applicable to this Flood Risk Project]

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 5 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a brief description of the basin, and its drainage area.

Table 5: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Eastern Prince William Sound Watershed	19020201	Prince William Sound	Largest watershed within the City of Valdez, encompassing the entire city limits.	5,480

4.2 Principal Flood Problems

Table 6 contains a description of the principal flood problems that have been noted for City of Valdez by flooding source**.**

Table 6: Principal Flood Problems

Flooding Source	Description of Flood Problems
Lowe River	The Lowe River is affected by glacier dammed-lake-release floods. This presents particular problems for monitoring and forecasting because of their ever-changing and ephemeral nature. While characteristics are common to many dammed-lake-release floods, there is a certain uniqueness to each individual case. Thus, individual monitoring programs have to be established and normal regional methods of flood for casting usually cannot be applied. In addition the Lowe River contains sections of braided channel configuration adjacent to developable lands in Valdez. Stream Channels may shift rapidly and unpredictably in these reaches, potentially causing excessive bank erosion adjacent to a channel that was previously dry. Knowledgeable discretion should be used when planning development adjacent to braid sections of streams. Potential flood hazard is due to runoff caused by rainfall, snowmelt, and glacial melt.
Mineral Creek	Mineral Creek contains sections of braided channel configuration adjacent to developable lands in Valdez. Stream Channels may shift rapidly and unpredictably in these reaches, potentially causing excessive bank erosion adjacent to a channel that was previously dry. Knowledgeable discretion should be used when planning development adjacent to braid sections of streams. Potential flood hazard is due to runoff caused by rainfall, snowmelt, and glacial melt.
Valdez Glacier Stream	The Valdez Glacier Stream is affected by glacier dammed-lake-release floods. This presents particular problems for monitoring and forecasting because of their ever-changing and ephemeral nature. While characteristics are common to many dammed-lake-release floods, there is a certain uniqueness to each individual case. Thus, individual monitoring programs have to be established and normal regional methods of flood for casting usually cannot be applied. In addition the Valdez Glacier Stream contains sections of braided channel configuration adjacent to developable lands in Valdez. Stream Channels may shift rapidly and unpredictably in these reaches, potentially causing excessive bank erosion adjacent to a channel that was previously dry. Knowledgeable discretion should be used when planning development adjacent to braid sections of streams. Potential flood hazard is due to runoff caused by rainfall, snowmelt, and glacial melt.

Table 7 contains information about historic flood elevations in the communities within City of Valdez.

Table 7: Historic Flooding Elevations

[Not Applicable to this Flood Risk Project]

4.3 Non-Levee Flood Protection Measures

Table 8 contains information about non-levee flood protection measures within City of Valdez such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

Table 8: Non-Levee Flood Protection Measures

[Not Applicable to this Flood Risk Project]

4.4 Levees

Please note that FEMA has identified levees in this jurisdiction that have not been demonstrated by the community or the levee owner to meet the requirements of 44CFR Part 65.10 of the NFIP regulations as it relates to the levee's capacity to provide 1-percent-annual-chance flood protection. As such, the existing flood hazard analysis in the affected areas has been carried forward from the previously-printed effective FIRM panel(s) and the area has been clearly identified on the FIRM panel with notes on bounding lines. This has been done to inform users that a temporary mapping action has been put in place until such time as FEMA is able to initiate a new flood risk project to apply new flood hazard mapping procedures for leveed areas. These levees occur on FIRM panel(s) 0200940119D, 0200940138D, 0200940335D, 0200940342D, 0200940355D, and 0200940361D, on Mineral Creek and the Lowe River and are identified on the FIRM panel(s) as potential areas on flood hazard data changes on further review. Levees and their accreditation status are listed in Table 9 of this FIS report.

Table 9: Levees

Community	Flooding Source	Levee Location	Levee Owner	USACE Levee	Levee ID	Covered Under PL84-99 Program?	FIRM Panel(s)	Levee Status
City of Valdez	Lowe River	RB	City of Valdez	N	N/A		0200940335D, 0200940342D, 0200940355D, 0200940361D	Never Accredited
City of Valdez	Mineral Creek	RB, LB	City of Valdez	N	N/A		0200940119D, 0200940138D	Never Accredited

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2% annual 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 that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); 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 community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Table 27, "Incorporated Letters of Map Change", which include Letters of Map Revision (LOMRs). For more information about LOMRs, refer to Section 6.5, "FIRM Revisions."

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 13. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 10. Frequency Discharge-Drainage Area Curves used to develop the hydrologic models may also be shown in Figure 7 for selected flooding sources. A summary of stillwater elevations developed for non-coastal flooding sources is provided in Table 11. (Coastal stillwater elevations are discussed in Section 5.3 and shown in Table 17.) Stream gage information is provided in Table 12.

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Lowe River	Approximately 11 miles upstream of confluence with Port Valdez	216	18,613	22,403	25,354	28,262	35,572
Lowe River	Approximately 10.4 miles upstream of confluence with Port Valdez	267	22,207	26,721	30,237	33,701	42,410
Lowe River	Approximately 8.7 miles upstream of confluence with Port Valdez	270	22,460	27,025	30,580	34,084	42,892
Lowe River	Approximately 8.4 miles upstream of the confluence with Port Valdez	275	22,755	27,378	30,980	34,529	43,452
Lowe River	Approximately 7.8 miles upstream of the confluence with Port Valdez	313	25,390	30,543	34,559	38,516	48,462
Lowe River	Approximately 6.9 miles upstream of the confluence with Port Valdez	317	25,622	30,821	34,873	38,866	48,902
Lowe River	Approximately 4.8 miles upstream of the confluence with Port Valdez	325	26,175	31,485	35,624	39,702	49,953

Table 10: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Lowe River	Approximately 3.5 miles upstream of the confluence with Port Valdez	334	26,776	32,207	36,440	40,611	51,096
Lowe River	Approximately 2.8 miles upstream of the confluence with Port Valdez	339	27,091	32,586	36,868	41,087	51,695
Lowe River	Approximately 1.7 miles upstream of the confluence with Port Valdez	342	27,296	32,832	37,146	41,397	52,084
Lowe River	Approximately 0.2 miles upstream of the confluence with Port Valdez	346	27,580	33,173	37,532	41,827	52,624
Lowe River	Just upstream of the confluence with Port Valdez	347	27,621	33,223	37,588	41,889	52,702
Mineral Creek	Approximately 5.0 Miles upstream of confluence with Port Valdez	32	4,195	5,041	5,691	6,334	7,920
Mineral Creek	Approximately 3.5 miles upstream of confluence with Port Valdez	41	4,338	5,314	6,066	6,826	8,695
Mineral Creek	Approximately 1.7 miles upstream of confluence with Port Valdez	44	4,462	5,497	6,296	7,108	9,100

Table 10: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Mineral Creek	Just upstream of confluence with Port Valdez	45	4,563	5,615	6,426	7,251	9,273
Robe River	Approximately 0.6 miles upstream of the confluence with Port Valdez	8	430	523	596	670	861
Robe River	Just upstream of the confluence with Port Valdez	10	511	620	707	795	1021
Valdez Glacier Stream	Approximately 1.3 miles upstream of the confluence with Port Valdez	130	12,601	15,011	16,877	18,705	23,274
Valdez Glacier Stream	Approximately 0.8 miles upstream of the confluence with Port Valdez	152	14,029	16,746	18,854	20,920	26,095
Valdez Glacier Stream	Just upstream of confluence with Port Valdez	152	14,064	16,788	18,901	20,973	26,160

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this Flood Risk Project]

Table 11: Summary of Non-Coastal Stillwater Elevations
[Not Applicable to this Flood Risk Project]

Table 12: Stream Gage Information used to Determine Discharges

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Mineral Creek	15227500	USGS	Mineral Creek approximately 1.5 miles upstream of the confluence with Port Valdez	45	1976	2012

5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. 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 Report in conjunction with the data 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.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed on Table 24, "Floodway Data."

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 13. Roughness coefficients are provided in Table 14. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 13: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Allison Creek	Confluence with Port of Valdez	Approximately 2.0 miles upstream of confluence with Port Valdez	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Browns Creek	Confluence with Lowe River	Approximately 1.5 miles upstream of Taps Access Road	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Canyon Slough	Confluence with Lowe River	Approximately 0.6 miles upstream of confluence with Lowe River	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Canyon Slough T1	Confluence with Canyon Slough	Approximately 1.4 miles upstream of confluence with Canyon Slough	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Canyon Slough T2	Confluence with Canyon Slough	Approximately 1.0 miles upstream of confluence with Canyon Slough	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Corbin Creek	At Richardson Highway Bridge	Approximately 4.5 miles upstream of Richardson Highway Bridge	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Lowe River	From confluence with Port of Valdez	To approximately 11.8 miles upstream of confluence with Port of Valdez	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	AE	Only the Lowe River has been gaged, and for a period of only five years. This lack of fundamental data necessitated a regional analysis to establish flows for the river. It is recommended that an expanded gaging program for the Valdez area be instituted as soon as possible.

Table 13: Summary of Hydrologic and Hydraulic Analyses *(continued)*

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Lowe River	Approximately 0.8 miles downstream of 4APL1 Road bridge	Approximately 0.8 miles upstream of 4APL1 Road bridge	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Lowe River T1	Confluence with Lowe River	Approximately 0.6 miles upstream of confluence with Lowe River	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Mineral Creek	Approximately 1.8 miles upstream of Mineral Creek bridge	Approximately 3.8 miles upstream of Mineral Creek bridge	Gage Analysis / Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Mineral Creek	At confluence with Port Valdez	Approximately 1.9 miles upstream of Mineral Creek Road	Gage Analysis / Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	AE	Profiles presented for Mineral Creek follow a baseline profile of the predicted flow pattern rather than a clearly defined stream channel. This path generally follows natural contours and was determined using engineering judgement. The channel "n" values for Mineral Creek ranged from 0.035 to 0.040, and the overbank "n" values ranged from 0.070 to 0.150.
Robe River	From confluence with Port of Valdez	To approximately 2.3 miles upstream of confluence with Port of Valdez	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	AE	For the Robe River, the channel "n" values ranged from 0.030 to 0.45, and the overbank "n" values ranged from 0.060 to 0.150. Ponding elevations for Robe Lake were determined using hydraulic analysis of the Robe River and engineering judgement.
Robe River	Approximately 0.3 miles upstream of Richardson Highway	Approximately 4.0 miles upstream of Richardson Highway	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Robe River T1	Confluence with Robe River	Approximately 0.2 miles upstream of Richardson Highway	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	

Table 13: Summary of Hydrologic and Hydraulic Analyses *(continued)*

Flooding Source	Study Limits Downstream Limit	Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Salmon Creek	Confluence with Port of Valdez	Approximately 2.2 miles upstream of confluence with Port Valdez	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Sawmill Creek	Confluence with Port of Valdez	Approximately 0.8 miles upstream of confluence with Port Valdez	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Slater Creek	Confluence with Valdez Glacier Stream	Approximately 1.5 miles upstream of confluence with Valdez Glacier Stream	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Solomon Gulch	Confluence with Port of Valdez	Approximately 0.8 miles upstream of Solomon Lake Dam Overflow	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Sulphide Gulch	Confluence with Lowe River	Approximately 1.0 miles upstream of confluence with Lowe River	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Unnamed T1	Confluence with Robe River	Approximately 0.6 miles upstream of confluence with Robe River	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Unnamed T2	Confluence with Port of Valdez	Approximately 730 feet upstream of Richardson Highway	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Unnamed T3.1	Confluence with Port of Valdez	Approximately 0.2 miles upstream of confluence with Port Valdez	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	

Table 13: Summary of Hydrologic and Hydraulic Analyses *(continued)*

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Unnamed T4	Confluence with Port of Valdez	Approximately 0.2 miles upstream of Richardson Highway	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Unnamed T4	Confluence with Port of Valdez	At confluence with Unnamed T4.1	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Unnamed T4.1	Confluence with Port of Valdez	Approximately 540 feet upstream of McKinley Street	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Unnamed T5	Confluence with Port of Valdez	Approximately 0.3 miles upstream of Richardson Highway	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Unnamed T6	Confluence with Port of Valdez	Approximately 0.2 miles upstream of confluence with Port Valdez	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Unnamed T7	Confluence with Port of Valdez	Approximately 430 feet upstream of confluence with Port Valdez	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	
Valdez Glacier	From confluence with Port of Valdez	To approximately 4.6 miles upstream of confluence with Port of Valdez	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	AE	Profiles presented for Valdez Glacier follow a baseline profile of the predicted flow pattern rather than a clearly defined stream channel. This path generally follows natural contours and was determined using engineering judgement. The channel "n" values for Valdez Glacier ranged from 0.040, and the overbank "n" values ranged from 0.055 to 0.300.
Valdez Glacier Stream	Approximately 0.7 miles upstream of confluence with Slater Creek	Approximately 2.7 miles upstream of confluence with Slater Creek	Regression Equations	HEC-RAS 3.1.1 and up	09/11/2015	A	

Table 14: Roughness Coefficients

[Not Applicable to this Flood Risk Project]

5.3 Coastal Analyses

For the areas of City of Valdez that are impacted by coastal flooding processes, coastal flood hazard analyses were performed to provide estimates of coastal BFEs. Coastal BFEs reflect the increase in water levels during a flood event due to extreme tides and storm surge as well as overland wave effects.

The following subsections provide summaries of how each coastal process was considered for this FIS Report. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation. Table 15 summarizes the methods and/or models used for the coastal analyses. Refer to Section 2.5.1 for descriptions of the terms used in this section.

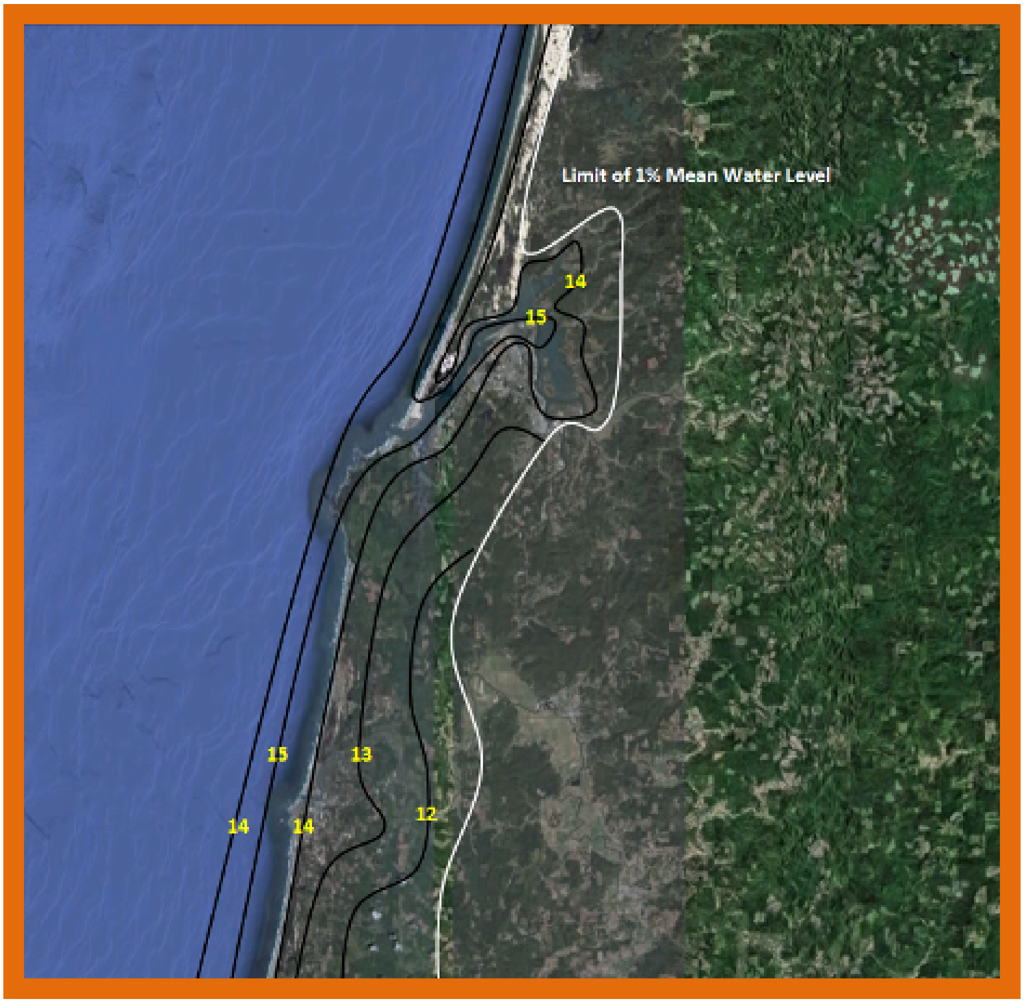
Table 15: Summary of Coastal Analyses

Flooding Source	Study Limits From	Study Limits To	Hazard Evaluated	Model or Method Used	Date Analysis was Completed
Port Valdez	Approximately 2.4 miles west of confluence with Mineral Creek.	Approximately 6.2 miles west of confluence with Salmon Creek.	Wave Runup	DIM/TAW	12/09/2013

5.3.1 Total Stillwater Elevations

The total stillwater elevations (stillwater including storm surge plus wave setup) for the 1% annual chance flood were determined for areas subject to coastal flooding. The models and methods that were used to determine storm surge and wave setup are listed in Table 15. The stillwater elevation that was used for each transect in coastal analyses is shown in Table 17, "Coastal Transect Parameters." Figure 8 shows the total stillwater elevations for the 1% annual chance flood that was determined for this coastal analysis.

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas



Astronomical Tide

Astronomical tidal statistics were generated directly from local tidal constituents by sampling the predicted tide at random times throughout the tidal epoch.

Storm Surge Statistics

Storm surge is modeled based on characteristics of actual storms responsible for significant coastal flooding. The characteristics of these storms are typically determined by statistical study of the regional historical record of storms or by statistical study of tidal gages.

When historic records are used to calculate storm surge, characteristics such as the strength, size, track, etc., of storms are identified by site. Tidal gages can be used instead of historic records of storms when the available tidal gage record for the area represents both the astronomical tide component and the storm surge component. Table 16 provides the gage name, managing agency, gage type, gage identifier, start date, end date, and statistical methodology applied to each gage used to determine the stillwater elevations.

Table 16: Tide Gage Analysis Specifics

Gage Name	Managing Agency of Tide Gage Record	Gage Type	Start Date	End Date	Statistical Methodology
Valdez AK 9454240	National Oceanic and Atmospheric Administration (NOAA)	Tide	1995	2012	N/A
Valdez Pioneer Fiel 702756 26479	United States Air Force, Weather Bureau Army Navy (USAF_WBAN)	Wind Speed and Direction	1975	2013	N/A
WSO Valdez 702750 26442	United States Air Force, National Climatic Data Center (USAF NCDC)	Wind Speed and Direction	1967	2005	N/A

Wave Setup Analysis
Wave setup was computed during the storm surge modeling through the methods and models listed in Table 15 and included in the frequency analysis for the determination of the total stillwater elevations. The oscillating component of wave setup, *dynamic wave setup*, was calculated along the transects using DIM/TAW method.

5.3.2 Waves

SWAN was used to calculate the nearshore wave fields required for the addition of wave setup effects, which provided input for wave setup and wave runup calculation.

5.3.3 Coastal Erosion

A single storm episode can cause extensive erosion in coastal areas. Storm-induced erosion was evaluated to determine the modification to existing topography that is expected to be associated with flooding events. Erosion was evaluated using the methods listed in Table 15.

5.3.4 Wave Hazard Analyses

Overland wave hazards were evaluated to determine the combined effects of ground elevation, vegetation, and physical features on overland wave propagation and wave runup. These analyses were performed at representative transects along all shorelines for which waves were expected to be present during the floods of the selected recurrence intervals. The results of these analyses were used to determine elevations for the 1% annual chance flood.

Transect locations were chosen with consideration given to the physical land characteristics as well as development type and density so that they would closely represent conditions in their locality. Additional consideration was given to changes in the total stillwater elevation. Transects were spaced close together in areas of complex topography and dense development or where total stillwater elevations varied. In areas having more uniform characteristics, transects were spaced at larger intervals. Transects shown in Figure 9, “Transect Location Map,” are also depicted on the FIRM. Table 17 provides the location, stillwater elevations, and starting wave conditions for each transect evaluated for overland wave hazards. In this table, “starting” indicates the parameter value at the beginning of the transect.

Wave Height Analysis

Wave height analyses were performed to determine wave heights and corresponding wave crest elevations for the areas inundated by coastal flooding and subject to overland wave propagation hazards. Refer to Figure 6 for a schematic of a coastal transect evaluated for overland wave propagation hazards.

Wave heights and wave crest elevations were modeled using the methods and models listed in Table 15, “Summary of Coastal Analyses”.

Wave Runup Analysis

Wave runup analyses were performed to determine the height and extent of runup beyond the limit of stillwater inundation for the 1% annual chance flood. Wave runup elevations were modeled using the methods and models listed in Table 15.

Table 17: Coastal Transect Parameters

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
		Significant Wave Height H_s (feet)	Peak Wave Period T_p (seconds)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Port of Valdez	1	0.0	0.0	* *	* *	* *	15.0 15.0-15.0	* *
Port of Valdez	2	0.0	0.0	* *	* *	* *	15.0 15.0-15.0	* *
Port of Valdez	3	0.0	0.0	* *	* *	* *	15.0 15.0-15.0	* *
Port of Valdez	4	0.0	0.0	* *	* *	* *	15.0 15.0-15.0	* *
Port of Valdez	5	0.0	0.0	* *	* *	* *	15.0 15.0-15.0	* *
Port of Valdez	6	0.0	0.0	* *	* *	* *	15.0 15.0-15.0	* *
Port of Valdez	7	0.0	0.0	* *	* *	* *	15.0 15.0-15.0	* *

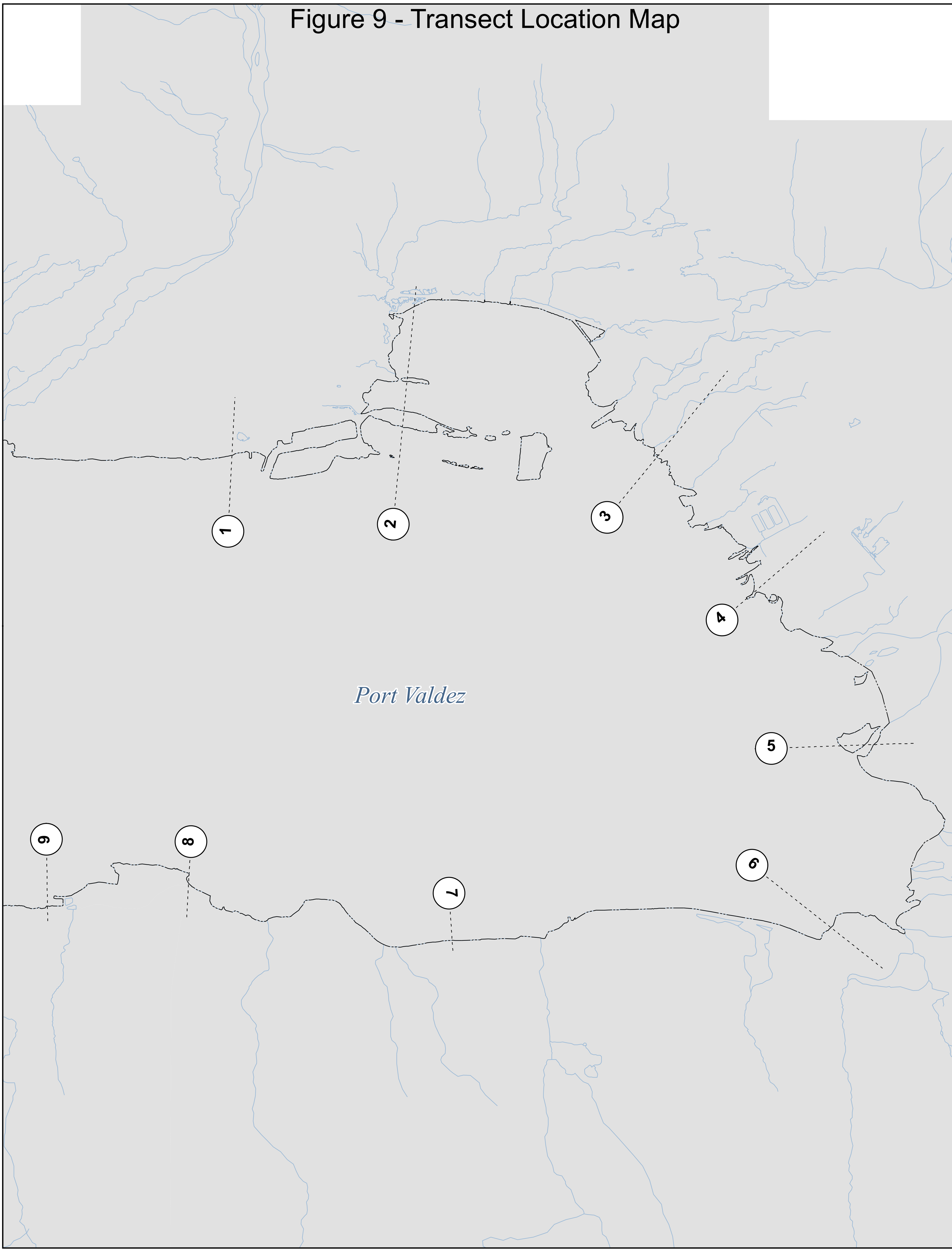
*Not calculated for this FIS project

Table 17: Coastal Transect Parameters *(continued)*

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
		Significant Wave Height H_s (feet)	Peak Wave Period T_p (seconds)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Port of Valdez	8	0.0	0.0	* *	* *	* *	15.0 15.0-15.0	* *
Port of Valdez	9	0.0	0.0	* *	* *	* *	15.0 15.0-15.0	* *

*Not calculated for this FIS project

Figure 9 - Transect Location Map



1 inch = 2,965 feet

0 0.25 0.5 1 Miles

Map Projection:
State Plane Alaska 3 FIPS 5003 Feet
North American Datum 1983

CITY LOCATOR

NATIONAL FLOOD INSURANCE PROGRAM

Transect Locator Map

PANELS PRINTED:

0138D
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0264D
0280D
0283D
0287D
0289D
0301D
0303D

FEMA

5.4 Alluvial Fan Analyses

This section is not applicable to this Flood Risk Project.

Table 18: Summary of Alluvial Fan Analyses
[Not Applicable to this Flood Risk Project]

Table 19: Results of Alluvial Fan Analyses
[Not Applicable to this Flood Risk Project]

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

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 used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information ServicesNOAA, N/NGS12National Geodetic SurveySSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 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 archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please contact information services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

The datum conversion locations and values that were calculated for City of Valdez are provided in Table 20.

Table 20: Countywide Vertical Datum Conversion

[Not Applicable to this Flood Risk Project]

A countywide conversion factor could not be generated for City of Valdez because the maximum variance from average exceeds 0.25 feet. Calculations for the vertical offsets on a stream by stream basis are depicted in Table 21 – Please note that datum shift information was derived by existing benchmark information that were converted from NGVD29 to NAVD88. Since the datum shift varies significantly by location in Alaska, only the listed benchmarks were selected due to the close proximity of the area of concern. For any further information, please visit the following website: http://www.ngs.noaa.gov/NGSDataExplorer/

Table 21: Stream-by-Stream Vertical Datum Conversion

Benchmark	NGVD29 height (Ft)	NAVD88 height (Ft)	Height Shift (Ft)
E11C964	145.10	151.76	6.66
E11B964	122.00	128.63	6.63
C721964	223.11	229.75	6.64
Average Shift Value			**6.64**

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's *Guidelines and Standards for Mapping Partners*, Appendix L.

Base map information shown on the FIRM was derived from the sources described in Table 22.

Table 22: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
S_Base_Index - Orthoimage Footprint	Aero-Metric	2009	N/A	Represents effective DFIRMs and LOMRs available as of the publication date
Public Land Survey System Sections	Alaska Department of Natural Resources	2013	1:10,000	PLSS data were digitized from USGS quadrangles
Political Boundaries	City of Valdez GIS Department	2013	N/A	Municipal and county boundaries
Transportation Features	City of Valdez GIS Department	2013	N/A	Roads and railroads
Lakes	City of Valdez GIS Department	2013	N/A	Water features
Streams	GEO Engineers INC.	2013	1:6,000	Water features

Table 22: Base Map Sources *(continued)*

Data Type	Data Provider	Data Date	Data Scale	Data Description
S_Base_Index - Orthoimage Footprint	Aero-Metric	2009	N/A	Represents effective DFIRMs and LOMRs available as of the publication date

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 23. For each coastal flooding source studied as part of this FIS Report, the mapped floodplain boundaries on the FIRM have been delineated using the flood and wave elevations determined at each transect; between transects, boundaries were delineated using land use and land cover data, the topographic elevation data described in Table 23, and knowledge of coastal flood processes. In ponding areas, flood elevations were determined at each junction of the model; between junctions, boundaries were interpolated using the topographic elevation data described in Table 23.

In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% 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.

The floodway widths presented in this FIS Report and on the FIRM 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. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 24, "Floodway Data."

Table 23: Summary of Topographic Elevation Data used in Mapping

		Source for Topographic Elevation Data			
Community	Flooding Source	Description	Scale	Contour Interval	Citation
City of Valdez	Corbin Creek, Mineral Creek, Robe River, Slater Creek, Unnamed T1, Unnamed T2, Unnamed T3.1, Unnamed T4, Unnamed T5, Unnamed T6, Unnamed T7, Valdez Glacier Stream	DEM	1:6,000	2 feet	2 Meter resoultion
City of Valdez	Allison Creek, Browns Creek, Canyon Slough, Canyon Slough T1, Canyon Slough T2, Corbin Creek, Lowe River, Salmon Creek, Sawmill Creek, Solomon Gulch, Sulphide Gulch	AKDNR DGGS	1:6,000	2 feet	1 Meter Resolution

Table 23: Summary of Topographic Elevation Data used in Mapping in Mapping *(continued)*

		Source for Topographic Elevation Data			
Community	Flooding Source	Description	Scale	Contour Interval	Citation
City of Valdez	Allison Creek, Browns Creek, Canyon Slough, Canyon Slough T1, Canyon Slough T2, Salmon Creek, Solomon Gulch,	DEM	1:6,000	2 feet	10 Meter Resolution

BFEs shown at cross sections on the FIRM represent the 1% annual chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations.

Table 24: Floodway Data

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	0	3,700	20,720	2.0	15.0	15.0	15.1	0.1
B	1,766	3,500	9,269	4.5	16.0	16.0	16.1	0.1
C	7,330	1,900	10,085	4.1	29.0	29.0	29.6	0.6
D	7,580	1,880	9,250	4.5	30.1	30.1	30.5	0.4
E	10,518	2,600	11,062	3.8	35.4	35.4	35.8	0.4
F	16,208	2,670	9,609	4.3	49.6	49.6	49.6	0.0
G	21,038	3,479	13,031	3.2	64.6	64.6	64.6	0.0
H	23,306	3,546	12,221	3.3	70.5	70.5	70.6	0.1
I	28,520	5,077	11,222	3.5	86.3	86.3	86.3	0.0
J	32,205	3,800	6,657	6.0	99.7	99.7	99.9	0.2
K	46,701	2,004	5,188	7.4	171.6	171.6	171.7	0.1
L	50,623	3,099	6,965	4.9	196.1	196.1	196.1	0.0
M	62,368	1,759	4,076	6.9	269.7	269.7	269.7	0.0

[1]Confluence with Port Valdez

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA

FLOODWAY DATA

FLOODING SOURCE: LOWE RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	1,383	314	791	9.0	15.6	15.6	15.6	0.0
B	4,377	285	1,004	7.1	41.6	41.6	41.6	0.0
C	4,513	295	1,192	6.0	43.3	43.3	43.3	0.0
D	7,385	765	1,552	4.6	70.1	70.1	70.1	0.0
E	10,043	91	503	14.2	95.6	95.6	95.6	0.0
F	10,123	93	760	9.3	98.6	98.6	98.6	0.0
G	10,932	83	712	9.9	107.8	107.8	107.8	0.0
H	12,475	213	1,116	6.3	117.5	117.5	117.5	0.0
I	14,902	287	1,152	6.1	139.7	139.7	139.8	0.1
J	17,451	252	930	7.6	165.7	165.7	165.8	0.1
K	19,554	177	651	10.9	185.1	185.1	185.1	0.0

[1]Confluence with Port Valdez

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA

FLOODWAY DATA

FLOODING SOURCE: MINERAL CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	0	184	430	1.8	18.4[2]	15.0	15.3	0.3
B	1,874	88	345	2.3	21.4[2]	17.4	18.2	0.8
C	2,957	137	372	2.1	23.1[2]	19.2	20.1	0.9
D	4,293	136	503	1.3	24.1[2]	20.5	21.2	0.7
E	5,699	98	291	2.3	25.1[2]	21.2	22.1	0.9
F	7,547	91	383	1.8	26.5[2]	23.1	23.9	0.8
G	8,591	42	182	3.7	27.2[2]	24.8	25.2	0.5
H	10,039	33	216	3.1	27.8[2]	26.5	27.4	0.9
I	10,162	40	253	2.7	27.8	27.6	28.2	0.6
J	10,732	50	272	2.5	28.1	28.1	28.7	0.6
K	11,798	65	311	2.2	28.8	28.8	29.5	0.7

[1]Confluence with Port Valdez
[2]Elevations controlled by the Lowe River

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA

FLOODWAY DATA

FLOODING SOURCE: ROBE RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	0	3,827	24,104	0.9	15.0	15.0	15.5	0.5
B	1,359	2,606	3,146	6.7	17.8	17.8	17.8	0.0
C	2,151	2,635	7,152	2.9	25.6	25.6	25.7	0.0
D	3,403	1,555	3,786	5.5	33.4	33.4	33.5	0.0
E	4,203	311	1,925	10.9	40.1	40.1	40.1	0.0
F	4,610	430	3,387	6.2	44.8	44.8	44.8	0.0
G	5,475	1,711	6,615	3.1	47.6	47.6	47.7	0.0
H	5,956	1,765	3,891	5.2	49.6	49.6	49.6	0.1
I	7,876	2,382	4,221	4.8	66.4	66.4	66.4	0.0
J	10,889	1,313	3,646	5.1	95.8	95.8	95.8	0.0
K	13,444	851	3,274	5.7	121.7	121.7	121.8	0.0
L	16,687	709	3,164	5.9	154.1	154.1	154.1	0.0
M	18,353	927	3,809	4.9	168.8	168.8	168.8	0.0
N	18,894	1,064	3,777	5.0	171.8	171.8	171.9	0.1
O	21,278	293	1,576	11.9	195.9	195.9	196.4	0.5
P	21,830	300	2,300	8.1	203.0	203.0	203.4	0.4
Q	24,557	156	1,523	12.3	226.2	226.2	226.3	0.1

[1]Confluence with Port Valdez

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA

FLOODWAY DATA

FLOODING SOURCE: VALDEZ GLACIER STREAM

Table 25: Flood Hazard and Non-Encroachment Data for Selected Streams
[Not Applicable to this Flood Risk Project]

6.4 Coastal Flood Hazard Mapping

Flood insurance zones and BFEs including the wave effects were identified on each transect based on the results from the onshore wave hazard analyses. Between transects, elevations were interpolated using topographic maps, land-use and land-cover data, and knowledge of coastal flood processes to determine the aerial extent of flooding. Sources for topographic data are shown in Table 23.

Zone VE is subdivided into elevation zones and BFEs are provided on the FIRM.

The limit of Zone VE shown on the FIRM is defined as the farthest inland extent of any of these criteria (determined for the 1% annual chance flood condition):

- The *primary frontal dune zone* is defined in 44 CFR Section 59.1 of the NFIP regulations. The primary frontal dune represents a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes that occur immediately landward and adjacent to the beach. The primary frontal dune zone is subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune zone occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

- The *wave runup zone* occurs where the (eroded) ground profile is 3.0 feet or more below the 2-percent wave runup elevation.

- The *wave overtopping splash zone* is the area landward of the crest of an overtopped barrier, in cases where the potential 2-percent wave runup exceeds the barrier crest elevation by 3.0 feet or more.

- The *breaking wave height zone* occurs where 3-foot or greater wave heights could occur (this is the area where the wave crest profile is 2.1 feet or more above the total stillwater elevation).

- The *high-velocity flow zone* is landward of the overtopping splash zone (or area on a sloping beach or other shore type), where the product of depth of flow times the flow velocity squared (hv^2) is greater than or equal to 200 ft^3/sec^2. This zone may only be used on the Pacific Coast.

The SFHA boundary indicates the limit of SFHAs shown on the FIRM as either “V” zones or “A” zones.

Table 26 indicates the coastal analyses used for floodplain mapping and the criteria used to determine the inland limit of the open-coast Zone VE and the SFHA boundary at each transect.

Table 26: Summary of Coastal Transect Mapping Considerations

Coastal Transect	Primary Frontal Dune (PFD) Identified	Wave Runup Analysis	Wave Height Analysis	Zone VE Limit	SFHA Boundary
		Zone Designation and BFE (ft NAVD 88)	Zone Designation and BFE (ft NAVD 88)		
1		N/A	VE 19 AE 15	Wave Height	SWEL
2		AE 15-17	N/A	Runup	N/A
3		AE 15	N/A	Runup	N/A
4		AE 15	N/A	Runup	N/A
5		AE 15	N/A	Runup	N/A
6		AE 15	N/A	Runup	N/A
7		AE 17	N/A	Runup	N/A
8		N/A	VE 18	Wave Height	SWEL
9		AE 16	N/A	Runup	N/A

6.5 FIRM Revisions

This FIS Report and the FIRM are based on the most up-to-date information available to FEMA at the time of its publication; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time. Certain types of requests require submission of supporting data. FEMA may also initiate a revision. Revisions to FIS projects may take several forms, including Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs) (referred to collectively as Letters of Map Change (LOMCs)), Physical Map Revisions (PMRs), and FEMA-contracted restudies. These types of revisions are further described below. Some of these types of revisions do not result in the republishing of the FIS Report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data (shown in Table 31, “Map Repositories”).

6.5.1 Letters of Map Amendment

A LOMA is an official revision by letter to an effective NFIP map. A LOMA results from an administrative process that involves the review of scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the currently effective FEMA map and establishes that a specific property is not located in a SFHA. A LOMA cannot be issued for properties located on the PFD (primary frontal dune).

To obtain an application for a LOMA, visit http://www.fema.gov and download the form “MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill”. Visit the “Flood Map-Related Fees” section to determine the cost, if any, of applying for a LOMA.

FEMA offers a tutorial on how to apply for a LOMA. The LOMA Tutorial Series can be accessed at http://www.fema.gov/plan/prevent/fhm/ot_lmreq.shtm.

For more information about how to apply for a LOMA, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627).

6.5.2 Letters of Map Revision Based on Fill

A LOMR-F is an official revision by letter to an effective NFIP map. A LOMR-F states FEMA's determination concerning whether a structure or parcel has been elevated on fill above the base flood elevation and is, therefore, excluded from the SFHA.

Information about obtaining an application for a LOMR-F can be obtained in the same manner as that for a LOMA, by visiting http://www.fema.gov for the "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill" or by calling the FEMA Map Information eXchange, toll free, at 1-877-FEMA MAP (1-877-336-2627). Fees for applying for a LOMR-F, if any, are listed in the "Flood Map-Related Fees" section.

A tutorial for LOMR-F is available at http://www.fema.gov/plan/prevent/fhm/ot_lmreq.shtm.

6.5.3 Letters of Map Revision

A LOMR is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations and planimetric features. All requests for LOMRs should be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map. If the request for a LOMR is not submitted through the chief executive officer of the community, evidence must be submitted that the community has been notified of the request.

To obtain an application for a LOMR, visit http://www.fema.gov and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the City of Valdez FIRM are listed in Table 27.

Table 27: Incorporated Letters of Map Change

[Not Applicable to this Flood Risk Project]

6.5.4 Physical Map Revisions

PMRs are an official republication of a community's NFIP map to effect changes to base flood elevations, floodplain boundary delineations, regulatory floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas or correction to base flood elevations or SFHAs.

The community's chief executive officer must submit scientific and technical data to FEMA to support the request for a PMR. The data will be analyzed and the map will be revised if warranted. The community is provided with copies of the revised information and is afforded a review period. When the base flood elevations are changed, a 90-day appeal period is provided. A 6-month adoption period for formal approval of the revised map(s) is also provided.

For more information about the PMR process, please visit http://www.fema.gov and visit the "Flood Map Revision Processes" section.

6.5.5 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy (CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit www.fema.gov to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

6.5.6 Community Map History

The current FIRM presents flooding information for the entire geographic area of City of Valdez. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBMs) and/or Flood Boundary and Floodway Maps (FBFMs) may have been prepared for the incorporated communities and the unincorporated areas in the county that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 28, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

- *Community Name* includes communities falling within the geographic area shown on the FIRM, including those that fall on the boundary line, nonparticipating communities, and communities with maps that have been rescinded. Communities with No Special Flood Hazards are indicated by a footnote. If all maps (FHBM, FBFM, and FIRM) were rescinded for a community, it is not listed in this table unless SFHAs have been identified in this community.

- *Initial Identification Date (First NFIP Map Published)* is the date of the first NFIP map that identified flood hazards in the community. If the FHBM has been converted to a FIRM, the initial FHBM date is shown. If the community has never been mapped, the upcoming effective date or "pending" (for Preliminary FIS Reports) is shown. If the community is listed in Table 28 but not identified on the map, the community is treated as if it were unmapped.

- *Initial FHBM Effective Date* is the effective date of the first Flood Hazard Boundary Map (FHBM). This date may be the same date as the Initial NFIP Map Date.

- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.

- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community. This is the first effective date that is shown on the FIRM panel.

- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As countywide studies are completed or revised, each community listed should have its FIRM dates updated accordingly to reflect the date of the countywide study. Once the FIRMs exist in countywide format, as Physical Map Revisions (PMR) of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by the PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the Valdez-Cordova Census Area FIRMs in countywide format was 9/9/9999.

Table 28: Community Map History

Community Name	Initial Identification Date (First NFIP Map Published)	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
City of Valdez	11/01/1974	11/01/1974	04/08/1977	09/03/1980	12/01/1983

SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION

7.1 Contracted Studies

Table 29 provides a summary of the contracted studies, by flooding source, that are included in this FIS Report.

Table 29: Summary of Contracted Studies Included in this FIS Report

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Allison Creek	December 1983	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Browns Creek	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Canyon Slough	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Canyon Slough T1	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Canyon Slough T2	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Corbin Creek	December 1983	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Lowe River	December 1983	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Lowe River T1	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez

Table 29: Summary of Contracted Studies Included in this FIS Report (*continued*)

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Mineral Creek	December 1983	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Robe River	December 1983	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Robe River	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Robe River T1	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Salmon Creek	December 1983	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Sawmill Creek	December 1983	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Slater Creek	December 1983	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Solomon Gulch	December 1983	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Sulphide Gulch	December 1983	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Unnamed T1	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Unnamed T2	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Unnamed T3.1	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Unnamed T4	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Unnamed T4.1	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Unnamed T5	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Unnamed T6	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Unnamed T7	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Valdez Glacier	TBD	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez
Valdez Glacier Stream	December 1983	STARR	HSFEHQ-09-D-0370	9/11/2015	City of Valdez

7.2 Community Meetings

The dates of the community meetings held for this FIS project and any previous FIS projects are shown in Table 30. These meetings may have previously been referred to by a variety of names (Community Coordination Officer (CCO), Scoping, Discovery, etc.), but all meetings represent opportunities for FEMA, community officials, study contractors, and other invited guests to discuss the planning for and results of the project.

Table 30: Community Meetings

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
City of Valdez	09/09/99	2/4/15	Project Discovery	City of Valdez, FEMA, STARR
		8/12/15	Flood Risk Review	City of Valdez, FEMA, STARR
			Final CCO/Open House	

SECTION 8.0 – ADDITIONAL INFORMATION

Information concerning the pertinent data used in the preparation of this FIS Report can be obtained by submitting an order with any required payment to the FEMA Engineering Library. For more information on this process, see http://www.fema.gov.

Table 31 is a list of the locations where FIRMs for the City Of Valdez can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

Table 31: Map Repositories

Community	Address	City	State	Zip Code
City of Valdez	212 Chenega Avenue	Valdez	AK	99686

The National Flood Hazard Layer (NFHL) dataset is a compilation of effective FIRM databases and LOMCs. Together they create a GIS data layer for a State or Territory. The NFHL is updated as studies become effective and extracts are made available to the public monthly. NFHL data can be viewed or ordered from the website shown in Table 32.

Table 32 contains useful contact information regarding the FIS Report, the FIRM, and other relevant flood hazard and GIS data. In addition, information about the state NFIP Coordinator and GIS Coordinator is shown in this table. At the request of FEMA, each Governor has designated an agency of State or territorial government to coordinate that State's or territory's NFIP activities. These agencies often assist communities in developing and adopting necessary floodplain management measures. State GIS Coordinators are knowledgeable about the availability and location of state and local GIS data in their state.

Table 32: Additional Information

FEMA and the NFIP	
FEMA and FEMA Engineering Library website	http://www.fema.gov
NFIP website	http://www.fema.gov/business/nfip
NFHL Dataset	http://msc.fema.gov
FEMA Region X	Federal Regional Center, 130 228th Street SW. Bothell, WA 98021-9796 (425) 487-4657
Other Federal Agencies	
USGS website	http://www.usgs.gov
Hydraulic Engineering Center website	http://www.hec.usace.army.mil
State Agencies and Organizations	

Table 32: Additional Information *(continued)*

State NFIP Coordinator	State National Floodplain Insurance Program (NFIP) Coordinator Taunnie L. Boothby, CFM Alaska Dept. Community & Econ. Dev. 550 West 7th Avenue, Suite 1770 Anchorage, AK 99501-3510 (907) 269-4583 FAX (907) 269-4539 taunnie.boothby@alaska.gov
State GIS Coordinator	State GIS Coordinator Kim Homan GIS Coordinator State of Alaska, Department of Environmental Conservation 410 Willoughby Avenue, Suite 303 Juneau, AK 99801 Phone: 907-465-5084 Fax: 907-465-5097

SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

Table 33 includes sources used in the preparation of and cited in this FIS Report as well as additional studies that have been conducted in the study area.

Table 33: Bibliography and References

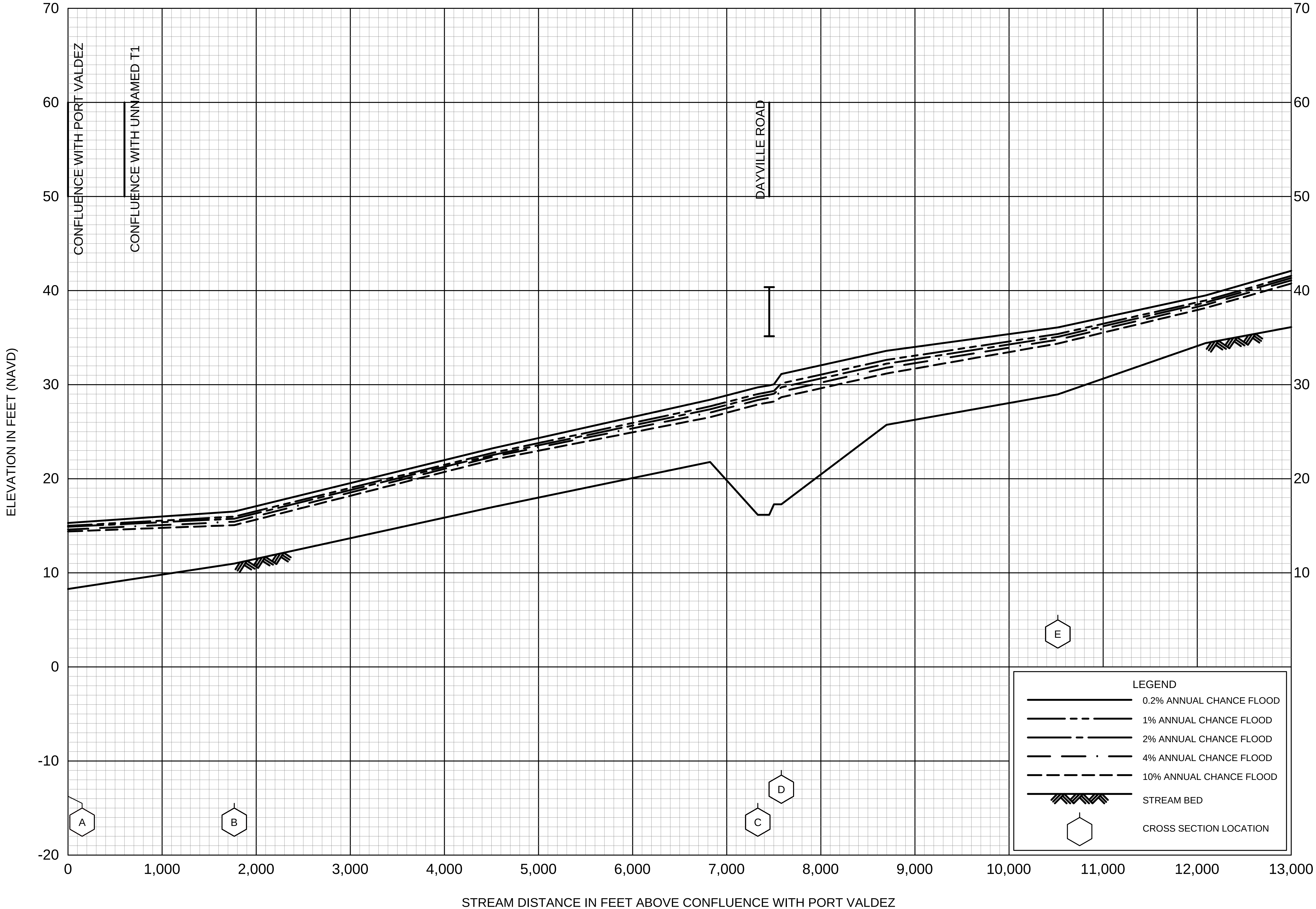
Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
1 Meter Resolution	Alaska Department of Natural Resources	*LiDAR data*	Watershed Sciences, Inc		2012	
2 Meter Resolution	Federal Emergency Management Agency	*DFIRM Study for Valdez, Alaska*	STARR (Stantec)	Laurel, MD	2014	FEMA Map Service Center http://hazards.fema.gov
10 Meter Resolution	US Geological Survey	*10 meter digital elevation model*	USGS	Reston, VA	N/A	
Appendix L	Federal Insurance Administration	*Guidelines and Specifications for Flood Hazard Mapping Partners*		Washington D.C.	2009	
Bulletin 17B (Gage Analysis)	U.S. Department of the Interior, Geological Survey, Office of Water Data Coordination	*Guidelines for Determining Flood Flow Frequency*	DOI	Reston, VA	1982	
DIM/TAW	Federal Emergency Management Agency	*Guidelines for Coastal Flood Hazard Analysis and Mapping for the Pacific Coast of the United States*	FEMA		2005	

Table 33: Bibliography and References *(continued)*

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
HEC-RAS	U.S. Department of the Army, Corps of Engineers	*HEC-RAS River Analysis System*	Hydrologic Engineering Center	Davis, California	2010	
Historic FIS	Federal Emergency Management Agency	*Flood Insurance Study: City of Valdez, Alaska*	Federal Emergency Management Agency	Washington D.C.	1980	
Principal Flood Problems	Federal Emergency Management Agency	*Flood Insurance Study, City of Valdez, Alaska*		Washington, D.C.	December 1983	FEMA Map Service Center http://hazards.fema.gov
User's Manual	U.S. Department of the Army, Corps of Engineers	*HEC-RAS 4.1 User's Manual*	Hydrologic Engineering Center	Davis, California	2013	http://www.hec.usace.army.mil/software/hec-ras/documents/HEC-RAS_4.1_Reference_Manual.pdf.
Water-Resources Investigations Report 03-4188 (Regression Equation)	U.S. Geological Survey	*Estimating the Magnitude and Frequency of Peak Streamflows for Ungaged Sites on Streams in Alaska and Conterminous Basins in Canada*	J.H. Curran, D.F. Meyers, and G.D. Task		2003	

Table 33: Bibliography and References *(continued)*

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
Water-Resources Investigation Report 93-4179 (Regression Equation)	U.S. Geological Survey	*Magnitude and Frequency of Floods in Alaska and Conterminous Basins of Canada*	Stanley H. Jones and Charles B. Fahl		1994	
		Average Weather for City of Valdez, AK			2014	www.weather.com
Zone A Analysis	Federal Emergency Management Agency	*Hydrologic Analyses Report*	Federal Emergency Management Agency	Laurel, MD	2014	



FLOOD PROFILES

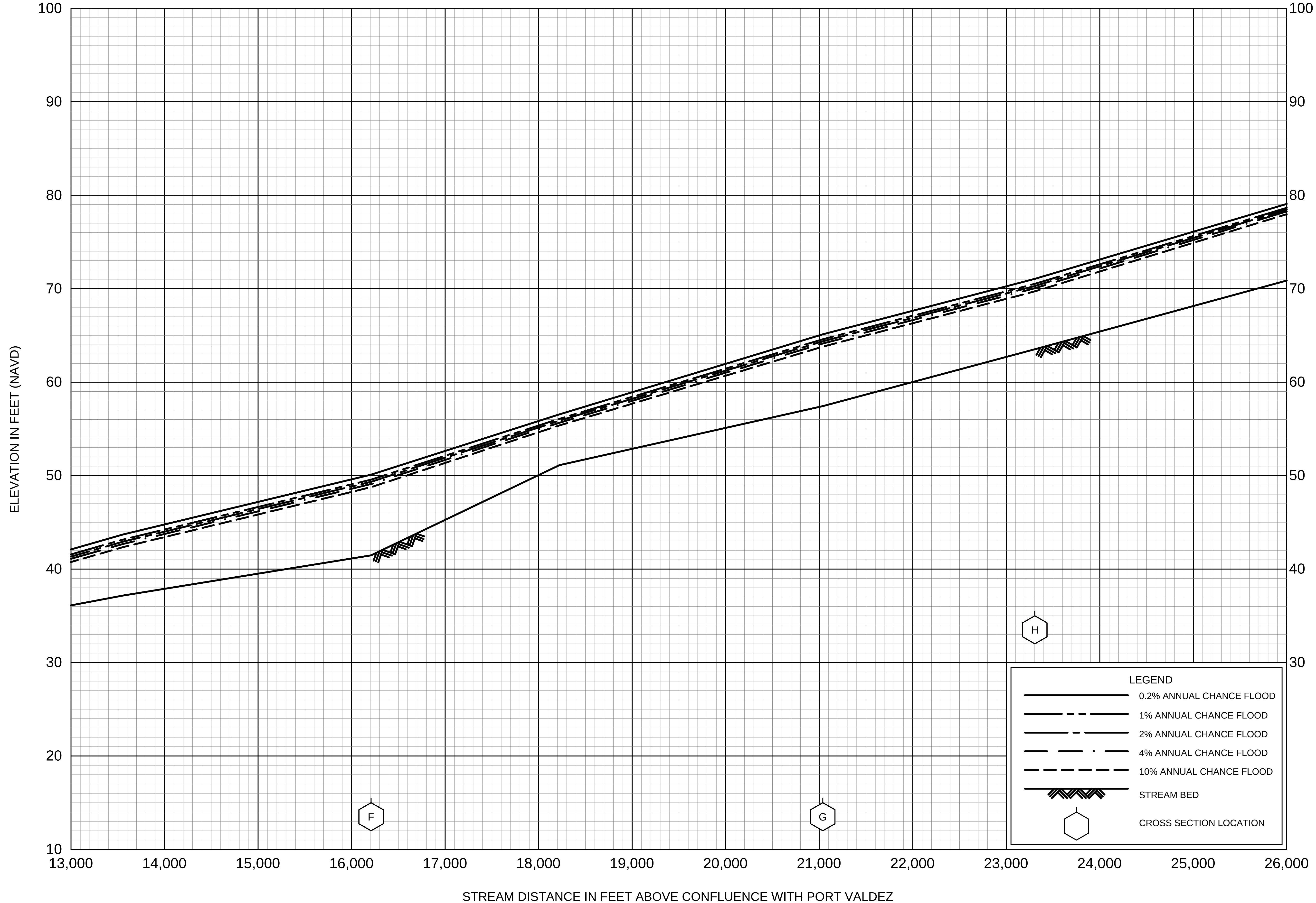
LOWE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA

01P



FLOOD PROFILES

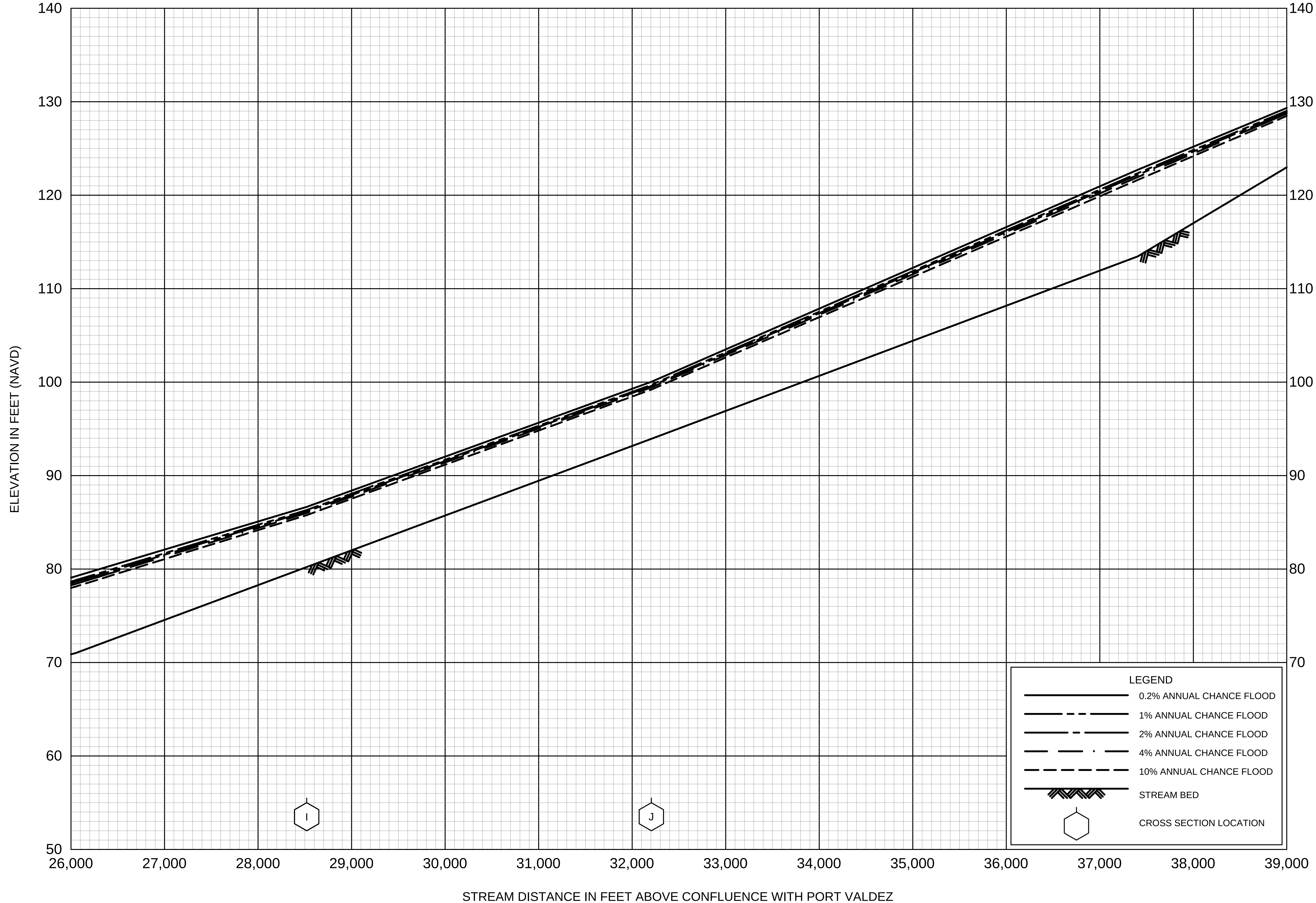
LOWE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA

02P



FLOOD PROFILES

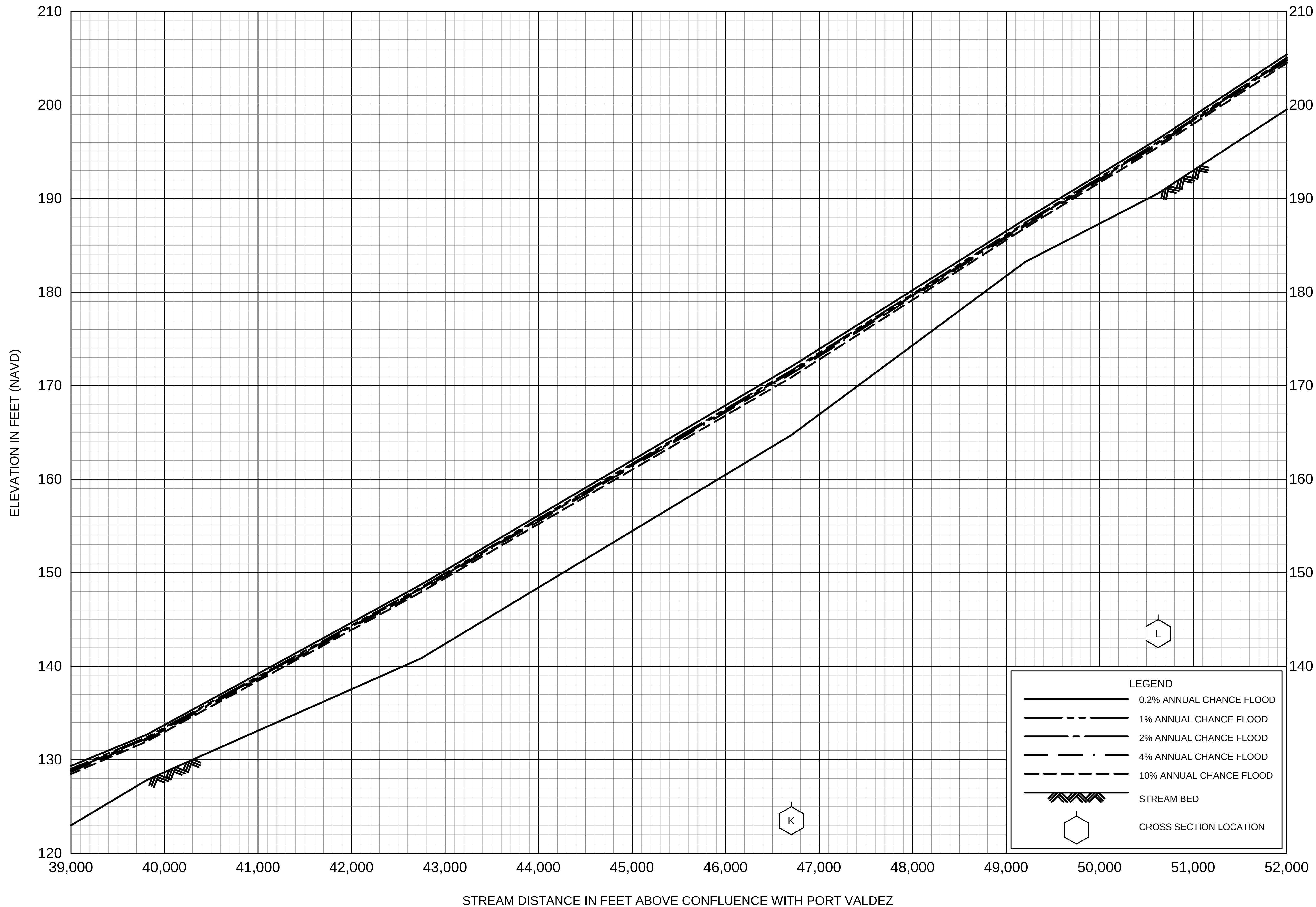
LOWE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA

03P



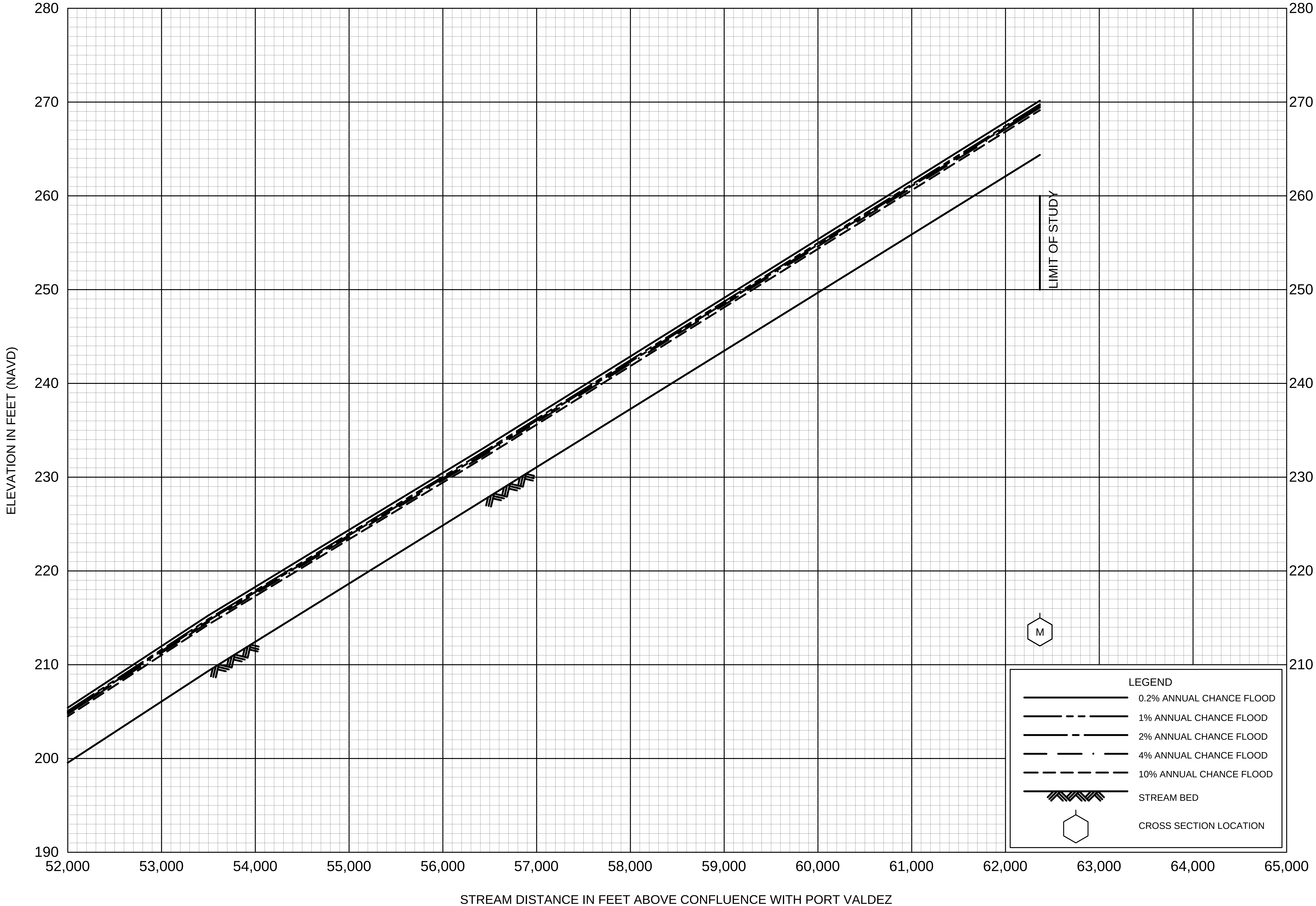
FLOOD PROFILES

LOWE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA



FLOOD PROFILES

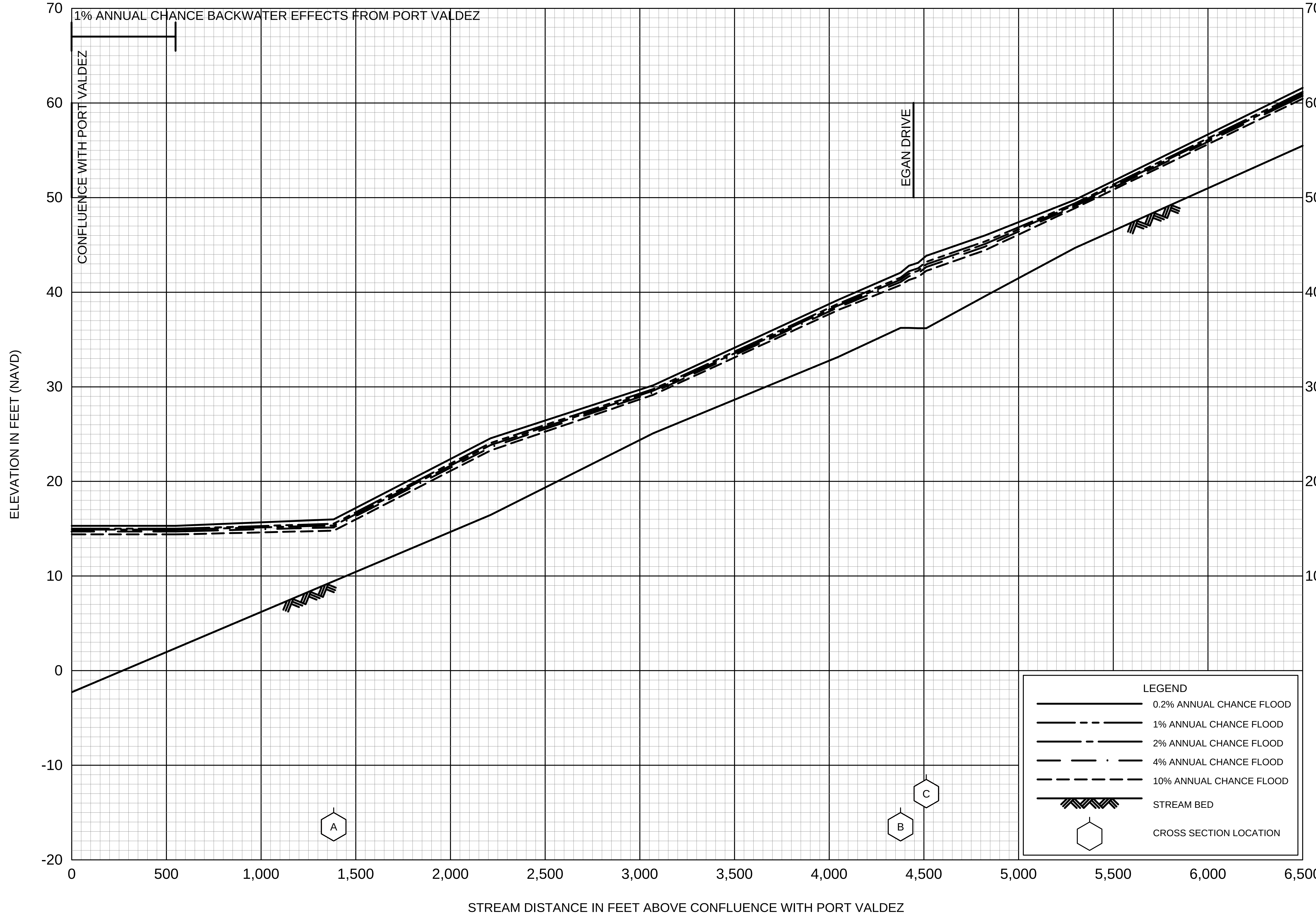
LOWE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA

05P



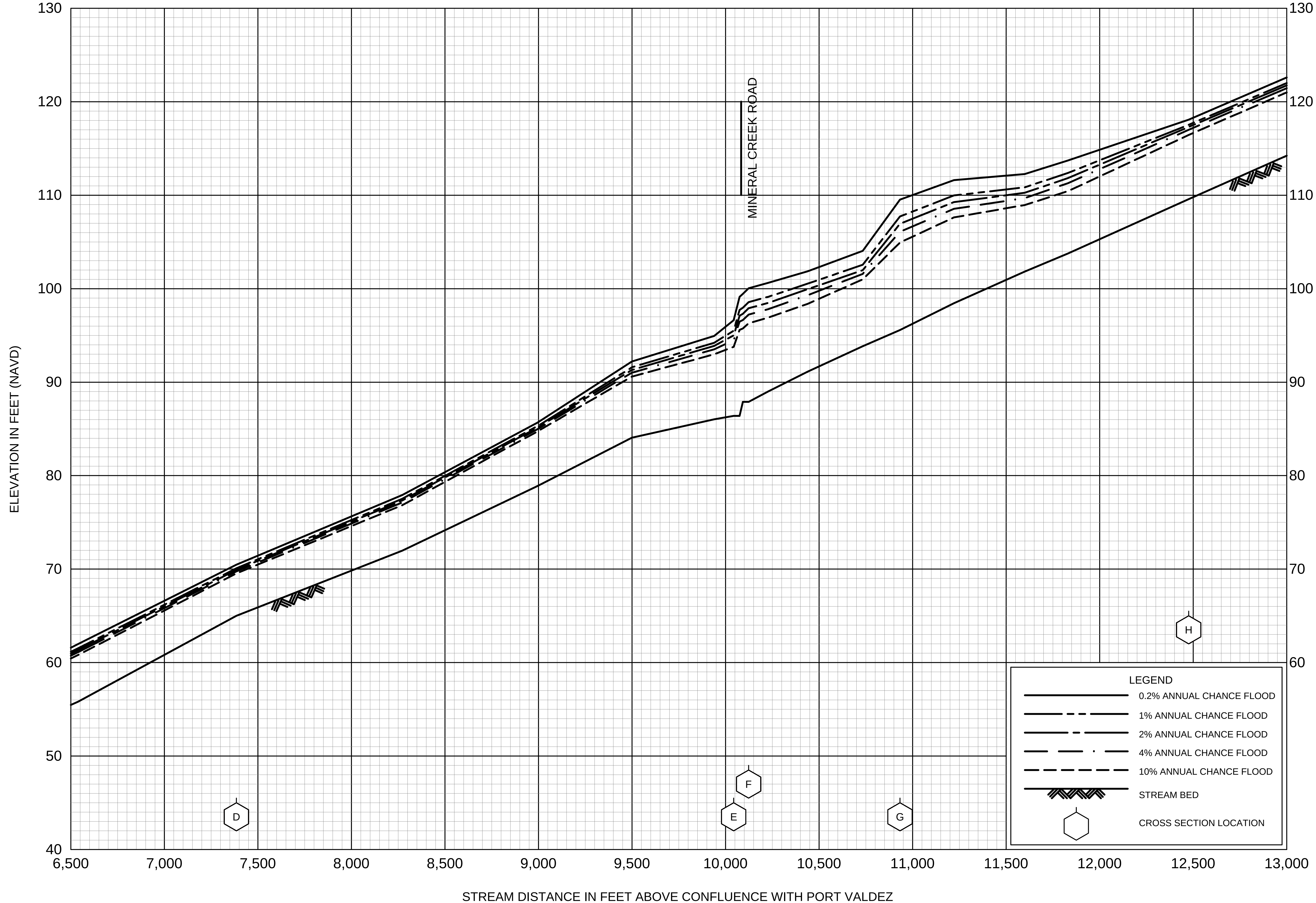
FLOOD PROFILES

MINERAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA



FLOOD PROFILES

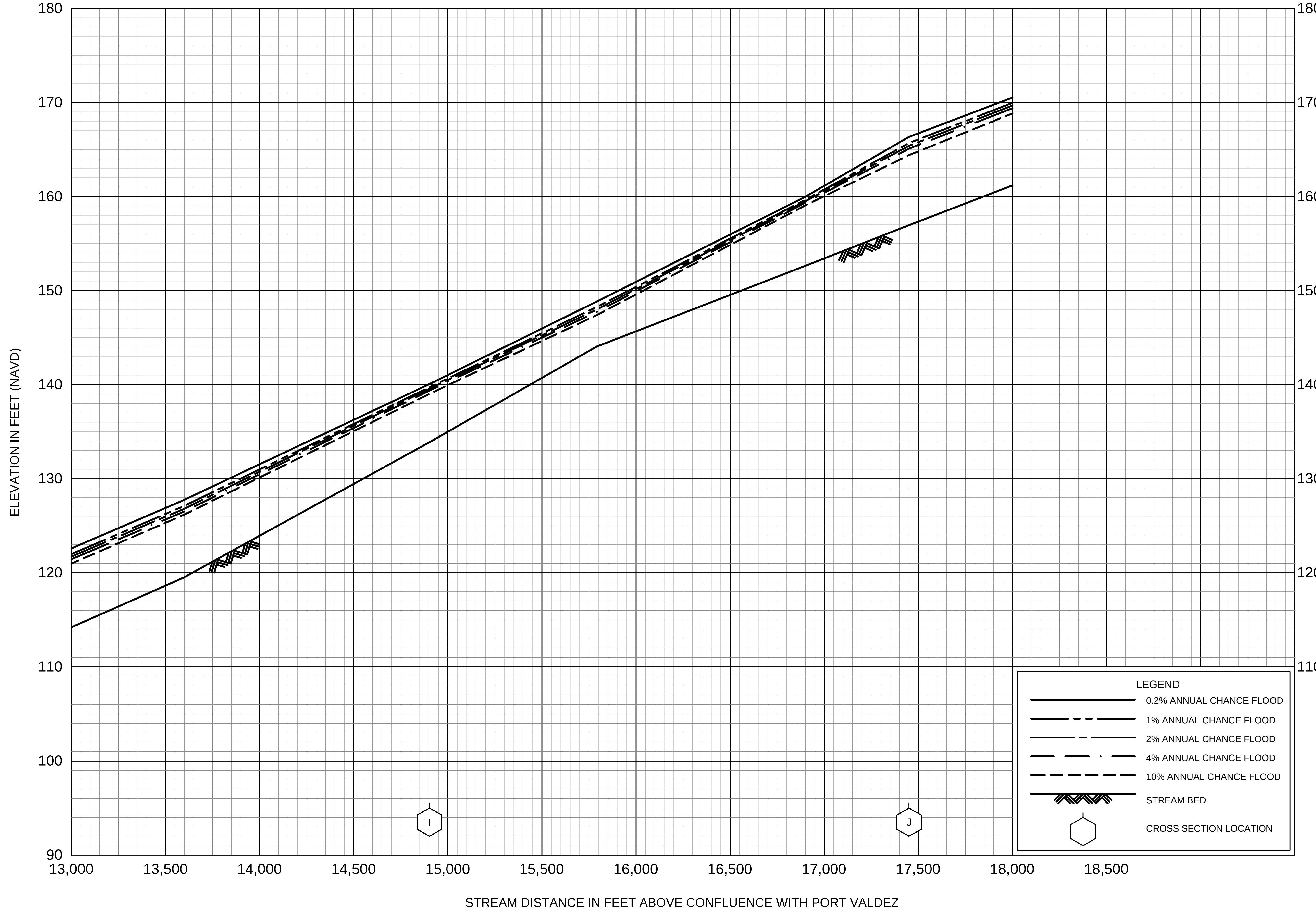
MINERAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA

07P



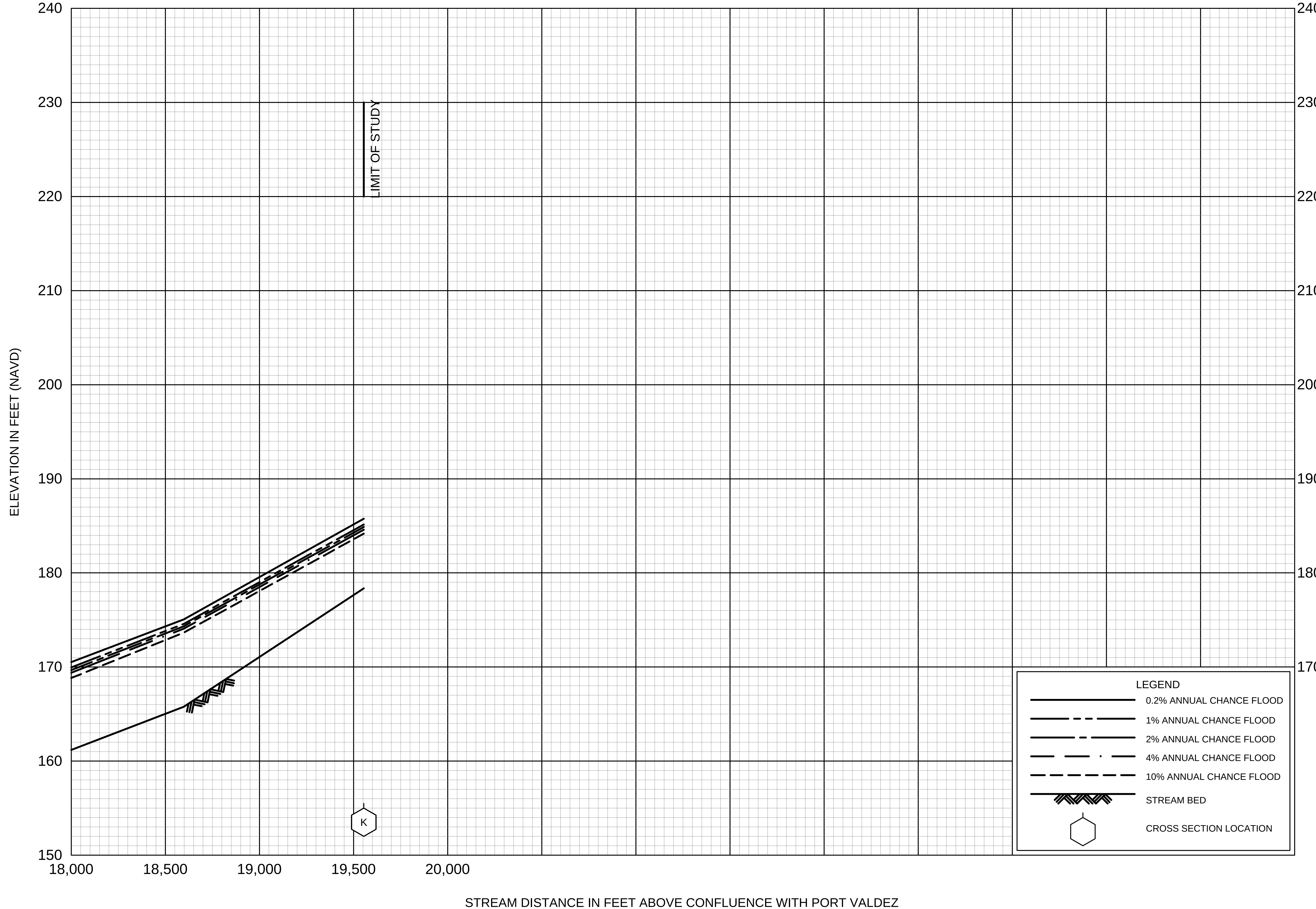
FLOOD PROFILES

MINERAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA



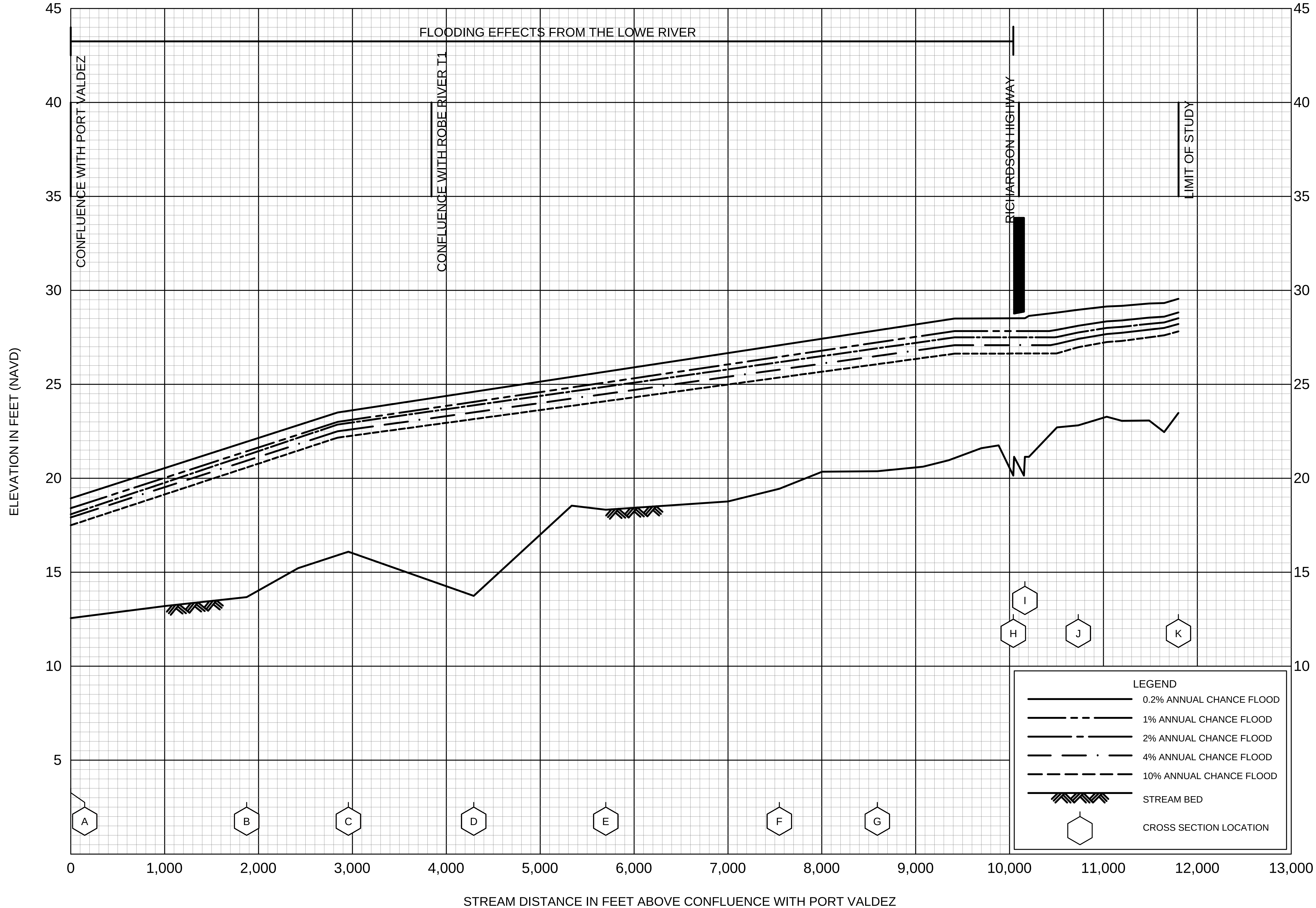
FLOOD PROFILES

MINERAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA



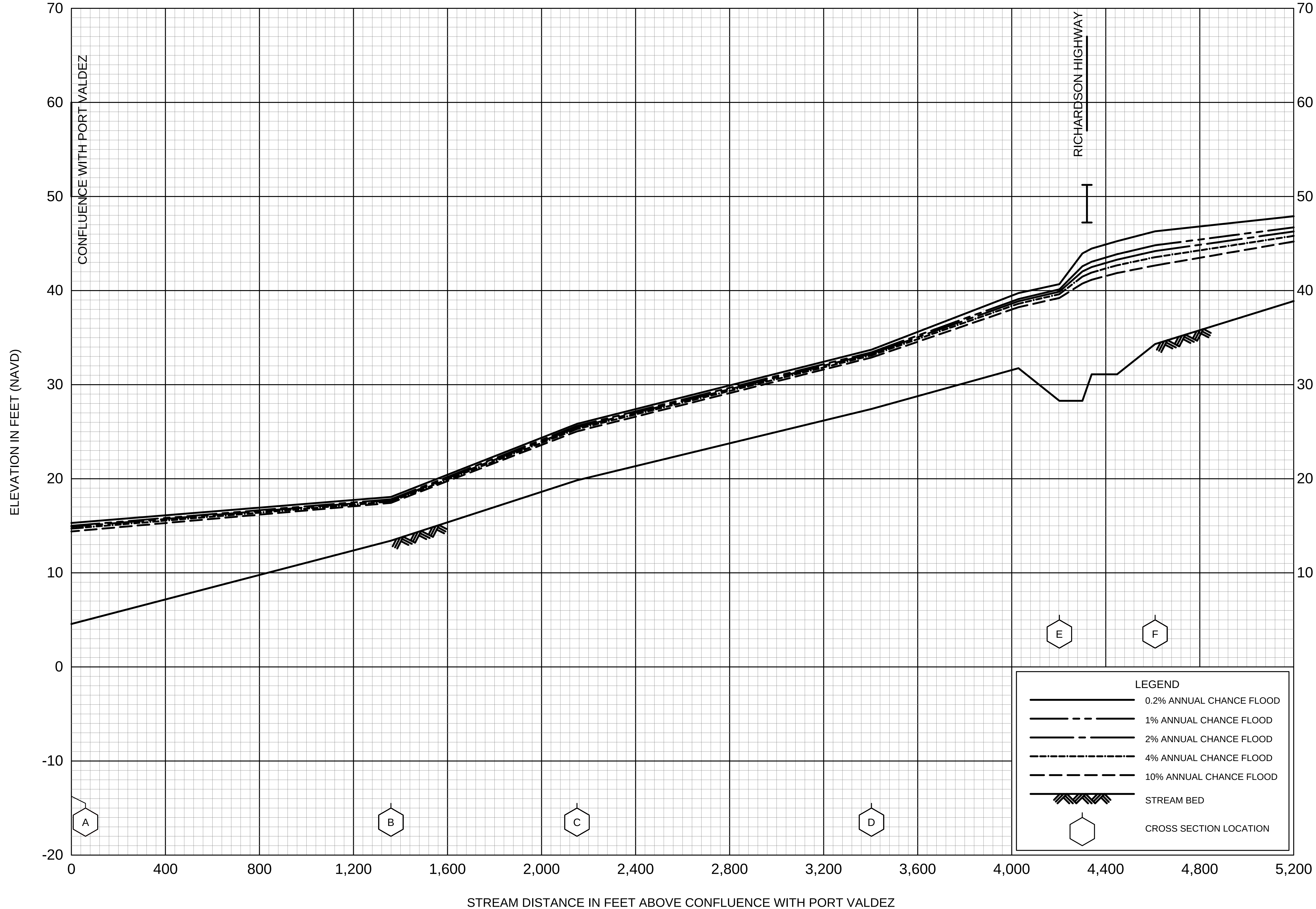
FLOOD PROFILES

ROBE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA



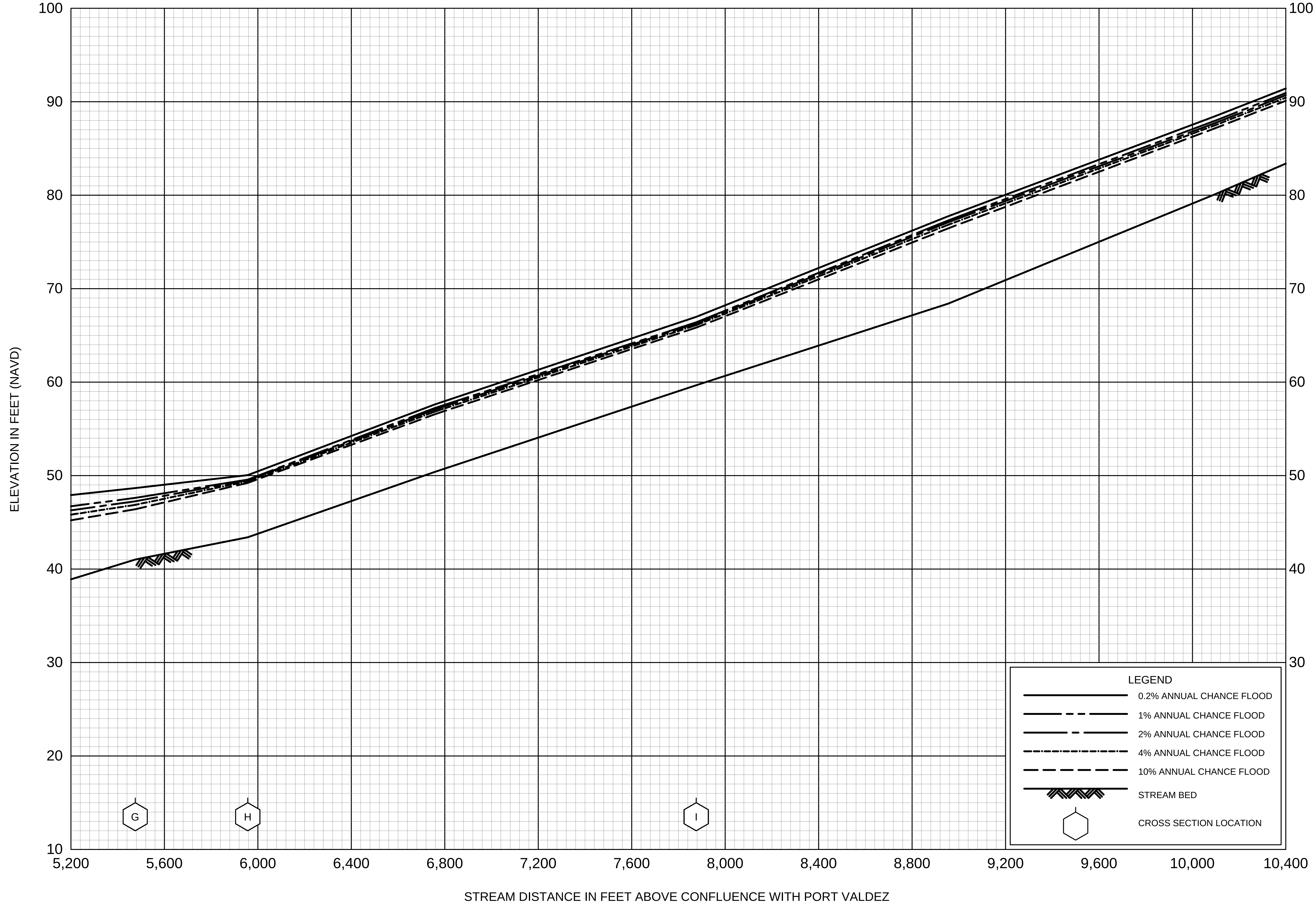
FLOOD PROFILES

VALDEZ GLACIER STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA



FLOOD PROFILES

VALDEZ GLACIER STREAM

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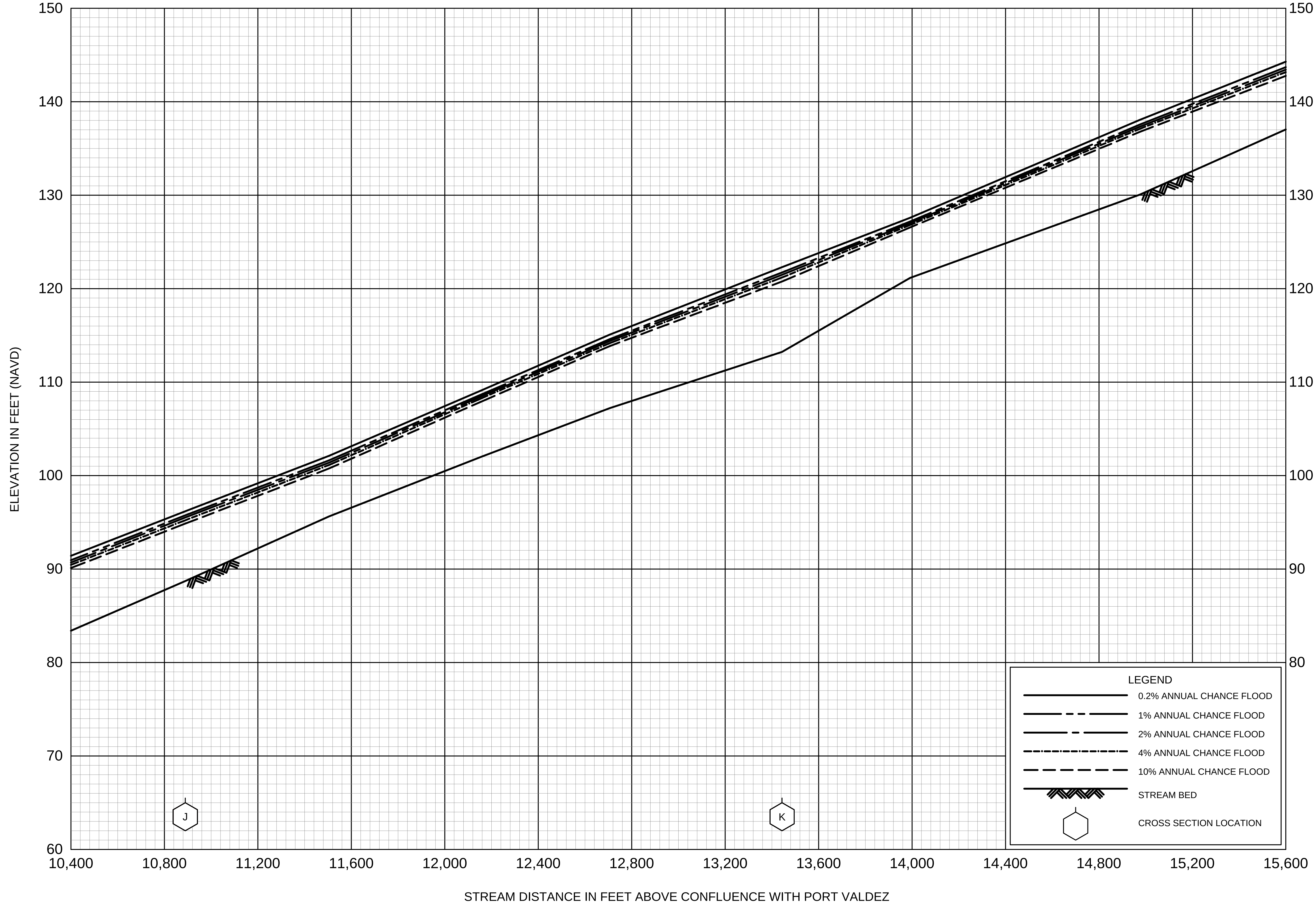

FLOOD PROFILES

VALDEZ GLACIER STREAM

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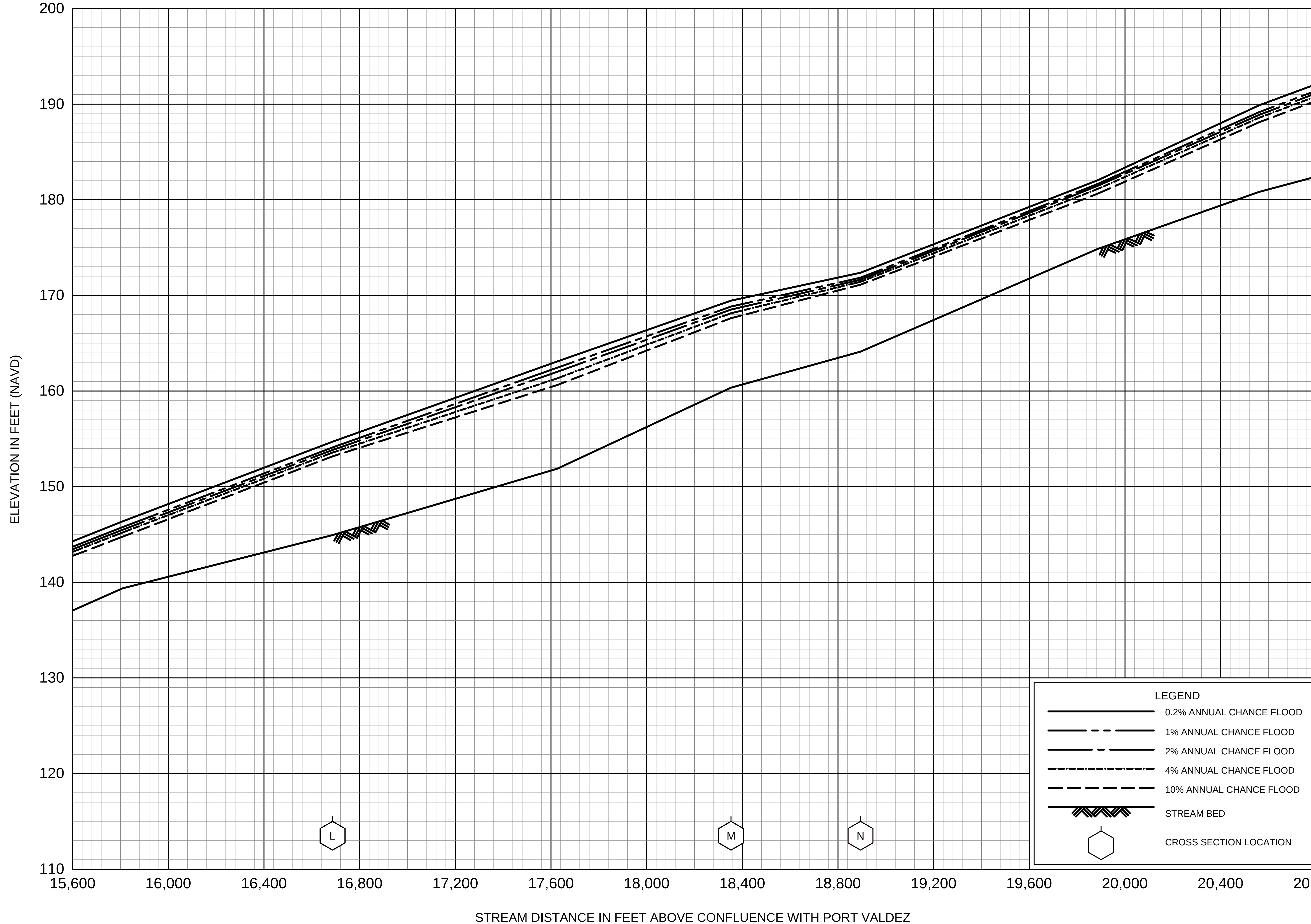

FLOOD PROFILES

VALDEZ GLACIER STREAM

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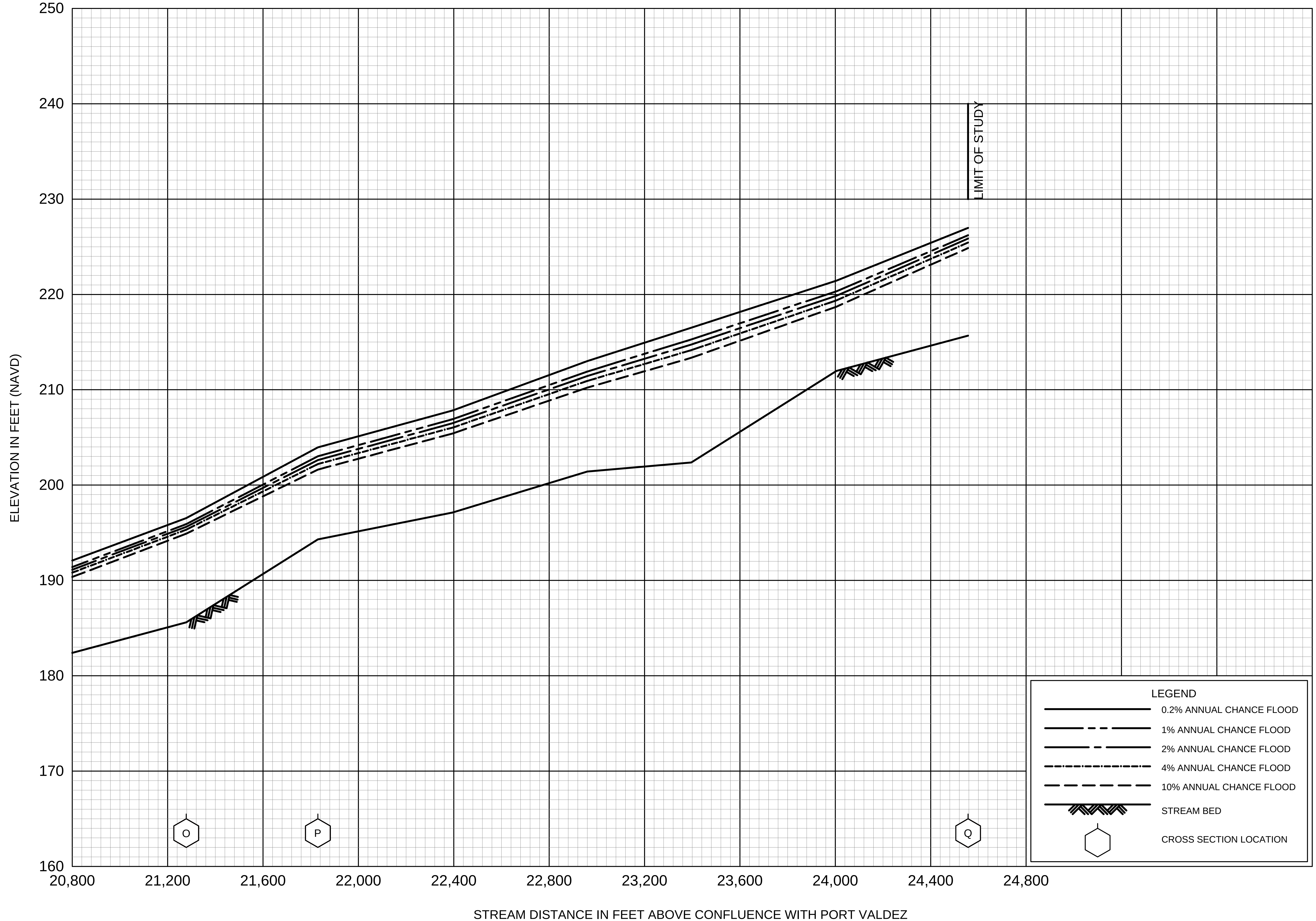

FLOOD PROFILES

VALDEZ GLACIER STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF VALDEZ, AK

VALDEZ-CORDOVA CENSUS AREA

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