



**Routes 7/15 Interchange
Norwalk, Connecticut
State Project No. 102-358**

**Environmental Assessment,
Draft Section 4(F) Evaluation and
Environmental Impact Evaluation**

**Appendix H
Floodplain Study**

August 2022

Prepared for:
Connecticut Department of
Transportation Federal Highway
Administration



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1.0 FLOODPLAINS STUDY

Floodplains are defined by the Federal Emergency Management Agency (FEMA) as any land area susceptible to being inundated by floodwaters from any source. Floodplains correspond to certain storm events (e.g., 10-year floodplain, 100-year floodplain, etc.). Floodways are defined by FEMA as the area of a watercourse and adjacent land that must be reserved in order to discharge the base flood without increasing the water surface elevation more than a designated surcharge height. The typical base flood is the 100-year storm event and the typical surcharge height is 1-foot.

All floodways are part of a watercourse's floodplain (see the FEMA Floodway Schematic sketch in Attachment A). The surcharge is the increase in water surface elevation if the floodway fringe, the area between the floodway and floodplain boundaries, is completely encroached by fill. Floodway widths and an allowed surcharge height assists local communities in setting standards on floodplain development.

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

When a project has potential to impact the floodplain, the agency must identify and evaluate practicable alternatives to locating within the 100-year floodplain, including alternative sites outside of the floodplain and identify impacts of the proposed action. If impacts cannot be avoided, measures to minimize the impacts and restore and preserve the floodplain, as appropriate, are to be incorporated.

1.1 EXISTING CONDITIONS

The Fairfield County FEMA Flood Insurance Rate Map (FIRM) encompassing the project area (Map Number 09001C0393G) was last revised on October 16, 2013. As shown on the map (see Figure 3.16.1), the Norwalk River runs north to south through the project area, running generally parallel and east of Route 7, and west of Main Avenue. The Norwalk River through the project limits has a designated FEMA 100-year floodplain (Zone AE) and associated floodway. Areas of 500-year floodplain (Zone X) are present as well. .

From upstream to downstream (north to south), in the vicinity of the project area, the Norwalk River flows south through bridges below Glover Avenue, Route 15 (Merritt Parkway) and a railroad (Metro North, Danbury Branch). South of Route 15 and west of the river, a levee is present. The levee protects a commercial and residential neighborhood, including Emerald, Ruby, Pearl, Gold and Silver Streets and Perry Avenue, from the 100-year flood.



The Flock Process Dam was formerly located approximately 0.2 miles downstream of the Route 15 bridge over the Norwalk River. In 2018 the dam was removed in a joint project of the City of Norwalk, CTDEEP and the USFWS, restoring approximately 3.5-miles of upstream watercourse for fish passage and aquatic habitat.

Downstream of the project area, the former Flock Process Dam is still shown on the FEMA Flood Profile, causing over 9-feet of backwater during the 100-year event. The backwater effect extends to Route 15 (see the FEMA Flood Profile sheets in Attachment A). In order to adjust the FEMA Flood Profile to reflect the dam's removal, a hydraulic model, using the U.S. Army Corps of Engineers' HEC-RAS hydraulic analysis software, was prepared to show updated existing conditions. Based on this updated information, three models were prepared:

- No Build Alternative – modeled as existing floodplain conditions with the Flock Process Dam removed;
- Alternative 21D – associated structures within floodplain were added to the No Build model; and
- Alternative 26 – associated structures within floodplain were added to the No Build model.

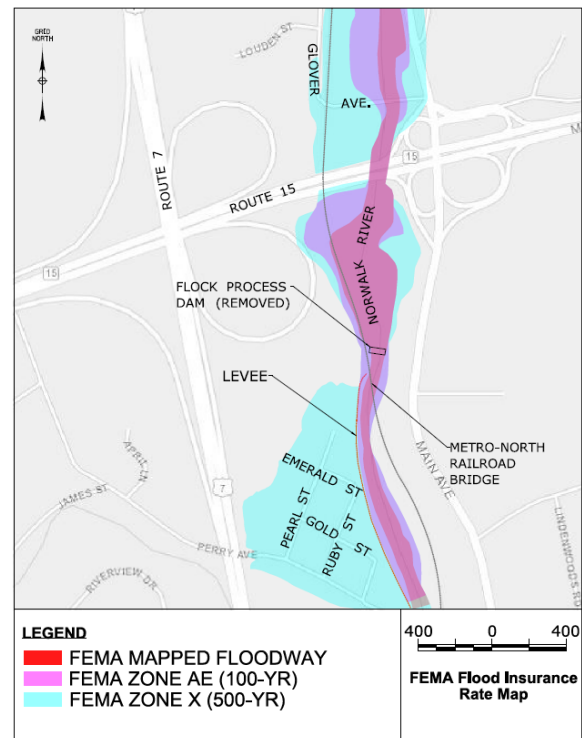


Figure 1.1 Flood Insurance Rate Map

The first step, adjustment of the FEMA Floodplain Profile by removal of the dam to determine current existing conditions, lowers the 100-year water surface elevation in the immediate vicinity of the dam. At Route 15, the 100-year water surface elevation lowers approximately 1.5-feet. . There is little effect further upstream since the river's slope gets steeper. Additionally, due to the steep embankment slopes along the river, the inundation limits of the 100-year events do not significantly change). (see Figure 3.16.2). These adjusted existing conditions are equivalent to the No Build Alternative, discussed in the following section.



1.2 IMPACTS

Avoidance and minimization of impact to regulated floodplain and floodway areas is considered in the development of the preliminary engineering layout of the proposed alternatives. Bridges and oversized structures are considered to reduce floodplain, floodway and wetland impact and to provide for wildlife movement. Compensatory flood storage areas could also be designated, as necessary, to balance floodplain losses.

Three preliminary alternatives – No Build, Alternative 21D and Alternative 26 – have been developed for the realignment study of the Route 7 and 15 interchange. The two build alternatives include new and rehabilitated structures over the Norwalk River as well as new highway ramps and roadways encroaching into the floodplain.

No Build Alternative

The No Build Alternative would not result in any improvements to the roadway network around the existing interchange. As such, there would be no impact to the floodplain or floodway.

Alternative 21D

Within the revised floodplain (dam removed) associated with the Norwalk River, the Alternative 21D layout includes five new highway ramp structures and the rehabilitation (or replacement) of the Glover Avenue bridge. Two highway ramp structures, Ramp D and Ramp B, extend the existing Route 15 bridge to the north and south, respectively. Ramp SE is a new structure over the Norwalk River. The new structures carrying Ramp B and Ramp SE over the railroad are partially located within the floodplain (see Figure 3.16.3).

The floodplain would be permanently impacted by the Ramp B and Ramp SE bridges over the railroad (eastern abutments), Ramp SE over the Norwalk River and temporarily impacted at Glover Avenue. Ramp B and Ramp SE would also install fill within the floodplain between the railroad and the Norwalk River and east of the river. Both proposed abutments of the Norwalk

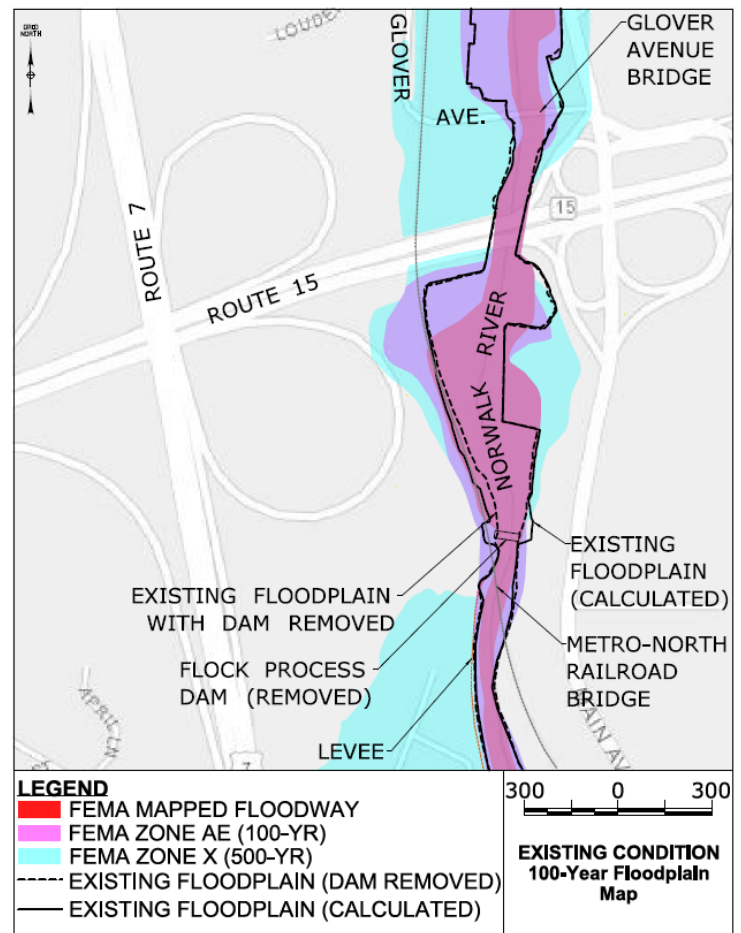


Figure 1.2 No Build Alternative: 100-year Floodplain Map (Flock Process Dam removed)



River bridge would be located within the floodplain. As designed, the low chord (the lowest portion of the superstructure) of Ramp SE is over 10-feet above the 100-year water surface elevation. The fill proposed for the construction of the ramp would raise the water surface elevation approximately 0.7-feet upstream of the bridge between Ramp SE and Route 15.

Work at Glover Avenue would be within the floodplain, but the floodplain limits would not extend far beyond the bridge abutments. Therefore, upstream of Route 15, there would be little change to the extent of the floodplain.

As with the existing conditions, the bridge carrying Route 15 over the Norwalk River would convey the 500-year flood without pressure or overtopping since flow would pass through the underpass (west of the Norwalk River) and Main Avenue underpass (east of the Norwalk River) before affecting the highway.

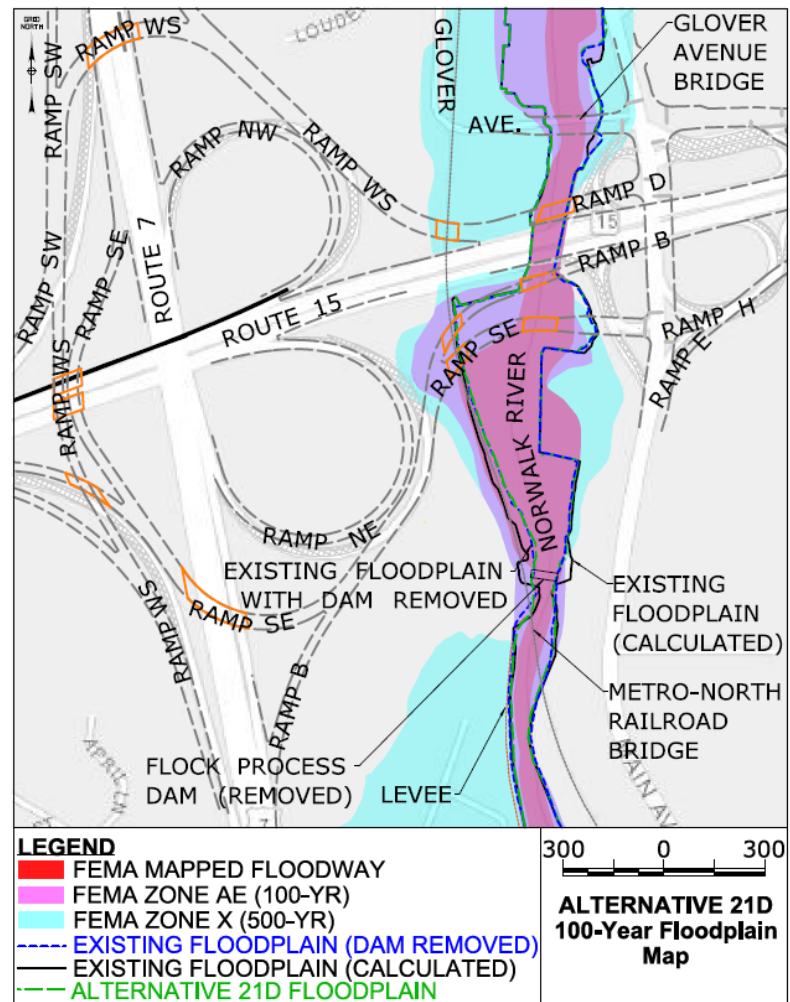


Figure 1.3 Alternative 21D 100-Year Floodplain Map railroad

Due to the removal of the Flock Process Dam and the clear-span structures proposed for the new highway ramps, Alternative 21D would have little impact on the computed 100-year water surface elevations, which set the floodplain. Although a small volume of floodplain storage is lost along Ramp SE, this volume would not be enough to cause an adverse impact (due to the large total volume of storage available). Additionally, the work would not promote additional floodplain development since no developments can be made along a highway ramp. As the floodplain impact would be minimal (and does not affect the floodway), this alternative would



comply with floodplain protection standards.

Alternative 26

Within the revised floodplain (dam removed) associated with the Norwalk River, the Alternative 26 layout includes three new highway ramp structures and the rehabilitation (or replacement) of the Glover Avenue bridge. One highway ramp structure, Ramp D, extends the existing Route 15 bridge to the north. Ramp B is a new structure over the Norwalk River. The new structure carrying Ramp B over the railroad would be partially located within the floodplain (Figure 3.16.4).

The floodplain would be permanently impacted by the two Ramp B bridges and temporarily impacted at Glover Avenue. Ramp B would also install fill within the floodplain between the railroad and the Norwalk River and east of the river. The eastern abutment of the railroad bridge and both abutments of the river bridge would be located within the floodplain. As designed, the low chord of Ramp B would be over 10-feet above the 100-year water surface elevation. The fill proposed for the construction of the ramp would raise the water surface elevation approximately 1.5-feet between Ramp B and Route 15.

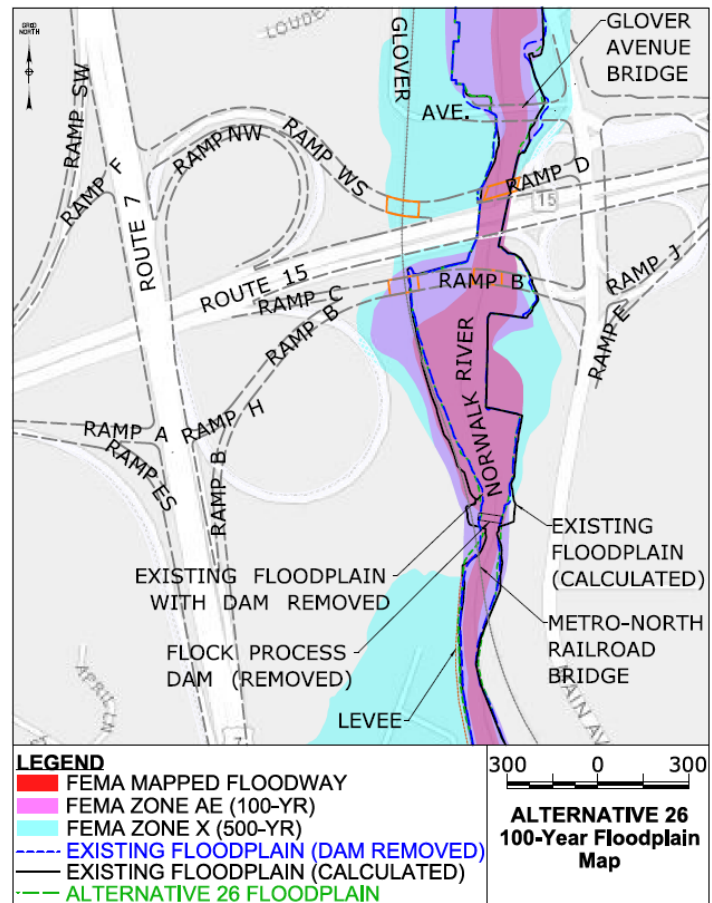


Figure 1.4 Alternative 26 100-Year Floodplain Map

Work at Glover Avenue would be within the floodplain, but the floodplain limits would not extend far beyond the bridge abutments. Therefore, upstream of Route 15, there would be little change to the extent of the floodplain.

As with the existing conditions, the bridge carrying Route 15 over the Norwalk River conveys the 500-year flood without pressure or overtopping since flow would pass through the railroad underpass (west of the Norwalk River) and Main Avenue underpass (east of the Norwalk River) before affecting the highway.

Due to the removal of the Flock Process Dam and the clear-span structures proposed for the



new highway ramp, Alternative 26 would have little impact on the computed 100-year water surface elevations. Although a small volume of floodplain storage would be lost along Ramp B, this volume would not be enough to cause an adverse impact (due to the large total volume of storage available). Additionally, the work would not promote additional floodplain development since no developments can be made along a highway ramp. As the floodplain impact would be minimal (and does not affect the floodway), this alternative would comply with floodplain protection standards.

1.3 MITIGATION

An encroachment with minor (non-adverse) impact is allowed within a floodplain. However, an encroachment, including fill, new construction, substantial improvement or other development is not allowed within a floodway unless a FEMA Letter of Map Revision (LOMR) is applied for and approved.

Within Connecticut, any state agency proposing an activity within or affecting a floodplain or that impacts natural or man-made storm drainage facilities must submit a Flood Management Certification to CTDEEP. Work within the regulated floodplain would require obtaining Flood Management Certification approval from CTDEEP during the permitting stage of the project, after a preferred alternative has been chosen and designed.

For each of the Build Alternatives, floodplain impact would be minimal and would not affect the floodway. Therefore, each of the Build Alternatives would comply with floodplain protection standards. However, for either alternative the project would likely require the submission of a CLOMR (Conditional Letter of Map Revision) application prior to construction and the submission of a LOMR (Letter of Map Revision) upon completion of the project in order to have the new structures mapped on the Flood Insurance Rate Map and Flood Profile.

The project would also require submission to CTDEEP for Flood Management Certification to verify that all elements of the project, including construction and operation, would comply with Connecticut's FEMA floodplain management standards and criteria. CTDOT would apply for Flood Management Certification during the permitting phase of the project, in coordination with the application for a Stormwater Discharge Permit and 401 Water Quality Certification.



Attachment A

FEMA Flood Insurance Study and Flood Profiles

FLOOD INSURANCE STUDY

VOLUME 1 OF 6



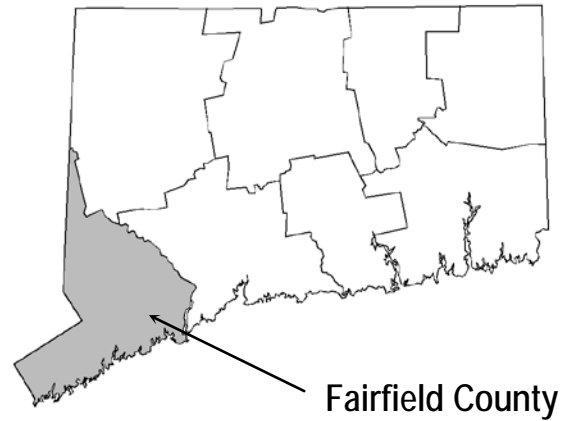
FAIRFIELD COUNTY, CONNECTICUT (ALL JURISDICTIONS)

COMMUNITY NAME

BETHEL, TOWN OF
BRIDGEPORT, CITY OF
BROOKFIELD, TOWN OF
DANBURY, CITY OF
DARIEN, TOWN OF
EASTON, TOWN OF
FAIRFIELD, TOWN OF
GREENWICH, TOWN OF
MONROE, TOWN OF
NEW CANAAN, TOWN OF
NEW FAIRFIELD, TOWN OF
NEWTOWN, TOWN OF
NORWALK, CITY OF
REDDING, TOWN OF
RIDGEFIELD, TOWN OF
SHELTON, CITY OF
SHERMAN, TOWN OF
STAMFORD, CITY OF
STRATFORD, TOWN OF
TRUMBULL, TOWN OF
WESTON, TOWN OF
WESTPORT, TOWN OF
WILTON, TOWN OF

COMMUNITY NUMBER

090001
090002
090003
090004
090005
090006
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090008
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090010
090188
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090141
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090020



Revised:
October 16, 2013



Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
09001CV001C

condition, with some seepage noted on the downstream face. The dam is noted as a 'high hazard potential structure' when taken into context with current USACE guidelines.

During September 1977 the town adopted floodplain regulations for the purpose of protecting life and property from the ravages of flooding and controlling development in areas subject to flooding. These regulations were adopted in accordance with the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973, and enabled the town to participate in the Regular Flood Insurance Program.

Presently, there are no existing or planned structural flood protection measures along any of the watercourses within the Town of Monroe. The small dams found in the community provide primarily for recreation and water supply rather than flood protection.

Non-structural measures of flood protection in the form of land use regulations are being used to aid in the prevention of future flood damage.

In the Town of New Canaan, in 1975, the Connecticut Department of Transportation modified the Merritt Parkway Bridge over the Five Mile River by adding two 11-foot diameter pipes to the existing 10-foot by 10-foot box culvert. The increased opening allows a larger flow of water under the bridge, producing a drop in water surface. This has resulted in less flood damage to the bridge and adjacent properties upstream of the bridge.

There are several large water-supply reservoirs in the Town of New Canaan, as well as many small pond dams with little storage capacity. Only Laurel Reservoir was assumed to reduce peak flows on the Rippowam River (Upper Reach) and Laurel Brook.

The town has adopted a policy to help minimize property damage by designating all potential flood hazard areas. The Planning and Zoning Commission discourages building in the areas that offer storage for water during winter storms.

There have not been any formal flood protection projects carried out by the Town of Newtown to reduce flooding on the Housatonic River (Middle Reach), the Pootatuck River, or any other small tributaries.

There are no publicly developed flood protection measures existing in the Pond Brook watershed. Some of the newer residential developments have small runoff detention structures to prevent flood increases caused by increased impervious surfaces. A short sub-reach of Pond Brook between U.S. Route 6 and Covered Bridge Road is channelized with a concrete lined trapezoidal channel bed.

After the flood of 1955, several flood control projects were undertaken in the City of Norwalk. The Norwalk River below New Canaan Avenue was realigned and the channel improved. Bridges which were washed out or were very inadequate were replaced. All of the bridges washed out in 1955 were replaced with structures of greater hydraulic capacity. A levee was built along the western bank of the Norwalk River between Perry Avenue and the railroad bridge. On August 3, 2011, the City of Norwalk received notification of levee accreditation, which states that the levee complies with the minimum requirements outlined in Title 44 of the Code of Federal Regulations, Section 65.10 (44

CFR 65.10). The accredited levee is shown on the effective FIRM as providing protection from the 1-percent-annual-chance flood.

In April 1978, the City of Norwalk adopted flood hazard zoning regulations to control the construction of buildings in areas which are subject to flooding to minimize the damages of such flooding and to promote the health and safety of the city's residents.

The NRCS designed a flood control project for the Norwalk River watershed which included five dams and the implementation of channel improvements along several sections of the river. The completed project would indicate the 1-percent-annual-chance flood would be 1,250 cfs.

One of these dams has been built in Ridgefield, near Fox Hill Condominiums and the source of Ridgefield Brook. The other two dams are located just upstream of Millers Pond on the Norwalk River and near Candees Pond on Cooper Pond Brook.

The 1-percent-annual-chance flood flow of 3,300 cfs at Branchville will only be decreased to 2,665 cfs instead of the expected 1,080 cfs. The October 1955 flood flow at Branchville was estimated at 3,040 cfs. There will be no decrease in the expected 1,090 cfs at the mouth of Cooper Pond Brook for a 1-percent-annual-chance flood, but there will be a significant difference of 1,105 cfs to 235 cfs for Ridgefield Brook at the outlet from Great Swamp (Reference 37). There have been no significant structural changes on the Titicus River or the East Branch Silvermine River to alter flood flows.

In the Town of Sherman, during Hurricane Diane, soil between culverts under the Saw Mill Bridge was washed out. These culverts were later replaced by a 10-foot diameter pipe in 1956 by the town.

Flooding problems resulting from Candlewood Lake can be controlled by lowering its elevation at the power station. However, this was not done during major floods because this would further raise the water-surface elevation on the Housatonic River (Upper Reach). No major flooding problems were reported due to Candlewood Lake.

In the City of Stamford, the USACE constructed the hurricane barrier, which protects low-lying development in the south end of the city from flooding caused by hurricanes or severe coastal storms of 0.2-percent-annual-chance recurrence intervals. On July 9, 2010, the City of Stamford received notification of levee accreditation, which states that the levees comply with the minimum requirements outlined in Title 44 of the Code of Federal Regulations, Section 65.10 (44 CFR 65.10). The accredited levees are shown on the effective FIRM as providing protection from the 1-percent-annual-chance flood.

The City of Stamford has widened the Toilsome Brook channel between Dann Street and Dartley Street, as well as the Bracewood Lane section. Further improvements on Toilsome Brook are in the planning stage.

The reservoirs in the study area were constructed for water supply only; therefore, the reservoirs have no significant effect on the 1- and 0.2-percent-annual-chance floods.

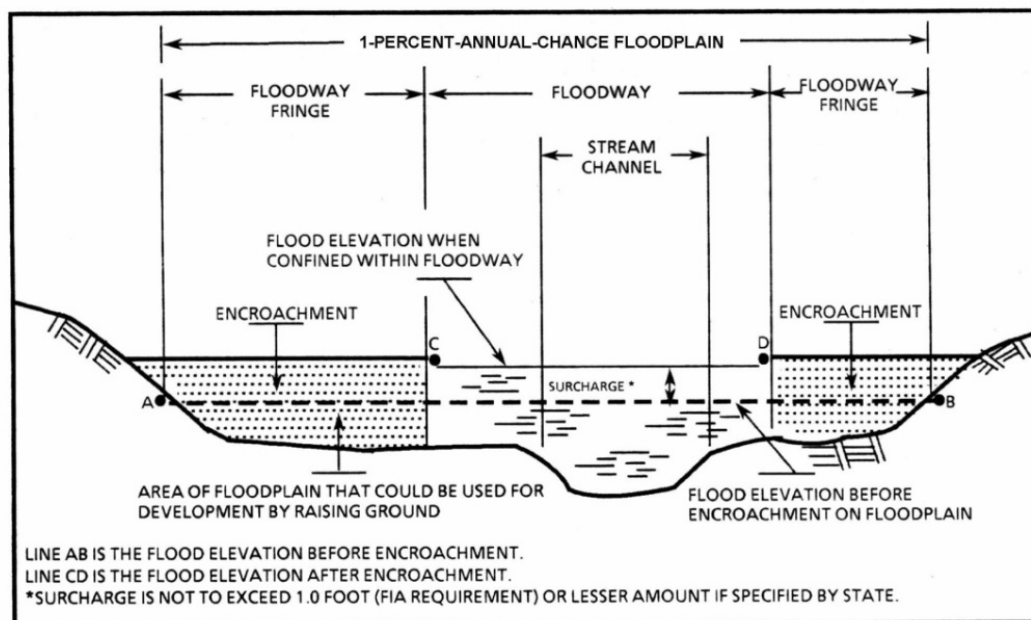


FIGURE 12 – FLOODWAY SCHEMATIC

5.0 INSURANCE APPLICATIONS

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

Zone A

Zone A is the flood insurance risk zone that corresponds to the 1-percent-annual-chance (100-year) floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such area, no BFEs or base flood depths are shown.

Zone AE

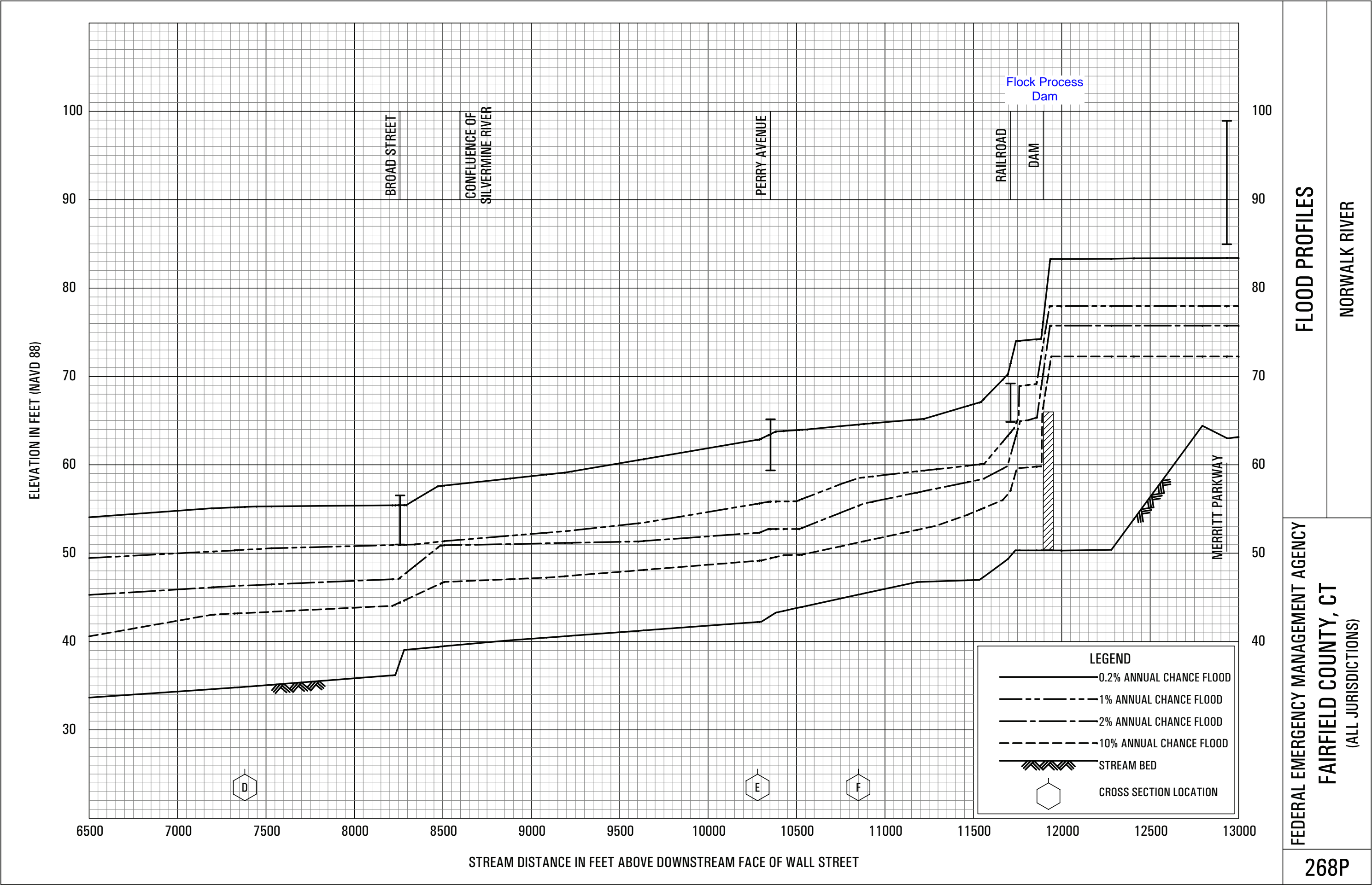
Zone AE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone VE

Zone VE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood



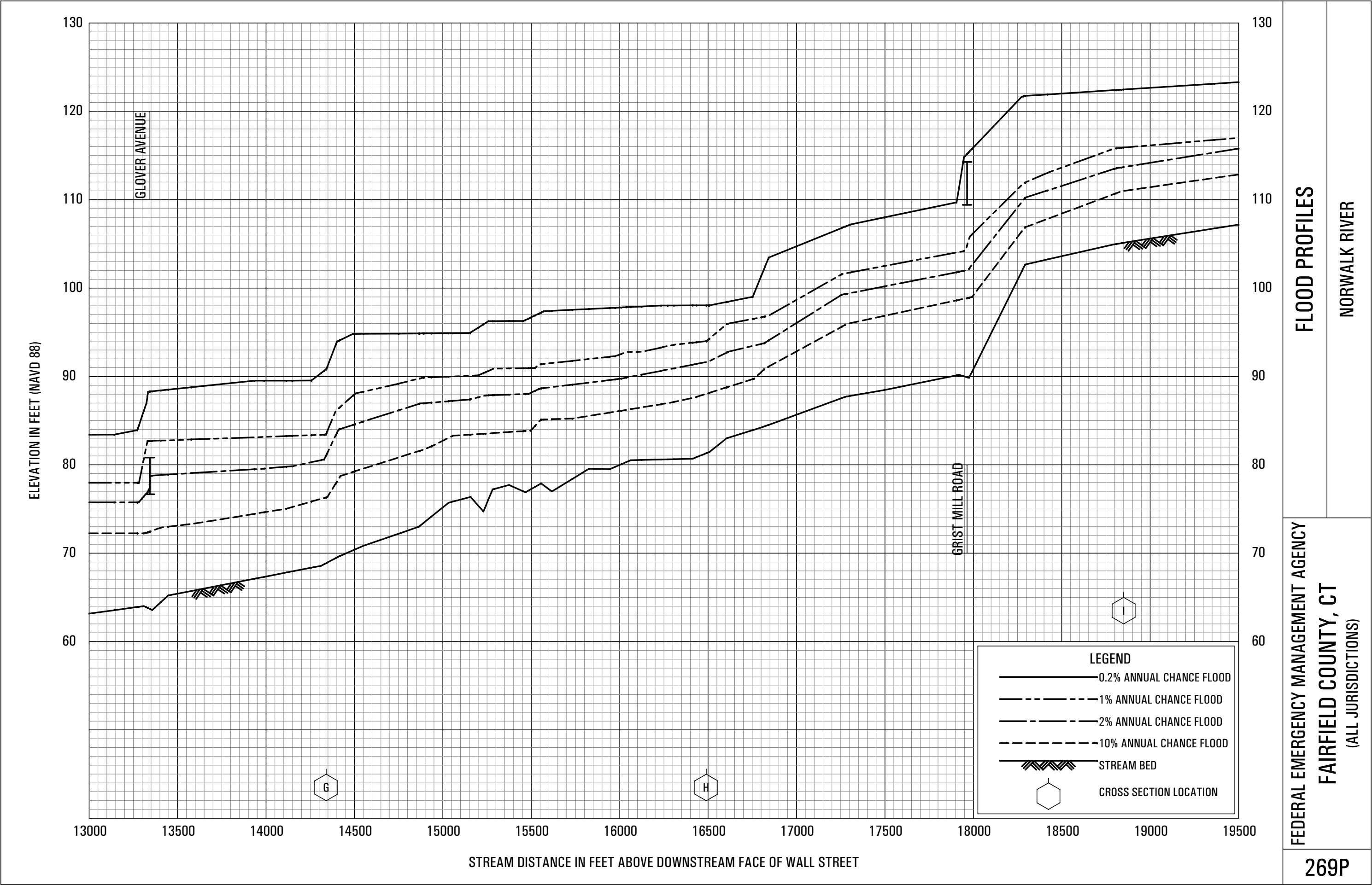
FLOOD PROFILES

NORWALK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, CT

(ALL JURISDICTIONS)



FLOOD PROFILES

NORWALK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, CT

(ALL JURISDICTIONS)