



U.S. Department  
of Transportation

**Federal Highway  
Administration**

# Memorandum

Subject: Procedures for Coordinating Highway  
Encroachments on Floodplains with the  
Federal Emergency Management Agency (FEMA)

Date: JUN 25 1982

From: Associate Administrator for  
Engineering and Operations  
Washington, D.C. 20590

Reply to  
Attn. of: HNG-31

To: Regional Federal Highway Administrators  
Regions 1-10  
Direct Federal Division Engineers

Attached are copies of the subject procedures and a letter from Mr. Richard W. Krimm of FEMA dated June 7, 1982. Mr. Krimm has endorsed the procedures and has distributed them to the field offices of FEMA. Please send copies of these procedures to the FHWA Divisions Offices and the States in your Region.

We believe these procedures provide excellent guidance in regard to meeting our responsibility to be consistent with the standards of the National Flood Insurance Program (NFIP) as set forth in the Federal-Aid Highway Program Manual (FHPM) 6-7-3-2, Location and Hydraulic Design of Encroachments on Flood Plains. The procedures establish some flexibility for achieving cost-effective encroachments on floodplains within communities that are in the NFIP. If an encroachment is proposed within an NFIP community, the economic consequences of alternatives can be assessed using the analysis procedures in Hydraulic Engineering Circular No. 17 (HEC 17), the Design of Encroachments on Floodplains Using Risk Analysis. This assessment/analysis can then be used, if needed, to support the community's application to FEMA for approval of an alternate floodway or a floodway revision. For all locations outside of NFIP communities or NFIP identified flood hazard areas, FHPM 6-7-3-2 shall be followed for encroachment design. This policy requires that encroachment designs be supported, as appropriate, by a risk assessment or risk analysis. Economic (risk) analysis, if appropriate, can be accomplished using the guidelines in HEC 17.

We encourage you to work with the States to implement these procedures as a part of Program Emphasis Area Number 2, Cost Effective Design and Construction. We are aware that some State environmental agencies have adopted strict requirements for encroachments on all floodplains, whether rural or urban in nature. These requirements allow the highway designer little discretion to achieve cost-effective designs. In such cases, this subject should be discussed with appropriate State personnel so that practicable State floodplain encroachment requirements can be developed. Implementation of these procedures, along with the economic (risk) assessment/analysis design process required by FHPM 6-7-3-2, has a high potential for achieving significant cost savings in the Federal-aid Highway Program.



R. D. Morgan

Attachments



# Federal Emergency Management Agency

Washington, D.C. 20472

7 JUN 1982

Mr. R. D. Morgan  
Associate Administrator for Engineering  
and Traffic Operations  
Federal Highway Administration  
Department of Transportation  
Washington, D. C. 20590

Dear Mr. Morgan:

This is in response to your letter of May 3 1982, seeking our endorsement of the procedure paper entitled "Procedures for Coordinating Highway Encroachments on Floodplains with FEMA." This paper expands upon my internal policy memorandum of December 29, 1981, concerning the Federal Emergency Management Agency's (FEMA's) handling of highway encroachments within regulatory floodways. Your expansion addresses highway agency responsibilities for coordination with FEMA under various situations in which FEMA has identified flood plains, floodways and base flood elevations.

We have reviewed your procedure paper and believe that it provides an excellent guideline for coordination between highway agencies, communities participating in the National Flood Insurance Program (NFIP) and FEMA, when flood plain encroachments involving highway construction are proposed. In accordance with Executive Order 11988, the procedures require compliance with NFIP standards and regulations, where practicable, but also provide for responsible actions where no practicable alternative can be identified. These actions include appropriate compensation to affected property owners, assurance that the NFIP will not incur additional liability due to increased flood hazards, and the provision of appropriate technical data to FEMA so that flood insurance maps and studies can be revised as necessary.

We compliment you on your efforts to establish workable operating procedures which incorporate coordination with FEMA on site specific projects. We believe that this procedure paper will facilitate the attainment of our mutual objective of future flood loss reduction. We will provide copies of the paper, with our endorsement, to our Regional Offices.

Sincerely,

Richard W. Krimm  
Assistant Associate Director  
Office of Natural and Technological  
Hazards Programs

## Procedures for Coordinating Highway Encroachments on Floodplains with Federal Emergency Management Agency (FEMA)

The local community with land use jurisdiction, whether it is a city, county, or State, has the responsibility for enforcing National Flood Insurance Program (NFIP) regulations in that community if the community is participating in the NFIP. Most NFIP communities have established a permit requirement for all development within the base (100 year) floodplain. Consistency with NFIP standards is a requirement for Federal-aid highway actions involving regulatory floodways. The community, by necessity, is the one who must submit proposals to FEMA for amendments to NFIP ordinances and maps in that community should it be necessary. Determination of the status of a community's participation in the NFIP and review of applicable NFIP maps and ordinances are, therefore, essential first steps in conducting location hydraulic studies and preparing environmental documents.

Where NFIP maps are available, their use is mandatory in determining whether a highway location alternative will include an encroachment on the base floodplain. Three types of NFIP maps are published: (1) a Flood Hazard Boundary Map (FHBM), (2) a Flood Boundary and Floodway Map (FBFM), and a Flood Insurance Rate Map (FIRM). A FHBM is generally not based on a detailed hydraulic study and, therefore, the floodplain boundaries shown are approximate. A FBFM, on the other hand, is generally derived from a detailed hydraulic study and should provide reasonably accurate information. The hydraulic data from which the FBFM was derived is available through the regional office of FEMA. This is normally in the form of computer input data cards for calculating water surface profiles. The FIRM is generally produced at the same time using the same hydraulic model and has appropriate rate zones and base flood elevations added.

Communities in the regular program of the NFIP generally have had detailed flood insurance studies performed. In these communities the NFIP map will be a FIRM and in the majority of cases, a regulatory floodway is in effect.

Communities in the emergency program of the NFIP usually have not had a detailed flood insurance study completed and, usually, only limited floodplain data is available. In this case the community NFIP map will be a FHBM and there will not be a regulatory floodway.

Other possibilities are: (1) the community is not in a FEMA identified flood hazard area and thus there is no NFIP map, (2) a FHBM, FIRM, or FBFM is available but the community is not participating in the NFIP, (3) a community is in the process of converting from the emergency program to the regular program and a detailed flood insurance study is underway, or (4) a community is participating in the regular program, the NFIP map is a FIRM, but no regulatory floodway has been established. Information on community participation in the NFIP is provided in the "National Flood Insurance Program Community Status Book" which is published bi-monthly for each State and is available through the Headquarters of FEMA.

### Coordination With FEMA

It is intended that there should be highway agency coordination with FEMA in situations where administrative determinations are needed involving a regulatory floodway or where flood risks in NFIP communities are significantly impacted. The circumstances which would ordinarily require coordination with FEMA are:

1. a proposed crossing encroaches on a regulatory floodway and, as such, would require an amendment to the floodway map,
2. a proposed crossing encroaches on a floodplain where a detailed study has been performed but no floodway designated and the maximum 1 foot increase in the base flood elevation would be exceeded,
3. a local community is expected to enter into the regular program within a reasonable period and detailed floodplain studies are underway,
4. a local community is participating in the emergency program and base flood elevation in the vicinity of insurable buildings is increased by more than 1 foot. (Where insurable buildings are not affected, it is sufficient to notify FEMA of changes to base flood elevations as a result of highway construction.)

The draft EIS/EA should indicate the NFIP status of affected communities, the encroachments anticipated and the need for floodway or floodplain ordinance amendments. Coordination means furnishing to FEMA the draft EIS/EA and, upon selection of an alternative, furnishing to FEMA through the community a preliminary site plan and water surface elevation information and technical data in support of a floodway revision request as required. If a determination by FEMA would influence the selection of an alternative, a commitment from FEMA should be obtained prior to the FEIS or FONSI. Otherwise this later coordination may be postponed until the design phase.

For projects that will be processed with a categorical exclusion, coordination may be carried out during design. However, the outcome of the coordination at this time could change the class of environmental processing.

### Highway Encroachments Which Are Consistent With Regulatory Floodways In Effect

In many situations it is possible to design and construct highways in a cost-effective manner such that their components are excluded from the floodway. This is the simplest way to be consistent with the standards and should be the initial alternative evaluated. If a project element encroaches on the floodway but has a very minor effect on the floodway water surface elevation (such as piers in the floodway), the project may normally be considered as being consistent with the standards if hydraulic conditions can be improved so that no water surface elevation increase is reflected in the computer printout for the new conditions.

### Revision of Regulatory Floodway So That Highway Encroachment Would Be Consistent

Where it is not cost-effective to design a highway crossing to avoid encroachment on an established floodway, a second alternative would be a modification of the floodway itself. Often, the community will be willing to accept an alternative floodway configuration to accommodate a proposed crossing provided NFIP limitations on increases in the base flood elevation are not exceeded. This approach is useful where the highway crossing does not cause more than a 1 foot rise in the base flood elevation. In some cases, it may be possible to enlarge the floodway or otherwise increase conveyance in the floodway above and below the crossing in order to allow greater encroachment. Such planning is best accomplished when the floodway is first established. However, where the community is willing to amend an established floodway to support this option, the floodway may be revised.

The responsibility for demonstrating that an alternative floodway configuration meets NFIP requirements rests with the community. However, this responsibility may be borne by the agency proposing to construct the highway crossing. Floodway revisions must be based on the hydraulic model which was used to develop the currently effective floodway but updated to reflect existing encroachment conditions. This will allow determination of the increase in the base flood elevation that has been caused by encroachments since the original floodway was established. Alternate floodway configurations may then be analyzed.

Base flood elevation increases are referenced to the profile obtained for existing conditions when the floodway was first established.

Data submitted to FEMA in support of a floodway revision request should include:

1. Copy of current regulatory Flood Boundary Floodway Map, showing existing conditions, proposed highway crossing and revised floodway limits.
2. Copy of computer printouts (input, computation, and output) for the current 100-year model and current 100-year floodway model.
3. Copy of computer printouts (input, computation, and output) for the revised 100-year floodway model. Any fill or development that has occurred in the existing flood fringe area must be incorporated into the revised 100-year floodway model.
4. Copy of engineering certification is required for work performed by private subcontractors.

The revised and current computer data required above should extend far enough upstream and downstream of the floodway revision area in order to tie back into the original floodway and profiles using sound hydraulic engineering practices. This distance will vary depending on the magnitude of the requested floodway revision and the hydraulic characteristics of the stream.

A floodway revision will not be acceptable if development that has occurred in the existing flood fringe area since the adoption of the community's floodway ordinance will now be located within the revised floodway area unless adversely affected adjacent property owners are compensated for the loss.

If the input data representing the original hydraulic model is unavailable, an approximation should be developed. A new model should be established using the original cross-section topographic information, where possible, and the discharges contained in the Flood Insurance Study which establish the original floodway. The model should then be run confining the effective flow area to the currently established floodway and calibrate to reproduce within 0.10 foot, the "With Floodway" elevations provided in the Floodway Data Table for the current floodway. Floodway revisions may then be evaluated using the procedures outlined above.

#### Floodway Encroachment Where Demonstrably Appropriate

When it would be demonstrably inappropriate to design a highway crossing to avoid encroachment on the floodway and where the floodway cannot be modified such that the structure could be excluded, FEMA will approve an alternate floodway with backwater in excess of the 1 foot maximum only when the following conditions have been met:

1. A location hydraulic study has been performed in accordance with Federal-Aid Highway Program Manual (FHPM) 6-7-3-2 "Location and Hydraulic Design of Encroachments on Floodplains" (23 CFR 650, Subpart A) and FHWA finds the encroachment is the only practicable alternative.
2. The constructing agency has made appropriate arrangements with affected property owners and the community to obtain flooding easements or otherwise compensate them for future flood losses due to the effects of the structure.
3. The constructing agency has made appropriate arrangements to assure that the National Flood Insurance Program and Flood Insurance Fund do not incur any liability for additional future flood losses to existing structures which are insured under the Program and grandfathered in under the risk status existing prior to the construction of the structure.
4. Prior to initiating construction, the constructing agency provides FEMA with revised flood profiles, floodway and floodplain mapping, and background technical data necessary for FEMA to issue revised Flood Insurance Rate Maps and Flood Boundary and Floodway Maps for the affected area upon completion of the structure.

#### Highway Encroachment On A Floodplain With A Detailed Study (FIRM)

In communities where a detailed flood insurance study has been performed but no regulatory floodway designated, the highway crossing should be designed to allow no more than a 1 foot increase in the base flood elevation based on technical data from the flood insurance study. Technical data supporting the increased flood elevation should be submitted to the local community and FEMA for their files. Where it is demonstrably inappropriate to design the highway crossing and meet backwater limitations the procedures outlined under

Floodway Encroachment Where Demonstrably Appropriate should be followed in requesting a revision of base floodplain reference elevations.

#### Highway Encroachment On A Floodplain Indicated On An FHBM

In communities where detailed flood insurance studies have not been performed, the highway agency must generate its own technical data to determine the base floodplain elevation and design encroachments in accordance with FHPM 6-7-3-2. Base floodplain elevations should be furnished to the community, and coordination carried out with FEMA as outlined previously where the increase in base flood elevations in the vicinity of insurable buildings exceeds 1 foot.

#### Highway Encroachment On Unidentified Floodplains

Encroachments which are outside of NFIP communities or NFIP identified flood hazard areas should be designed in accordance with FHPM 6-7-3-2 of the Federal Highway Administration. The NFIP identified flood hazard areas are those delineated on an FHBM, FBFM or FIRM.

#### To Obtain FEMA Publications

##### 1. National Flood Insurance Program Community Status Book

Write to FEMA, 500 "C" Street, SW., Room 431, Insurance Operations, Washington, D.C. 20472 and request to be placed on the appropriate State mailing list.

##### 2. Flood Insurance Study Report and/or FBFM

Write to FEMA, 500 "C" Street, SW., State and Local Programs Room 418, Washington, D.C. 20472 request:

###### (a) For future studies,

To be placed on mailing list to receive all studies and maps as they are completed for a State.

###### (b) For completed studies,

(1) The study for a particular community (provide number).

(2) All the studies for a particular State. You will received about 50 percent of the completed studies to date.

##### 3. FHBM or FIRM for a particular community with ID number,

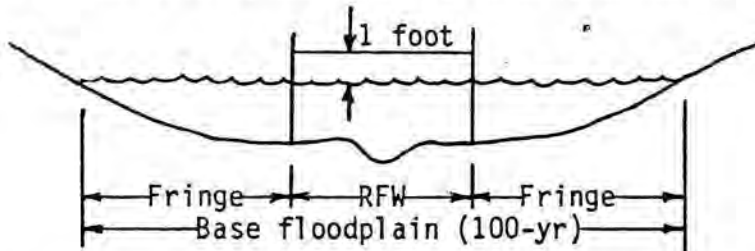
(a) call NFIP contractor (800)638-6620, (800)492-6605(MD), 897-5900 in D.C., or

(b) write NFIP, P.O. Box 34604, Bethesda, Maryland 20034

## Briefing FHWA/FEMA Coordination Procedures

The procedures divide highway encroachments on floodplains into six categories:

1. Consistent with a Regulatory Floodway (RFW)
  - a. applicable to 5000 communities (county or city) which are in the FEMA regular flood insurance program.
  - b. community prohibits development in RFW, but allows development that is flood proofed in fringe



- c. highways are consistent by not increasing backwater:
    - (1) bridging RFW and
    - (2) excluding fill from RFW
2. Consistent by Revision of RFW
  - a. same as 1
  - b. same as 1
  - c. same as 1
  - d. if community and FEMA agree, RFW can be shifted
3. On RFW Where Demonstrably Appropriate
  - a. same as 1
  - b. same as 1
  - c. highways can increase backwater if:
    - (1) little or no risk to development can be demonstrated and
    - (2) community and FEMA concur
4. On Floodplain Shown on Flood Insurance Rate Map (FIRM)
  - a. applicable to 2000 communities in regular insurance program,
  - b. no RFW has been developed, but flood elevations have
  - c. community controls development within FIRM
  - d. highway encroachment should cause less than 1 foot of backwater
5. On Floodplain Shown on Flood Hazard Boundary Map (FHBM)
  - a. applicable to 13000 communities, 10000 in emergency insurance program
  - b. no RFW or flood elevations have been developed
  - c. community controls development within FHBM
  - d. highway encroachment should cause less than 1 foot of backwater if insurable buildings are present
6. On unidentified floodplains
  - a. floodplain is not shown on FIRM or FHBM
  - b. floodplain is therefore outside of the 20000 flood prone areas in the US that are of concern of FEMA
  - c. apply FHPM 6-7-3-2, Location and Hydraulic Design of Encroachments on Flood Plains