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DR-02.100 FLOODPLAIN MANAGEMENT

DR-02.100 General

For decades, the national response to flood disasters was limited to building flood control works (dams, levees, seawalls, etc.) and providing disaster relief to flood victims. To compound the problem, the public 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, Congress created legislation to establish floodplain management to reduce annual flood losses through more careful planning and provide property owners with affordable flood insurance.

"Floodplain Management" means operating an overall community program of corrective and preventive measures for reducing flood damage, including (but not limited to) emergency preparedness plans and other measures aimed at the present and future use of the floodplain. Floodplain management includes specific local codes and ordinances that provide standards for the location and design of development within flood-prone areas. These measures may be adopted in any manner that is legally enforceable for a particular community. Typically, they take the form of zoning, subdivision or building requirements, and/or a special purpose floodplain ordinance.

Floodplains are usually thought of as areas adjacent to large streams. Stormwater is often associated with outfalls from small pipes or streams. This chapter will begin with a discussion of stormwater management and progress through floodplain management.

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DR-02.200 Stormwater Management Plan

The Kentucky Department of Highways often is and should be perceived as a developer of transportation facilities that have the potential to stimulate secondary activity along the transportation corridor, just as a major residential development can stimulate commercial activity. Secondary activity must be anticipated during the planning phase to address the overall stormwater management needs with other utilities such as water, wastewater, and power. Because the transportation corridor often traverses several watersheds, the development of an adequate stormwater management plan can be severely fragmented and significant problems may result if there is a lack of coordinated planning among concerned parties.

To be truly effective, a stormwater management plan should consider the total scope of development (i.e., transportation, residential, commercial, industrial, and agricultural). Department coordination with responsible local agencies is essential to assure that proposed facilities are compatible with the long-term needs of the area. The Highway Department can provide important information to local agencies wishing to develop a comprehensive stormwater management plan without assuming responsibility for the planning and decision-making process for the entire watershed.

Before design, a level of planning should be undertaken that will properly locate facilities and adequately address local concerns, permitting requirements, legal considerations, and other potential problems. This chapter provides general guidelines and major considerations for evaluating these factors during the planning and location process. The important point to emphasize is that the designer should become involved in the early stages of project development and not wait until the later design stages.

DR-02.210 Flood Hazards

Floodflow characteristics at a highway stream crossing should be analyzed to determine their affect upon the highway as well as to evaluate the affects of the highway upon the floodflow. Such an evaluation can assist in determining those locations at which construction and maintenance will be unusually expensive or hazardous. Thus, it is important to identify the flood hazards before any highway involvement to determine if the flood hazard for the alternates studied will be increased,

decreased, or the same with and without the proposed highway improvement. Flood hazards should include effects to private property both upstream and downstream (i.e., overtopping floodwaters diverted onto previously unaffected property).

Although satisfactory solutions often can be obtained by making only minor changes in selected routes to take advantage of better natural hydraulic features at alternate sites, troublesome and uncertain conditions are sometimes best avoided altogether.

DR-02.220 Construction Problems

Many serious construction problems arise because important drainage and water-related factors were overlooked or neglected in the planning and location phases of the project. With proper planning, many problems can be avoided or cost effective solutions developed to prevent extended damages. Such problems include:

- soil erosion,
- sediment deposition,
- drainage and landslide,
- timing of project stages,
- protection for fish habitat,
- protection of streams, lakes, and rivers, and
- protection of wetlands.

Analysis of available data, proper scheduling of work, and other aspects involved in the early planning and location studies can alleviate many problems encountered in the construction of drainage facilities.

DR-02.230 Maintenance Problems

Planning and location studies should consider potential erosion and sedimentation problems upon completion of highway construction. If a particular location will require frequent and expensive maintenance due to drainage, alternate locations should be considered unless the potentially high maintenance costs can be reduced by special design. Experience in the area is the best indicator of maintenance problems and interviews with maintenance personnel could be extremely helpful in identifying potential drainage problems. Reference to highway maintenance and flood reports, damage surveys, newspaper clippings and interviews with local residents could be helpful in evaluating potential maintenance problems.

Channel changes, minor drainage modifications and revisions in irrigation systems usually carry the assumption of certain maintenance responsibilities by the department constructing the highway. Potential damage from the erosion and degradation of stream channels and problems caused by ice and debris can be of considerable significance from the maintenance standpoint.

DR-02.240 Interagency Coordination

Coordination between concerned agencies during the project planning phase will help produce a design that is more satisfactory to all. Substantial cost savings and other benefits frequently can be realized for highway and water resource projects through coordinated planning among the Federal, State, and local agencies that are engaged in water-related activities (such as flood control and water resources planning). Interagency cooperation, through the Area Development District (ADD) offices, etc., is an essential element for serving the public interests.

Early planning and location studies should be coordinated within the Department so duplication of effort is minimized and all those who might be involved in future project work will be informed of any ongoing studies and study results. See the Design Manual.

DR-02.250 Legal Aspects

Detailed legal aspects related to drainage are referred to the Legal Council. The following generalizations, given in Chapter V of the Highway Drainage Guidelines, by AASHTO (1992) should be considered:

- A goal in highway drainage design should be to perpetuate natural drainage, insofar as practical.
- The courts look with disfavor upon infliction of damage that could reasonably have been avoided, even where some alteration in flow is legally permissible.
- The basic laws relating to the liability of governmental entities are undergoing radical change, with a trend toward increased governmental liability.
- Drainage laws are also undergoing change, with the result that older and more specific standards are being replaced by more flexible standards that tend to depend on the circumstances of the particular case.

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In water law matters, designers should recognize that the State is generally held to a higher standard than a private citizen. This is true though the State should be granted the same rights and liabilities, since no law says differently. In general, designers should not address a question of law without the aid of legal counsel. Whenever drainage problems are known to exist or can be identified, drainage and flood easements or other means of avoiding future litigation should be considered, especially in locations where a problem could be caused or aggravated by the construction of a highway.

It is often helpful in the planning and location phase of a project to document the history and present status of existing conditions or problems, and supplement the record by photographs and descriptions of field conditions. Such thoroughness is essential, because the Department may be blamed for flooding or erosion damage caused by conditions that existed before highway construction.

DR-02.260 Environmental Considerations

For all projects, some environmental studies should be performed. The environmental studies should comply with all Federal, State, and local laws and regulations related to environmental quality and should identify all environmental impacts of the project both positive and negative. If the project under study requires a Federal action, then the EPA rules relating to environmental studies must be followed.

It is important to document the environmental considerations for the proposed project, including any alternatives that will receive consideration. Encroachments onto adjacent areas (including environmental encroachments) should be avoided whenever possible. Identifying environmental considerations early in the planning process can prevent major implementation problems as the design and construction of the project proceeds.

DR-02.270 Permits

Specific Federal, State, and local permits that will be needed for a highway project must be identified in the environmental document early in the planning stages. For Federal permits, applications should be filed with the Coast Guard for the construction of bridges on Navigable streams, and with the Corps of Engineers for other construction.

Before initiating design work, the designer must review the environmental document with the appropriate Central Office

Personnel to identify regulatory commitments, constraints, and any permits required. Permits, as required, should be obtained before construction begins, and preferably before detailed plans are prepared. A list of the major categories of applicable permits are given below:

- stormwater discharge permits (pending); State, Metropolitan Sewer District (MSD), Lexington Fayette County Urban Government (LFCUG),
- dredge and fill permits; Clean Water Act
- navigation clearances; Coast Guard, TVA.

DR-02.280 Location Considerations

The primary drainage consideration for facility location in highway planning is the evaluation of the impact of flood plain encroachments for a stream crossing. Hydraulic and environmental considerations of highway river crossings and encroachments are presented in the FHWA Highways in the River Environment, Training and Design Manual (1990). The Manual provides 13 hypothetical examples of typical river environments and identifies possible local, upstream, and downstream effects of highway encroachments. Twelve case histories of actual river crossings in the United States that illustrate the qualitative response of various types of encroachments are then discussed.

The principal factors to be considered in locating a stream crossing that involves encroachment within a flood plain are:

- river type (straight or meandering),
- river characteristics (stable or unstable),
- river geometry and alignment,
- hydrology,
- hydraulics,
- flood plain flow,
- needs of the area, and
- economic and environmental concerns.

A detailed evaluation of these factors is part of the location hydraulics study. When a suitable crossing location has been selected, specific crossing components can then be determined. When necessary, these include:

- the geometry and length of the approaches to the crossing,
- probable type and approximate location of the abutments,
- probable number and approximate location of the piers,
- estimated depth to the footing supporting the piers (to protect against local scour),

- the location of the longitudinal encroachment in the flood plain,
- the amount of allowable longitudinal encroachment into the main channel, and
- the required river training works to ensure that river flows approach the crossing or the encroachment in a complementary way.

Exact information on these components is usually not developed until the final stage.

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DR-02.300 Quality And Quantity Concerns

Planning for drainage and stormwater management facilities should include a consideration of the potential problems associated with stormwater quality and quantity.

DR-02.310 Quality - Pending

Maximize stable open channels and minimize storm sewers and culvert lengths. Drainage to sinkholes should have at least 150 feet of open channel to trap silt. When unavailable, an aggregate ring should be placed around the sinkhole to provide filtration and ponding for the flow. Sinkholes within 100 feet of the Right-of-Way used for drainage should be purchased.

DR-02.320 Quantity

Determinations of stormwater quantity are primarily useful for evaluating and mitigating the impact of a project. Without detention ponds (basins, storage areas), land development increases peak runoff rates and volumes from storm events, which can lead to higher flood elevations. Appropriate hydrologic and hydraulic calculations presented in various chapters of this manual should be made to determine the required conveyance through the highway right-of-way and to aid in mitigating impacts to downstream property owners.

Typical facilities are listed below:

- onsite storage
- offsite storage
- open channels
- storm drain systems
- stormwater pumping
- culverts
- bridges
- gutters, inlets, and pavement
- energy dissipators

The ability of a facility to accomplish the following controls for a particular area should be evaluated:

- Reduce runoff rates by increasing infiltration, and by storing precipitation and runoff where it falls and releasing it slowly.

- Protect areas subject to flood damages by keeping runoff confined to drainage facilities such as pipes or channels and by building appropriate flood control facilities.

- Keep flood plain encroachment outside the limits of regulated floodways.

The following questions should be considered when selecting the plan for disposal of stormwater runoff:

- Are existing drainage systems large enough to handle anticipated runoff?

- Are design discharges consistent with adopted drainage plans and regulatory criteria?

- Will the project require retention or detention storage areas to mitigate the impacts of increased runoff, or can the increase be handled by other project features?

- Is there sufficient area to construct a retention or detention pond within the right-of-way? Are alternative sites available for storage of stormwater? Is property available outside the right-of-way? Does the project schedule allow time to acquire additional right-of-way?

- Are there unusual groundwater or soil conditions? Is there a high groundwater table, or are there impermeable soil layers?

- Are there any jurisdictional, permit, or economic restrictions?

- Are there any unusual site conditions, such as woods, wetlands, or other environmental features that might influence the development of a stormwater management system?

- Are there any sinkholes that might influence the development of a stormwater management system? Are the sinks needed for drainage? What are the stage-storage relationship and the stage-discharge relationship for the sinks to be used for drainage?

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DR-02.400 National Flood Insurance Program

DR-02.410 General

The Flood Disaster Protection Act of 1973 (Pl 93-234, 87 Stat. 975) denies Federal financial assistance to flood prone communities that fail to qualify for flood insurance. Formula grants to states are excluded from the definition of financial assistance, and the definition of construction in the Act does not include highway construction; therefore, Federal aid for highways is not affected by the Act. The Act does require communities to adopt certain land use controls to qualify for flood insurance. These land use requirements could impose restrictions on the construction of highways in floodplains and floodways in communities that have qualified for flood insurance. A floodway, as used here and as used with the National Flood Insurance Program, is that portion of the floodplain required to pass a flood that has a 1-percent chance of occurring in any 1-year period without cumulatively increasing the water surface elevation more than a selected surcharge, usually one foot.

DR-02.420 Flood Insurance

The National Flood Insurance Act of 1968, as amended, (42 U.S.C. 4001-4127) requires that communities adopt adequate land use and control measures to qualify for insurance. Federal criteria promulgated to implement this provision contain the following requirements which can affect certain highways:

- In riverine situations, when the Administrator of the Federal Insurance Administration has identified the flood prone area, the community must require that until a floodway has been designated, no use, including land fill, be permitted within the floodplain area having special flood hazards for which base flood elevations have been provided; unless it is demonstrated that the cumulative effect of the proposed use, when combined with all other existing and reasonably anticipated uses of a similar nature, will not increase the water surface elevation of the 100-year flood more than one foot at any point within the community.

- After the floodplain area having special flood hazards has been identified and the water surface elevation for the 100-year flood and floodway data have been provided, the community must designate a floodway which will convey the 100-year flood without increasing the water surface elevation of the flood more than the surcharge at any point and prohibit, within the designated

floodway, fill, encroachments, and new construction and substantial improvements of existing structures which would result in any increase in flood heights within the community during the occurrence of the 100-year flood discharge.

The participating cities and/or counties agree to regulate development in the designated floodplain and floodway through regulations adopted in a floodplain ordinance. The ordinance requires that development in the designated floodplain be consistent with the intent, standards and criteria set by the National Flood Insurance Program.

DR-02.430 Local Community

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. 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 Federal Emergency Management Agency (FEMA) for amendments to NFIP ordinances and maps in that community should it be necessary. The highway agency should deal directly with the community and, through them, deal with FEMA. 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.

DR-02.440 NFIP Maps

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:

- Flood Hazard Boundary Map (FHBM),
- Flood Boundary and Floodway Map (FBFM), and
- 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 are available through the regional office of FEMA. This is normally in the form of computer input data records 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 may or may not have published one or more of the above maps depending on their level of participation in the NFIP. Information on community participation in the NFIP is provided in the "National Flood Insurance Program Community Status Book" which is published semiannually for each State.

DR-02.450 Coordination With FEMA

It is intended that there should be 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 include the following:

- When a proposed crossing encroaches into the Regulatory Floodway of a stream and the calculations show no increase in stage for the Floodway, a No-Rise Certificate with the documentation is forwarded to FEMA for their review.

- When a proposed crossing encroaches on a Regulatory Floodway and either the allowable surcharge on the floodplain, the zero increase for the Floodway is exceeded or the Floodway is widened to obtain the zero increase, a Letter of Map Revision (LOMR) is requested from FEMA.

- When a proposed crossing encroaches on a floodplain where a Special Flood Hazard Area has been defined but no Floodway has been delineated and the allowable surcharge has been exceeded, a LOMR is requested from FEMA.

- When a local community is expected to enter the regular program within a reasonable period and detailed floodplain studies are underway, FEMA shall be contacted to determine if the proposed encroachment will affect the Floodway, if a No-Rise or LOMR is applicable, or if the encroachment could be included in the study.

- When 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, a LOMR shall be requested from FEMA.

- LOMR's require hydraulic data documenting the effect of the encroachment on the floodplain or Floodway. They also require the submission of As-Built plans when the highway project is over 90% complete.

When a local community is not participating in the program, FEMA criteria shall be used for review since those Identified but Not In Program may reenter the program readily and a majority of the counties in the state have some mapping. No contact with FEMA will be required.

The draft Environmental Impact Statement or Environmental Assessment (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 final environmental impact statement (FEIS) or a finding of no significant impact (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.

DR-02.460 Consistent With Floodways

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.

DR-02.470 Revisions Of Floodway

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

DR-02.480 Data For Revisions

Data submitted to FEMA, through the community, in support of a floodway revision request should include the following:

- Copy of current regulatory Flood Boundary Floodway Map, showing existing conditions, proposed highway crossing and revised floodway limits.

- Copy of computer printouts (input, computation, and output) for the current 100-year model and current 100-year floodway model.

- 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.

- 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 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.

If input data representing the original hydraulic model are 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 that established 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.

DR-02.490 Allowable Floodway Encroachment

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:

- A location hydraulic study has been performed according to FHWA, "Location and Hydraulic Design of Encroachments on Floodplains" (23 CFR 650, Subpart A) and FHWA finds the encroachment is the only practical alternative. See Exhibit 2-970.

- 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 backwater greater than one foot.

- The constructing agency has made appropriate arrangements to assure that the National Flood Insurance Program and Flood Insurance Fund will not incur any liability for additional future flood losses to existing structures that are insured under the Program and grandfathered in under the risk status existing before the construction of the structure.

- Before 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 1 foot increase in the base flood elevation based on technical data from the flood insurance study. This one foot increase is allowable if there is no existing, planned, or potential development in the base floodplain. If there is existing, planned, or potential development in the base floodplain, the limit is no increase in the Allowable Base Flood Elevation which will have to be calculated. Exceeding either of these two limits will require submittal to FEMA.

Highway Encroachment On A Floodplain Indicated On A FHBM (FIRM)

In communities where a no detailed flood insurance study has been performed, the base flood elevation shall have to be determined. As above, the one foot increase on the base flood or No-Rise on the Allowable Base Flood may govern, depending upon the existing, planned, or potential development in the floodplain.

Highway Encroachment On A Unidentified Floodplain

Since 101 of the 120 counties in Kentucky have some FEMA mapping, all communities shall be considered FEMA mapped.

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DR-02.500 Executive Orders

DR-02.510 General

Presidential Executive Orders (E.O.) have the effect of law in the administration of programs by Federal agencies. While executive orders do not directly apply to State Highway Department, these requirements are usually implemented through general regulations.

DR-02.520 Requirements

Executive Order 11988, May 24, 1977, requires each Federal agency, in carrying out its activities, to take the following actions:

- to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains; and

- to evaluate the potential effect of any actions it may take in a floodplain, to assure its planning programs reflect consideration of flood hazards and floodplain management.

These requirements are contained in the Federal Register, April 26, 1979 (44 CFR 24678), and in 23 CFR 650, Subpart A.

Executive Order 11990, May 24, 1977, orders each Federal agency to:

- take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values to wetlands;

- avoid undertaking or providing assistance for new construction in wetlands unless the head of the agency finds that there is no practicable alternative and all practicable measures are taken to minimize harm which may result from the action; and

- to consider factors relevant to the proposal's effects on the survival and quality of the wetlands.

These requirements are contained in 23 CFR 771.

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DR-02.600 Management Procedure

DR-02.610 General

The optimum design of a highway crossing of a natural channel would include:

Matching the stages for more frequent floods, say less than a five year flood.

Allowing the roadway to be overtopped by a flood whose return interval is determined by the anticipated traffic.

Creating one foot of backwater for the one hundred year floodplain and zero backwater on the one hundred year Floodway.

The matching of stages for the more frequent floods is an environmental consideration. This is also an attempt at eliminating the aggradation and degradation problems associated with highway drainage structures.

The consideration of roadway overtopping in the analysis of an existing or proposed roadway may be important in the sizing of a bridge or culvert for a highway. The overtopping flood should be discussed during the field inspections and well documented on a Checklist for Federally Funded projects.

In the Commonwealth of Kentucky, Floodplain Management for state owned property is regulated by 200 KAR 6:040. A copy of this regulation is shown in Exhibit 02.940. The construction and maintenance of highways in floodplains should follow the requirements delineated in this regulation. Thus, the Designer shall determine if the existing or proposed highway is in the 100 Year floodplain for a stream. If the highway is in the floodplain, the limits of stage increase are 1.0 feet on the floodplain and no increase on the Floodway. If the stream has a Regulatory Floodway defined and these limits are exceeded, the Department must request a Letter of Map Revision (LOMR) from FEMA. If the highway encroaches into the Regulatory Floodway and no increase in the stage is shown, a No-Rise Certificate with backup documentation shall be sent to FEMA. FEMA may approve this No-Rise Certificate or issue a LOMR stating that the increase in stage will require approval from the community through which the stream passes. If the highway encroaches into the floodplain of a stream with Special Flood Hazard areas defined, the designer

shall determine if there is any existing, planned, or potential development in the floodplain. If this situation exists, the designer shall calculate the floodway for the stream and the limit shall be no increase on the Floodway. If this situation does not exist, the limit shall be one foot increase on the floodplain. If the limit is exceeded in either of the above cases, a LOMR shall be requested of FEMA.

Sites with LOMR's will require further study by the designer, approval from the community through which the stream passes, and submittal of As-Built plans to FEMA when the project is constructed.

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DR-02.700 Work in the 100-Year Floodplain

DR-02.710 General

When working within the 100-Year Floodplain, different levels of review must be completed depending upon the size of the drainage area and the complexity of the area.

DR-02.720 Review Thresholds

Federally funded project require review by the Atlanta and Washington, D. C. offices when the project includes bridges with unusual features or 125,000 square feet or greater deck area, storm sewers with greater than 200 cfs outfall, storm sewers with greater than 5 acre-feet of storage, pumping stations, or highway fill dams with 50 acre-feet storage or greater than 25 feet high.

The Department needs to review floodplain encroachments for streams. Encroachments for streams with one square mile drainage area or greater may require FEMA review.

The Natural Resources and Environmental Cabinet, Division of Water needs to review the design of highway fill dams with storage greater than 50 acre-feet or height greater than 25 feet.

The Tennessee Valley Authority must be contacted to determine the need for a permit for highway construction along the Tennessee River. The criteria usually expressed is minimal change in the storm storage capacity above elevation 359 feet and less than five acre-feet disturbance of the power storage capacity between elevation 354 feet and 359 feet.

Contact the PERMIT COORDINATOR, Division of Design, for permit requirements for encroachments within the channel banks for small streams, within the Ordinary Highwater for large streams, and into wetland areas.
Also see the Design Manual for additional guidance for permit requirements.

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DR-02.900 CHAPTER 2 EXHIBITS

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Executive Order 11988 May 24, 1977

FLOODPLAIN MANAGEMENT

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), the National Flood Insurance Act of 1968, as amended (42 U.S.C. 4001 et seq.), and the Flood Disaster Protection Act of 1973 (Public Law 93-234, 87 Stat. 975), in order 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 or indirect support of floodplain development wherever there is a practicable alternative, it is hereby ordered as follows:

Section 1. Each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

Sec. 2. In carrying out the activities described in Section 1 of this Order, each agency has a responsibility to evaluate the potential effects of any actions it may take in a floodplain; to ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management; and to prescribe procedures to implement the policies and requirements of this Order, as follows:

(a) (1) Before taking an action, each agency shall determine whether the proposed action will occur in a floodplain -- for major Federal actions significantly affecting the quality of the human environment, the evaluation required below will be included in any statement prepared under Section 102(2)(C) of the National Environmental Policy Act. This determination shall be made according to a Department of Housing and Urban Development (HUD) floodplain map or a more detailed map of an area, if available. If such maps are not available, the agency shall make a determination of the location of the floodplain based on the best available information. The Water Resources Council shall issue guidance on this information not later than October 1, 1977.

(2) If an agency has determined to, or proposes to, conduct, support, or allow an action to be located in a floodplain, the agency shall consider alternatives to avoid adverse effects and incompatible development in the floodplains. If the head of the agency finds that the only

practicable alternative consistent with the law and with the policy set forth in this Order requires siting in a floodplain, the agency shall, prior to taking action, (i) design or modify its action in order to minimize potential harm to or within the floodplain, consistent with regulations issued in accord with Section 2(d) of this Order, and (ii) prepare and circulate a notice containing an explanation of why the action is proposed to be located in the floodplain.

(3) For programs subject to the Office of Management and Budget Circular A-95, the agency shall send the notice, not to exceed three pages in length including a location map, to the state and areawide A-95 clearinghouses for the geographic areas affected. The notice shall include: (i) the reasons why the action is proposed to be located in a floodplain; (ii) a statement indicating whether the action conforms to applicable state or local floodplain protection standards and (iii) a list of the alternatives considered. Agencies shall endeavor to allow a brief comment period prior to taking any action.

(4) Each agency shall also provide opportunity for early public review of any plans or proposals for actions in floodplains, in accordance with Section 2(b) of Executive Order No 11514, as amended, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require the preparation of an environmental impact statement under Section 102(2) (C) of the National Environmental Policy Act

of 1969, as amended.

(b) Any requests for new authorization or appropriations transmitted to the Office of Management and Budget shall indicate, if an action to be proposed will be located in a floodplain, whether the proposed action is in accord with this Order.

(c) Each agency shall take floodplain management into account when formulating or evaluating any water and land use plans and shall require land and water resources use appropriate to the degree of hazard involved. Agencies shall include adequate provision for the evaluation and consideration of flood hazards in the requlations and operating procedures for the licenses, permits, loan or grants-in-aid programs that they administer. Agencies shall also encourage and provide appropriate guidance to applicants to evaluate the effects of their proposals in floodplains prior to submitting applications for Federal licenses, permits, loans or grants.

(d) As allowed by law each agency shall issue or amend existing regulations and procedures within one year to comply with this Order. These procedures shall incorporate the Unified National Program for Floodplain Management of the Water Resources Council, and shall explain the means that the agency will employ to pursue the nonhazardous use of riverine, coastal and other floodplains in connection with the activities under its authority. To the extent possible, existing processes, such as those of the Council on Environmental Quality and the Water Resources Council,

shall be utilized to fulfill the requirements of this Order. Agencies shall prepare their procedures in consultation with the Water Resources Council, the Federal Insurance Administration, and the Council on Environmental Quality, and shall update such procedures as necessary.

Sec. 3. In addition to the requirements of Section 2, agencies with responsibilities for Federal real property and facilities shall take the following measures:

(a) The regulations and procedures established under Section 2(d) of this Order shall, at a minimum, require the construction of Federal structures and facilities to be in accordance with the standards and criteria and to be consistent with the intent of those promulgated under the National Flood Insurance Program. They shall deviate only to the extent that the standards of the Flood Insurance Program are demonstrably inappropriate for a given type of structure or facility.

(b) If, after compliance with the requirements of this Order, new construction of structures or facilities are to be located in a floodplain, accepted floodproofing and other flood protection measures shall be applied to new construction or rehabilitation. To achieve flood protection, agencies shall, wherever practicable, elevate structures above the base flood level rather than filling in land.

(c) If property used by the general public has suffered flood damage or is located in an identified flood hazard area, the responsible agency shall provide

on structures, and other places where appropriate, conspicuous delineation of past and probable flood height in order to enhance public awareness of and knowledge about flood hazards.

(d) When property in floodplains is proposed for lease, easement, right-of-way, or disposal to non-Federal public or private parties, the Federal agency shall (1) reference in the conveyance those uses that are restricted under identified Federal, State or local floodplain regulations; and (2) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successors, except where prohibited by law; or (3) withhold such properties from conveyance.

Sec. 4. In addition to any responsibilities under this Order and Sections 202 and 205 of the Flood Disaster Protection Act of 1973, as amended (42 U.S.C. 4106 and 4128), agencies which guarantee, approve, regulate, or insure any financial transaction which is related to an area located in a floodplain shall, prior to completing action on such transaction, inform any private parties participating in the transaction of the hazards of locating structures in the floodplain.

Sec. 5. The head of each agency shall submit a report to the Council on Environmental Quality and to the Water Resources Council on June 30, 1978, regarding the status of their procedures and the impact of this Order on the agency's operations. Thereafter, the Water Resources

Council shall periodically evaluate agency procedures and their effectiveness.

Sec. 6. As used in this Order:

(a) The term "agency" shall have the same meaning as the term "Executive agency" in Section 105 of Title 5 of the United States Code and shall include the military departments; the directives contained in this Order, however, are meant to apply only to those agencies which perform the activities described in Section 1 which are located in or affecting floodplains.

(b) The term "base flood" shall mean that flood which has a one percent or greater chance of occurrence in any given year.

(c) The term "floodplain" shall mean the lowland and relatively flat areas adjoining inland and coastal waters including floodprone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

Sec. 7. Executive Order No. 11296 of August 10, 1966, is hereby revoked. All actions, procedures, and issuances taken under that Order and still in effect shall remain in effect until modified by appropriate authority under the terms of this Order.

Sec. 8. Nothing in this Order shall apply to assistance provided for emergency work essential to save lives and protect property and public health and safety, performed pursuant to Sections 305 and 306 of the Disaster Relief Act of 1974 (88 Stat. 148, 42 U.S.C. 5145 and 5146).

Sec. 9. To the extent the provisions of Section 2(a) of this Order are applicable to projects covered by Section 104(h) of the Housing and Community Development Act of 1974, as amended (88 Stat. 640, 42 U.S.C. 5304(h)), the responsibilities under those provisions may be assumed by the appropriate applicant, if the applicant has also assumed, with respect to such projects, all of the responsibilities for environmental review, decisionmaking, and action pursuant to the National Environmental Policy Act of 1969, as amended.

Executive Order 11990

PROTECTION OF WETLANDS

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et. seq.), in order to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative, it is hereby ordered as follows:

Section 1. (a) Each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

(b) This Order does not apply to the issuance by Federal agencies of permits, licenses, or allocations to private parties for activities involving wetlands on non-Federal property.

Sec. 2. (a) In furtherance of Section 101 (b)(3) of the National Environmental Policy Act of 1969 (42 U.S.C.

4331(b)(3)) to improve and coordinate Federal plans, functions, programs and resources to the end that the Nation may attain the widest range of beneficial uses of the environment without degradation and risk to health or safety, each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use. In making this finding the head of the agency may take into account economic, environmental and other pertinent factors.

(b) Each agency shall also provide opportunity for early public review of any plans or proposals for new construction in wetlands, in accordance with Section 2(b) of Executive Order No. 11514, as amended, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require the preparation of an environmental impact statement under Section 102(2)(C) of the National Environmental Policy Act of 1969, as amended.

Sec. 3. Any requests for new authorizations or appropriations transmitted to the Office of Management and Budget shall indicate, if an action to be proposed will be located in wetlands, whether the proposed action is in accord with this Order.

Sec. 4. When Federally-owned wetlands or portions of wetlands are proposed for lease, easement, right-of-way or disposal to non-Federal public or private parties, the Federal agency shall (a) reference in the conveyance those uses that are restricted under identified Federal, State or local wetlands regulations; and (b) attach other appropriate restrictions to the uses of properties by the grantees or purchaser and any successor, except where prohibited by law; or (c) withhold such properties from disposal.

Sec. 5. In carrying out the activities described in Section 1 of this Order, each agency shall consider factors relevant to a proposal's effect on the survival and quality of the wetlands. Among these factors are:

(a) public health, safety, and welfare, including water supply, quality, recharge and discharge; pollution; flood and storm hazards; and sediment and erosion;

(b) maintenance of natural systems, including conservation and long term productively or existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources; and

(c) other uses of wetlands in the public interest, including recreational; scientific, and cultural uses.

Sec. 6. As allowed by law, agencies shall issue or amend their existing procedures in order to comply with this Order. To the extent possible, existing processes, such as those of the Council on Environmental Quality and

the Water Resource Council, shall be utilized to fulfill the requirements of this Order.

Sec. 7. As used in this Order:

(a) The term "agency" shall have the same meaning as the term "Executive Agency" in Section 105 of Title 5 of the United States Code and shall include the military departments; the directives contained in this Order, however, are meant to apply only to those agencies which perform the activities described in Section 1 which are located in or affecting wetlands.

(b) The term "new construction" shall include draining, dredging, channelizing, filling, diking, impounding, and related activities and any structures or facilities begun or authorized after the effective date of this Order.

(c) The term "wetlands" means those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

Sec. 8. This Order does not apply to projects presently under construction, or to projects for which all of the funds have been appropriated through Fiscal Year 1977, or to projects and programs for which a draft or final

environmental impact statement will be filed prior to October 1, 1977. The provisions of Section 2 of this Order shall be implemented by each agency not later than October 1, 1977.

Sec. 9. Nothing in this Order shall apply to assistance provided for emergency work, essential to save lives and protect property and public health and safety, performed pursuant to Sections 305 and 306 of the Disaster Relief Act of 1974 (88 Stat. 148, 42 U.S.C. 5145 and 5146).

Sec. 10. To the extent the provisions of Sections 2 and 5 of this Order are applicable to projects covered by Section 104(h) of the Housing and Community Development Act of 1974, as amended (88 Stat. 640, 42 U.S.C. 5304(h)), the responsibilities under those provisions may be assumed by the appropriate applicant, if the applicant has also assumed, with respect to such projects, all of the responsibilities for environmental review, decisionmaking, and action pursuant to the National Environmental Policy Act of 1969, as amended.

U. S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

FEDERAL-AID HIGHWAY PROGRAM MANUAL

VOLUME	6	ENGINEERING AND TRAFFIC OPERATIONS
CHAPTER	7	BRIDGES, STRUCTURES AND HYDRAULICS
SECTION	3	HYDRAULICS, EROSION CONTROL AND WATER QUALITY
SUBSECTION	2	LOCATION AND HYDRAULIC DESIGN OF ENCROACHMENTS ON FLOOD PLAINS

Transmittal 315
November 15, 1979
HNG-31

1. PURPOSE.* *To prescribe Federal Highway Administration (FHWA) policies and procedures for the location and hydraulic design of highway encroachments on flood plains, including direct Federal highway projects administered by the FHWA.*

2. AUTHORITY. *23 U.S.C. 109(a) and 315, 23 CFR 1.32, 49 CFR 1.48(b), Executive Order 11988 - Floodplain Management, May 24, 1977 (42 FR 26951), and Department of Transportation Order 5650.2, April 26, 1979 (44 FR 24678).*

3. POLICY. *It is the policy of the FHWA:*

   a. *to encourage a broad and unified effort to prevent uneconomic, hazardous or incompatible use and development of the Nation's flood plains,*

   b. *to avoid longitudinal encroachments, where practicable,*

   c. *to avoid significant encroachments, where practicable,*

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* Regulatory material is italicized and is published in 23 CFR 650.

d. to minimize impacts of highway agency actions which adversely affect base flood plains,

e. to restore and preserve the natural and beneficial flood-plain values that are adversely impacted by highway agency actions,

f. to avoid support of incompatible flood-plain development,

g. to be consistent with the intent of the Standards and Criteria of the National Flood Insurance Program, where appropriate, and

h. to incorporate "A Unified National Program for Floodplain Management" of the Water Resources Council into FHWA procedures.

4. DEFINITIONS

a. Action - any highway construction, reconstruction, rehabilitation, repair, or improvement undertaken with Federal or Federal-aid highway funds or FHWA approval.

b. Base Flood - the flood or tide having a 1-percent chance of being exceeded in any given year.

c. Base Flood Plain - the area subject to flooding by the base flood.

d. Design Flood - the peak discharge, volume if appropriate, stage or wave crest elevation of the flood associated with the probability of exceedance selected for the design of a highway encroachment. By definition, the highway will not be inundated from the stage of the design flood.

e. Encroachment - an action within the limits of the base flood plain.

f. Floodproof - to design and construct individual buildings, facilities, and their sites to protect against structural failure, to keep water out or to reduce the effects of water entry.

g. *Freeboard - the vertical clearance of the lowest structural member of the bridge superstructure above the water surface elevation of the overtopping flood.*

h. *Minimize - to reduce to the smallest practicable amount or degree.*

i. *Natural and Beneficial Flood-plain Values - include but are not limited to fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge.*

j. *Overtopping Flood - the flood described by the probability of exceedance and water surface elevation at which flow occurs over the highway, over the watershed divide, or through structure(s) provided for emergency relief.*

k. *Practicable - capable of being done within reasonable natural, social, or economic constraints.*

l. *Preserve - to avoid modification to the functions of the natural flood-plain environment or to maintain it as closely as practicable in its natural state.*

m. *Regulatory Floodway - the flood-plain area that is reserved in an open manner by Federal, State or local requirements, i.e., unconfined or unobstructed either horizontally or vertically, to provide for the discharge of the base flood so that the cumulative increase in water surface elevation is no more than a designated amount (not to exceed 1 foot as established by the Federal Emergency Management Agency (FEMA) for administering the National Flood Insurance Program).*

n. *Restore - to reestablish a setting or environment in which the functions of the natural and beneficial flood-plain values adversely impacted by the highway agency action can again operate.*

o. *Risk - the consequences associated with the probability of flooding attributable to an encroachment. It shall include the potential for property loss and hazard to life during the service life of the highway.*

p. *Risk Analysis - an economic comparison of design alternatives using expected total costs (construction costs plus risk costs) to determine the alternative with the least total expected cost to the public. It shall include probable flood-related costs during the service life of the facility for highway operation, maintenance, and repair, for highway-aggravated flood damage to other property, and for additional or interrupted highway travel.*

q. *Significant Encroachment - a highway encroachment and any direct support of likely base flood-plain development that would involve one or more of the following construction- or flood-related impacts:*

(1) *a significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route,*

(2) *a significant risk, or*

(3) *a significant adverse impact on natural and beneficial flood-plain values.*

r. *Support Base Flood-Plain Development - to encourage, allow, serve, or otherwise facilitate additional base flood-plain development. Direct support results from an encroachment, while indirect support results from an action out of the base flood plain.*

5. APPLICABILITY

a. *The provisions of this directive shall apply to all encroachments and to all actions which affect base flood plains, except for repairs made with emergency funds (FHPM 6-9-16-1 and 2, 23 CFR 668) during or immediately following a disaster.*

b. *The provisions of this directive shall not apply to or alter approvals or authorizations which were given by FHWA pursuant to directives in effect before the effective date of this directive.*

6. PUBLIC INVOLVEMENT. *Procedures which have been established to meet the public involvement requirements of FHPM 7-7-2 (23 CFR 771) and FHPM 7-7-1 (23 CFR 795) or FHPM 7-7-5 (23 CFR 790) shall be used to provide opportunity for early public review and comment on alternatives which contain encroachments.*

   a. *Public notices issued in accordance with the above procedures shall make reference to significant encroachments which are contained in alternatives under consideration.*

   b. *Public hearing presentations shall include identification of encroachments.*

7. LOCATION HYDRAULIC STUDIES

   a. *National Flood Insurance Program (NFIP) maps or information developed by the highway agency, if NFIP maps are not available, shall be used to determine whether a highway location alternative will include an encroachment.*

   b. *Location studies shall include evaluation and discussion of the practicability of alternatives to any longitudinal encroachments.*

   c. *Location studies shall include discussion of the following items, commensurate with the significance of the risk or environmental impact, for all alternatives containing encroachments and for those actions which would support base flood-plain development:*

      (1) *the risks associated with implementation of the action,*

      (2) *the impacts on natural and beneficial flood-plain values,*

      (3) *the support of probable incompatible flood-plain development,*

      (4) *the measures to minimize flood-plain impacts associated with the action, and*

(5) the measures to restore and preserve the natural and beneficial flood-plain values impacted by the action.

d. Location studies shall include evaluation and discussion of the practicability of alternatives to any significant encroachments or any support of incompatible flood-plain development.

e. The studies required by paragraphs 7c and d shall be summarized in environmental review documents prepared pursuant to FHPM 7-7-2 (23 CFR 771).

f. Local, State, and Federal water resources and flood-plain management agencies should be consulted to determine if the proposed highway action is consistent with existing watershed and flood-plain management programs and to obtain current information on development and proposed actions in the affected watersheds.

8. ONLY PRACTICABLE ALTERNATIVE FINDING

a. A proposed action which includes a significant encroachment shall not be approved unless the FHWA finds that the proposed significant encroachment is the only practicable alternative. This finding shall be included in the final environmental document (final environmental impact statement or finding of no significant impact) and shall be supported by the following information:

(1) the reasons why the proposed action must be located in the flood plain,

(2) the alternatives considered and why they were not practicable, and

(3) a statement indicating whether the action conforms to applicable State or local flood plain protection standards.

b. A copy of the finding shall be made available to appropriate State and areawide clearinghouses following procedures established in accordance with FHPM 4-1-4 (23 CFR 420).

9. DESIGN STANDARDS

a. *The design selected for an encroachment shall be supported by analyses of design alternatives with consideration given to capital costs and risks, and to other economic, engineering, social, and environmental concerns.*

(1) *Consideration of capital costs and risks shall include, as appropriate, a risk analysis or assessment which includes:*

(a) *the overtopping flood or the base flood, whichever is greater, or*

(b) *the greatest flood which must flow through the highway drainage structure(s), where overtopping is not practicable. The greatest flood used in the analysis is subject to state-of-the-art capability to estimate the exceedance probability.*

(2) *The design flood for encroachments by through lanes of Interstate highways shall not be less than the flood with a 2-percent chance of being exceeded in any given year. No minimum design flood is specified for Interstate highway ramps and frontage roads or for other highways.*

(3) *Freeboard shall be provided, where practicable, to protect bridge structures from debris- and scour-related failure.*

(4) *The effect of existing flood control channels, levees, and reservoirs shall be considered in estimating the peak discharge and stage for all floods considered in the design.*

(5) *The design of encroachments shall be consistent with standards established by the FEMA, State, and local governmental agencies for the administration of the National Flood Insurance Program for:*

(a) *all direct Federal highway actions, unless the standards are demonstrably inappropriate, and*

(b) *Federal-aid highway actions where a regulatory floodway has been designated or where studies are underway to establish a regulatory floodway.*

b. *Rest area buildings and related water supply and waste treatment facilities shall be located outside the base flood plain, where practicable. Rest area buildings which are located on the base flood plain shall be floodproofed against damage from the base flood.*

c. *Where highway fills are to be used as dams to permanently impound water more than 50 acre-feet (6.17×10^4 cubic metres) in volume or 25 feet (7.6 metres) deep, the hydrologic, hydraulic, and structural design of the fill and appurtenant spillways shall have the approval of the State or Federal agency responsible for the safety of dams or like structures within the State, prior to authorization by the Division Administrator to advertise for bids for construction.*

10. CONTENT OF DESIGN STUDIES

a. *The detail of studies shall be commensurate with the risk associated with the encroachment and with other economic, engineering, social, or environmental concerns.*

b. *Studies by highway agencies shall contain:*

(1) *the hydrologic and hydraulic data and design computations,*

(2) *the analysis required by paragraph 9a, and*

(3) *for proposed direct Federal highway actions, the reasons, when applicable, why FEMA criteria (44 CFR 60.3, formerly 24 CFR 1910.3) are demonstrably inappropriate.*

c. *For encroachment locations, project plans shall show:*

(1) the magnitude, approximate probability of exceedance and, at appropriate locations, the water surface elevation associated with the overtopping flood or the flood of paragraph 9a(1)(b), and

(2) the magnitude and water surface elevation of the base flood, if larger than the overtopping flood.

23 CFR Chapter 1 (4-1-91 Edition)

PART 650 - BRIDGES, STRUCTURES, AND HYDRAULICS

Subpart A - Location and Hydraulic Design of Encroachments on Flood Plains

Subpart A - Location and Hydraulic Design of Encroachments on Flood Plains

Source: 44 FR 677580, Nov. 26, 1979, unless otherwise noted.

§ 650.101 Purpose.

To prescribe Federal Highway Administration (FHWA) policies and procedures for the location and hydraulic design of highway encroachments on flood plains, including Federal highway projects administered by the FHWA.

§ 650.103 Policy.

It is the policy of the FHWA:

(a) To encourage a broad and unified effort to prevent uneconomical, hazardous or incompatible use and development of the Nation's flood plains,

(b) To avoid longitudinal encroachments, where practicable,

(c) To avoid significant encroachments, where practicable,

(d) To minimize impacts of highway agency actions which adversely affect base flood plains,

(e) to restore and preserve the natural and beneficial flood-plain values that are adversely impacted by highway agency actions,

(f) To avoid support of incompatible flood-plain development,

(g) To be consistent with the intent of the Standards and Criteria of the National Flood Insurance Program, where appropriate, and

(h) To incorporate "A Unified National program for Floodplain Management" of the Water Resources Council into FHWA Procedures.

§ 650.105 Definitions.

(a) *Action* shall mean any highway construction, reconstruction, rehabilitation, repair, or improvement undertaken with Federal or Federal-aid highway funds or FHWA approval.
(b) *Base Flood* shall mean the flood or tide having a 1-percent chance of being exceeded in any given year.
(c) *Base Flood Plain* shall mean the area subject to flooding by the base flood.
(d) *Design Flood* shall mean the peak discharge, volume if appropriate, stage or wave crest elevation of the flood associated with the probability of exceedance selected for the design of a highway encroachment. By definition, the highway will not be inundated from the stage of the design storm.
(e) *Encroachment* shall mean an action within the limits of the base floodplain.
(f) *Floodproof* shall mean to design and construct individual buildings, facilities, and their sites to protect against structural failure, to keep water out and to reduce the effects of water entry.
(g) *Freeboard* shall mean the vertical clearance of the lowest structural member of the bridge superstructure above the water surface elevation of the overtopping flood.
(h) *Minimize* shall mean to reduce to the smallest practicable amount or degree.
(i) *Natural and beneficial flood-plain values* shall include but are not limited to fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge.
(j) *Overtopping flood* shall mean the flood described by the probability of exceedance and water surface elevation at which flow occurs over the highway, over the watershed divide, or through structure(s) provided for emergency relief.
(k) *Practicable* shall mean capable of being done within reasonable natural, social, or economic constraints.
(l) *Preserve* shall mean to avoid modification to the functions of the natural flood-plain environment or to maintain it as closely as practicable in its natural state.
(m) Regulatory floodway shall mean the flood-plain area that is reserved in an open manner by Federal, State or local requirements, i.e., unconfined or unobstructed either horizontally or vertically, to provide for the discharge of the base flood so that the cumulative increase in water surface elevation is no more than a designated amount(not to exceed 1 foot as established by the Federal Emergency Management Agency (FEMA) for administering the National Flood Insurance Program).

(n) *Restore* shall mean to reestablish a setting or environment in

which the functions of the natural and beneficial flood-plain values adversely impacted by the highway agency action can again operate.

(o) Risk shall mean the consequences associated with the probability of flooding attributable to an encroachment. It shall include the potential for property loss and hazard to life during the service life of the highway.

(p) Risk analysis shall mean an economic comparison of design alternatives using expected total costs(construction plus risk costs) to determine the alternative with the least total expected cost to the public. Is shall include probable flood-related costs during the service life of the facility for highway operation, maintenance, and repair, for highway-aggravated flood damage to other property, and for additional or interrupted highway travel.

(q) *Significant encroachment* shall mean a highway encroachment and andy direct support of likely base flood-plain development that would involve one or more of the following construction related impacts:

(1) A significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route.

(2) A significant risk, or

(3) A significant adverse impact on natural and beneficial flood-plain values.

(r) *Support base flood-plain development* shall mean to encourage, allow, serve, or otherwise facilitate additional flood-plain development. Direct support results from an encroachment, while indirect support results from an action out of the base flood plain.

§ 650.107 Applicability.

(a) The provisions of this regulation shall apply to all encroachments and to all actions which affect base flood plains, except for repairs made with emergency fund (23 CFR part 668) during or immediately following a disaster.

(b) The provisions of this regulation shall not apply to or alter approvals or authorizations which were given by FHWA pursuant to regulations or directives in effect before the effective date of this regulation.

§ 650.109 Public involvement.

Procedures which have been established to meet the public involvement requirements of 3 CFR part 771 shall be used to provide opportunity for early public review and comment on alternatives which contain encroachments.

[53 FR 11065, Apr. 5, 1988]

§ 650.111 Location Hydraulic Studies.

(a) National flood Insurance Program (NFIP) maps or information developed by the highway agency, if NFIP maps are not available, shall be used to determine whether a highway location alternative will include an encroachment.

(b) Location studies shall include evaluation and discussion of the practicability of alternatives to any longitudinal encroachments.

(c) Location studies shall include discussion of the following items, commensurate with the significance of the risk or environmental impact, for all alternatives containing encroachments and for those actions which would support base flood-plain development:

(1) The risks associated with implementation of the action,

(2) The impacts on natural and beneficial flood-plain values,

(3) The support of probable incompatible flood-plain development,

(4) The measures to minimize flood-plain impacts associated with the action, and

(5) The measures to restore and preserve the natural and beneficial flood-plain values impacted by the action.

(d) Location studies shall include evaluation and discussion of the practicability if alternatives to any significant encroachments or any support of incompatible flood-plain development.

(e) The studies required by 650.111(c) and (d) shall be summarized in environmental review documents prepared pursuant to 23 CFR part 5771.

(f) Local, State, and Federal water resources and flood-plain management agencies should be consulted to determine if the proposed highway action is consistent with existing watershed and flood-plain management programs and to obtain current information on development and proposed actions in the affected watersheds.

§ 650.113 Only practicable alternative finding.

(a) A proposed action which includes a significant encroachment shall not be approved unless the FHWA finds that the proposed significant encroachment is the only practicable alternative. This finding shall be included in the final environmental impact statement(final environmental impact statement or finding of no significant impact) and shall be supported by the following information:

(1) The reasons why the proposed action must by located in the flood plain,

(2) The alternatives considered and why they were not practicable, and

(3) A statement indicating whether the action conforms to applicable State or local flood-plain protection standards.

[44FR67580, Nov 26, 1979, as amended at 48FR29274, June 24, 1983]

§ 650.115 Design standards.

(a) The design selected for an encroachment shall by supported by analyses of design alternatives with consideration given to capital costs and risks, and to other economic, engineering, social, and environmental concerns.

(1) Consideration of capital costs and risks shall include, as appropriate, a risk analysis or assessment which includes:

(i) The overtopping flood or the base flood, whichever is greater, or

(ii) The greatest flood which must flow through the highway drainage structure(s), where overtopping is not practicable. The greatest flood used in the analysis is subject to state-of-the-art capacity to estimate the exceedance probability.

(2) The design flood for encroachments by through lanes of interstate highways shall not be less than the flood with a 2-percent chance of being exceeded in any given year. No minimum design flood is specified for Interstate highway ramps and frontage roads or for other highways.

(3) Freeboard shall be provided, where practicable, to protect bridge structures from debris- and scour-related failure.

(4) The effect of existing flood control channels, levees, and reservoirs shall be considered in estimating the peak discharge and stage for all floods considered in the design.

(5) The design of encroachments shall be consistent with standards established by the FEMA, State, and local governmental agencies for the administration of the National Flood Insurance program for:

(i) All direct Federal highway actions, unless the standards are demonstrably inappropriate, and

(ii) Federal-aid highway actions where a regulatory floodway has been designated or where studies are underway to establish a regulatory floodway.

(b) Rest area buildings and related water supply and waste treatment facilities shall be located outside the base flood plain, where practicable. Rest area buildings which are located on the base flood plain shall be floodproofed against damage from the base flood.

(c) Where highway fills are to be used as dams to permanently impound water more than 50 acre-feet(6.17×10^4 cubic metres) in volume or 25 feet (7.6 metres) deep, the hydrologic, hydraulic, and structural design of the fill and appurtenant spillways shall have the approval of the State or Federal agency responsible for the

safety of dams or like structures within the State, prior to authorization by the Division administrator to advertise for bids for construction.

§ 650.117 Content of design studies.

(a) The detail of studies shall be commensurate with the risk associate with the encroachment and with other economic, engineering, social, or environmental concerns.

(b) Studies by highway agencies shall contain:

(1) The hydrologic and hydraulic data an design computations,

(2) The analysis required by 650.115(a), and

(3) For proposed direct Federal highway actions, the reasons, when applicable, why FEMA criteria (44 CFR 60.3, formerly 24 CFR 1910.3) are demonstrably inappropriate.

(c) For encroachment locations, project plans shall show:

(1) The magnitude, approximate probability of exceedance, and at appropriate locations, the water surface elevations associated with the overtopping flood or the flood of 650.115(a)(1)(II), and

(2) The magnitude and water surface elevation of the base flood, if larger than the overtopping flood.

Section 1. The Division of Properties of the Finance and Administration Cabinet is responsible for maintenance of inventory records for all state-owned land.

Section 2. The inventory shall be supplied to the Division of Properties by each agency. The report will be as of June 30th and due to arrive in the Division of Properties no later than September 30th. All inventory records must be kept current.

Section 3. Forms for reporting the inventory of both land and buildings shall be supplied by the Division of Properties.
(1) Land. Each tract of land will require a separate inventory report Form PR-40.
(2) Buildings.
(a) Each individual building should be reported on separate inventory report Form PR-40.
(b) If acquisition costs are not known, the current appraisal price should be used for the cost. This will include all permanent installations and additions.

Section 4. Periodic inspections shall be made by the Division of Properties to determine accuracy of reports. When changes in the inventory become necessary because of sales, purchases, demolitions, and modifications to the building, the agency must adjust their inventory records accordingly and provide a copy of the change to the Division of Properties. (2 Ky.R. 572; eff. 7-7-76.)

200 KAR 6:021. Relocation assistance payments and services of the Finance and Administration Cabinet.

RELATES TO: KRS 56.610 to 56.760, 49 CFR Part 24
STATUTORY AUTHORITY: KRS 56.690, 49 CFR Part 24
NECESSITY AND FUNCTION: The Finance and Administration Cabinet is required to adopt administrative regulations and procedures to implement the provisions of KRS 56.610 to 56.760, providing for uniform relocation assistance services and compensation to persons displaced by the land acquisition programs of the Commonwealth of Kentucky, except for acquisitions by the Transportation Cabinet. This regulation adopts the federal regulations relating to uniform relocation assistance that are set forth in 49 CFR Part 24, and repeals Finance and Administration Cabinet regulation, 200 KAR 6:020, pertaining to relocation assistance.

Section 1. The Finance and Administration Cabinet through its Division of Real Properties, shall administer the relocation assistance programs for all executive agencies of state government in accordance with the federal regulations relating to uniform relocation assistance that are set forth in 49 CFR Part 24, Subparts A, B, C, D, E, F and G, and Appendix A and B to Part 24, which were effective March 2, 1989, and are hereby adopted without change by the Finance and Administration Cabinet. (15 Ky.R. 2327; eff. 7-7-89.)

200 KAR 6:040. Flood plain management.

RELATES TO: KRS Chapters 45, 56, 151
STATUTORY AUTHORITY: KRS 56.185
NECESSITY AND FUNCTION: In order for the Commonwealth of Kentucky to qualify for the purchase of flood insurance for state structures under the National Flood Insurance Program it must comply with the federal National Flood Insurance Program regulations administered by the Federal Emergency Management Agency. The amendments to these regulations allow the Commonwealth of Kentucky to bring its present regulations, relating to flood plain management into compliance with the National Flood Insurance Program.

Section 1. General. (1) Purpose. The purpose of this regulation is to minimize the loss of lives and property due to floods. Each state agency undertaking a development activity within the base flood plains of the state shall comply with this regulation.
(2) Definitions. Unless otherwise defined, terms in this regulation shall be interpreted to give them the meaning they commonly have.
(a) "Addition to an existing building" means any walled and roofed expansion to the perimeter of a building in which the addition is connected by a common loadbearing wall other than a fire wall. Any walled and roofed addition which is connected by a fire wall or is separated by independent perimeter loadbearing walls is new construction.
(b) "Allowable base flood elevation" means an increase of no more than one (1) foot in the water surface elevation above the existing base flood elevation.
(c) "Area of shallow flooding" means a designated AO Zone on a community's Flood Insurance Rate Map (FIRM) with base flood depths from one (1) to three (3) feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and indeterminate, and where velocity flow may be evident.
(d) "Base flood" means the flood having a one (1) percent chance of being equaled or exceeded in any given year (i.e., 100-year frequency flood).
(e) "Base flood elevation" means the elevation of the existing base flood.
(f) "Base flood plain" means any land area susceptible to a base flood.
(g) "Basement" means that portion of a building having its floor subgrade (below ground level) on all sides.
(h) "Building" means any structure built for support, shelter, or enclosure for any occupancy or storage.
(i) "Development activity" means any manmade change to improved or unimproved real estate by a state agency including, but not limited to, the construction of buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations.
(j) "Elevated building" means a nonbasement building built to have the lowest floor elevated above the ground level by means of fill, solid foundation perimeter walls, pilings, columns (posts and piers), shear walls, or breakaway walls.
(k) "FEMA" means Federal Emergency Management Agency.
(l) "Flood" or "flooding" means a general and temporary condition of partial or complete

inundation of normally dry land areas from:
1. The overflow of inland or tidal waters;
2. The unusual and rapid accumulation or runoff of surface waters from any source.

(m) "Flood Hazard Boundary Map (FHBM)" means an official map of a community, issued by the Federal Emergency Management Agency, where the boundaries of the areas of special flood hazard have been defined as Zone A.

(n) "Flood Insurance Rate Map (FIRM)" means an official map of a community, on which the Federal Emergency Management Agency has delineated both the areas of special flood hazard and the risk premium zones applicable to the community.

(o) "Flood insurance study" is the official report provided by the Federal Emergency Management Agency. The report contains flood profiles, as well as the Flood Boundary Floodway Map and the water surface elevation of the base flood.

(p) "Flood proofing" means any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures or their contents.

(q) "Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one (1) foot.

(r) "Floor" means the top surface of an enclosed area in a building (including basement), i.e., top of slab in concrete slab construction or top of wood flooring in wood frame construction. The term does not include the floor of a garage used solely for parking vehicles.

(s) "Functionally dependent facility" means a facility which cannot be used for its intended purpose unless it is located or carried out in close proximity to water, such as a docking or port facility necessary for the loading and unloading of cargo or passengers, shipbuilding, ship repair, or seafood processing facilities. The term does not include long-term storage, manufacture, sales, or service facilities.

(t) "Mean sea level" means the average height of the sea for all stages of the tide.

(u) "Manufactured home" means a structure, transportable in one or more sections, which is built on a permanent chassis and designed to be used with or without a permanent foundation when connected to the required utilities. It does not include recreational vehicles or travel trailers. This term also includes park trailers, travel trailers, and similar transportable structures placed on a site for 180 consecutive days or longer and intended to be improved property.

(v) "New construction" means facilities for which the "start of construction" began on or after the effective date of this regulation.

(w) "Riverine" means relating to, formed by, or resembling a river (including tributaries), streams, brooks, etc.

(x) "Secretary" means the Secretary of the Finance and Administration Cabinet.

(y) "Start of construction" (for other than new construction or substantial improvements under the Coastal Barrier Resources Act (P.L. 97-348)), includes substantial improvement, and means the date on which the work order was issued by the Finance and Administration Cabinet, provided the actual start of construction, repair, reconstruction, or improvement was within 180 days from the work order date. The actual start means the first placement of permanent construction of a structure (including a manufactured home) on a site, such as the pouring of slabs or footings, installation of piles, construction of columns, or any work beyond the stage of excavation or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure.

(z) "State" means Commonwealth of Kentucky.

(aa) "State agency" means any state administrative body, department, bureau or division as defined in KRS Chapter 12, and any institution, commission, board, program cabinet, instrumentality, independent state authority, office, or other agency of the state.

(bb) "State facility" means all structures including, but not limited to, buildings, manufactured homes, storage tanks, docks, piers, dams, levees, utilities, roads, and bridges, constructed or placed, and associated land disturbance activities or state-owned lands.

(cc) "Substantial improvement" means any repair, reconstruction, or improvement of a state facility, the cost of which equals or exceeds fifty (50) percent of the current value of the facility either: before the improvement or repair is started; or if the facility has been damaged and is being restored, before the damage occurred. The term does not include: any project for improvement of a structure to comply with existing state health, sanitary, or safety codes solely necessary to assure safe living conditions; or any alteration of a structure listed on the "National Register of Historic Places" or a "State Inventory of Historic Places."

(dd) "Water surface elevation" means the projected heights in relation to mean sea level reached by floods in the flood plains of riverine areas.

Section 2. Application. This regulation shall apply to all base flood plains of the state.

Section 3. Establishing Flood Plains. (1) Base flood plains in the state will be identified in writing by the Natural Resources and Environmental Protection Cabinet. The Finance and Administration Cabinet will use this in determining whether a permit is to be issued.

Section 4. Abrogation and Greater Restrictions. This regulation is not intended to repeal, abrogate, or impair any existing state easements, covenants, or deed restrictions. Where this regulation and another state regulation conflict or overlap, whichever imposes the more stringent restrictions shall apply. Compliance with this regulation does not relieve responsibility for complying with other statutory requirements. All permits as required under CFR 44, Chapter 1, Section 60.3(a)(2) of

the National Flood Insurance Program must be obtained where applicable.

Section 5. Interpretation. In interpreting and applying this regulation, all provisions shall be construed in favor of the state.

Section 6. Warning and Disclaimer of Liability. This regulation shall not subject the state or any officer, agency or employee thereof to any liability for any damages from flooding that may occur or result from compliance with or reliance on this regulation or any administrative decision made hereunder.

Section 7. Development Permit. (1) The Secretary shall administer this regulation by granting, granting with conditions, refusing to grant, or otherwise determining the appropriate action as hereinafter provided, a development permit to state agencies proposing to undertake development activity within the base flood plain, excluding only those activities of the Department of Highways in the Transportation Cabinet relating to the acquiring of right-of-way for, and constructing and maintaining of highways.

(2) The Secretary of the Transportation Cabinet, subject to this regulation, shall grant, grant with conditions, or refuse to grant, a permit for development activities for the Department of Highways. The permit shall include a certification that it was issued pursuant to this regulation and a copy of it shall be provided to the Finance and Administration Cabinet.

Section 8. Flood Plain Management. (1) Every state agency (except as provided in Section 7) proposing development activity within the base flood plain shall notify the Finance and Administration Cabinet prior to initiating such activity. The notice shall contain a complete description of the proposed development and likely effects of it on the base flood plain; an explanation of why the development must be located in the flood plain, whether alternative sites were considered, and why alternative sites not in the flood plain were rejected.

(2) The plans and specifications for all construction covered by this regulation shall meet the following criteria:

(a) All development activity within a floodway, except as hereinafter provided, is prohibited. Necessary utilities are permitted. Except as provided in subparagraph 3 of this paragraph, the following are also permitted in the floodway only if their construction does not cause the flood to exceed the base flood elevation: necessary marine use facilities (other than buildings) when such construction is considered together with full usage of the floodway on the opposite bank; and bridges, with their appurtenances. Construction within the floodway must be designed to withstand at least the water velocity of the base flood. Dams are permitted only if the base flood plain is held entirely in fee simple. To meet the requirements of this regulation, the following methods shall be acceptable in order of preference:

1. Design the facility so there is no encroachment within the floodway;

2. Fully offset the effect of any encroachment into the floodway by stream improvements; or

3. Determine the increased backwater over the base flood elevation caused by an encroachment and secure any affected land by flood easement or fee simple purchase.

4. In areas where no floodway is designated, an engineering analysis must be conducted to establish an appropriate floodway or it must be demonstrated that the proposed development, in combination with all present and planned development, will not cause the flood to exceed the allowable base flood elevation. The methodology for conducting such an analysis may be obtained from FEMA.

5. If subparagraphs 2, 3, or 4 of this paragraph are used, new flood plain information must be provided to FEMA.

(b) Development outside the floodway limits, but in the remaining portion of the flood plain, is permitted as follows:

1. Water supply, sewage, electrical, gas, and all other utilities must be so located and constructed as to eliminate infiltration of flood waters which could damage the utilities. In the case of on site waste disposal systems, they shall also be located to avoid contamination from them during flooding.

2. All structures shall be anchored to prevent flotation, collapse, or lateral movement and constructed with materials resistant to flood damage by methods that minimize flood damage.

3. Electrical, heating, ventilation, plumbing, air conditioning equipment, and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

4. No manufactured home shall be allowed in the base flood plain.

5. Buildings shall be constructed so as to be protected to at least the base flood elevation. Flood protection for such buildings may consist of the following methods in order of preference:

a. Elevation of the lowest floor (including basement) using open works such as columns, walls, piles.

b. Elevation of the lowest floor (including basement) using fill.

c. For nonresidential buildings only, together with attendant utility and sanitary facilities, completely flood proofed watertight with walls substantially impermeable to the passage of water and with structural components able to resist the hydrostatic and hydrodynamic loads and buoyancy effects of the base flood. The adequacy of such flood proofing shall be certified by a professional engineer registered in Kentucky.

(c) New construction or substantial improvements of elevated buildings that include fully enclosed areas formed by foundation and other exterior walls below the base flood elevation shall be designed to preclude finished living space and designed to allow for the entry and exit of floodwaters to automatically equalize hydrostatic flood forces on exterior walls.

1. Designs for complying with these requirements must either be certified by a professional engineer or architect or meet the following minimum criteria:

a. Provide a minimum of two (2) openings having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding;

b. The bottom of all openings shall be no higher than one (1) foot above grade; and

c. Openings may be equipped with screens, louvers, valves or other coverings or devices provided they permit the automatic flow of floodwaters in both directions.

2.a. Electrical, plumbing, and other utility connections are prohibited below the base flood elevation;

b. Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage or maintenance equipment used in connection with the premises (standard exterior door) or entry to the living area (stairway or elevator); and

c. The interior portion of such enclosed area shall not be partitioned or finished into separate rooms.

(d) Standards for areas of shallow flooding (AO Zones). Located within the areas of special flood hazard are areas designated as shallow flooding areas. These areas have special flood hazards associated with base flood depths of one (1) to three (3) feet where a clearly defined channel does not exist and where the path of flooding is unpredictable and indeterminate; therefore, the following provisions apply:

1. All new construction and substantial improvements of residential structures shall have the lowest floor, including basement, elevated to the depth number specified on the Flood Insurance Rate Map, in feet, above the highest adjacent grade. If no depth number is specified, the lowest floor, including basement, shall be elevated, at least two (2) feet above the highest adjacent grade.

2. All new construction and substantial improvements or nonresidential structures shall:

a. Have the lowest floor, including basement, elevated to the depth number specified on the Flood Insurance Rate Map, in feet, above the highest adjacent grade. If no depth number is specified, the lowest floor, including basement shall be elevated at least two (2) feet above the highest adjacent grade; or

b. Together with attendant utility and sanitary facilities be completely flood-proofed to or above that level so that any space below that level is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

(e) Improvements to existing facilities are permitted within the flood plain provided:

1. For facilities located in the floodway, no additions, alterations, encroachments, or relocations will cause flood levels to increase.

2. Practical alternatives are considered and used to minimize or eliminate flood damages.

3. Facilities substantially improved shall meet all requirements of new development as contained in this section.

Section 9. Administrative Procedures. (1) Upon receipt and review by the secretary of notice from a state agency proposing development activity within the flood plain, the secretary shall: issue a development permit; issue such a permit with conditions; refuse to issue a permit and provide the reasons for denial; or, in his discretion, determine that such a permit is not required under this regulation.

(2) When a development permit for building construction is issued, the agency undertaking the development in accordance with the terms of the permit shall:

(a) Secure a certification from a land surveyor or professional engineer registered in Kentucky of the elevation of the lowest floor (including basement) or, if flood proofing is utilized, the actual level of flood proofing in relation to the mean sea level and provide the certificate to the secretary within thirty (30) days following its issuance.

(b) Secure certifications, as applicable under Section 8(2)(b)5c of this regulation and provide same to the secretary within sixty (60) days after completion of the building.

(3) The Finance and Administration Cabinet shall maintain for public inspection all certifications and permit records required by these regulations. (7 Ky.R. 695; Am. 813; eff. 4-1-81; 14 Ky.R. 1931; 2181; eff. 5-9-88.)

Federal Emergency Management Agency
Region IV
1371 Peachtree Street, NE, Suite 700
Atlanta, GA 30309

PROCEDURES FOR "NO-RISE" CERTIFICATION FOR PROPOSED DEVELOPMENTS IN REGULATORY FLOODWAYS

Section 60.3 (d) (3) of the National Flood Insurance Program (NFIP) regulations states that a community shall "prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base (100-year) flood discharge."

Prior to issuing any building grading or development permits involving activities in a regulatory floodway, the community must obtain a certification stating the proposed development will not impact the pre-project base flood elevations, floodway elevations, or floodway data widths. The certification should be obtained from the permittee and be signed and sealed by a professional engineer.

The engineering or "no-rise" certification must be supported by technical data. The supporting technical data should be based upon the standard step-backwater computer model utilized to develop the 100-year floodway shown on the community's effective Flood Insurance Rate Map or Flood Boundary and Floodway Map (FBFM) and the results tabulated in the community's Flood Insurance Study (FIS).

Although communities are required to review and approve the "no-rise" submittals, they may request technical assistance and review from the FEMA regional office. However, if this alternative is chosen, the community must review the technical submittal package and verify that all supporting data, listed in the following paragraphs, are included in the package before forwarding to FEMA.

To support a "no-rise" certification for proposed developments encroaching into the regulatory floodway, a community will require that the following procedures be followed:

Currently Effective Model

1. Furnish a written request for the step-backwater computer model for the specified stream and community, identifying the limits of the requested data. A fee will be assessed for providing the data. Send data requests to:

   Federal Emergency Management Agency
   1371 Peachtree Street N.E., Suite 735
   Atlanta, Georgia 30309

   or to:

   FIS Information Specialist
   Dewberry & Davis
   8401 Arlington Boulevard
   Fairfax, Virginia 22031-4666

Duplicate Effective Model

2. Upon receipt of the step-backwater computer model, the engineer should run the original step-backwater model to duplicate the data in the effective FIS.

Existing Conditions Model

3. Revise the original step-backwater model to reflect site specific existing conditions by adding new cross-sections (two or more) in the vicinity of the proposed development, without the proposed development in place. Floodway limits should be manually set at the new cross-section locations by measuring from the effective FIRM or FBFM. The cumulative reach lengths of the stream should also remain unchanged. The results of these analyses will indicate the 100-year floodway elevations for revised existing conditions at the proposed project site.

Proposed Conditions Model

4. Modify the revised existing conditions model to reflect the proposed development at the new cross-sections, while retaining the currently adopted floodway widths. The overbank roughness coefficients should remain the same unless a reasonable explanation of how the proposed development will impact Manning's "n" values should be included with the supporting data. The results of this floodway run will indicate the 100-year floodway elevations for proposed conditions at the project site. These results must indicate NO impact on the 100-year flood elevations, floodway elevations, or floodway widths shown in the Duplicate Effective Model or in the Existing Conditions Model.

The original FIS model, the duplicate effective FIS model, the revised existing conditions model, and the proposed conditions model should all produce the same exact results.

The "no-rise" supporting data and a copy of the engineering certification must be submitted to and reviewed by the appropriate community official prior to issuing a permit.

The "no-rise" supporting data should include, but may not be limited to:

a. Duplicate of the original FIS step-backwater model printout or floppy disk.

b. Revised existing conditions step-backwater model.

c. Proposed conditions step-backwater model.

d. FIRM and topographic map, showing floodplain and floodway, the additional cross-sections, the site location with the proposed topographic modification superimposed onto the maps, and a photocopy of the effective FIRM or FBFM showing the current regulatory floodway.

e. Documentation clearly stating analysis procedures. All modifications made to the original FIS model to represent revised existing conditions, as well as

those made to the revised existing conditions model to represent proposed conditions, should be well documented and submitted with all supporting data.

f. Copy of effective Floodway Data Table copied from the FIS report.

g. Statement defining source of additional cross-section topographic data and supporting information.

h. Cross-section plots, of the added cross sections, for revised existing and proposed conditions.

i. Certified planimetric (boundary survey) information indicating the location of structures on the property.

j. Copy of the microfiche, or other applicable source, from which input for original FIS HEC-2 model was taken.

k. Floppy disk with all input files.

l. Printout of output files from EDIT runs for all three floodway models.

The engineering "no-rise" certification and supporting technical data must stipulate NO impact on the 100-year flood elevations, floodway elevations, or floodway widths at the new cross-sections and at all existing cross-sections anywhere in the model. Therefore, the revised computer model should be run for a sufficient distance (usually one mile, depending on hydraulic slope of the stream) upstream and downstream of the development site to insure proper "no-rise" certification.

Attached is a sample "no-rise" certification form that can be completed by a registered professional engineer and supplied to the community along with the supporting technical data when applying for a development permit.

01-01-93	NO-RISE CERTIFICATE	EXHIBIT DR-02.950

ENGINEERING "NO-RISE" CERTIFICATION

This is to certify that I am duly qualified engineer licensed to practice in the State of Kentucky.

It is to further certify that the attached technical data supports the fact that proposed Bridge Construction (Name of Development) will not impact the 100-year flood elevations, floodway elevations and floodway widths on Levisa Fork of The Big Sandy River (Name of Stream) at published sections in the Flood Insurance Study for Floyd County (Name of Community), dated June, 1990 and will not impact the 100-year flood elevations, floodway elevations, and floodway widths at unpublished cross-sections in the vicinity of the proposed development.

May 15, 1993
(Date)

KRB
(Signature)

Drainage Engineer
(Title)

SEAL:

Frankfort, KY
(Address)

FEMA, NTHD
8/91

Federal Emergency Management Agency

Region IV
1371 Peachtree Street, NE, Suite 700
Atlanta, GA 30309

Data Request Checklist for A Conditional Letter of Map Revision

Requestor: _____ Date: _____

The information checked below in Column 1 is required to process the request for a conditional Letter of Map Revision. Information checked in Column 2 has been received and should not be resubmitted unless specifically requested.

(1) Req'd Data	(2) Rec'd Data		
_____	_____	1.	Initial fee for conditional Letter of Map Revision: (Checks made to UNITED STATES TREASURY.)
_____	_____	a.	New bridge or culvert (no channelization) $350
_____	_____	b.	Channel modifications only $400
_____	_____	c.	Channel modification and new bridge or culvert $525
_____	_____	d.	Levees, berms or other structural measures $675
X	_____	2.	A concise statement indicating the natural and extent of the proposed revision requested for the FIS/FIRM.
X	_____	3.	Letter from the community requesting a revision to the FIS/FIRM.
_____	_____	4.	State approval of the proposed revision.
X	_____	5.	A brief statement describing the methodology used to determine hydrologic and/or hydraulic parameters (revised existing and/or proposed).
X	_____	6.	New/Revised hydrologic analyses (including a Summary of Discharges table) for existing conditions.
X	_____	7.	New/Revised hydrologic analyses (including a Summary of Discharges table) for proposed conditions.
X	_____	8.	Hydraulic analyses (computer models - input and output) which duplicate the hydraulic analyses used for the effective FIS (baseline model) for the following frequency floods: 10-, 50-, 100-, and 500-year floods and floodway.

X		9.	New/Revised hydraulic analyses (computer models - input and output) for existing conditions for the following frequency floods: 10-, 50-, 100-, and 500-year floods and floodway.
X		10.	New/Revised hydraulic analyses (computer models - input and output) for proposed conditions for the following frequency floods: 10-, 50-, 100-, and 500-year floods and floodway.
X		11.	Certified topographic work map with existing and proposed topography showing revised existing and/or proposed 100- and 500 year flood boundaries, 100-year floodway, base flood elevations, cross sections, stream alignment, and road alignment.
X		12.	Annotated FIRM and/or Flood Boundary and Floodway Map (FBFM) showing revised existing and/or proposed 100- and 500-year flood boundaries, 100-year floodway, base flood alignment, and corporate limits.
X		13.	Annotated FIS flood profile(s) showing revised existing and/or proposed 10-, 50-, 100-, and 500-year flood profiles.
X		14.	Annotated FIS Floodway Data Table(s) showing revised existing and/or proposed floodway data.
X		15.	Certified construction plans for the proposed floodway modifications.
		16.	Certification from a Federal agency or registered professional engineer indicating proposed structural flood protection measures are adequately designed and will be maintained to withstand a 100-year flood.
		17.	A draft copy of an operation and maintenance plan for any proposed structural flood protection measures.
		18.	Written statement from the community indicating they will accept ultimate responsibility for maintenance of a structural flood protection system.
		19.	Study which addresses interior drainage for area to be protected by a proposed levee or dike system.

_____ _____ 20. Documentation supporting one of the following:

a. A public notice stating the community's intent to revise the floodway.

b. Evidence indicating the entire floodway revision is contained on the appellant's property.

_____ _____ 21. Other: _____

_____

_____

_____

** Please note the submittal of the items listed on the above list will initiate the review process. However, as the review progresses, you may be asked to submit additional information including, but not limited to, those data listed above.

01-01-93	RISK ASSESSMENT FORM	EXHIBIT DR-02.970

County: FLOYD	Route: U.S. 23	Station: 143+20
UPN:	FPN: FSP 036 0023 018-019	Item No: 12-123.0

LEVEL 1 - Qualitative assessment involving the application of hydrologic, hydraulic, and geomorphic factors to identify potential problems and alternative solutions.

Do Hydrology

Do Field Survey (i.e. bridge opening, roadway profile, stream profile, hydraulic sections, etc.)

Review (check) available documentation:
- ☒ Bridge Maintenance File
- ☐ Bridge Plans
- ☒ County Soils Study
- ☐ Old Drainage Folder
- ☒ Flood Insurance Maps
- ☒ Flood Insurance Study
- ☐ Geologic Maps
- ☐ Roadway Plans
- ☐ USCOE Study
- ☐ USGS Study
- Other: AERIAL PHOTO

Identify Problems: SCOUR UPSTREAM OF NORTHEAST ABUTMENT

Problems Solved? ☒ Yes ☐ No; if No, go to LEVEL 2

If the proposed structure is a new crossing, go to LEVEL 2

If the proposed crossing is >2 bridge widths up or downstream, > 1' grade change, > 50' (total bridge length) multispan, > 100' single span, or in a (Regulatory Floodway;) go to LEVEL 2

Replace with hydrologic, hydraulic, and geomorphically Equivalent Crossing

Document Design

LEVEL 2 - Quantitative analysis combined with a more detailed qualitative assessment of the hydrologic, hydraulic, and geomorphic factors of the stream.

List Design Controls (i.e. hydraulic, roadway, structure, surrounding property, etc.): HYDRAULIC, STRUCTURE

Do Stream Stability Analysis

Do Hydraulic Analysis

Do Scour Analysis

Were the Design Controls met? ☐ Yes ☒ No; if No, explain; then go to LEVEL 3: EXISTING FLOODWAY WIDTH < PROPOSED

If the deck area is > 125,000 square feet; go to LEVEL 3

If the existing or proposed structure is a unique bridge, foundation, etc.; go to LEVEL 3

Document Design

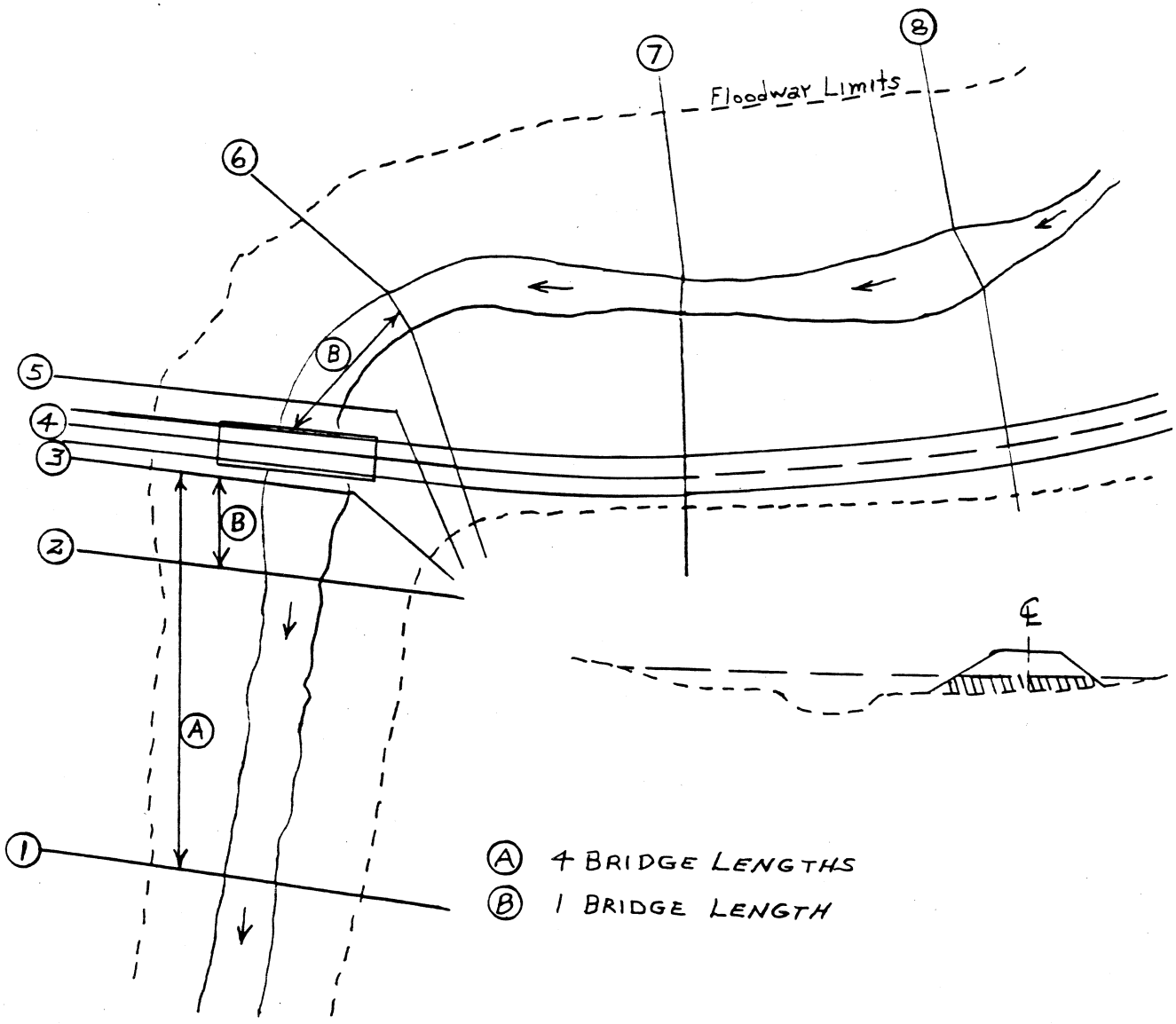
LEVEL 3 - Complex quantitative analysis based on detailed mathematical modeling and possibly physical hydraulic modeling. This analysis is necessary only for high risk locations, extra-ordinarily complex problems, and after the fact analyses where losses and liability costs are high.

Check if used:
- ☐ FESWMS Analysis
- ☒ Floodway Modification*
- ☐ Overflow structure(s)
- ☒ Risk Analysis
- Other:

*IF EXISTING FLOODWAY WIDTH < PROPOSED, PURCHASE FLOODWAY INCREASE.
IF EXISTING FLOODWAY ELEVATION < PROPOSED, PURCHASE FLOODPLAIN INCREASE.

Document Design

01-01-93	LOCATION OF HYDRAULIC SECTIONS	EXHIBIT DR-02.980



COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
ADAIR	ADAIR					
ADAIR	COLUMBIA					
ALLEN	ALLEN	210267	X			
ALLEN	SCOTTSVILLE	210001				X
ANDERSON	ANDERSON	210002	X			
ANDERSON	LAWRENCEBURG	210003	X			X
BALLARD	BALLARD	210268		X		X
BALLARD	BARLOW					
BALLARD	BLANDVILLE					
BALLARD	KEVIL					
BALLARD	LA CENTER					
BALLARD	WICKLIFFE	210006	X			
BARREN	BARREN	210334	X			
BARREN	CAVE CITY					
BARREN	GLASGOW	210007				X
BARREN	HISEVILLE					
BARREN	PARK CITY					
BATH	BATH	210008	X			
BATH	OWINGSVILLE					
BATH	SALT LICK	210009				X
BATH	SHARPSBURG					
BELL	BELL	210010		X	X	
BELL	MIDDLESBORO	215190		X	X	
BELL	PINEVILLE	210012			X	
BOONE	BOONE	210013		X		

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
BOONE	FLORENCE		X			X
BOONE	UNION	210270	X			
BOONE	WALTON					
BOURBON	BOURBON	210271		X	X	
BOURBON	MILLERSBURG	210014	X			
BOURBON	NORTH MIDDLETOWN					
BOURBON	PARIS	210015		X	X	
BOYD	BOYD	210016		X	X	
BOYD	ASHLAND	210017		X	X	
BOYD	CATTLETTSBURG	210018		X	X	
BOYLE	BOYLE	210322	X			
BOYLE	DANVILLE	210019				X
BOYLE	JUNCTION CITY					
BOYLE	PERRYVILLE	210020	X			
BRACKEN	BRACKEN	210021	X			
BRACKEN	AUGUSTA	210022		X		X
BRACKEN	BROOKVILLE					
BRACKEN	FOSTER		X			
BRACKEN	GERMANTOWN					
BREATHITT	BREATHITT	210023	X			
BREATHITT	JACKSON	210024	X			
BRECKINRIDGE	BRECKINRIDGE		X			
BRECKINRIDGE	CLOVERPORT	210026				X
BRECKINRIDGE	HARDINSBURG					
BRECKINRIDGE	IRVINGTON					
BULLITT	BULLITT	210273	X			

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
BULLITT	FOX CHASE					
BULLITT	HEBRON ESTATES					
BULLITT	HILLVIEW					
BULLITT	HUNTERS HOLLOW					
BULLITT	LEBANON JUNCTION	210304				X
BULLITT	MT. WASHINGTON					
BULLITT	PIONEER VILLAGE					
BULLITT	SHEPHERDSVILLE	210028	X			
BUTLER	BUTLER	210029				X
BUTLER	MORGANTOWN					
BUTLER	ROCHESTER					
BUTLER	WOODBURY					
CALDWELL	CALDWELL					
CALDWELL	FREDONIA				X	
CALDWELL	PRINCETON	210031	X			X
CALLOWAY	CALLOWAY		X			
CALLOWAY	HAZEL					
CALLOWAY	MURRAY	210032		X	X	
CAMPBELL	CAMBPBELL	210034		X	X	X
CAMPBELL	ALEXANDRIA					
CAMPBELL	BELLEVUE	210035		X	X	
CAMPBELL	CALIFORNIA	210036		X	X	
CAMPBELL	COLD SPRING					
CAMPBELL	CRESTVIEW					
CAMPBELL	DAYTON	210037		X	X	
CAMPBELL	FORT THOMAS		X			

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
CAMPBELL	HIGHLAND HEIGHTS					
CAMPBELL	MELBOURNE	210250		X	X	
CAMPBELL	MENTOR	210275		X	X	X
CAMPBELL	NEWPORT	210039		X	X	
CAMPBELL	SILVER GROVE	210040		X	X	
CAMPBELL	SOUTHGATE	210276	X			
CAMPBELL	WILDER	210041		X		X
CAMPBELL	WOODLAWN					
CARLISLE	CARLISLE	210042	X			
CARLISLE	ARLINGTON	210043	X			
CARLISLE	BARDWELL	210044	X			
CARROLL	CARROLL	210045	X		X	
CARROLL	CARROLLTON	210232		X		X
CARROLL	GHENT	210046	X	X		X
CARROLL	PRESTONSVILLE	210047	X	X		X
CARROLL	SANDERS	210048				X
CARROLL	WORTHVILLE	210049	X			X
CARTER	CARTER	210050		X		
CARTER	GRAYSON	210051		X		X
CARTER	OLIVE HILL	210052		X	X	
CASEY	CASEY	210053	X			
CASEY	LIBERTY	210054				X
CHRISTIAN	CHRISTIAN		X			
CHRISTIAN	CROFTON					
CHRISTIAN	HOPKINSVILLE	210055		X	X	X
CHRISTIAN	LA FAYETTE					

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
CHRISTIAN	OAK GROVE					
CHRISTIAN	PEMBROKE					
CLARK	CLARK	210278	X	X	X	
CLARK	WINCHESTER	210056		X	X	X
CLAY	CLAY	210057	X			
CLAY	MANCHESTER	210058				X
CLINTON	CLINTON	210327	X			
CLINTON	ALBANY	210059	X			X
CRITTENDON	CRITTENDON		X			
CRITTENDEN	MARION					
CUMBERLAND	CUMBERLAND	210060	X	X		
CUMBERLAND	BURKESVILLE	210061	X			X
DAVIESS	DAVIESS	210062		X	X	
DAVIESS	OWENSBORO	210063		X	X	
DAVIESS	WHITESVILLE					
EDMONSON	EDMONSON		X			
EDMONSON	BROWNSVILLE	210236	X			
ELLIOTT	ELLIOTT					
ELLIOTT	SANDY HOOK					
ESTILL	ESTILL					
ESTILL	IRVINE	210064	X			
ESTILL	RAVENNA	210319				X
FAYETTE	FAYETTE					
FAYETTE	LEXINGTON	210067		X	X	X
FLEMING	FLEMING					
FLEMING	EWING					

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
FLEMING	FLEMINGSBURG	210068				X
FLOYD	FLOYD	210069			X	
FLOYD	ALLEN	210070		X	X	
FLOYD	MARTIN	210071			X	
FLOYD	PRESTONSBURG	210072		X	X	
FLOYD	WAYLAND	210073		X	X	
FLOYD	WHEELWRIGHT	210074	X			X
FRANKLIN	FRANKLIN	210080		X	X	
FRANKLIN	FRANKFORT	210275		X		X
FULTON	FULTON		X			
FULTON	FULTON (CITY OF)	210336		X	X	
FULTON	HICKMAN	210077	X			
GALLATIN	GALLATIN		X			
GALLATIN	GLENCOE	210078	X			
GALLATIN	SPARTA	210079	X			
GALLATIN	WARSAW	210080	X	X		
GARRARD	GARRARD	210081	X			
GARRARD	LANCASTER	210082	X			X
GRANT	GRANT					
GRANT	CORINTH					
GRANT	CRITTENDEN					
GRANT	DRY RIDGE					
GRANT	WILLIAMSTOWN					
GRAVES	GRAVES	210282	X			
GRAVES	MAYFIELD	210083		X	X	
GRAVES	WATER VALLEY					

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
GRAVES	WINGO					
GRAYSON	GRAYSON	210330	X		X	X
GRAYSON	CANEYVILLE	210084	X			X
GRAYSON	CLARKSON					
GRAYSON	LEITCHFIELD	210085	X			
GREEN	GREEN					
GREEN	GREENSBURG		X			
GREENUP	GREENUP	210288			X	
GREENUP	BELLEFONTE					
GREENUP	GREENUP (CITY OF)	210084		X	X	
GREENUP	FLATWOODS	210087		X	X	
GREENUP	RACELAND	210089		X	X	X
GREENUP	RUSSELL	210090		X	X	X
GREENUP	SOUTH SHORE	210091		X	X	
GREENUP	WORTHINGTON			X	X	X
GREENUP	WURTLAND	210085		X	X	
HANCOCK	HANCOCK					
HANCOCK	HAWESVILLE	210239	X	X		X
HANCOCK	LEWISPORT	210093	X	X		X
HARDIN	HARDIN	210094		X		X
HARDIN	ELIZABETHTOWN	210095			X	
HARDIN	MULDRAUGH					
HARDIN	RADCLIFF	210366				
HARDIN	SONORA					
HARDIN	UPTON					
HARDIN	VINE GROVE	210096	X			

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
HARDIN	WEST POINT	210097		X		
HARLAN	HARLAN	210098		X	X	X
HARLAN	BENHAM	210099		X		X
HARLAN	CUMBERLAND	210100				X
HARLAN	EVARTS	210101		X	X	
HARLAN	HARLAN (CITY OF)	210102		X	X	
HARLAN	LOYALL	215189	X			X
HARLAN	LYNCH	210104		X		X
HARLAN	WALLINS CREEK	215192		X	X	
HARRISON	HARRISON	210329		X	X	
HARRISON	BERRY		X			
HARRISON	CYNTHIANA	210107		X	X	
HART	HART	210257	X			
HART	BONNEVILLE	210108	X			X
HART	HORSE CAVE					
HART	MUNFORDVILLE	210243	X			X
HENDERSON	HENDERSON	210286		X		X
HENDERSON	CORYDON					
HENDERSON	HENDERSON (CITY OF)	210109	X	X	X	
HENRY	HENRY	210110	X			
HENRY	CAMPBELLSBURG					
HENRY	EMINENCE					
HENRY	NEW CASTLE					
HENRY	PLEASUREVILLE					
HENRY	SMITHFIELD					
HICKMAN	HICKMAN	210338	X			

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
HICKMAN	CLINTON	210111	X			X
HICKMAN	COLUMBUS					
HOPKINS	HOPKINS	210112	X			
HOPKINS	DAWSON SPRINGS	210113	X			
HOPKINS	EARLINGTON	210114	X			
HOPKINS	HANSON					
HOPKINS	MADISONVILLE	210115	X			
HOPKINS	MORTONS GAP					
HOPKINS	NEBO					
HOPKINS	NORTONVILLE	210305	X			X
HOPKINS	ST. CHARLES	210320				X
HOPKINS	WHITE PLAINS					
JACKSON	JACKSON	210118	X			
JACKSON	ANNVILLE					
JACKSON	MCKEE	210119	X			X
JEFFERSON	JEFFERSON(exc. below)	210120		X	X	
JEFFERSON	JEFFERSONTOWN	210121				X
JEFFERSON	LOUISVILLE	210122		X	X	
JEFFERSON	SHIVELY	210124		X		X
JEFFERSON	ST. MATTHEWS	210123	X			X
JESSAMINE	JESSAMINE	210125		X	X	X
JESSAMINE	NICHOLASVILLE	210126	X	X		X
JESSAMINE	WILMORE	210311	X	X		
JOHNSON	PAINTSVILLE	210127		X	X	
JOHNSON	JOHNSON	210339		X		X
KENTON	KENTON	210128		X	X	

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
KENTON	BROMLEY	210253		X	X	
KENTON	COVINGTON	210129		X	X	
KENTON	CRESCENT PARK					
KENTON	CRESCENT SPRINGS					
KENTON	CRESTVIEW HILLS					
KENTON	EDGEWOOD					
KENTON	ELSMERE					
KENTON	ERLANGER					
KENTON	FAIRVIEW					
KENTON	FORT WRIGHT	210249		X	X	
KENTON	FORT MITCHELL					
KENTON	INDEPENDENCE	210240		X	X	
KENTON	KENTON VALE					
KENTON	LAKESIDE PARK					
KENTON	LATONIA LAKES					
KENTON	LUDLOW	210266		X	X	
KENTON	PARK HILLS					
KENTON	RYLAND HEIGHTS					
KENTON	TAYLOR MILL	210246		X		X
KENTON	VILLA HILLS					
KENTON	VISALIA					
KNOTT	KNOTT	210340	X			
KNOTT	HINDMAN	210130	X			
KNOTT	PIPPA PASSES					
KNOX	KNOX	210131		X		X
KNOX	BARBOURVILLE	210132		X		X

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
KNOX	CORBIN	210227		X		X
LARUE	LARUE	210288	X			
LARUE	HODGENVILLE	210133	X			
LAUREL	LAUREL	210134	X	X		X
LAUREL	LONDON					
LAWRENCE	LAWRENCE	210258		X	X	X
LAWRENCE	BLAINE					
LAWRENCE	LOUISA	210241			X	X
LEE	LEE	210135	X			
LEE	BEATTYVILLE	210136		X	X	
LESLIE	LESLIE	210324	X			
LESLIE	HYDEN	210137	X			
LETCHER	LETCHER	210289	X			
LETCHER	BLACKEY					
LETCHER	FLEMING-NEON	210290	X			X
LETCHER	JENKINS	210138	X			X
LETCHER	WHITESBURG	210140	X	X		X
LEWIS	LEWIS	210141		X		X
LEWIS	CONCORD					
LEWIS	VANCEBURG	210142	X	X		X
LINCOLN	LINCOLN	210325	X			
LINCOLN	CRAB ORCHARD					
LINCOLN	HUSTONVILLE	210144				X
LINCOLN	STANFORD	210145			X	
LIVINGSTON	LIVINGSTON		X			
LIVINGSTON	CARRSVILLE					

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
LIVINGSTON	GRAND RIVERS					
LIVINGSTON	SALEM					
LIVINGSTON	SMITHLAND	210147	X	X		X
LOGAN	LOGAN	210341	X			
LOGAN	ADAIRVILLE	210353	X			
LOGAN	AUBURN	210148	X			X
LOGAN	LEWISBURG	210149	X			X
LOGAN	RUSSELLVILLE	210150		X	X	X
LYON	LYON					
LYON	EDDYVILLE					
LYON	KUTTAWA					
MADISON	MADISON	210342	X			X
MADISON	BEREA	210156	X	X		X
MADISON	RICHMOND	210157				X
MAGOFFIN	MAGOFFIN			X	X	X
MAGOFFIN	SALYERSVILLE	210159		X		X
MARION	MARION	210160	X			X
MARION	BRADFORDSVILLE	210116				X
MARION	LEBANON	210162	X			
MARION	LORETTO					
MARION	RAYWICK					
MARSHALL	MARSHALL	210252				X
MARSHALL	BENTON	210163	X	X		X
MARSHALL	CALVERT CITY	210164		X	X	
MARSHALL	HARDIN					
MARTIN	MARTIN	210116	X	X		X

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
MARTIN	INEZ	210362		X	X	X
MARTIN	WARFIELD	210364		X	X	X
MASON	MASON	201259	X			
MASON	DOVER	210167	X			
MASON	MAYSVILLE	210168				X
MASON	SARDIS					
MASON	WASHINGTON					
MCCRACKEN	MCCRACKEN	210151		X	X	X
MCCRACKEN	LONE OAK					
MCCRACKEN	PADUCAH	210152		X	X	
MCCREARY	MCCREARY	210343	X			
MCLEAN	MCLEAN	210153	X	X		X
MCLEAN	CALHOUN	210154	X			X
MCLEAN	ISLAND					
MCLEAN	LIVERMORE	210155	X			X
MCLEAN	SACRAMENTO					
MEADE	MEADE	210169	X	X		X
MEADE	BRANDENBURG	210170	X			X
MEADE	EKRON					
MENIFEE	MENIFEE					
MENIFEE	FRENCHBURG					
MERCER	MERCER	210306	X	X		
MERCER	BURGIN	210171	X			
MERCER	HARRODSBURG	210172	X			
METCALFE	METCALFE					
METCALFE	EDMONTON	210173				X

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
MONROE	MONROE					
MONROE	FOUNTAIN RUN					
MONROE	GAMALIEL					
MONROE	TOMPKINSVILLE					
MONTGOMERY	MONTGOMERY	210326	X			
MONTGOMERY	CAMARGO					
MONTGOMERY	JEFFERSONVILLE		X			
MONTGOMERY	MT. STERLING	210234				X
MORGAN	MORGAN	210292	X			
MORGAN	WEST LIBERTY	210174	X			X
MUHLENBURG	MUHLENBURG	210293	X	X		X
MUHLENBURG	BREMEN					
MUHLENBURG	CENTRAL CITY	210175	X			X
MUHLENBURG	DRAKESBORO					
MUHLENBURG	GREENVILLE	210176	X			
MUHLENBURG	POWDERLY					
MUHLENBURG	SOUTH CARROLLTON	210194	X			
NELSON	NELSON	210177		X	X	
NELSON	BARDSTOWN	210178		X	X	
NELSON	BLOOMFIELD	210179		X	X	
NELSON	FAIRFIELD					
NELSON	NEW HAVEN	210180	X	X		
NICHOLAS	NICHOLAS	210181				X
NICHOLAS	CARLISLE	210182	X			X
OHIO	OHIO	210183	X	X		X
OHIO	BEAVER DAM	210184				X

COUNTY	COMMUNITY	FIP NO.	F H B M	F I S	F B F M	F I R M
OHIO	CENTERTOWN					
OHIO	FORDSVILLE					
OHIO	HARTFORD	210357				X
OHIO	MCHENRY	210233	X			
OHIO	ROCKPORT	210245	X			
OLDHAM	OLDHAM	210185	X	X		
OLDHAM	CRESTWOOD					
OLDHAM	GOSHEN					
OLDHAM	LA GRANGE					
OLDHAM	ORCHARD GRASS HILLS					
OLDHAM	PARK LAKE					
OLDHAM	PEWEE VALLEY					
OLDHAM	RIVER BLUFF					
OWEN	OWEN	210186	X			
OWEN	GRATZ	210321	X			
OWEN	MONTEREY	210295				X
OWEN	OWENTON					
OWSLEY	OWSLEY	210296	X			
OWSLEY	BONNEVILLE	210187	X			
PENDLETON	PENDLETON		X			
PENDLETON	BUTLER	210188	X			X
PENDLETON	FALMOUTH	210189	X			X
PERRY	PERRY	215191		X	X	
PERRY	HAZARD	210188		X	X	
PERRY	VICCO	210192				X
PIKE	PIKE	210298		X	X	X

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
PIKE	COAL RUN	210263		X	X	X
PIKE	ELKHORN CITY	210356	X	X	X	X
PIKE	PIKEVILLE	210193		X		
POWELL	POWELL	210194	X			X
POWELL	CLAY CITY	210195	X			X
POWELL	STANTON	210196	X	X		
PULASKI	PULASKI	210197	X			
PULASKI	BURNSIDE					
PULASKI	EUBANK					
PULASKI	FERGUSON					
PULASKI	SCIENCE HILL					
PULASKI	SOMERSET	210199				X
ROBERTSON	ROBERTSON	210200	X			
ROBERTSON	MT. OLIVET					
ROCKCASTLE	ROCKCASTLE					
ROCKCASTLE	BRODHEAD	210201	X			
ROCKCASTLE	LIVINGSTON	210202				X
ROCKCASTLE	MT. VERNON					
ROWAN	ROWAN	210203		X	X	X
ROWAN	LAKEVIEW HEIGHTS					
ROWAN	MOREHEAD	210204		X	X	
RUSSELL	RUSSELL	210205	X	X		
RUSSELL	JAMESTOWN	210206	X			X
RUSSELL	RUSSELL SPRINGS					
SCOTT	SCOTT	210207		X	X	
SCOTT	GEORGETOWN	210208		X	X	X

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
SCOTT	SADIEVILLE	210260		X		
SCOTT	STAMPING GROUND	210261		X	X	
SHELBY	SHELBY	210209	X			
SHELBY	SHELBYVILLE					
SHELBY	SIMPSONVILLE					
SIMPSON	SIMPSON	210316	X			
SIMPSON	FRANKLIN	210210				X
SPENCER	SPENCER	210211	X			
SPENCER	TAYLORSVILLE	210247	X			
TAYLOR	TAYLOR	210212	X	X		X
TAYLOR	CAMPBELLSVILLE	210213	X			X
TODD	TODD					
TODD	ALLENVILLE					
TODD	ELKTON					
TODD	GUTHRIE	210214	X			X
TODD	TRENTON					
TRIGG	TRIGG	210315	X			
TRIGG	CADIZ	210354	X			
TRIMBLE	TRIMBLE	210300	X			
TRIMBLE	BEDFORD					
TRIMBLE	MILTON	210215	X	X		
UNION	UNION		X			
UNION	MORGANFIELD	210216	X			X
UNION	STURGIS	210217	X			
UNION	UNIONTOWN	210218	X			
UNION	WAVERLY					

COUNTY	COMMUNITY	FIP NO.	FHBM	FIS	FBFM	FIRM
WARREN	WARREN	210312		X		X
WARREN	BOWLING GREEN	210219		X		X
WARREN	OAKLAND					
WARREN	PLUM SPRINGS					
WARREN	SMITHS GROVE					
WARREN	WOODBURN					
WASHINGTON	WASHINGTON	210365				
WASHINGTON	MACKVILLE					
WASHINGTON	SPRINGFIELD	210220	X			X
WASHINGTON	WILLISBURG					
WAYNE	WAYNE	210348				X
WAYNE	MONTICELLO	210221				X
WEBSTER	WEBSTER					
WEBSTER	CLAY	210222	X			X
WEBSTER	DIXON					
WEBSTER	PROVIDENCE	210223	X			X
WEBSTER	SEBREE	210224				X
WEBSTER	SLAUGHTERS	210225	X			X
WEBSTER	WHEATCROFT	210248	X			
WHITLEY	WHITLEY	210226	X	X	X	X
WHITLEY	WILLIAMSBURG	210228	X			
WOLFE	WOLFE					
WOLFE	CAMPTON	210229				X
WOODFORD	WOODFORD	210230		X	X	X
WOODFORD	MIDWAY					
WOODFORD	VERSAILLES	210231	X			

COMMUNITIES IN THE FLOOD INSURANCE PROGRAM June 9, 1993

PUBLISHED SOIL SURVEYS
KENTUCKY
DECEMBER 1987

Adair - 1964
Anderson and Franklin - 1985
Ballard and McCracken - 1976
Barren - 1969
Bath - 1963 (1958)
Boone, Campbell, and Kenton - 1973
Bourbon and Nicholas - 1982
Boyd and Greenup - 1979
Boyle and Mercer - 1983
Bullitt and Spencer - 1986
Caldwell - 1966
Calloway and Marshall - 1973
Campbell (Boone, Campbell and Kenton)
Carroll, Gallatin, and Owen - 1976
Carter - 1983
Christian - 1980
Clark - 1964
Daviess and Hancock - 1974
Elliott - 1965
Estill and Lee - 1974
Fayette - 1968
Fourteen Co. Eastern Ky. Reconnaissance - 1963
Franklin (Anderson and Franklin)
Fulton - 1964
Gallatin (Carroll, Gallatin, and Owen) - 1976
Grant and Pendleton - 1980
Graves - 1953
Grayson - 1972
Green and Taylor - 1982
Greenup (Boyd and Greenup) - 1979
Hancock (Daviess and Hancock)
Hardin and Larue - 1979
Harrison - 1968
Henderson - 1967
Henry and Trimble - 1992
Hopkins - 1977
Jefferson - 1966
Jessamine and Woodford - 1983
Kenton (Boone, Campbell, and Kenton) - 1973
Larue (Hardin and Larue) - 1979

Laurel and Rockcastle - 1981
Lee (Estill and Lee) - 1974
Leslie and Perry - 1982
Logan - 1975
Lyon and Trigg - 1981
Madison - 1973
Marshall (Calloway and Marshall) - 1973
Mason - 1986
McCracken (Ballard and McCracken) - 1976
Knox and Eastern Part of Whitley County - 1988
McCreary-Whitley (Western half of Whitley) - 1970
McLean and Muhlenberg - 1980
Menifee and Rowan and Northwestern Morgan - 1974
Mercer (Boyle and Mercer) - 1983
Metcalfe - 1967
Monroe - 1982
Montgomery - 1986
Morgan-Northwestern (Menifee, Rowan and Northwestern Morgan)
Muhlenberg (McLean and Muhlenberg) - 1980
Nelson - 1971
Nicholas (Bourbon and Nicholas) - 1982
Ohio - 1987
Oldham - 1977
Owen (Carroll, Gallatin and Owen) - 1976
Pendleton (Grant and Pendleton) - 1980
Perry (Leslie and Perry) - 1981
Pike - 1990
Pulaski - 1974
Rockcastle (Laurel and Rockcastle) - 1981
Rowan (Menifee and Rowan and Northwestern Morgan) - 1974
Russell - 1982
Scott - 1977
Shelby - 1980
Simpson - 1985
Taylor (Green and Taylor) - 1982
Todd - 1987
Trigg (Lyon and Trigg) - 1981
Trimble(Henry and Trimble)-1992
Union and Webster - 1981
Warren - 1981
Washington - 1986
Wayne - 1990
Webster (Union and Webster) - 1981
Whitley (Eastern Half) (Knox-Whitley)

Whitley-Western half (McCreary-Whitley) - 1970
Woodford (Jessamine and Woodford) - 1983
* Either out of print or in limited supply with remaining copies in appropriate county conservation district office.