Supplemental Material for Part III:

ENVIRONMENTAL ISSUES

The Missouri Clean Water Commission

Channel Modification Guidelines

MISSOURI DEPARTMENT OF NATURAL RESOURCES
Water Pollution Control Program

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MISSOURI CLEAN WATER COMMISSION

CHANNEL MODIFICATION GUIDELINES

The Clean Water Commission and the Department of Natural Resources recognize that stream channelization can have an adverse effect on water quality. Channelization can result in an increase in stream bank erosion and erosion in upstream reaches and tributaries. Channelization causes turbidity, changes in water color, sediment deposition, changes of water temperature, changes of dissolved oxygen concentration, reduction of habitat for aquatic life, and loss of wetland. In Missouri, more than 2,200 stream miles have been lost to channelization.

The Clean Water Commission and its staff will review channel modification projects for conformity with the following guidelines prior to issuing Section 401 Water Quality Certification or making other water quality determinations. Section 401 Water Quality Certification is required for Section 404 permits for placement of dredged or fill material as provided under the Clean Water Act (Public Law 95-217).

When channel modification is necessary, proper planning to minimize damages to water quality must be utilized. Persons considering any channel modification should address the following alternatives in order to select the most environmentally favorable solution practicable for the particular situation. It is recommended that the alternatives be addressed in an engineering or hydrologic report. The alternatives are listed in ascending order of effects to stream bed and bank stability, water quality, velocity of flow, and the designated uses of the stream. Other professionally developed channel modification alternatives which minimize the effects on water quality will be considered if submitted as part of the engineering or hydrologic report.

1. Riprapping and Other Bank Protection Measures - Riprapping is the placement of irregular permanent material, such as rock, in critical areas along a watercourse to minimize further bank erosion. Other measures may include use of rock hardpoints, jetties, bankline revetments, pilings, and similar structures.

2. Selective Snagging - Selective removal of obstructions from the channel and stream banks to increase the hydraulic capacity of the stream.

3. Clearing and Snagging - The removal of obstructions from the channel and stream banks, including vegetation, to increase the stream's hydraulic capacity.

4. Widening - Enlarging the cross-sectional dimensions of a channel to restore or increase its hydraulic capacity. Widening may involve clearing and snagging.

   A. Widening should be performed on one side only, where practicable.

   B. Widening should not directly effect the bottom of the existing channel.

   C. Widening should maintain the course of natural stream meanders.

   D. Erodible banks should be stabilized with permanent vegetation or riprap to prevent erosion.

5. Deepening - Increasing the depth of a limited area of a channel to increase its hydraulic capacity and improve drainage. Deepening frequently involves clearing and snagging.

6. By-pass Channel Development - Excavation of a supplemental channel to carry excess flows.

   A. The by-pass channel should carry flow only during periods of high flow and should be stabilized by using riprap or permanent vegetation in order to prevent erosion.

   B. Stream flows should be maintained in the old channel during normal flow conditions.

   C. The structure allowing the divergence of excess flows to the by-pass channel should be maintained.

   D. Grade stabilization structures or other methods should be employed to reduce the impact of gradient changes.

7. Channel Realignment - Construction of a new channel to restore or increase the capacity of the stream to carry water; this may include the substantial modification of the existing channel.

   A. The engineering or hydrologic report should demonstrate that the minimum amount of stream channel will be realigned to accomplish the intended purpose of the project.

   B. The cross-sectional area of the new channel should be equal to or greater than the cross-sectional area of the old channel which it replaces or the engineering or hydrologic report should demonstrate that a smaller cross-sectional area will provide adequate carrying capacity for expected high flows.

C. Generally, the cross-sectional area of the new channel should be constant for each design reach. On large channel realignment projects, the engineering study should address channel dimensions to demonstrate that velocities at bank-full will not create unstable conditions.

D. Any bends in the new channel should be constructed so that the radius of the bends, as measured from the center of the channel, is equal to or greater than ten times the width of the channel at bank-top.

E. Channel banks should be constructed with a 3 to 1 horizontal to vertical slope and should be stabilized by using riprap or permanent vegetation. The use of steeper channel bank slopes should be justified in the engineering or hydrologic report.

F. Grade stabilization structures or other methods should be employed to reduce the impact of gradient changes.

A stream, its channel configuration, and its adjacent floodplain, including wetlands and riparian vegetation, are interrelated portions of a dynamic ecosystem which constitute a valuable natural resource. Water quality is an integral part of this ecosystem. The antidegradation policy requires that "... Existing instream water uses be maintained and protected. No further water quality degradation which would interfere with or become injurious to existing instream water uses is allowable ..." (10 CSR 20-7.031 Missouri Water Quality Standards). In evaluating requests for 401 certifications for projects proposing stream modifications, the need to maintain a viable, naturally functioning ecosystem will be balanced with food and fiber, economic and other social needs. Channel modification projects will be given especially careful review in designated high quality waters or in other areas with outstanding ecological recreational or aesthetic value.

Section 404 of the Clean Water Act exempts certain activities from the permit requirements. These include routine agricultural activities, construction or maintenance of farm or stock ponds and irrigation or drainage ditches, and certain land or water transportation activities. Section 404 should be consulted for the list of specific exemptions.

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