CHAPTER 3
POLICY

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3.1 OVERVIEW

3.1.1 Introduction
Drainage concerns are one of the most important aspects of highway design and construction. The purpose of this chapter is to outline specific policies which, when carried out, will provide an appropriate level of consideration for the multitude of variables that influence drainage design.

3.1.2 Policy versus Criteria
Policy and criteria statements are frequently closely related; criteria being Colorado Department of Transportation (CDOT) numerical or specific guidance that is founded in broad policy statements. For this design manual, the following definitions of policy and criteria will be used.

**Policy** is a definite course of action or method of action, selected to guide and determine present and future decisions. Only the Transportation Commission can set CDOT policy.

**Design Criteria** are the standards by which a policy is carried out or placed in action. Thus design criteria are needed for design, while policy statements are not.

The following is an example of a policy statement:

"The designer will size the drainage structure to accommodate a flood compatible with the projected traffic volumes."

The design criteria for designing the structure might be:

"In rural areas that experience 50-year recurrence interval flood discharges (Q\textsubscript{50}) greater than or equal to 4,000 cfs, cross drainage structures for two lane roads shall be designed for a 50-year flood (exceedance probability of 2 percent); for areas that experience Q\textsubscript{50} less than 4,000 cfs, cross drainage structure shall be designed for a 25-year flood (exceedance probability of 4 percent)."

3.2 GENERAL HYDRAULIC DESIGN POLICIES

3.2.1 General Policies
Hydrologic analysis and hydraulic analysis set forth the design process representative of the present "standard engineering practice". Engineering evaluation outlines the approach to be followed by a competent and prudent designer in evaluating, selecting, and approving a final design. The following policies are made in regard to the design process.

- It is the designer's responsibility to provide an adequate drainage structure. The designer is not required to provide a structure that will handle all conceivable flood flows under all possible site conditions.
- The detail of design studies should be commensurate with the risk associated with the encroachment and with other economic, engineering, social, or environmental concerns.
- The design flood and in some cases the overtopping flood may serve as criteria for evaluating the adequacy of a proposed design. The "overtopping flood" is the smallest recurrence interval flood that
will result in flow over the highway or other watershed boundary. The overtopping flood flow is the flow that overtops the highway or other watershed boundary limit. The "design flood" is the recurrence interval of the flood for which the drainage structure is sized; to assure that no traffic interruption or significant damage will result. The overtopping flood and the design flood may vary widely depending on the grade, alignment and classification of the road and the characteristics of the water course and floodplain.

- The predicted value of the 100-year or base flood serves as the present engineering standard for evaluating flood hazards and as the basis for regulating flood plains under the National Flood Insurance Program. The designer must make a professional judgment as to the degree of risk that is tolerable for the base flood on a case-by-case basis.

- The developed hydraulic performance curve of a drainage structure depicts the relationship between floodwater stage elevation and flood flow magnitudes and frequencies. The performance curve should include the 100-year flood. With the performance curve, the designer can evaluate the adequacy of the design for a range of flows and take into consideration errors of estimate in the hydrologic estimating procedure. It is standard engineering practice to use the predicted value of the 100-year flood as the basis for evaluating flood hazards; however, flows larger than this value may be considered for complex, high risk or unusual cases that require special studies or risk analyses.

3.3 FEDERAL POLICIES

3.3.1 Introduction

The following section lists the federal legislation that contains the federal policies that might affect drainage design and construction. This section gives the legislative reference, regulations reference, purpose, applicability, general procedures, and agency for coordination and consultation. For more detailed information about specific federal policies, the applicable legislation should be consulted. Abbreviations are given in subsection 3.3.2.

3.3.2 Abbreviations

The following are the abbreviations used in the descriptions of federal policies given below:

- BIA - Bureau of Indian Affairs;
- BLM - Bureau of Land Management;
- CEQ - Council on Environmental Quality;
- CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act;
- CFR - Code of Federal Regulations;
- DOA - Department of the Army;
- DOD - Department of Defense;
- DOI - Department of the Interior;
- DOT - Department of Transportation;
- EPA - Environmental Protection Agency;
- FEMA - Federal Emergency Management Agency;
- FHPM - Federal-Aid Highway Program Manual;
- FHWA - Federal Highway Administration;
- FIFRA - Federal Insecticide, Fungicide, and Rodenticide Act;
- FWPCA - Federal Water Pollution Control Act;
- FWS - Fish and Wildlife Service;
- HUD - Housing and Urban Development;
3.3.3 **Environmental Policies**

FHWA sets forth the regulations under 23 CFR 650. CDOT abides by these regulations.


   *Purpose.* Consider environmental factors through systematic interdisciplinary approach before committing to a course of action.

   *Applicability.* All highway projects.


   *Coordination.* Appropriate federal, state, and local agencies.

2. **Section 4(f) of the Department of Transportation Act**: 23 USC 138, 49 USC 303 (P.L. 100-17,97-449, and 86-670), 23 CFR 771.135.

   *Purpose.* Preserve publicly-owned parklands, waterfowl and wildlife refuges, and all historic areas.

   *Applicability.* Significant publicly owned parklands, recreation areas, wildlife and waterfowl refuges, and all significant historic sites used for a highway project.

   *General Procedures.* Specific finding required: (1) selected alternative should avoid protected areas, unless not feasible or prudent; and (2) includes all possible planning to minimize harm.

   *Coordination.* DOI, DOA, HUD, state, or local agencies having jurisdiction, and State Historic Preservation Officer (for historic sites).

Purpose. To assure that possible adverse, economic, social, and environmental effects of proposed highway projects and project locations are fully considered and that final decisions on highway projects are made in the best overall public interest.

Applicability. To the planning and development of proposed projects on any federal-aid system for which the FHWA approves the plans, specifications, and estimates, or has the responsibility for approving a program.

General Procedures. (1) Identification of social, economic, and environmental effects, (2) Consideration of alternative courses of action, (3) involvement of other agencies and the public, and (4) Systematic interdisciplinary approach. The report required by Section 128, on the consideration given to the social, economic and environmental impacts of the project, may serve as part of the NEPA compliance document.

Coordination. Appropriate federal, state, and local agencies.


Purpose. To ensure adequate opportunity for public hearings on the social, economic and environmental effects of alternative project locations and major design features, as well as the consistency of the project with local planning goals and objectives.

Applicability. Public hearings or hearing opportunities are required for projects described in each state's FHWA approved public involvement procedures.

General Procedures. Public hearings or opportunities for public hearings during the consideration of highway location and design proposals are conducted as described in the state's FHWA-approved, public involvement procedures. States must certify to FHWA that such hearings or the opportunity have been held and must submit a hearing transcript to FHWA.

Coordination. Appropriate federal, state, and local agencies.

5. Surface Transportation and Uniform Relocation Assistance Act of 1987: Section 123(f) Historic Bridges 23 U.S.C: 144(o) (P.L. 100-17).

Purpose. Complete an inventory of on- and off-system bridges to determine their historic significance. Encourage the rehabilitation, reuse, and preservation of historic bridges.

Applicability. Any bridge that is listed on, or eligible for listing on, the National Register of Historic Places.

General Procedures. (1) Identify historic bridges on and off system, (2) Seek to preserve or reduce impact to historic bridges, and (3) Seek a recipient prior to demolition.

Coordination. State Historic Preservation Officer and Advisory Council on Historic Preservation.


Purpose. To encourage the use of native wildflowers in highway landscaping.

Applicability. Wildflowers are to be planted on any landscaping project undertaken on the federal-aid highway system.
General Procedures. At least 1/4 of 1 percent of funds expended on a landscaping project must be used to plant wildflowers on that project.

Coordination. Appropriate federal and state agencies.

3.3.4 Health Policies


Purpose. Ensure public health and welfare through safe drinking water.

Applicability. (1) All public drinking water systems and reservoirs (including rest area facilities), and (2) Actions which may have a significant impact on an aquifer or wellhead protection area which is the sole or principal drinking water source, as designated through the Federal Register process.

General Procedures. (1) Compliance with national primary drinking water regulations, (2) Compliance with state wellhead protection plans, and (3) Compliance with MOA’s between EPA and FHWA covering specific sole-source aquifers.

Coordination. EPA and appropriate state agency.

3.3.5 Land and Water Usage


Purpose. Preserve and protect wilderness areas in their natural condition for use and enjoyment by present and future generations.

Applicability. All lands designated as part of the wilderness system by Congress.

General Procedures. Apply for modification or adjustment of wilderness boundary by either Secretary of the Interior or Agriculture, as appropriate.

Coordination. Agriculture (USFS), DOI (FWS, NPS, BLM), and state agencies.


Purpose. Preserve and protect wild and scenic rivers and immediate environments for benefit of present and future generations.

Applicability. All projects that affect designated and potential wild, scenic, and recreational rivers, and/or immediate environments.

General Procedures. Submit project plans and reports to appropriate federal agency.

Coordination. DOI (NPS) and/or Agriculture (USFS), state agencies.


Purpose. Preserve, develop, and assure the quality and quantity of outdoor recreation resources for present and future generations.
Applicability. All projects that impact recreational lands purchased or improved with land and water conservation funds.

General Procedures. The Secretary of the Interior must approve any conversion of property acquired or developed with assistance under this act to other than public, outdoor recreation use.

Coordination. DOI, state agencies.


Purpose. To avoid direct or indirect support of new construction in wetlands wherever there is a feasible alternative.

Applicability. Federally undertaken, financed, or assisted construction and improvements in or with significant impacts on wetlands.


Coordination. DOI (FWS), EPA, USCE, NMFS, NRCS state agencies.


Purpose. To promote the conservation of wetlands in the U.S. in order to maintain the public benefits they provide.

Applicability. All projects that may impact wetlands.

General Procedures. (1) Preparation of a National Wetlands Priority Conservation Plan that provides priority with respect to federal and state acquisition, and (2) Provides direction for the National Wetlands Inventory Project.

Coordination. FWS.


Purpose. Provide for outdoor recreation needs and encourage outdoor recreation.

Applicability. Projects affecting national recreational, scenic, or side trails designated by Congress and lands through which such trails pass.

General Procedures. (1) Apply for right-of-way easement from the Secretary of Interior or Agriculture, as appropriate, (2) Ensure that potential trial properties are made available for use as recreational and scenic trails.

Coordination. DOI (NPS) or Agriculture (USFS).


Purpose. Protection of navigable waters in the U.S.

Applicability. Any construction affecting navigable waters and any obstruction, excavation, or filling.
General Procedures. Must obtain approval of plans for construction, dumping, and dredging permits (Section 10) and bridge permits (Section 9).

Coordination. USCE, USCG, EPA, state agencies.


Purpose. Restore and maintain chemical, physical, and biological integrity of the nation's waters through prevention, reduction, and elimination of pollution.

Applicability. Any discharge of a pollutant into waters of the U.S.

General Procedures. (1) Obtain permit for dredge or fill material from USCE or state agency, as appropriate (Section 404), (2) Permits for all other discharges are to be acquired from EPA or appropriate state agency (Section 402), (3) Water quality certification is required from state water resource agency (Section 401), (4) All projects shall be consistent with the state non-point source pollution management program (Section 319).

Coordination. USCE, EPA, designated state water quality control agency, designated state non-point source pollution agency.


Purpose. To avoid the long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to restore and preserve the natural and beneficial values served by floodplains.

Applicability. All construction of federal or federally aided buildings, structures, roads, or facilities that encroach upon or affect the base floodplain.

General Procedures. (1) Assessment of flood hazards, (2) Specific finding required in final environmental document.

Coordination. FEMA, state and local agencies.


Purpose. (1) Identify flood-prone areas and provide insurance, (2) Require purchase of insurance for buildings in special flood-hazard areas.

Applicability. Any federally assisted acquisition of construction project in area identified as having special flood hazards.

General Procedures. Avoid construction in, or design to be consistent with, FEMA-identified flood-hazard areas.

Coordination. FEMA, state and local agencies.

*Purpose.* Preserve, restore, and improve wetlands of the nation.

*Applicability.* Any agreements with landowners and operators in important migratory waterfowl nesting and breeding areas.

*General Procedures.* Apply procedures established for implementing Executive Order 11990.

*Coordination.* Secretary of Agriculture, Secretary of Interior.


*Purpose.* Minimize impacts on farmland and maximize compatibility with state and local farmland programs and policies.

*Applicability.* All projects that take right of way in farmland.

*General Procedures.* (1) Early coordination with the NRCS, (2) Land evaluation and site assessment, (3) Determination on whether or not to proceed with farmland conversion, based on severity of impacts and other environmental considerations.

*Coordination.* NRCS


*Purpose.* Protect human health and the environment, prohibit open dumping, manage solid wastes, regulate treatment, storage, transportation, and dispose of hazardous waste.

*Applicability.* Any project that takes right-of-way containing a hazardous waste.

*General Procedures.* Coordinate with EPA or state agency on remedial action.

*Coordination.* EPA or state agency approved by EPA, if any.


*Purpose.* Provide for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive hazardous waste disposal sites.

*Applicability.* Any project that might take right-of-way containing a hazardous substance.

*General Procedures.* (1) Avoid hazardous waste sites, if possible, (2) Check EPA lists of hazardous waste sites, (3) Field surveys and reviews of past and present land use, (4) Contact appropriate officials if uncertainty exists, (5) If hazardous waste is present or suspected, coordinate with appropriate officials, and (6) If hazardous waste is encountered during construction, stop project and develop remedial action.

*Coordination.* EPA or state agency approved by EPA, if any.

**Purpose.** Conserve species of fish, wildlife and plants facing extinction.

**Applicability.** Any action that is likely to jeopardize continued existence of such endangered/threatened species or result in destruction or modification of critical habitat.

**General Procedures.** Consult with the Secretary of the Interior or Commerce, as appropriate.

**Coordination.** DOI (FWS), Commerce (NMFS).

16. **Fish and Wildlife Coordination Act**: 16 USC 661-666c (P.L. 85-624, 89-72, 95-616).

**Purpose.** Conservation, maintenance, and management of wildlife resources.

**Applicability.** (1) Any project which involves impoundment (surface area of 10 acres or more), diversion, channel deepening, or other modification of a stream or other body of water, and (2) Transfer of property by federal agencies to state agencies for wildlife conservation purpose.

**General Procedures.** Coordinate early in project development with FWS and state fish and wildlife agency.

**Coordination.** DOI (FWS), state fish and wildlife agencies.

### 3.4 STATE POLICIES

#### 3.4.1 Access Control Code

The Access Control Code is based upon the authority granted in CRS 1973, 43-2-147, as amended. On January 7, 1981, a revised code was submitted to the House and Senate Transportation Committees during the 1st regular session of the 53rd General Assembly. This allowed the Colorado Highway Commission to adopt the code as a rule and regulation.

The code is to ensure the public's health, safety and welfare are maintained. Any proposed development that applies for access to any state highway will be reviewed for adequate drainage design by CDOT Hydraulics Engineer.

Colorado has statutory law or natural flow rule that places a natural easement or servitude upon the lower land for the drainage of surface water in its natural course. The natural flow of the water cannot be obstructed by the servient owner to the detriment of the dominant owner. The owner of the upper lands has an easement over lower lands for drainage of surface waters and natural drainage conditions can be altered by an upper land owner provided the water is not sent down in a manner or quantity to cause more harm than formerly. Hankins v. Borland, 163 Colo. 575, 431 P.2d 1007 (1967); H. Gordon Howard v. Cactus Hill Ranch Company, 529 P.2d 660 (1974); Hoff v. Ehrlich, 511 P.2d 523 (1973), Ambrosio v. Perl-Mack Construction Company, 143 Colo. 49, 351 P.2d 803 (1960).

#### 3.4.2 CDOT Hydraulic Design

- Drainage structures shall be designed in accordance with the hydrology and hydraulic criteria and procedure as set forth in this manual.
• Hydrologic/hydraulic documentation shall be retained in the project plans or other permanent location at least until the drainage facility is totally replaced or modified as a result of a new drainage study.

• The basic hydraulic design data as defined in this manual shall be included in the construction plans.

• Where FEMA determined discharge flow rates exist, these flow rates must be used in the design of CDOT hydraulic structures.

• On FEMA regulated sites, CDOT shall provide hydrologic and hydraulic data to the local floodplain regulatory agency for their future use and to accommodate updates to floodplain maps. CDOT shall not process Letter of Map Revision (LOMR) or Conditional Letter of Map Revision (CLOMR) applications for the site.

3.4.3 Hydraulic Design Responsibility

In-House/Region Designs

Upon receipt of the field survey, the Project Manager will review the project for possible drainage involvement. If involved, the Project Manager and the Hydraulics Engineer will confer on the project scope. The Hydraulics Engineer will estimate his project scheduling and establish the date the hydrology for the entire project will be completed. The Hydraulics Engineer will design the structures, such as bridges, irrigation crossings, storm drains and culverts. The Project Manager will provide the necessary roadway data such as structure cross-sections, Computer-Aided Drafting (CAD) files, Bridge Hydraulic Information Sheet, utility data, grading plan, and other necessary processed data to the Hydraulics Engineer as needed. The Hydraulics Engineer will provide the preliminary designs and hydraulic data to the Project Manager before the Field Inspection Review (FIR), and the final information prior to the Final Office Review (FOR).

Consultant Designs

Early in the project design, the CDOT Project Manager should contact the Hydraulics Engineer and confer on the scope of hydraulics work. A preliminary hydraulics report by the consultant will be submitted to the CDOT Project Manager or their designee prior to the FIR meeting. A final hydraulics report by the consultant will be submitted to the CDOT Project Manager prior to the FOR for concurrence. A copy of the sealed final hydraulic report shall be submitted to the CDOT Hydraulics Engineer for future reference.

Sign-off on Plans

The Hydraulics Engineer shall sign off on Form 1048a, Project Scoping/Clearance Record, for final hydraulic designs by in-house or consultant designers.

Stamping of Plans

All in-house CDOT hydraulic designs shall be sealed in the record plan set by the Hydraulics Engineer. The consultant shall stamp any consultant hydraulic designs. Other projects such as off-system, will follow the law requirements for that owner.
Off-System Designs

Off-system designs consist of projects that will eventually become CDOT property, projects that directly connect to CDOT property, or projects that have federal participation. For example, a section of new road and related drainage improvements sponsored and constructed by a county that becomes CDOT right-of-way upon completion. Early in the project design, the off-system Project Manager should contact the CDOT Region(s) where the project is envisioned to confer on the scope of the project. The off-system Project Manager must coordinate submittal to CDOT of hydrologic and hydraulic design data, erosion control and water quality design data, bridge data and other data that may be of regulatory interest to CDOT, for CDOT review and comment.

3.5 MUNICIPAL POLICIES

If a municipal policy is more stringent than CDOT's, the more stringent policy will be used provided that all parties in that jurisdiction are required to build to that more stringent policy. The intent is to have consistent designs between jurisdictions within an area. If a benefit cannot be justified for the roadway user, then the local jurisdiction or party will be asked to participate in the cost.