

2 Legal Aspects

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2 Legal Aspects

2.1 OVERVIEW

2.1.1 Introduction

Various drainage laws and rules applicable to highway facilities are discussed in this chapter. The intent of this chapter is to provide information and guidance on the designer's role with respect to legal issues associated with highway drainage. This chapter is not meant to summarize all existing laws and should not be treated as a substitute for obtaining an opinion from legal counsel.

The following generalizations can be made in reaching the proper conclusion regarding liability:

- A goal in highway drainage design should be to perpetuate natural drainage, insofar as practicable.
- The historic flow and path should be maintained as much as possible. For example, if a large borrow ditch is filled, the effects of the loss of detention storage should be considered.
- Courts generally look with disfavor upon infliction of injury or damage that could reasonably have been avoided by a prudent designer, even where some alteration in flow is legally permissible.
- There is a trend towards increased governmental liability, therefore, design is very important.

2.1.2 Order of Authority

There is an order of authority that is followed when applying various statutes, regulations, etc. In descending order they are as follows: Federal, State and local. Generally, the laws of the lower level do not bind the superior level. For example, the Federal government is not bound to follow a regulation established at the local level. However, the local level is required to follow not only local regulations but also those of the State and Federal governments.

Often, the State and local levels create regulations to ensure the requirements of the Federal laws are met. Occasionally there are conflicts. Many of these conflicts require constitutional interpretation and analysis. Such conflicts should be referred to the Colorado Attorney General's Office through CDOT's Chief Engineer.

2.1.3 Related Publications

There are numerous publications that discuss the legal aspects of drainage and water laws. The following publications provide guidance:

Volume 1, Chapter 2 – Legal Aspects of the American Association of State Highway and Transportation Officials (AASHTO) *Drainage Manual* (2014).

Volume 1, Chapter 2 – Drainage Law of the Urban Drainage and Flood Control District *Urban Storm Drainage Criteria Manual* (2016).

2.2 FEDERAL LAWS

2.2.1 General

Federal law consists of the U.S. Constitution, Acts of Congress, regulations, Executive Orders and case law. Federal law does not address drainage directly. However, many laws have implications that affect drainage design. These include laws concerning:

- Flood insurance and construction in flood hazard areas, navigation and construction in navigable waters (of which there are few in Colorado);
- Water pollution control;
- Environmental protection; and
- Protection of fish and wildlife.

2.2.2 Significant Federal Law

For a listing of the significant Federal law affecting highway drainage please refer to:

Volume 1, Chapter 2 – Legal Aspects of the American Association of State Highway and Transportation Officials (AASHTO) *Drainage Manual*, (Washington D.C., 2014).

2.2.3 Navigable Waters Regulations

The Congress of the United States asserts regulatory authority over certain waterways, which are deemed to be “navigable waters.” The only waters in Colorado defined as navigable are the Colorado River west of Grand Junction and the Navajo Reservoir.

If a designer becomes involved in a project that involves navigable waters, the designer must be aware that coordination and approval from the Coast Guard and the Corps of Engineers is required. Also, a National Pollutant Discharge Elimination System (NPDES) permit will be required from the Colorado Department of Public Health and Environment (CDPHE). NPDES requirements are covered in the State Laws section below. Designers need to recognize that such coordination and approval takes time and failure to seek approvals early can lead to project delays.

2.3 FISH AND WILDLIFE SERVICE

2.3.1 Requirements

The Fish and Wildlife Coordination Act requires that “whenever the waters of any stream or body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatsoever, including navigation and drainage, by any department or agency of the United States, or by any public or private agency under Federal permit or license, such department or agency shall first consult with the US Fish and Wildlife Service, Department of the Interior and with the head of the agency exercising administration over the wildlife resources of the particular state with a view

to the conservation of wildlife resources by preventing loss and damage to such resources as well as providing for the development and improvement thereof.”

2.3.2 Service’s Role

The U.S. Fish and Wildlife Service’s role in the permit review process is to review and comment on the effects of a proposal on fish and wildlife resources. It is the function of the regulatory agency (e.g. Corps of Engineers; US Coast Guard) to consider and balance all factors, including anticipated benefits and costs in accordance with the National Environmental Policy Act (NEPA), in deciding whether to issue the permit (40 FR 55810, December 1, 1975).

2.4 FLOODPLAIN REGULATIONS

The purpose of this section is to provide an overview of applicable floodplain regulations and to provide the roles and responsibilities for construction of a CDOT project within a floodplain.

2.4.1 Terminology and Definitions

There are specific terminology and definitions related to floodplain regulations. The following are the mostly commonly-used terms and definitions which are referenced throughout this section:

- *100-year Flood*: A flood that has a 1-percent chance of being equaled or exceeded in any given year (also known as the 1-percent annual chance flood or base flood).
- *100-year Floodplain*: The area of land susceptible to being inundated by a 100-year flood.
- *500-year Flood*: A flood that has a 0.2-percent chance of being equaled or exceeded in any given year (also known as the 0.2-percent annual chance flood).
- *500-year Floodplain*: The area of land susceptible to being inundated by a 500-year flood.
- *Base Flood Elevation (BFE)*: The water surface elevation of a 100-year flood (1-percent annual chance flood).
- *Best Available Data*: Hydrologic or hydraulic studies that may not currently be incorporated into the effective FEMA FIRM, but are considered by the governing community to be the most-representative study for existing conditions within a watercourse.
- *Code of Federal Regulations (CFR)*: The codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.
- *Community*: Any political subdivision in the State of Colorado that has authority to adopt and enforce floodplain-management regulations through zoning, including, but not limited to, cities, towns, unincorporated areas in the counties, Indian tribes, and drainage and flood- control districts.
- *Conditional Letter of Map Revision (CLOMR)*: FEMA’s review comments on whether a proposed project complies with NFIP criteria.
- *Development*: Per FEMA’s definition, “development” is any manmade change to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.

- *Flood Insurance Rate Map (FIRM)*: Maps prepared by FEMA that show areas subject to flooding.
- *Flood Insurance Study (FIS)*: A hydraulic study prepared by FEMA that accompanies a FIRM.
- *Floodway*: The stream channel plus that portion of the overbanks that must be kept free from encroachment in order to convey the 100-year flood without increasing base-flood elevations by more than 0.5 ft, as defined by the Colorado Water Conservation Board (CWCB) in Rules and Regulations for Regulatory Floodplains in Colorado (2010).

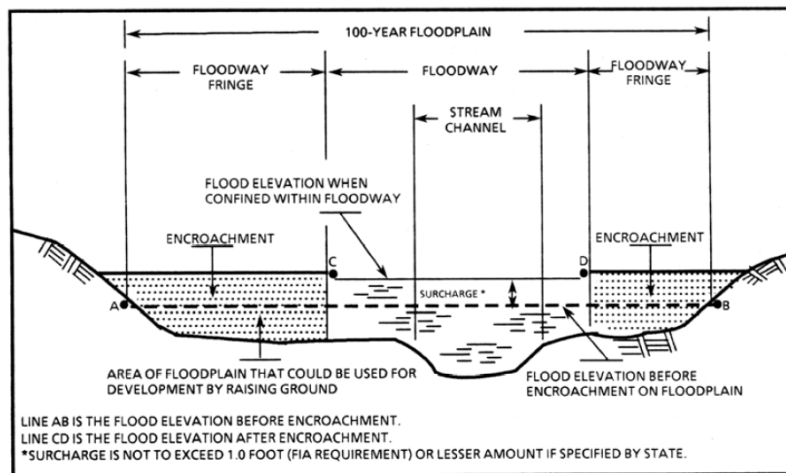


Figure 2.4.1 Floodway Schematic (FEMA 2016)

- *Floodplain Development Permit*: A permit required by the local community to build within the floodplain. The permit name may differ by community (e.g., Floodplain Use Permit).
- *Letter of Map Change (LOMC)*: The combined term for the two letters that are issued by FEMA for projects located within a floodplain: CLOMR and LOMR.
- *Letter of Map Revision (LOMR)*: FEMA's review of the as-built conditions of a constructed project and the associated changes to the floodplain. A LOMR results in an official change to the FIRM and FIS report.
- *No-Rise Certification*: The terminology for when a proposed project causes a 0.00-ft increase in BFE between the existing conditions and the proposed conditions. Note that the existing conditions at a site may differ from the effective FEMA information due to changes in topography, new structures, local information, natural channel evolution, or other land-use and fluvial geomorphologic processes.
- *Special Flood Hazard Area (SFHA)*: The type of floodplain as designated by FEMA. The most common types found in Colorado include:

Zone A: An approximate floodplain that has not been determined using detailed hydraulic models. These do not include BFEs, but are rather the shaded floodplain area themselves.

Zone AE: A detailed floodplain that has been determined using a hydraulic model. These floodplains include BFEs and often a floodway.

Zone AH: An area subject to ponding of flood waters with average depths between 1.0 and 3.0 feet.

Zone AO: An area of shallow flooding (usually sheet flow on sloping terrain) with average depths between 1.0 and 3.0 feet.

Zone A1-30: Equivalent to the Zone AE SFHA defined above. Zones A1 through A30 are found on older FEMA floodplain maps and still exist for some parts of Colorado.

Zone A99: Areas that are protected by a Federal flood-protection system where construction has reached specified statutory milestones. No BFEs or depths are shown within these zones.

2.4.2 National Flood Insurance Program

Congress created the National Flood Insurance Program (NFIP) through the National Flood Insurance Act of 1968, as amended, 42 USC 4001-4127. The Act is intended to provide government-administered flood insurance to persons needing coverage, identify flooding hazards, and manage risk to the public. In order to participate in the NFIP, a local participating community in the state of Colorado must adopt adequate land-use and floodplain-management measures through their local ordinances. The community must ensure that all development within a floodplain meets NFIP requirements to remain compliant within the program.

Specific NFIP requirements are set forth within the Code of Federal Regulations (CFR) 44 CFR 60.3, “Floodplain Management Criteria for Flood-Prone Areas,” which, by reference, refers to requirements provided in 44 CFR Sections 59 through 78. CDOT projects located within regulatory floodplains may be affected by the requirements set forth in 44 CFR 60.3. Therefore, the design and permitting of CDOT projects must adhere to applicable floodplain requirements for the specific project area. The requirements conforming with NFIP regulations were restated through Executive Order (EO) 13690, “Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input,” signed on January 30, 2015. EO 13690 amended the previous EO 11988, “Floodplain Management,” issued in 1977 and reaffirmed key tenets and added climate informed science opportunities.

2.4.3 Regulatory Entities

The NFIP sets forth the minimum floodplain-management requirements for participation in the program, but also encourages states and local communities to develop more stringent requirements as desired. Additionally, communities that implement requirements above and beyond the minimum requirements of the NFIP are eligible to participate in FEMA’s Community Rating System (CRS) and receive reductions of up to 45 percent for flood-insurance premiums. States and local agencies may develop additional requirements to supplement those found in 44 CFR 60.3. The following sections describe the roles of the federal, state, and local agencies in the floodplain permitting process.

2.4.3.1 Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) oversees the NFIP and ensures that participating communities are in compliance with the requirements of the program. FEMA’s role is to develop the regulatory floodplain and all supporting back-up information; set minimum standards for floodplain management; develop standards and specifications for flood studies; make revisions to the floodplain information as needed; coordinate with states and communities regarding their floodplain management ordinances; and, manage several other program tasks.

Ultimately though, FEMA performs mostly high-level management of the NFIP and delegates management of specific floodplains to state and local agencies.

2.4.3.2 Colorado Water Conservation Board

In Colorado, the Colorado Water Conservation Board (CWCB) is the state agency responsible for administering and enforcing floodplain regulations. In November 2010, the CWCB adopted their current floodplain regulations entitled “Rules and Regulations for Regulatory Floodplains in Colorado” (The Rules). The Rules were enacted pursuant to the authority granted to the CWCB in sections 24-4-103, 24-65.1-101(1)(c)(I), 24-65.1-202(2)(a)(I), 24-65.1-302(2)(a), 24-65.1-403(3), 30-28-111(1)-(2), 31-23-301(1)-(3), 37-60-106(1), 37-60-106(1)(c)-(g), (j), (k), and C.R.S (2010). The Rules are intended to provide standards for regulatory floodplains within the State of Colorado. The CWCB rules apply to all communities within the State of Colorado regardless of whether they participate within the NFIP.

Several important requirements are contained in the Rules including floodplain management standards that exceed those required by the NFIP. These include, but are not limited to:

- One foot of freeboard shall be provided to all new and substantially-changed structures in 100-year floodplains, with the exception of critical facilities.
- Two feet of freeboard shall be provided to all new and substantially-changed critical facilities (as defined in the rules) in 100-year floodplains. In addition to this CWCB requirement, EO 13690 requires 3 feet of freeboard for critical actions. Critical actions are defined as any activity for which even a slight chance of flooding would be too great. This definition applies to CDOT bridges, large culverts, and roadways.
- In areas with defined base-flood elevations, floodway surcharge criteria shall be reduced to 0.5 ft (from 1.0 ft) for all new studies begun after January 14, 2011.
- Whenever a stream-alteration activity is known or suspected to increase or decrease the established BFE in excess of 0.3 vertical feet (or a more stringent standard adopted by the local government authority), a Letter of Map Revision (LOMR) showing such changes shall be obtained in order to accurately reflect the proposed changes on FEMA’s regulatory floodplain map for the stream reach.

All of the rules set forth by CWCB also apply to activities conducted by state agencies, and to federal activities that are fully or partially financed by state funds. Therefore, **all CDOT** projects must be in compliance with the current version of the Rules when a proposed project is located within a floodplain, and with any federal Executive Orders effective at the time of project scoping.

2.4.3.3 Local Communities

As previously discussed, local communities have the authority to adopt and enforce floodplain management ordinances that exceed those found in the NFIP and CWCB Rules. Additionally, some communities prepare their own flood studies for water courses within their boundaries. These studies can be incorporated into the FEMA FIRM, or could be stand-alone studies representing the best available data for the watercourse. Therefore, coordination with the local community is necessary in order to determine the specific floodplain management regulations and the most up-to-date hydrologic and hydraulic data that is applicable to the project area. Current regulations can typically be found in the floodplain management section of a community’s local ordinances.

Some communities within Colorado do not currently participate in the NFIP and therefore will not have any FEMA-published floodplain information. Community participation in the NFIP is provided in the *National Flood Insurance Program Community Status Book*, published semi-annually for each state. For bridge and culvert design criteria in non-participating community watersheds, please refer to Chapter 10 of this manual. Additionally, some communities regulate floodplains that are currently unmapped by FEMA (e.g., Jefferson County). Therefore, coordination with the local community during design of a project is essential.

2.4.3.4 Urban Drainage and Flood Control District

The Urban Drainage and Flood Control District (UDFCD) was established by the Colorado legislature in 1969 to assist the communities of the Denver metro-area with floodplain and drainage management. UDFCD assists local communities in preparation of flood studies called Flood Hazard Area Delineation studies (FHADs). UDFCD also works with FEMA to get local FHAD data incorporated into FIRM and FIS reports.

UDFCD also receives annual grants from FEMA to review request for Letters of Map Change (LOMCs) to FIRMs within the UDFCD boundaries. Therefore, any project requiring a LOMC (CLOMR or LOMR) located in a floodplain within the UDFCD boundary will be reviewed and approved by UDFCD. Any project located outside of the UDFCD boundary will be reviewed by FEMA.

2.4.3.5 Governing Legal Authority

It is a federal requirement, under Title 44 CFR, EO 11988, and EO 13690, requires that state Departments of Transportation (DOTs) must follow the local floodplain permitting process. Floodplain permits are issued and enforced at the local level. These requirements were reiterated in letters received by CDOT from the Federal Highway Administration (FHWA), CWCB, Fort Collins Utilities, and United States Department of Transportation (USDOT) between 2009 and 2012. Therefore, any proposed CDOT project that qualifies as a development under 44 CFR 59.1 and falls within the FEMA designated floodplain must adhere to the rules of the NFIP, and must receive the applicable floodplain development permit. Watersheds outside FEMA and local jurisdiction are subject to the design standards of Chapter 10 of this manual. More information on qualifying development actions is provided in Section 2.4.5.1.

2.4.4 Guiding Documents

FEMA, UDFCD, CWCB, and local agencies publish floodplain studies and documentation. A description of that information is provided in the following sections.

2.4.4.2 Flood Insurance Study Report

For every participating community within the NFIP, FEMA has published a Flood Insurance Study (FIS) which provides the current (effective) floodplain information for the community. Typical information found within the FIS includes: a summary of peak discharges, hydrologic and hydraulic back-ground data, flood profiles, floodway data information, community flooding history, and a summary of historic LOMCs within the community. The first step in determining if a proposed CDOT project will be located within a FEMA-regulated floodplain is to obtain the effective FIS and floodplain maps for the community. This information can be obtained from the following locations:

- FEMA Map Service Center at <http://www.fema.gov>
- UDFCD website (for projects within the District Boundary) at <http://udfcd.org>
- Local communities through either their website or by contacting the local floodplain administrator
- Region Hydraulic Units at CDOT

2.4.4.3 FIRMs and Flood Risk Mapping

There are four types of existing NFIP floodplain maps in the state of Colorado:

- *Flood Hazard Boundary Map (FHBM)*: A FHBM typically shows approximate floodplain boundaries with no water-surface elevations determined. The FHBMs were the early types of maps prepared for the NFIP. Most have been replaced by FIRMs, but some still exist for some communities in Colorado.
- *Flood Boundary and Floodway Map (FBFM)*: A FBFM was also an early NFIP map, but differed from the FHBM in that the floodplains were generated using detailed hydrologic and hydraulic data rather than approximate data. They typically provide BFEs for the water surface corresponding with the 100-year flood, and will likely also include a floodway boundary.
- *Flood Insurance Rate Map (FIRM)*: A FIRM is the official map of the community on which FEMA has delineated the special flood hazard areas, floodways, BFEs, and any other pertinent floodplain information.
- *Digital Flood Insurance Rate Maps (DFIRMs)*: The DFIRM is a digital format of the FIRM, and is available for download in GIS format from the FEMA website. The DFIRM is accompanied by a database containing data and analysis used to create the DFIRMs. FEMA began creating DFIRMs in 2004. Communities with maps dated prior to 2004 will have vector maps that have not yet been digitally converted. Digital floodplain data may not be available for those communities.

2.4.4.4 Local Floodplain Studies

In addition to FEMA information, the CWCB and other local agencies may have additional flood studies that have not been adopted by FEMA. This information will typically supersede or supplement the effective FEMA data as the best available data for a particular watercourse. For example, as previously discussed, the UDFCD prepares FHAD studies for watercourses within their boundaries. However, in many cases the floodplains developed by FHAD studies have not been adopted yet by FEMA (and may never be). Other communities (e.g., Fort Collins and Colorado Springs) have master plans that include updated flood studies that have not been adopted by FEMA, and are not shown on the effective FIRM panels. Prior to preparing the floodplain permit for a project it is important to coordinate with the local floodplain administrator to determine the most up-to-date floodplain information for the project site.

2.4.5 Design Considerations

The ideal design for any CDOT project would cause no impact to the limits of the floodplain or associated BFEs. In practice, that is not always possible, notably with the design of new bridges or other structures that must be located within the floodplain and/or floodway. The type of regulatory floodplain, the location of the project, and several other site factors all influence the potential impacts that a proposed project will have on the floodplain.

2.4.5.1 Types of Applicable CDOT Projects

Every floodplain disrupted by above- or below-ground CDOT projects requires a floodplain development permit (or equivalent) from the local community. As previously discussed, any proposed CDOT project that qualifies as a development under 44 CFR 59.1 and falls within the FEMA designated floodplain must adhere to the rules of the NFIP and must receive the applicable floodplain development permit. The definition of development per 44 CFR 59.1 is as follows:

Development means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.

The vast majority of proposed CDOT projects and maintenance activities would qualify as a development per NFIP regulations and should be permitted and certified prior to mobilization as such. CDOT projects that would meet the definition of development include, but are not limited to, the following: resurfacing of roadways; construction of new or repairing existing culverts/bridges; construction of highway medians; bridge-scour repair; construction of permanent water quality features; and, nearly any other type of project or maintenance activity located within the floodplain boundary.

It should be noted that emergency repair projects are typically exempt from complying with NFIP floodplain permitting requirements and may be eligible for a variance from compliance with the requirements. But, all permanent repair must be duly permitted by local governing agencies in accordance with federal and state regulatory requirements. If it is uncertain if the project meets the definition of a development described above, the project manager should consult with the CDOT Regional Hydraulic Engineer and/or the local community's floodplain administrator for clarification of the applicable regulations.

2.4.5.2 Minimizing Floodplain Impacts

In order minimize floodplain impacts, the following are design considerations based on the type of floodplain in which a proposed project will be located:

Zone A: CWCB Rules allow up to a 0.50 ft increase in BFE due to a project in a Zone A floodplain before a CLOMR is needed. Therefore, the design of the project should focus on achieving a 0.00 ft rise (if possible) with a maximum allowable rise of 0.50 ft.

Zone AE (with floodway): Avoid construction within the regulatory floodway if possible. If construction falls within the regulatory floodway the project may not cause an increase (0.00 ft) in BFE, and shall be certified by a registered professional engineer in accordance with the standards of 44 CFR 60.3(d). If the proposed project does touch the floodway and causes an increase in BFE, then a CLOMR must be obtained. No floodway activities may cause any BFE rise on any insurable structures at any time, without exception.

Zone AE (without floodway), Zone AO, and Zone AH: Similar to Zone A, every effort should be made to cause a maximum increase of less than 0.5 ft. Any proposed project that causes an increase greater than 0.50 feet must receive a CLOMR. Additionally, after construction, any project that causes an increase or decrease of more than 0.3 ft must be followed by a LOMR (per CWCB Rules).

Zone A1-30: Zones A1-30 may or may not have an associated floodway. Determine if there is an associated floodway by consulting the FIS and FBFM (if applicable). If the Zone A1-A30 SFHA does not have a regulatory floodway, then the same pre- and post-project

requirements should be followed as Zone AE (without floodway). If the Zone A1-A30 does have a regulatory floodway, then the same pre- and post-project as Zone AE (with floodway) apply.

Each of the above design considerations are based on minimum requirements set forth by FEMA and CWCB. Local communities may have standards that exceed those discussed above and must be followed.

2.4.6 Floodplain Permitting Requirements

During the design of the project, the proper floodplain permit must be obtained. If a proposed project (pre-construction) does not result in an increase in the base flood elevation BFE, then the project can be permitted and certified through the local community floodplain permit process and does not need to be sent to FEMA for a CLOMR. However, if a proposed project does increase the BFE by 0.01 ft or more over the existing or effective conditions, then the project may have to go through the FEMA LOMC process.

Similarly, after the project has been constructed (post-construction) the proper permitting requirements must be met. If a CLOMR was required **or** if the constructed project caused an increase or decrease in BFE of greater than 0.30 feet, then the project must be followed with a LOMR through FEMA. If the project does not fall into either of those categories, then the pre-construction floodplain development permit must be officially closed-out using survey data obtained after the project has been constructed.

Table 2.4.1 below provides a summary of pre- and post-project permitting requirements and the approximate schedule for review time and approval. Permitting and certification standard operating procedures are provided with examples in Appendix A.

The following sections describe the pre- and post-construction permits in detail.

Table 2.4.1 Summary of Pre-Construction Floodplain Permitting

Type of Flood Zone	BFE Increase (ft)	Pre-Construction		Post-Construction		Agency	Approx. Review Time ³
		Permit Type	Permit Submittal Date	Permit Type	Permit Submittal Date		
Zone A, AE ¹ , AO, AH or A1-30 ¹	< 0.00 ²	floodplain development permit (with no-rise certification)	after FOR plans (or equivalent level of design), obtain prior to AD	floodplain development permit close-out (using as-built survey)	after as-built survey is complete	local agency	1 month
	< 0.5 ² (but > 0.00 ft)	floodplain development permit	after FOR plans (or equivalent level of design), obtain prior to AD	floodplain development permit close-out (using as-built survey)	after as-built survey is complete	local agency	1 month
	> 0.5	CLOMR	after FOR plans (or equivalent level of design), obtain prior to AD	LOMR	within 1 year of construction (per FEMA)	local agency and FEMA	6 - 9 months
Floodway	>0.00	CLOMR	after FOR plans (or equivalent level of design), obtain prior to AD	LOMR	within 1 year of construction (per FEMA)	local agency and FEMA	6 - 9 months

Notes: ¹ Zone AE outside of the regulatory floodway (flood fringe).

² If the BFE increases **or** decreases by more than 0.3 ft, then a LOMR supported by as-built certified survey and documents is required prior to final approval and release of Contractor(s).

³ Review times are approximate and could exceed the times shown depending on the complexity of the project.

2.4.6.1 No-Rise Certification

No-rise is a measurement of the change in BFE or 100-year water surface elevation, as measured to the nearest 0.00 ft, created by proposed development in the floodplain or floodway against existing or effective conditions. The no-rise certification is a signed and certified statement from a registered professional engineer that the proposed project does not cause any rise in the floodplain elevations. An example No-Rise Certification is provided in Figure 2.4.2. In the scenario where a proposed project causes no increase in the BFEs, a no-rise certification must be included along with the floodplain development permit application. There are several methods for

proving no-rise for a project. General procedures for CDOT no-rise submittals are outlined in the SOP included in Appendix A.

"NO-RISE" CERTIFICATION

This is to certify that I am a duly qualified registered professional engineer licensed to practice in the State of _____

It is further to certify that the attached technical data supports the fact that proposed _____ (Name of Development) will not impact the 100-year flood elevations, floodway elevations, or floodway widths on _____ (Name of Stream) at published sections in the Flood Insurance Study for _____ (Name of Community) dated _____ (Study Date) and will not impact the 100-year flood elevations, floodway elevations, or floodway widths at unpublished cross-sections in the vicinity of the proposed development.

Attached are the following documents that support my findings:

Date: _____

Signature: _____

Title: _____ {SEAL}

Figure 2.4.2 Example No-Rise Certification (FEMA 2013)

2.4.6.2 Floodplain Development Permit

Any project that is located within a FEMA designated floodplain boundary (SFHA) must be permitted through the local floodplain development-review process. It should be noted that the local community has a right to request a CLOMR be submitted to FEMA under any circumstances, with or without justification, regardless of the amount of increase in BFE. Therefore, in some instances when the increase is more than 0.00 ft, but less than 0.5 ft, the community, District, or CWCB may request that CDOT submit a CLOMR to FEMA for review and comment.

The floodplain development permit will take approximately one month for review and approval by the local agency. The review time could vary greatly depending on the complexity of the project and the current workload of the local agency. The floodplain development permit can be submitted after the project is at a level of design where there are few changes anticipated (typically following FOR). Additionally, the project schedule should aim for receiving the final approved floodplain permit prior to the advertisement date. At the latest, the final approved floodplain permit must be delivered to CDOT from the local agency prior to mobilization of the project, but as a standard practice is typically secured prior to construction advertisement.

Typically the local community will require technical documentation to support the floodplain development permit. This documentation typically includes a completed floodplain permit application for the project, a hydraulic report or memo, supporting hydraulic and hydrologic models, topographic work maps, plan drawings, survey information, no-rise certifications, community or contractor affidavits, and any other supporting background information. The requirements vary by community; therefore, it is important to coordinate with the local agency during the project scoping process to understand their floodplain permitting process, fees, and

protocols. If a consultant is preparing the design for CDOT, then the permitting should be coordinated with the CDOT Regional Hydraulic Engineer for review and approval prior to submitting the floodplain development permit to the community. Review times for local floodplain permits vary by community and should be factored into the schedule for the project.

2.4.6.3 CLOMR

As shown in Table 2.4.1, a Conditional Letter of Map Revision (CLOMR) is required if a proposed project will increase the BFE by more than 0.00 ft within a regulatory floodway or by more than 0.5 ft within the floodplain. A CLOMR is FEMA's review comments on whether a proposed project complies with NFIP criteria. There are specific items that must be submitted with the CLOMR application for FEMA's review. These typically include: application forms (MT-2 forms); hydraulic report; hydrologic calculations or modeling; hydraulic model; plan drawings; topographic work maps; annotated FIRMs; and, any other pertinent supporting background information for the project. A detailed description of the specific requirements for CLOMR submittals can be found in the MT-2 forms and their associated instructions on the FEMA website. Refer to the FEMA website for the most current version of the MT-2 forms (<https://www.fema.gov/mt-2-application-forms-and-instructions>).

All CLOMR submittals must be reviewed and approved by the CDOT Regional Hydraulic Engineer, then submitted to the local community for approval, and lastly submitted to FEMA for review. CDOT is responsible for submitting all CLOMRs to the LOMC Clearinghouse directly, and paying FEMA contractor review fees. Local agencies neither submit LOMCs, nor do they cover the review fees associated with map revision requests. CDOT's contractor may submit LOMCs and pay fees on behalf of CDOT as the applicant for the map revision request, but this must be established under a CDOT task order. A CLOMR review will take a minimum of 90 days for processing by FEMA, and can take up to several months if the project significantly impacts the floodplain. **Therefore, it is important to factor the CLOMR review period into the schedule for the project.**

2.4.7 Post-Construction Floodplain Requirements

Every project located within a regulatory floodplain is not complete until the post-construction floodplain permitting requirements have been fulfilled. The following sections describe the actions and responsibilities required to close out an open floodplain permit.

2.4.7.1 Release of Contractor

In many scenarios, post-construction survey of the project site is necessary to close out the permit. Therefore the project surveyor must remain on the contractor's team until after construction is complete and the as-built survey has been performed, delivered, reviewed, and approved. Additionally, the contractor must not be released until the floodplain development permit, no-rise certification or recertification, or LOMC is approved.

2.4.7.2 Survey Requirements

Some floodplain permitting requirements and no-rise certifications state that as part of conditional approval of the project, as-built survey must be obtained to certify that the project was constructed as planned. The as-built survey must be included as a modified specification to the plan set in order to ensure that it is collected after the project is constructed. An example of an as-built survey specification is attached in Appendix B. Additional information regarding survey

requirements can be found in “Guidance for Flood Risk Analysis and Mapping, Elevation Guidance, Document 47,” prepared by FEMA, dated May 2016.

2.4.7.3 Close-Out of Floodplain Permits

The following sections describe the close-out process for the three types of floodplain permits described in Section 2.4.6.

2.4.7.3.1 Floodplain Development Permit and No-Rise Certification

An as-built survey must be completed after the project is constructed to verify that the proposed design elevations match the as-built elevations. The as-built survey will be used to develop as-built documentation that verifies the project was built as proposed and approved by the pre-construction floodplain permit. This information will be provided to the local floodplain administrator in order to officially close the floodplain development permit. This is up to the discretion of the CDOT Regional Hydraulic Engineer on an as-needed basis, and pursuant to the permitting requirements of the local community. If no rise cannot be achieved, mitigating actions shall be completed at the contractor’s expense until it is achieved. This must be carefully identified during the project scoping process.

Similar to the standard floodplain development permit close-out, under circumstances where a no-rise certification was submitted to the local floodplain permitting entity, an as-built survey may be required to verify that the proposed no-rise condition was satisfied. This is up to the discretion of the CDOT Regional Hydraulic Engineer on an as-needed basis and pursuant to the permitting requirements of the local community.

2.4.7.3.2 LOMR

After construction has been completed, any project that required a pre-project CLOMR must be followed by a post-project Letter of Map Revision (LOMR). The finalized LOMR from FEMA will result in an official change to the FIRM and will revise the floodplain delineation, floodway delineation, and/or BFEs due to the construction of the project. There are specific items that must be submitted within the LOMR application for FEMA’s review. These items are similar to the items required in a CLOMR review, but must represent the as-built conditions. The specific requirements for LOMR submittals can be found in the MT-2 form instructions on the FEMA website. Refer to the FEMA website for the most current version of the MT-2 forms (<https://www.fema.gov/mt-2-application-forms-and-instructions>).

As previously stated, per the 2010 CWCB Rules, if a project results in an increase or decrease in BFE greater than 0.30 ft, a LOMR must be submitted to FEMA in order to officially change the floodplain information shown on the FIRM and FIS to represent the new and revised conditions.

2.5 EXECUTIVE ORDERS

2.5.1 Background

Presidential Executive Orders (EO) have the effect of law in the administration of programs by Federal agencies. Although Executive Orders do not directly apply to CDOT, these requirements are usually implemented through general regulations.

2.5.2 EO 11988

Executive Order 11988, May 24, 1977, requires each Federal agency, in implementing its activities, to take steps to achieve the following results:

- reduce the risk of flood loss;
- minimize the impact of floods on human safety, health, and welfare;
- restore and preserve the natural and beneficial values served by floodplains;
- evaluate the potential effect of any actions it may take in a floodplain; and
- ensure its planning programs reflect consideration of flood hazards and floodplain management.

These requirements are contained in 23 CFR 650 Subpart A and were published in the *Federal Register*, April 26, 1979, 44 FR 24678. The floodplain avoidance and evaluation requirements are addressed in the appropriate environmental document. The floodplain encroachment impacts are addressed in the design policies found in each chapter of this manual.

2.5.3 EO 11990

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 that may result from the action; and
- Consider factors relevant to the proposal's effects on the survival and quality of the wetlands.

These requirements are contained in 23 CFR 771, which are addressed in the appropriate environmental document.

2.6 COLORADO DRAINAGE LAW

2.6.1 Derivation of State Drainage Law

State drainage law is derived mainly from the common law and statutory law. *Common law* is a body of principles which developed from immemorial usage and custom and which receives judicial recognition and sanction through repeated application. These principles were developed without legislative action and are embodied in the decisions of the courts. *Statutory laws* are created by the legislature to enlarge, modify, clarify or change the common law applicable to particular drainage conditions. This type of law is derived from constitutions, statutes, ordinances and codes.

2.6.2 The Natural Flow Rule

Colorado has statutory law or the 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*, 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*, 351 P.2d 803 (1960).

2.6.3 Basic Water Rules

Two major rules have been developed by the courts regarding the disposition of surface waters. The first is known as the civil law rule of natural drainage. The second is referred to as the common enemy doctrine. Modification of both rules has tended to bring the concepts closer together, and in some cases the original rule has been replaced by a compromise rule known as the reasonable use rule.

Much of the law regarding stream waters is founded on a common law maxim that states “water runs and ought to run as it is by natural law accustomed to run.” Thus, as a general rule, any interference with the flow of a natural watercourse to the injury or damage of another will result in liability. This may involve augmentation, obstruction and detention, or diversion of a stream. However, there are qualifications.

In common law, floodwaters are treated as a “common enemy” of all people, lands and property attacked or threatened by them.

In ground water law, the “English Rule,” which is analogous to the common enemy rule in surface water law, is based on the doctrine of absolute ownership of water beneath the property by the landowner.

2.6.4 Classification of Waters

The first step in the evaluation of a drainage problem is to classify the water. There are four classifications, which are defined below. Once the classification has been established, the rule that applies to the particular class of water determines responsibilities with respect to the disposition of the water.

- A. *Surface Water* - Surface waters are those waters which have been precipitated on the land from the sky or forced to the surface in springs, and which have been spread over the surface of the ground without being collected into a definite body or channel.
- B. *Stream Water* - Stream waters are former surface or ground waters which have entered and now flow in a well-defined natural watercourse, together with other waters reaching the stream by direct precipitation, or rising from springs in the bed or banks of the watercourse (a definite channel with bed and banks within which water flows either continuously or intermittently).
- C. *Flood Water* - Flood waters are former stream waters which have escaped from a watercourse and flow or stand over adjoining lands. They remain floodwaters until they disappear from the surface by infiltration or evaporation, or return to a natural watercourse.
- D. *Ground Water:* - Ground waters are either percolating waters or underground streams. Percolating waters include all waters which pass through the ground beneath the surface of the earth without a definite channel. The general rule is that all underground waters are presumed to be percolating. To be considered an underground stream, the existence and course of an underground permanent channel must be clearly shown. Underground streams are waters passing through the ground beneath the surface in permanent, distinct, well-defined channels.

2.6.5 Surface Waters

The civil law rule is based upon the perpetuation of natural drainage. The rule places a natural easement or servitude upon the lower land for the drainage of surface water in its natural course and the natural flow of the water cannot be obstructed by the servient owner to the detriment of the dominant owner. Most states following this rule have modified it to be similar to Colorado's version.

2.6.6 Stream Waters

Where natural watercourses are unquestioned in fact, and in permanence and stability, there is little difficulty in application of the rule. Highways cross channels on bridges and culverts, usually with some constriction of the width of the channel and obstruction by substructure within the channel, both causing backwater upstream and acceleration of flow downstream. The changes in regime must be so small as to be tolerable by adjoining owners, or there may be liability of any injuries or damages suffered.

Surface waters from highways are often discharged into the most convenient watercourse. The right is unquestioned if those waters were naturally tributary to the watercourse and unchallenged if the watercourse has adequate capacity. However, if all or part of the surface waters have been diverted from another watershed to a small watercourse, any lower owner may complain and recover for resulting loss (a damage).

2.6.7 Flood Waters

Considering floodwaters as a common enemy permits all affected landowners including owners of highways, to act in any reasonable way to protect themselves and their property from the common enemy. They may obstruct its flow from entering their land, backing or diverting water onto lands of another without penalty, by gravity or pumping, by diverting dikes or ditches, or by any other reasonable means.

Again, the test of reasonableness has frequently been applied, and liability can result where unnecessary damage is caused. Ordinarily, the highway designer should make provisions for overflow in areas where it is feasible that it will occur. There is a definite risk of liability if such waters are impounded on an upper owner or, worse yet, are diverted into an area where they would not otherwise have gone. Merely to label waters as "flood waters" does not mean that they can be disregarded.

2.6.8 Ground Water

The "English Rule" has been modified by the "Reasonable Use Rule" which states in essence that each landowner is restricted to a reasonable exercise of his own right and a reasonable use of his property in view of the similar right of his neighbors.

The key word is "reasonable." While this may be interpreted somewhat differently from case to case, it can generally be taken to mean that a landowner can utilize subsurface water on his property for the benefit of agriculture, manufacturing, irrigation, etc. pursuant to the reasonable development of his property although such action may interfere with the underground waters of neighboring property. However, it generally precludes the withdrawal of underground waters for distribution or sale for uses not connected with any beneficial ownership or enjoyment of the land from whence they were taken.

A further interpretation of reasonable in relation to highway construction would view the excavation of a deep cut section that intercepts or diverts underground water to the detriment of adjacent property owners as unreasonable. There are also cases where highway construction has permitted the introduction of surface contamination into subsurface waters and thus incurred liability for resulting damages.

2.6.9 C.R.S. § 33-5-101 to 107

This law requires all state agencies to get Colorado Parks and Wildlife (CPW) certification before construction in any stream, its banks, or its tributaries. The primary emphasis is on fishing waters. A Memorandum of Agreement (MOA) between CDOT and CPW was signed in November 1990 allowing limited programmatic certification.

2.6.10 Clean Water Act

In Colorado, the Department of Public Health and Environment, Water Quality Control Divisions (“Division”) has been delegated the NPDES program with the Environmental Protection Agency retaining oversight. Therefore, a CDPS (Colorado Discharge Permit System) permit must be obtained in Colorado. The permits are designed to limit the amount of pollutants entering streams, lakes, rivers and groundwater in order to protect established beneficial uses and water quality standards. The permit program covers the following categories:

- stormwater discharges;
- industrial waste discharges;
- sanitary sewage/domestic wastewater discharges; and
- discharges to ground water.



Photo 2.1



Photo 2.2

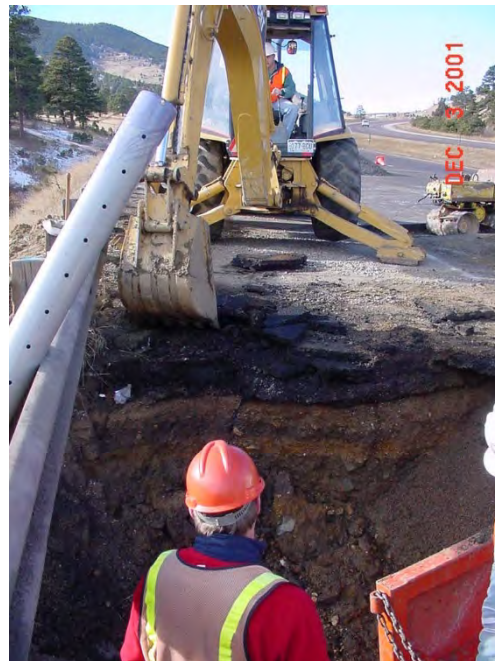


Photo 2.3

2.7 STATUTORY LAW

2.7.1 Introduction

Statutes have been enacted that affect drainage in one way or another. Statutes may have been enacted in areas previously covered by the common law. In the event of applicable rules from both, statutes prevail. If there is no statute, the common law rules developed by State courts apply.

2.7.2 Eminent Domain

Eminent domain is the power of the government to take private property for public use. CDOT often uses the power of eminent domain to acquire property for highway purposes, including the right to discharge highway drainage across adjoining lands.

Title 38 of the Colorado Revised Statutes codifies the State's right of eminent domain. If the State exercises its power of eminent domain, the private landowner must be fairly compensated for his loss. The landowner may dispute the taking of property or the amount of compensation offered. Therefore, the designer must be prepared to testify in court regarding the design, the design's effect on the property taken and the need for the taking.

2.7.3 Water Rights

The water right, which attaches to a watercourse, is a right to the use of the flow, not ownership of the water itself. This is true under both the riparian doctrine and the appropriation doctrine. This right of use is a property right, entitled to protection to the same extent as other forms of property, and is regarded as real property. After the water has been diverted from the stream flow and reduced to possession, the water itself becomes the personal property of the riparian owner or the appropriator.

1. Riparian Doctrine: Under the riparian doctrine, lands contiguous to watercourses have prior claim to waters of the stream solely by reason of location and regardless of the relative productive capacities of riparian and non-riparian lands.
2. Doctrine of Prior Appropriation: The essence of this doctrine is the exclusive right to divert water from a source when the water supply naturally available is not sufficient for the needs of all those holding rights to its use. Such exclusive right depends upon the effective date of the appropriation, the first in time being the first in right. **This is the doctrine that is used in Colorado.** See *Comstock*, 145 P. 700 (1914); C.R.S. § 37-82-101.

Generally, the important thing for designers to keep in mind in the matter of water rights is that the proposed work in the vicinity of a stream or irrigation ditch should not impair either the quality or quantity of flow of any water rights. A ditch agreement is needed when work is proposed on a multiple user irrigation system. A ROW agreement is used for single user irrigation systems.

2.7.4 Urban Drainage and Flood Control District

The Urban Drainage and Flood Control District was created by the state legislature in 1969 (Senate Bill 202). The boundaries are generally the metropolitan area (approximately 1360 square miles) around Denver and Boulder. They have the authority to review and approve all major

drainage work. Normally, the Urban Drainage and Flood Control District restricts itself to multi-jurisdictional drainage ways.

Information about other jurisdictions can be obtained from the Department of Local Affairs to check if the drainage design would affect others.

2.7.5 The Colorado Department of Transportation Access Code

The State Highway Access Code is found in 2 CCR 601-1. This code was developed pursuant to the authority granted in C.R.S. § 43-2-147. The State Highway Access Code requires anyone applying for an access permit to have his or her drainage reviewed by CDOT. Specifically, 2 CCR 601-1 § 4.11 addresses drainage requirements for new accesses.

2.7.6 Colorado Statutes

Specifically, title 37 of the Colorado Revised Statutes discusses water issues. It may be helpful for the designer to be familiar with these laws. Some of the laws include the following:

- § 37-84-106 provides that all bridges constructed over any ditch, race, drain or flume crossing any public highway, street or alley, after construction shall be maintained by and at the expense of the county or municipality.
- § 37-84-119 states that the owners or persons in control of any ditch or canal used for irrigating purposes shall maintain it in good order and repair and ready to receive water by April 1 each year.
- § 37-84-101 states that the owner of any ditch shall carefully maintain the embankment thereof so that the waters of such ditch do not flood or damage the premises of others.
- § 37-84-103(1) provides that any bridge constructed on a public highway to accommodate the crossing of any ditch or otherwise must be constructed in accordance with applicable standards established by the State.
- § 37-86-106 provides that whenever it is necessary to convey water through the land of another, the shortest and most direct route practicable should be selected.
- § 37-96-103(2) states that when a public entity responsible for landscaping and maintaining any public project or facility builds or makes changes, the plan for such building or changes shall seek to conserve water. Standards and considerations are located in the statute.

2.8 LOCAL LAWS AND APPLICATIONS

2.8.1 Local Laws

Local governments usually have ordinances and codes that require consideration during design. For example, zoning ordinances can have a substantial effect on the design of a highway and future drainage from an area. On occasion, a question may arise as to whether the State must comply with local ordinances. Generally, the State is not legally required to comply with local ordinances except where compliance is required by specific State statute. Quite often, however, CDOT attempts to conform to local ordinances as a matter of courtesy especially when it can be done without imposing a burden on the State.

2.8.2 Municipal Liability

A municipality is generally treated like a private party in State drainage matters. A municipality undertaking a public improvement is liable like an individual for damage resulting from negligence or an omission of duty. As a general rule, municipalities are under no legal duty to construct drainage improvements unless public improvements necessitate drainage – as in those situations in which street grading and paving or construction accelerate or alter storm runoff. In addition, it is generally held that municipalities are not liable for adoption or selection of a defective plan of drainage.

Municipalities can be held liable for negligent construction of drainage improvements, for negligent maintenance, for repair of drainage improvements and, if they fail to provide a proper outlet, for drainage improvements.

2.8.3 Acts of Others

The general rule is that a municipality is not liable for the acts of officers, agents, or employees that are governmental in nature, but is liable for negligent acts of its agents in the performance of duties relating to proprietary or private corporate purposes of the city. If the construction, maintenance and repair of drainage improvements is regarded as proprietary or corporation functions, then a municipality may be held liable for the acts of its officers, agents or employees for injuries resulting from negligent construction, maintenance, or dangerous conditions of a public facility.

2.8.4 Acts of Developers

Unless an ordinance or statute imposes a duty on a municipality to prevent or protect land from surface water drainage, a municipality will not incur liability for wrongfully issuing building permits, failing to enforce an ordinance, or approving defective subdivision plans. However, there is a trend toward imposing a greater burden or responsibility on municipalities for the drainage consequences of urban development.

2.8.5 Personal Liability

Public employees generally have been personally liable for injuries caused by their negligent actions within the scope of their employment, even when the defense of sovereign immunity was available to their employers.

2.8.6 Drainage Improvements

A municipality's inherent police powers enable it to enact ordinances that serve the public health, safety, morals or general welfare. Ordinances addresses drainage problems are clearly a proper exercise of a municipality's police powers.

2.8.7 Special Matters

A. *Irrigation Ditches* - In situations in which an irrigation ditch intersects a drainage basin, the irrigation ditch does not have to take underground waters diverted by a tile drain. However, the surface drainage must be accepted if the irrigation ditch is constructed in a way into which surface water would naturally flow. Irrigation ditch owners have reluctantly accepted historic peak and volume runoff.

- B. *Dams and Detention Facilities* - The Dam Inspection Unit of the Office of the State Engineer is responsible for reviewing all permanent impoundments in Colorado. Generally, if a dam's permanent pool level is less than 25 acres and less than 10 feet high, the dam will not fall under the State Engineer's jurisdiction.

2.9 NATIONAL PERMITS/CERTIFICATIONS

2.9.1 Section 401 of the *Clean Water Act*

Purpose

The purpose of the *Clean Water Act*, Section 401 Certification is to restore and maintain the chemical, physical, and biological integrity of the nation's waters through the prevention, reduction, and elimination of pollution.

Applicability

A Section 401 Certification may be required in conjunction with any Section 404 permits, individual or nationwide.

Responsible State Agency

Section 401 of the Federal *Clean Water Act* requires states to review projects and Federal permits to ensure that they will not impact the stream quality or violate Surface Water Standards. Typically, a state Department of Environment and Natural Resources (DENR) conducts this review and issues a Section 401 certification.

Legal References

The following lists the legal references for the Section 401 Certification:

- Section 401 of the Federal *Water Pollution Control Act* (1972), as amended by the *Clean Water Act* (1977 and 1987), 33 USC 1341;
- 33 CFR 320-332; and
- 40 CFR 230 and 233.

2.9.2 Section 402 of the *Clean Water Act*

Purpose

The purpose of Section 402 of the *Clean Water Act*, which is also known as Section 402 National Pollutant Discharge Elimination System (NPDES) Construction Permit program, is to restore or maintain, or both, the chemical, physical, and biological integrity of the nation's waters through the prevention, reduction, and elimination of pollution.

Applicability

Section 402 NPDES Construction Permits are required for all construction activities involving clearing, grading, and excavation that disturb one acre or more of land area. In addition, all construction activities that are on or adjacent to waters of the state must require a construction permit regardless of land area disturbed. The NPDES Program consists of a Surface Water

Discharge (SWD) permit and stormwater permits. The SWD permit controls discharges from point sources of pollution such as construction dewatering activities. The stormwater program regulates stormwater discharges from three potential sources - municipal separate storm sewer systems (MS4s), construction activities, and industrial activities. Most stormwater discharges are considered point sources, and operators of these sources may be required to receive an NPDES permit before they can discharge. This permitting mechanism is designed to prevent stormwater runoff from washing harmful pollutants into local surface waters (e.g., streams, rivers, or lakes).

Responsible State Agency

The Colorado Department of Natural Resources administer the NPDES program, which includes enforcement, management, and implementation of the permit program.

Responsible CDOT Unit

CDOT Environmental is responsible for the NPDES Program.

Legal References

The following lists the legal references for the NPDES Construction Permit:

- Section 402 of the *Federal Water Pollution Control Act* (1972), as amended by the *Clean Water Act* (1977 and 1987), 33 USC 1342; and
- 40 CFR 122-136.

2.9.3 Section 404 of the *Clean Water Act*

Purpose

The purpose of Section 404 of the *Clean Water Act* is to ensure that the physical, biological, and chemical quality of our nation's water is protected from irresponsible and unregulated discharges of dredged or fill material that could permanently alter or destroy these valuable resources.

Applicability

Section 404 of the Federal *Clean Water Act* requires that anyone, including a government agency, political subdivision, landowner, or developer, who is proposing to conduct activities that involve the discharge of “dredged or fill material” into “waters of the United States,” obtain a permit. The term “discharge of dredged material” includes “all mechanized land clearing, ditching, channelization, and other excavation activities that would have the effect of degrading or destroying waters of the United States.” The term “waters of the United States” includes all lakes, waterways, rivers, streams, and jurisdictional wetlands. Waters of the United States includes essentially all surface waters such as all navigable waters and their tributaries, all interstate waters and their tributaries, all wetlands adjacent to these waters, and all impoundments of these waters. The term “fill” means any material used that will replace an aquatic area with dry land or change the bottom elevation of a wetland (e.g., concrete, riprap, earth fill).

Responsible Federal Agency

For Section 404 Permits, the U.S. Army Corps of Engineers is the Federal agency with overall responsibility for administering the program, reviewing permit applications, and issuing permits. Note that each Corps District has its own procedures and permit requirements.

Responsible CDOT Unit

CDOT is responsible for securing Section 404 Permits for state highway projects. Hydraulic engineers assist CDOT Environmental in completing the permit application by providing necessary technical data. CDOT Environmental is responsible for submitting all completed application forms and required details showing the location, nature, and quantity of the fill into the waters of the United States. These sketches should be in accordance with the permit application instructions and should include a location map.

The local government engineers are responsible for securing Section 404 Permits for local government road and structure Federal-aid projects. Local government engineers are responsible for completing the application forms and assembling the required details, including a location map, and the nature and quantity of fill into the waters of the United States. These items shall be in accordance with the permit application instructions.

Documentation

Appendix C summarizes the documentation that should be included in the Permit File for a Section 404 Permit.

Definitions

The following definitions are applicable to Section 404 Permits:

Headwaters of the United States. The point on a non-tidal stream above which the average annual flow is less than five cubic feet per second (ft³/s). The U.S. Army Corps of Engineers District Engineer may estimate this point from available data by using the mean annual area precipitation, area drainage basin maps, and the average runoff coefficient, or by similar means. For streams that are dry for long periods of the year, District Engineers may establish the headwaters as that point on the stream where a flow of five cfs is equaled or exceeded 50 percent of the time (33 CFR 330).

Ordinary Highwater (OHW). The line showing on the shore that is established by fluctuations of water and is indicated by physical characteristics such as clear, natural lines impressed on the waterway bank, shelving, changes in the character of the soil, destruction of terrestrial plants, the presence of litter or debris, or other appropriate means that consider the characteristics of the surrounding area. In the absence of documented ordinary highwater data, states have used the computed 2-year flow depth as the ordinary highwater depth for permit applications.

Special Aquatic Sites. Mudflats, refuges, riffle and pool complexes, sanctuaries, vegetated shallows, and wetlands.

Waters of the United States. In general, for identification, the “Waters of the United States” include all jurisdictional wetlands and areas within a blue solid line or a blue dash line on the USGS quadrangle maps. Each river, stream, creek, intermittent tributary, pond, impoundment, lake, or wetlands is considered part of the Waters of the United States. Irrigation ditches or channel modifications that intersect a blue line and intercept the flow may also be considered Waters of the United States.

Jurisdictional Wetlands. Bogs, marshes, sloughs, and swamps are other terms used to describe these areas. Floodplains, or areas where water stands on, at, or near the groundline, may be considered suspected jurisdictional wetlands. Guidelines, as established by the U.S. Army Corps of Engineers Wetland Delineation Manual (available online), indicate that jurisdictional wetlands should have all of the following characteristics:

- a majority of water-tolerant plants;
- saturated soils; and
- water on, at, or near the surface of the ground during a specified portion of the growing season.

On January 9, 2001, the U.S. Supreme Court issued a decision, *Solid Waste Agency of Northern Cook County vs. U.S. Army Corps of Engineers* (521 U.S. 159, 2001) that limits the scope of the U.S. Army Corps of Engineers *Clean Water Act* (CWA) regulatory permitting program (Section 404) applied to isolated waters of the United States. The Supreme Court overturned the Corps' assertion of Federal jurisdiction over certain isolated wetlands based upon the presence of migratory birds.

The U.S. Supreme Court has ruled in *Rapanos vs. United States*, Nos. 04-1034-1384 (June 19, 2006) that not all wetlands are under the jurisdiction of the *Clean Water Act*. The requirement for a Clean Water Act permit to discharge dredged or fill material into “navigable waters” only applies to relatively permanent, standing, or continuously flowing waters. It does not apply to channels through which water flows intermittently or ephemerally, or which periodically provide drainage for rainfall. Wetlands near ditches or man-made drains that empty into traditional navigable waters are not included.

Types of Section 404 Permits

The U.S. Army Corps of Engineers issues individual permits as well as Nationwide and Regional General Permits. Each of these is discussed in the following sections.

Individual Permits: These permits are the basic form of authorization under the U.S. Army Corps of Engineers permit program. Individual permits are required where a proposed project does not meet the terms or conditions of either a regional or nationwide general permit, or both, due either to the type of activity, size of project, or when it is probable that the project will cause more than minimal impact to the aquatic environment. The following applies:

- Individual permits are issued following a full public interest review of an individual application for a Department of the Army permit. A public notice is distributed to all known interested persons. After evaluating all comments and information received, a final decision on the application is made.
- The permit decision is influenced by the outcome of a public interest balancing process where the benefits of the project are balanced against the detriments. A permit is often granted unless the proposal is found to be contrary to the public interest.
- Processing time usually takes 60 to 120 days unless a public hearing is required or an environmental impact statement is prepared.

Nationwide Permits (NWP): Nationwide general permits are issued to the general public every five years and are applicable anywhere (with some special limitations) in the United States. There are currently 50 different categories of activities authorized under this permit program. Some of the activities require notification to the U.S. Army Corps of Engineers prior to implementation, and some require submittal of wetland delineation if the project is proposed to be constructed within a wetland. All nationwide general permits have restrictions based on activity, project size, area impacted, construction method, etc. Some of the nationwide general permits currently in effect include approved categorical exclusions, maintenance, minor road crossings, bank stabilization, etc.

The most common types of these permits for transportation purposes are covered under NWP Nos. 3, 7, 13, 14, 23, 27, 41, and 43. CDOT usually submits a Section 404 permit application for all projects that appear to qualify for a Nationwide Permit, plus those that will require an Individual 404 Permit. For Nationwide Permits requiring a preconstruction notification, the preconstruction notification requirement is satisfied by submitting the Section 404 Permit application.

1. NWP No. 3: Maintenance. This NWP authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill. In addition, it can allow the removal of accumulated sediment and debris in the vicinity of existing structures, or permit temporary structures, fill, and work to conduct the maintenance activity. All permitted work is to restore the facility back to original conditions. A preconstruction notification is required for the sediment and debris removal activities.
2. NWP No. 7: Outfall Structures and Maintenance. This NWP is not likely to be used by states.
3. NWP No. 13: Bank Stabilization. This NWP is for the placement of stream bank stabilization for erosion prevention. This permit is limited to 500 linear ft and with material below ordinary highwater being an average of less than one cubic yard per running foot. A preconstruction notification for fills is required in special aquatic sites in excess of 500 linear ft in length or involving the discharge of fill material greater than one cubic yard per running foot along the bank below the plane of the ordinary highwater mark.
4. NWP No. 14: Linear Transportation Crossings. This NWP for public projects is limited to the loss of one half acre. The permittee must submit a preconstruction notification to the District Engineer prior to commencing the activity if (1) the loss of waters of the United States exceeds 1/10 acre; or (2) there is a discharge in a special aquatic site, including wetlands (Sections 10 and 404).
5. NWP No. 23: Approved Categorical Exclusions. This NWP is applicable to highway projects with at least partial Federal funding that have FHWA-approved categorical exclusions. This is the primary Nationwide Permit used for state DOT projects that have been categorically approved by the FHWA.
6. NWP No. 27: Stream and Wetland Restoration Activities. The permittee must submit a preconstruction notification to the District Engineer prior to commencing the activity.
7. NWP No. 41: Reshaping Existing Drainage Ditches. A Preconstruction Notification is required for projects that affect greater than 500 linear ft.
8. NWP No. 43: Stormwater Management Facilities. The discharge must not cause the loss of greater than one-half acre of non-tidal waters of the United States, including the loss of no more than 300 linear ft of streambed unless, for intermittent and ephemeral streambeds, this 300-linear ft limit is waived in writing by the District Engineer. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters. This NWP does not authorize discharges of dredged or fill material for the construction of new stormwater management facilities in perennial streams.

Regional General Permits (RGP): The U.S. Army Corps of Engineers is authorized to issue, after notice and opportunity for public hearing, general permits on a regional or statewide basis for any category of recurring activities that are similar in nature, similar in their impact on water quality and the aquatic environment, and cause only minimal adverse impact both individually and cumulatively. The purpose of the general permit is to allow certain minimal impact activities to

occur with little, if any, delay or paperwork. These permits may be issued to a specific group, entity, or agency, or to the public in general.

The term “general permit” means a Department of the Army authorization that is issued on a nationwide or regional basis for a category or categories of activities when those activities are substantially similar in nature (as stated above), and the general permit would result in avoiding unnecessary duplication of regulatory control exercised by another Feder, State, or local agency provided that it has been determined that the environmental consequences of the action are individually and cumulatively minimal.

When an RGP is designated or implied, the hydraulic engineer should prepare a memorandum for the hydraulic project file stating the following: This project qualifies for an RGP in that (each eligibility criteria for the RGP should be listed and the level of adherence to those criteria noted).

Nationwide Permits Regional Conditions

Individual USACE regions may set its own Regional Conditions that apply within their jurisdiction for any of the Nationwide Permits. Regional Conditions are asserted by the District Engineer using discretionary authority to ensure that the NWP would not result in more than minimal adverse environmental effects either individually or cumulatively. The Regional Conditions may be for a specific geographic area, class of activity, or class of waters within the state whenever there are sufficient concerns for the environment under the section 404(b)(1) Guidelines or any other factor of the public interest so requires. States should become familiar with any regional conditions to ensure that the Nationwide Permit is granted in a timely fashion.

Nationwide Permits Mitigation Information

Mitigation includes measures that avoid, minimize, or compensate for impacts to the aquatic ecosystem. Avoidance and minimization associated with NWP authorizations are limited to on-site measures. The following descriptions apply:

1. Avoid. Take all appropriate and practical measures to avoid adverse impacts to the aquatic ecosystem.
2. Minimize. Take all appropriate and practical measures to minimize adverse impacts to the aquatic ecosystem.
3. Compensate. The applicant may be required to implement appropriate and practical measures to compensate for adverse project impacts to the aquatic ecosystem that cannot reasonably be avoided or minimized. Compensatory mitigation can take many forms, some of which are the use of buffer zones adjacent to the stream corridors and wetland areas, stream restoration or “naturalization,” specific mitigation, mitigation banking, in-lieu fee-based mitigation, protection of areas by deed restrictions, or conservation easements.

Section 404 permittees are responsible for developing a mitigation plan and submitting it to the Corps. Include the following in the mitigation plan:

- A complete description of efforts made to avoid and minimize adverse project impacts to the aquatic ecosystem and a thorough description of the proposed compensatory mitigation.
- Wetland delineation (if appropriate), conducted in accordance with the U.S. Army Corps of Engineers *Wetlands Delineation Manual*.

- A detailed description of the nature and location of all proposed ground-disturbing activities and structures associated with the compensatory mitigation project.
- For work that would create new aquatic resources or modify existing aquatic resources, provide a description of the proposed hydrology, a soil description, and a planting plan.
- A proposal for monitoring the success of the proposed mitigation plan, including the name and telephone number of the responsible party, success criteria, and a compliance reporting program. Continue monitoring for at least two years after all mitigation activities have been completed and planting survival requirements have been achieved. Include all appropriate contingency plans and address provisions for long-term operations and maintenance.

Application Procedure

A typical Section 404 application procedure is provided in Appendix C. CDOT Environmental may choose to follow a Section 404 application procedure different from that found in Appendix C.

Distribution of Permits

Upon receipt of the Corps Section 404 Permit, CDOT Environmental will notify the Hydraulics Engineer and Bid Letting Office of the receipt of the permit, the expiration date of the permit, the type of permit received, and the locations permitted. Depending upon the project activities, other state offices may be notified of the permit conditions.

At the time a project with a Section 404 Permit is advertised for letting, CDOT Environmental will forward the permit letter, the permit application, any application quantity attachments, and the wetland table to the area engineer responsible for the project construction for their use during construction.

Legal References

The following lists the legal references for Section 404 Permits:

- Section 404 of the Federal *Water Pollution Control Act* (1972), as amended by the *Clean Water Act* (1977 and 1987), 33 USC 1344; and
- 33 CFR 320-332.

2.9.4 Section 9 of the Rivers and Harbors Appropriation Act of 1899

Purpose

The purpose of the Section 9 of the Rivers and Harbors Act is 1899 is to ensure that there will be no interference to navigation on navigable waterways of the United States.

Applicability

A Section 9 Navigable Waters Permit is required for the construction, modification, replacement, or removal of any bridge or causeway over a navigable waterway. Coast Guard permits are not required for the following projects:

- Construction of Federal-aid bridges (23 CFR 650, Subpart H) crossing non-tidal waters not presently used as or susceptible to use as a means of transporting interstate or foreign commerce;
- Removal of an existing bridge that will not be replaced by another bridge;
- If the state DOT will retain the entire bridge or designated sections for purposes other than transporting people or physical matter across a navigable waterway (i.e., fishing pier), the state should notify the U.S. Army Corps of Engineers (USACE) District Office with jurisdiction over the bridge’s geographic area. USACE will either approve or deny the request. If the state receives USACE approval, the state must adhere to the USACE permit requirements, because USCG no longer has jurisdiction over the bridge. If USACE denies the request, USCG retains jurisdiction to prescribe removal conditions to protect navigation; and
- Repair or replacement of worn or obsolete parts on an existing bridge.

Responsible Federal Agency

For Section 9 Navigable Waters Permits, the U.S. Army Corps of Engineers is the Federal agency with overall responsibility for reviewing permit applications and issuing permits. THE USCG, Bridge Administration Division is responsible for issuing permits. If a Section 9 permit is also required, the United States Coast Guard is the Federal agency with overall responsibility for reviewing permit applications and issuing permits.

Responsible CDOT Unit

Typically, Staff Bridge is responsible for the Section 9 Permit. Hydraulics engineers are responsible for submitting all completed application forms, required sketches showing the project location, etc.

Legal References

The following lists the legal references for Section 9 Permits:

- Section 9 of the *Rivers and Harbors Appropriation Act of 1899*, 33 USC 401;
- 23 CFR Part 650, Subpart H; and
- 33 CFR 114-118.

2.9.5 Section 10 of the Rivers and Harbors Appropriation Act of 1899

Section 10(b) of the *Rivers and Harbors Appropriation Act* approved March 3, 1899 (33 USC 403) (hereinafter referred to as Section 10), prohibits the unauthorized obstruction or alteration of any navigable water of the United States. The construction of any structure in or over any navigable water of the United States, the excavating from or depositing of material in such waters, or the accomplishment of any other work affecting the course, location, condition, or capacity of such waters is unlawful unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army. The instrument of authorization is designated a permit.

Purpose

The purpose of the Section 10 Navigable Waters Permit is to protect and preserve the navigable waterways of the United States.

Applicability

A Section 10 Navigable Waters Permit is required for structures or work (other than bridges or causeways) affecting a navigable waterway. Examples of work include dredging, channelization, and filling.

Responsible Federal Agency

For Section 10 Navigable Waters Permits, the U.S. Army Corps of Engineers is the Federal agency with overall responsibility for reviewing permit applications and issuing permits. If a Section 9 permit is also required, the United States Coast Guard is the Federal agency with overall responsibility for reviewing permit applications and issuing permits.

Responsible CDOT Unit

Typically, Staff Bridge is responsible for the Section 10 Permit. Hydraulics engineers are responsible for submitting all completed application forms, required sketches showing the project location, etc.

Legal References

The following lists the legal references for Section 10 Permits:

- Section 10 of the *Rivers and Harbors Appropriation Act of 1899*, 33 USC 403;
- 23 CFR Part 650, Subpart H; and
- 33 CFR 320-332.

2.9.6 State/County/City Permits and Certifications

In addition to the various national permits that may be required for a construction project, projects may be subject to state, county, and city permitting requirements.

State

The Colorado Division of Water Resources has the responsibility for water rights, dam safety, and other water related activities.

Water Rights: Whether a water rights permit is needed depends on the type of proposed water use. These permits may be required for domestic water use, or for water distribution systems.

Dam Safety: Typically, state agency approval is needed if the proposed highway fill forms a dam that meets any of the following conditions:

- The proposed dam will impound more than 25 acre-ft of water at the primary spillway elevation;
- Regardless of the amount of water impounded, diversions will be made from the dam to serve some use other than reasonable domestic use; or
- Dam height; or
- The proposed dam is being constructed on a navigable stream.

Additional conditions may apply; therefore, the designer must research additional state dam requirements from the Colorado Department of Natural Resources, Division of Water Resources, Office of the State Engineer, Dam Safety Branch.

County/City

Hydraulic engineers should be aware that many county and city government entities may have drainage ordinances or other permitting requirements that need to be considered. Generally, the state is not legally required to comply with local ordinances except where compliance is required by specific state statute. Contact the local NFIP coordinator for details.

2.10 ROLE OF THE DESIGNER

2.10.1 Responsibility

The designer has a two-fold responsibility relating to legal issues associated with highway drainage. First, the designer should be aware of the legal principles involved and apply that knowledge to their designs. Second, the designer should be prepared to consult CDOT's legal staff, as necessary, in the preparation and trial of cases involving drainage issues. The duties of a designer include direct legal involvement in the following areas:

- Conduct investigations, advise and provide expert testimony on the technical aspects of drainage claims involving existing highways;
- Provide drainage design information during right-of-way acquisitions to assist appraisers in evaluating damage; and
- Provide testimony in condemnation proceedings when necessary.

2.10.2 Investigating a Complaint

Drainage complaints should be addressed promptly and in an unbiased manner. This means accepting that the flooding is a serious problem for the complainer, and not accepting anyone's preconceived conclusions. All facts must be assembled and analyzed before conclusions can be determined on what happened and why. Also, it is advisable to list any action by others that could possibly be responsible for the flooding.

When the hydraulic engineer is requested to investigate a complaint, the following guidelines are recommended:

Step 1 - Determine facts

- A. Obtain the general facts about the complaint.
 - Show on a map the location of the problem on which the complaint is based.
 - Clearly determine the basis for the complaint by obtaining information including what area was flooded; complainer's opinion on what caused the flooding; description of the alleged damages; and dates, times, and durations of flooding.
 - Briefly relate the history of any other grievances that were expressed prior to the claim presently being investigated.
 - Obtain approximate dates that the damaged property or improvements, or both, were acquired by those claiming damages.

B. Collect facts about the specific flood event(s) involved.

- Obtain rainfall data including dates, amounts, time periods, and locations of gauges. Rainfall data are often helpful regardless of the source.
- Document observed highwater information at or in the vicinity of the claim. Locate highwater marks on a map and specify datum. Always try to obtain highwater marks both upstream and downstream of the highway and the time the elevations occurred.
- Determine the duration of flooding at the site of the alleged damage. Determine the direction of flood flow at the damaged site. Describe the condition of the stream before, after, and during flood(s). Determine if the growth in the channel was light, medium, or heavy and if there were drift jams. Determine if the stream carries significant drift in flood stage. Determine if the flow was fast or sluggish, and if light, moderate, or severe erosion occurred.
- Document the flood history at the site. Determine if the highway was overtopped by the flood. If so, determine the depth of overtopping and, if possible, estimate a flow velocity across the highway. Obtain narratives of any eyewitnesses to the flooding. Obtain facts about the flood(s) from sources (e.g., newspaper accounts, witnesses, measurements by other agencies (USGS, USACE, NRCS), individuals, maps, National Weather Service rainfall records).

C. State facts about the highway crossing involved.

- Show profile of the highway across the stream valley. Give the date of the original highway construction and dates of all subsequent alterations to the highway, and describe what the alterations were.
- Describe what existed prior to the highway (e.g., county road, city street, abandoned railroad embankment). Also, include a description of the drainage facilities and drainage patterns that existed prior to the highway.
- Provide a description of the existing drainage facilities.
- Provide the original drainage design criteria, or give capacity and frequency of the existing facility based upon current criteria.

Step 2 - List possible effects by others

- Determine if there are any other stream crossings in the vicinity of the damaged site that could have affected the flooding.
- Determine if there are any other contributing factors (e.g., pipelines, highways, streets, railroads, dams).
- Determine if there have been any significant constructed changes to the stream or watershed that might affect the flooding.

Step 3 - Analyze the facts

- From the facts, determine what should be done to relieve the problem regardless of who has responsibility for the remedy.
- Identify others who may possibly provide assistance.

Step 4 - Make conclusions and recommendations

- Determine the contributing factors leading to the alleged flood damage.

- Specify feasible remedies. This should be done without regard for who has responsibility to implement a remedy.

The list under Step 1 is not all-inclusive, nor is it intended that the entire list will be applied in every case. This outline is given as a guide to the type and scope of information desired from an investigation of a drainage complaint. It is advantageous to have available hydraulic design documentation as outlined in Chapter 4 “Documentation Procedures.” When adequate information has been obtained, the designer should again analyze the facts, consider the conclusions and recommendations, and prepare a response to the complainer explaining the results of the investigation. Documentation of the facts and findings is important if there is future action.

2.10.3 Legal Matters

Drainage matters range from the simple to the complex. If the facts are ascertained and plan developed before initiating a proposed improvement, the likelihood of an injury to a landowner is remote and CDOT or the developer should be able to undertake such improvements relatively assured of no legal complications.

A designer may require a legal opinion on a particular drainage problem or improvement. In order to obtain an opinion, the designer must clearly and concisely relay all of the information and be prepared to answer questions.

The designer may also be called upon to act as an expert or factual witness in a legal proceeding. Testimony often involves preparation time before a court hearing, the ability to present technical information in layman’s terms, and the ability to clearly describe the issues at hand.

2.10.4 As a Witness

When requested, the designer should accept the responsibility of providing expert testimony in highway drainage litigation. Witness duty ordinarily requires considerably more time of a witness than the time spent in the courtroom. The best use of the designer’s time can be arranged by consulting with legal counsel to determine what types of information and data will be needed, the types of presentation needed, and when testimony will be required.

Testimony often involves presenting technical facts in layman’s language so that it will be clearly understood by those in the courtroom. The designer’s testimony generally describes the highway drainage system involved in the alleged injury or damage, and how that system affects the complainant. Documentation of design considerations and evidence of conditions existing prior to construction of the highway will be necessary to support all testimony.

2.10.5 Witness Conduct

The designer who will be a witness should bear one fact in mind – the purpose of the court is to administer justice. Testimony should have one purpose – to bring out all known facts relevant to the case so that justice can better be served. Following are some pointers on being a witness:

- Tell the truth and do not try to color, shade, or change your testimony to help either side.
- Never lose your temper or show prejudice in favor of one side that is not supported by facts.
- Do not be afraid of lawyers and give your information honestly.
- Speak clearly and loudly to be heard by everyone involved in the courtroom proceeding.

- If you do not understand a question, ask that it be explained. If you still do not understand what is being asked, explain that you cannot give an answer to that question.
- Answer all questions directly and never volunteer information the questioner does not ask for.
- Stick to the facts and what you personally know.
- Do not be apprehensive. Your purpose is to present the facts as you know them and that is all that will be expected.
- If you do not know the answer to a question, just admit it. It is to your credit to be honest, rather than try to have an answer for everything that is asked.
- Do not try to memorize your story. There is no more certain way to cross yourself than to memorize your story and try to fit this story with the questions being asked.
- Work with your lawyer in preparing your testimony and stick to the facts as you know them.

REFERENCES

1. AASHTO, *Drainage Manual*. Chapter 2, Legal Aspects, American Association of State Highway and Transportation Officials, Volume 1, Washington D.C., 2014.
2. FEMA, *National Flood Insurance Program and Related Regulations*, 44 CFR 65.10, Federal Emergency Management Agency, Washington D.C.,
3. UDFCD, *Criteria Manual*. Chapter 2, Drainage Law, Urban Drainage and Flood Control District, Volume 1, Denver, 2016.

APPENDIX A – EXAMPLE PERMITTING AND CERTIFICATION STANDARD OPERATING PROCEDURES

HYDRAULICS STANDARD OPERATING PROCEDURE (SOP) NO-RISE CERTIFICATION FOR FEMA FLOODWAYS

DATE: January 5, 2017 (**DRAFT**)

TO: Johnny Olson, P.E. -- *CDOT Region 4 Regional Transportation Director*
Heather Paddock, P.E. -- *CDOT Region 4 Central Program Manager*

FROM: Brian Varrella, P.E., CFM -- *CDOT Region 4 Hydraulics Unit Lead*

SUBJECT: CDOT Region 4 procedures for certifying no-rise in FEMA regulatory floodways

PURPOSE AND INTENT

The Colorado Department of Transportation (CDOT) Region 4 Hydraulics Unit provides assistance and support to project managers throughout the Region for technical and non-technical services. Many of those services include clearances for roadway repair and rehabilitation projects in regulatory floodways and floodplains, also known as the Special Flood Hazard Area (SFHA). This procedure memorandum shall assist all project and program managers at Region 4 with understanding the basic requirements of Federal and State laws applying to SFHAs, with critical focus on floodways, and the standard of care associated with the maintenance and construction of transportation pavement treatments. Information contained herein reflects draft floodway guidance issued by the Federal Emergency Management Agency (FEMA) in December 2016. This information shall not apply to the construction, maintenance, repair or rehabilitation of culverts, bridges, irrigation facilities or other hydraulic structures.

BACKGROUND AND METHODOLOGY

Region 4 Hydraulics provides in-house design and analysis, external hydraulic and hydrologic (H&H) review, and permit clearances for roadway surface treatments (or pavements) in regulatory floodplains and floodways identified by FEMA as SFHAs. Every SFHA disrupted by above- or below-ground disturbances requires a flood hazard development permit be obtained from local agencies acting on FEMA's behalf prior to that disturbance, consistent with federal code standards and FEMA guidance issued in December 2016.

Activities requiring a local agency permit are defined as “development” in Title 44 of the Code of Federal Regulations, Section 59.1 (44 CFR 59.1). When crossing or making contact with FEMA regulatory floodways, it is contingent upon CDOT to apply for a floodplain development permit from the local governing agency, and to support that application with a certification of no-rise. No-rise is a measurement of the change in base flood elevation (BFE) or 100-year water surface elevation, as measured to the nearest 0.00 feet, created by proposed or completed development in the floodway. If no-rise is not achievable or certifiable in pre-construction analysis, then CDOT must prepare a Letter of Map Change (LOMC) to the FEMA Flood Insurance Rate Map (FIRM). The process to change or revise a FIRM is known as a Conditional Letter of Map Revision

(CLOMR) for pre-construction development, or LOMR for post-construction certification purposes, and is recorded on the MT-2 Form issued by FEMA.

Both no-rise certification and LOMC processes require the seal of a licensed professional engineer. Standards associated with these certifications, and applicable Federal and State code, were provided to Region 4 Transportation Director Johnny Olson and the PE IIIs of Region 4 in a memo dated January 31, 2012, from former Region 4 Hydraulics Unit Lead Steve Griffin.

Many methods and means are available to Region 4 personnel to certify no-rise for transportation pavement projects. The most simple is by inspection and photography; the most complex, time-consuming and expensive is by detailed hydraulic analysis. If no-rise cannot be certified, a LOMC process must be executed. A spectrum of opportunity lies between the bookends of inspection/photography and hydraulic analysis.

Final procedures for certifying no-rise in the floodway portion of the SFHA are ultimately the discretion of local floodplain administrators, and the procedures offered herein are not intended to be utilized on bridges, culverts or other hydraulic structure construction or maintenance activities. General procedures for CDOT Region 4 no-rise submittals shall include (but may not be limited to) the following;

1. **Inspection with Photographic Evidence;** match existing adjacent hard points in the SFHA by photographic field evidence (and/or survey) on small-scale projects where the patch is no longer than the width of the paved roadway.
 - a. Projects; existing edges for an asphalt or concrete patch
 - b. Verification; photos & memo
 - c. Time = 8-16 hrs
 - d. Cost = \$100-\$1,000 in fees
2. **Maintain Existing Grade (a.k.a. At- or Below-Grade);** maintain roadway overtopping elevations in the SFHA to 0.00 ft or lower (no lower than 0.30 ft) to create an increase in cross section flow area and overtopping conveyance. Use survey evidence and ensure as-built info reflects pre-construction elevations.
 - a. Projects; most mill & overlays, and pavement maintenance
 - b. Verification; spreadsheet analysis, pre- and post-construction survey, drawings, memo
 - c. Time = 12-16 hrs
 - d. Cost = \$100-\$1,000 in fees + drawings
3. **Conveyance Shadowing;** find and utilize conveyance shadows and ineffective flow areas in existing hydraulic models using City of Fort Collins Stormwater Utility guidance dated 2011.
 - a. Projects; new bridges/culverts, roadway expansion most mill & overlays, and pavement maintenance
 - b. Verification; GIS analysis, pre- and post-con. survey, drawings, memo
 - c. Time = 16-24 hrs
 - d. Cost = \$100-\$1,000 in fees + drawings
4. **Simple Hydraulic Analysis;** maintain *average* cross section flow area or *average* weir profile elevations in the SFHA with simple analysis and survey data.
 - a. Projects; new bridges/culverts, roadway expansion, some mill & overlays
 - b. Verification; hydraulic analysis, pre- and post-con. survey, drawings, limited hydraulics report

- c. Time = 24-32 hrs
 - d. Cost = \$100-\$1,000 in fees + drawings
5. **Detailed Hydraulic Analysis;** create additional conveyance and prepare hydraulic analyses to satisfy no-rise criteria; for weir overtopping prove L and H of the broad-crested weir equation ($Q_{weir} = CLH^{1.5}$) balance out to pre-project conditions.
- a. Projects; new bridges/culverts, roadway expansion, some mill & overlays
 - b. Verification; hydraulic analysis, pre- and post-con. survey, drawings, full hydraulics report
 - c. Time = 1-2 weeks
 - d. Cost = \$100-\$1,000 in fees + \$5,000-\$10,000 consulting costs
6. **FEMA Map Revision (a.k.a. LOMC);** in the event no-rise cannot be achieved, prepare a CLOMR to prove the proposed design will meet federal, state and local standards, then prepare a LOMR immediately after construction to revise flood hazard mapping.
- a. Projects; new bridges/culverts, roadway expansion, some mill & overlays
 - b. Verification; full hydraulic analysis, pre- and post-con. survey, drawings, full report for review by local agency and FEMA, and MT-2 forms/report
 - c. Time = 12-18 months
 - d. Cost = \$5,500-\$10,000 in fees + \$50,000-\$150,000 consulting costs

The preceding procedures are offered to all CDOT Region 4 projects to verify and justify no-rise in the BFE for transportation paving operations, in order of increasing complexity. A lower number herein indicates a lower required volume of engineering analysis and documentation for completion and clearance, and shorter time for compliance.

Exceptions to these general procedures exist on every project. This is not intended to be an exhaustive list of potential solutions to engineering challenges, nor is this information intended to apply to the construction, maintenance, repair or rehabilitation of culverts, bridges, irrigation facilities or other hydraulic structures. Any and all alternatives will be explored by Region 4 professionals and their consultants on a case-by-case basis on every project.

REFERENCES:

1. City of Fort Collins (CofFC), *City of Fort Collins Municipal Code, Chapter 10; Flood Prevention and Protection*. (2012). Available at: <http://www.colocode.com/ftcollins/municipal/chapter10.htm>
2. CoFC, *Case Study and Technical Guidance for Documenting Flood Risks Within Ineffective Flow and Conveyance Shadow Areas*. Draft Technical Guidance and Case Study for Poudre Floodplain Regulations Update (2011).
3. Colorado Department of Transportation, Steve Griffin. *Floodplain Permitting for CDOT Resurfacing Jobs, PE III Meeting, January 31, 2012*. Memorandum of C/LOMR procedures identified by FHWA, CWCB, CDOT, and CofFC (2012).
4. Colorado Water Conservation Board (CWCB) expert *Stephanie DiBetitto*, for assistance with review, comment and revision.
5. Federal Emergency Management Agency (FEMA) draft guidelines titled *Proposed Development in the Floodway*. Issued December 2016 for review. Paper copy provided to CDOT Region 4 as a courtesy from FEMA Region VIII staff.
6. Federal Emergency Management Agency (FEMA) Region VIII experts *Matthew Buddie* and *David Sutley*, for assistance with review, comment and revision.
7. Title 44, Code of Federal Regulations, Section 59.1 (44 CFR 59.1). Available at: <http://goo.gl/Hw834J>

APPENDIX B – EXAMPLE OF AN AS-BUILT SURVEY SPECIFICATION**REVISION OF SECTION 625 CONSTRUCTION SURVEYING**

Section 625 of the Standard Specifications is hereby revised for this project as follows: Subsection 625.03 shall include the following:

The Contractor shall provide construction surveying, which shall be performed by a licensed Professional Land Surveyor registered in the State of Colorado.

The horizontal and vertical control for this project has been established as shown on the plans. All available information defining the extent of that control is provided on the plans, or is available from the CDOT Engineer (Engineer). The Engineer shall be notified immediately in the event that actual conditions are not as represented on the plans.

The Contractor shall survey the existing roadway surface prior to the start of the project to establish the original profile grade and horizontal alignment. The Contractor shall reestablish the original profile grade and horizontal alignment prior to placement of Hot Mix Asphalt. Blue top grade stakes shall be placed every 100 Lin. Ft. in tangent sections of roadway. Blue top grade stakes shall be placed every 50 Lin. Ft. in curves and super elevated sections of roadway. Stakes shall be placed on centerline and on the outside edge of pavement or as directed by the Engineer. The grade stakes shall be utilized to maintain the grade lines of the existing roadway.

The Contractor shall field verify all lengths and sizes of pipes and elevations for culvert extensions prior to placing orders for materials. The Contractor shall be responsible for calculating and staking the new flow lines for the ends of pipes.

All costs associated with this work shall be included in Item 625, Construction Surveying. Subsection 625.04 shall include the following:

- (a) *Definition of Floodplain Portions of the Project.* For the purposes of this project, the Federal Emergency Management Agency (FEMA) regulatory floodplain portions of the project are defined as being:

Within Elbert County: US 24 From MP 354.71 to MP 354.93

- (b) *Contractor Surveying in Floodplain Portions of the Project.* The provisions of this subsection shall apply only to the FEMA regulatory floodplain portions of the project, as defined above.

In these portions of the project, the Contractor shall use a preconstruction profile grade and horizontal alignment prepared by and supplied from CDOT as technical drawings developed from a digital terrain model (DTM). This information shall be utilized by CDOT Region 4 Hydraulics as good faith baseline information for comparing pre-construction and as-built elevations in floodplain crossings for Elbert County floodplain permitting only. The Contractor shall obtain independent pre-construction survey information, certified by a registered professional land surveyor (PLS) registered in the state of Colorado, after notice-to-proceed (NTP). CDOT Region 4 Hydraulics shall then amend the County-approved permit using Contractor certified survey as updated pre-construction baseline information. The former survey from CDOT shall then be rendered null and void as superseded by the Contractor certified information, for floodplain management purposes and permitting purposes in Elbert County.

After the top mat of hot mix asphalt (HMA) has been placed, compacted and all required smoothness corrections have been made, the Contractor shall re-survey the as-built roadway surface to establish the new profile grade on the proposed horizontal alignment. As-built survey points must be captured slightly outside the limits of the floodplain, and at 100 foot intervals within the limits of the floodplain. Portions of the roadway with any weir flow overtopping profile changes greater than 0.00 feet, or less than -0.30 feet on the average of the overtopping profile from the Contractor's preconstruction survey data points (the highest visible point of the roadway) shall be corrected at the Contractor's expense. All Contractor pre-construction and as-built survey information shall be submitted initially as a printed site survey with the following minimum components:

- North arrow and engineering scale
- Date and name of person creating the site survey
- Title block and border
- Benchmark reference, including number and elevation from an established system (if using CDOT Modified State Plane, a survey shift to State Plane 83 North is required)
- Regulatory floodplain boundaries with labels
- Points acquired (in Northing, Easting, Elevation format)
- Professional certifying statement and stamp from a registered Professional Land Surveyor (PLS) licensed to practice in the state of Colorado.

A digital copy of all survey information shall be provided as an ASCII file or spreadsheet for testing against approved floodplain permit analytical methods, and as a technical drawing. Submittals shall be reviewed and comments returned for any corrections in 20 working days. Once corrections have been made, these areas shall be resurveyed. If the average overtopping profile is still greater than 0.00 feet or less than -0.30 feet from the CDOT preconstruction survey data, the Contractor shall re-correct as many times as necessary, at the Contractor's expense, until the average overtopping profile falls in the range of the limits of this requirement. Acceptable methods of correcting roadway elevation shall include diamond grinding, full-depth replacement, or other method as approved by the Engineer. All current effective floodplain limits and boundaries can be obtained from the FEMA Map Service Center (MSC) at <http://msc.fema.gov/portal>.

The cost of all Contractor surveying required to perform the work described in this subsection shall be included in the Construction Surveying pay item.

In Subsection 625.13 delete the last paragraph and replace with the following:

Traffic control for construction surveying will not be measured and paid for separately but will be included in the work.

APPENDIX C – TYPICAL SECTION 404 APPLICATION PROCEDURE

The Section 404 application should be prepared and submitted to the U.S. Corps of Engineers at least 90 days prior to the letting date to allow the U.S. Corps of Engineers sufficient time to process the application and issue a permit prior to preparation of the bid documents and FHWA review. The Corps criterion is 30 days for processing NWP's. If it is known that a permit may be an individual permit, the lead time should be increased to 6 months prior to letting as the individual permit requires the U.S. Corps of Engineers to advertise with a public notice for up to 30 days, and sufficient time is needed to address any public comments.

The typical application package includes the Section 404 application form, optional fill quantity sheet, an environmental document (Environmental Classification (EC)), batched environmental studies or an Environmental Assessment (EA), a location map (the project plans title sheet and a copy of the USGS quadrangle map for the project area), and appropriate project plan sheets to define the proposed work activity.

In addition to the permanent construction activity, the application package should address anticipated temporary fill activities associated with the project construction (e.g., traffic diversions, stream diversions, cofferdams, contractor work platforms, falsework piling, haul road crossings).

The permit application packet shall be on 8 1/2 in × 11 in sheets, or 11 in × 17 in plan sheets, defining all impacts to “Waters of the United States,” such as bridge and culvert crossing locations or fill placement into jurisdictional wetlands locations. Bridge location drawings require a plan and elevation view, and wetlands impact details should be shown on a plan view with a cross section through the fill area. Indicate the acres of the wetlands filled on the drawing.

The level of detail required in the permit application packet is as follows:

Vicinity Map (taken from USGS quad map):

- Location of activity or wetland mitigation site (if applicable);
- Name of waterbody;
- Names or numbers of highways/roads;
- North arrow; and
- Scale.

Plan View Sketch:

- Name of waterbody and all highways/roads;
- Area showing the limits of the fill placement;
- Location of all wetlands;
- North arrow; and
- Scale.

Elevation View (or typical cross section):

- OHW elevation;
- Other water elevations;

- Riprap; and
- Other fill material.

Other Documentation:

- Hydrogeomorphic classification (HGM document);
- Wetlands delineation/documentation; and
- Wetland mitigation plan.

On major road projects that are expected to require individual Section 404 Permits, the U.S. Army Corps of Engineers has deemed it necessary to include a detail showing the plan view and a longitudinal cross section of each 36-in. diameter or greater culvert falling in naturally occurring waterways. An overall project map shall be included with the permit application to show the location of each such culvert and the locations of the wetlands impacts throughout the project. In this case, the U.S. Army Corps of Engineers interprets the definition of “Waters of the United States” to include all naturally occurring draws.

Include the quantities of the various fill materials and show both the total cubic yards and the cubic yards placed below the Ordinary Highwater (OHW) elevation in the permit application. In addition, provide the total area in square feet or acres of the fill material placed below OHW. Any wetland mitigation plans required should also be submitted with the permit application.

The hydraulics engineer should review constructability issues at project sites where temporary work causeways and cofferdams will be required. Construction activities such as bridge pier construction, storm drain outfalls in rivers, and earth haul roads across streams may all require temporary filling of the “Waters of the United States.” Engineers should submit detailed sketches of temporary causeways, etc., with the applications. All construction activities that impact the “Waters of the United States” (either permanent or temporary) should be included in the permit application.

Projects that have both road construction and bridge construction shall have one combined Section 404 Permit application. Multiple projects in the same contiguous section of roadway will also usually be submitted in one combined application.

Projects that consist of several individual sites in one project but on several waterways, highway routes, or counties may require separate applications by waterway, highway, or county to aid the U.S. Army Corps of Engineers in processing the application.