EXECUTIVE SUMMARY

The Colorado Floodplain and Stormwater Criteria Manual (Statewide Manual) has been prepared to establish the minimum uniform standards for identification and designation of all floodplains within the state. The CWCB designates and approves the state's floodplains under the provisions of its "Rules and Regulations for Regulatory Floodplains in Colorado." The floodplain and floodway criteria outlined in the Statewide Manual are part of the CWCB Rules and Regulations.

The Statewide Manual also contains engineering and management guidelines for other related floodplain and stormwater topics. These guidelines are provided to help local agencies to establish standards in dealing with the drainage issues and problems. Many communities within the State of Colorado currently do not have adequate drainage manuals that address the floodplain and stormwater issues. Establishment and enforcement of minimum drainage standards are important for these communities to reduce future flood damages to public and private properties and promote public safety and general welfare of their communities. The CWCB recommends for these communities to adopt and implement the stormwater management and engineering criteria outlined in this Statewide Manual. If needed, the Manual contents may be revised by the adopting communities to meet their own specific needs. Each entity adopting the contents of the Statewide Manual is responsible for enforcement of the manual within its jurisdictional boundaries.

The overall Statewide Manual contents have been prepared and organized into two volumes. Volume I of the Manual contains information and guidelines that are necessary for the floodplain and stormwater management practices. Volume II contains guidelines and procedures for floodplain and stormwater engineering analyses and design. The criteria presented in Volume I of the Manual are minimum guidelines that can be adopted by the local communities to manage their stormwater and floodplains and to meet the requirements of the Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP). Presented in Volume 2 of the Manual are recommended minimum design and technical standards for analysis of natural and manmade stormwater conveyance systems and design of storm drainage facilities.

The Manual contents have been prepared based on the state-of-art information available at the time of manual preparation and should be updated as better techniques and new information become available in the future. The manual chapters and sections contain text, tables, charts, figures, pictures, etc. to communicate the information to a wide variety of users. Where appropriate, example problems have been provided to further illustrate to the potential users how to use different features of the manual. Summary descriptions of the chapters that are included in the Statewide Manual are provide below:

Chapter 1 – General Provisions

The purpose, applicability to existing drainage manuals, CWCB authority and roles, Colorado flood history, and definition of terms and abbreviations are provided in this chapter. A summary of current Colorado Drainage Law along with citing of relevant court cases that have shaped drainage laws in Colorado is also provided.

Chapter 2 – CWCB Principles

This chapter contains CWCB statements on floodplain, floodway, stormwater, and flood control related items. Also, the CWCB policy dealing with potential discrepancies between the Statewide Manual and other adopted manuals is provided. A copy of the CWCB Rules and Regulations for Regulatory Floodplains in Colorado has been included in this chapter.

Chapter 3 – Floodplain and Stormwater Management

Practical and recommended guidelines for floodplain management issues such as floodplain management goals, local government floodplain regulations, level of protection, regulatory floodways, sources of flood hazard area information, floodplain development procedures, floodproofing, etc. are provided in this chapter. Also, this chapter contains recommended stormwater management guidelines to help local government agencies to develop their own storm drainage planning and development policies (i.e. maximum allowable street flooding depths, storm drain system design criteria, on-site detention basin requirements, etc.).

Chapter 4 – Permit Requirements

A current list of the applicable permitting agencies (local, state, and federal), their roles, and permit requirements (including submittal information needs and general permitting procedures) for floodplain and stormwater related projects are provided in this chapter.

Chapter 5 – Report Submittal Requirements

General outline of report submittal requirements for the following three activities are provided:

1. Revision of existing floodplains
2. Delineation and designation of new floodplains
3. Submittal of subdivision drainage reports

Chapter 6 – Flood Preparedness Activities and Flood Hazard Mitigation

This chapter provides discussions and outlines of the National Flood Insurance Program (NFIP), Federal and State flood hazard mitigation programs, and flood preparation activities to educate and help guide the local floodplain administrators to utilize the available federal and state programs to meet their communities' needs.

Chapter 7 – Information Resources and Networks

A list of sources for additional information on floodplain and stormwater related topics that are covered in this manual is provided. The list includes names, addresses, telephone and fax numbers, email and Internet addresses, and other available repositories of information (i.e. libraries).

Chapter 8 – Mapping Standards and Modernization

The recommended minimum standards (accuracy, scale, contour interval, etc.) of mapping and field survey data for use in floodplain analyses and delineations are

provided in this chapter. This chapter also provides practical guidelines for converting existing floodplain delineations on hard copy maps into a digital format and preparation of new digital floodplain boundaries that are compatible with the GIS format for later incorporation into D-FIRMs.

Chapter 9 – Hydrologic Analysis

This chapter presents three hydrologic modeling approaches (synthetic, statistical, and regional regression) and their common applications for different hydrologic and watershed conditions.

Various synthetic hydrologic modeling methods and computer programs recommended for use in determining the rainfall and runoff information for different hydrologic and watershed conditions are discussed. The guidelines for use of statistical and regional regression methods for various conditions are also provided.

Chapter 10 – Hydraulic Analysis

Three hydraulic analysis approaches (approximate, limited detail, and detailed) and modeling methods and applications are presented in this chapter.

The approximate method describes simple techniques that could be used in the field to estimate channel capacity and flood flow rates without the use of computer aided programs. Recommended methods and guidelines for preparation of limited detailed and detailed hydraulic and floodplain analyses of natural and manmade open channel/river systems are also provided.

Chapter 11 – Floodplain Delineation

Recommended methods and techniques for delineation of limited and detailed floodplain and floodway boundaries are provided in this chapter. The recommended delineation procedures outlined in this chapter are compatible with the FEMA FIS publications. BFE's, flood profiles, and other related delineation topics are discussed in this chapter.

Chapter 12 – Unique Hydraulic Conditions

Practical analysis and design guidelines for areas with unique hydraulic conditions are provided in this chapter. Specifically, this chapter presents hydraulic evaluation of alluvial fans, mud and debris flow, irrigation-stormwater interaction, and ice jams. Due to bank erosion hazards in unstable channels, recommendations are provided for drainageway buffer zones and setback limits in this chapter. For complicated hydraulic areas, information is provided on the use of two-dimensional models.

Chapter 13 – Design of Hydraulic Structures

This chapter provides recommended minimum criteria for hydraulic design of open channels, bridges and culverts, dams and reservoirs, and levees. Recommended design criteria for detention basins have also been included. Information on drop structures and recreational structures will be provided in the future. When appropriate, references are made to existing hydraulic and design manuals and guidelines for more detailed discussions.

Chapter 14 – Storm Drain Systems

General criteria for hydraulic design and analysis of storm drain inlets, underground storm sewer pipes, manhole spacing, and street overflow conveyance system are provided in this chapter.

Chapter 15 – Storm Drainage Water Quality

Discussions on the NPDES Storm Water Program and practical guidelines and considerations for design of stormwater quality improvement facilities along with a list of frequently used structural and non-structural BMP measures are provided in this chapter.

Chapter 16 – References

This chapter provides a list of textbooks, manuals, and publications used or referenced in preparation of the Statewide Manual contents. The overall reference list is separated and provided for different topics (ie. hydrology, water quality, etc.).