

**SUMMARY OF CHANGES TO VOLUME 2  
of the  
URBAN STORM DRAINAGE CRITERIA MANUAL  
and  
DISCLAIMER**

**2001 Edition vs. 1969 Edition**

**GENERAL**

- All chapters edited; some totally rewritten.
- Many design aids added, including figures, nomographs, spreadsheets, etc.
- New chapters on Revegetation and Design Examples added.
- Emphasis on maintenance, public safety, aesthetics and multidisciplinary design approaches.
- Design checklists added to many chapters.
- Stronger emphasis on “designing with nature” principles such as “bioengineering.”

**HYDRAULIC STRUCTURES CHAPTER**

- Revises drop structure design criteria and details.
- Provides guidance on safety considerations for boatable channels.
- Includes section on “rundowns” to convey flows into major drainageways and storage facilities.
- Also includes section on design of low tailwater basins at storm sewer discharge locations.
- Emphasizes public safety.

**CULVERTS CHAPTER**

- Contains significant changes.
- Emphasizes public safety through appropriate use of trash/safety racks at culvert entrances.
- Provides minimum trash rack size guidance.
- Discourages use of grates or racks at pipe outlets.

**STORAGE CHAPTER**

- Contents totally rewritten.
- Emphasizes designing for maintainability, aesthetics and safety.
- Addresses protecting against catastrophic failures due to overtopping embankments.
- Gives alternative techniques for preliminary and final design sizing of facilities.
- Presents guidance on sizing and use of retention facilities.
- Includes spreadsheets for aid in preliminary and final design.
- Provides for consistency with Volume 3 of the *Manual*.

**FLOODPROOFING CHAPTER**

- Contents completely rewritten.
- Draws heavily from Federal Emergency Management Agency guidance.

**REVEGETATION CHAPTER**

- Introduces a new chapter.
- Provides guidance on preparation of a planting plan.
- Provides grass and wildflower seed mixes for different soil and moisture conditions.
- Lists recommended shrubs, trees and planting techniques.
- Gives details on bioengineered elements including live staking, poling and willow bundles.
- Discusses soil amendments.
- Includes a revegetation process guidance chart.

**DESIGN EXAMPLES CHAPTER**

- Provides a variety of design examples from around the Denver metropolitan area.

## **2001 through 2005 Revisions to 2001 Edition of Volume 2**

### **ENTIRE VOLUME 2**

2005-03: Reformat entire Volume 2 to facilitate future updates. (Significant Revision)

### **HYDRAULIC STRUCTURES CHAPTER**

2002-06: Correct Tables HS-4 and HS-7a4 and Figure HS-8. (Significant Revision)

### **CULVERT CHAPTER**

2001-07: Rewritten *Trash Rack* Section. (Major Revision)

## **January 2007 Update to 2001 Edition**

### **HYDRAULIC STRUCTURES CHAPTER**

- Revised Manning's  $n$  and Boulder sizing recommendations for grouted boulders.
- Revised simplified Grouted Sloping Boulder (GSB) drop design recommendations and increased the allowable maximum drop for the simplified design from 5-feet to 6-feet.
- Added details for a smaller Impact Energy Dissipating Basin that is recommended for use with pipe outlets from 18- to 48-inches in diameter.
- Added details for the design of an impact basin for pipe outlets 18" and smaller in diameter.
- Modified the guidance on pipe outlet rundowns.
- Added details for a Grouted Boulder Rundown
- Added details for a GSB drop for use in channels with sandy/erosive soils.
- Modified concrete check structure details
- Added details and design guidance for a sheet-pile check structure.
- Clarifies some point in the *Detailed Hydraulic Analysis* section including guidance for Manning's  $n$  for Concrete, Boulders and Grouted Boulders.
- Clarified guidance on the design of low tailwater riprap basins at pipe outlets.

### **STORAGE CHAPTER**

- Clarifies a number of topics covered in the *Design Storms for Sizing Storage Volumes* section, including issues dealing with drainage and flood control, spillway sizing, retention facilities, outlet works design (including guidance for triangular weirs) and other miscellaneous items.
- Clarifies the uses Rational Formula-Based Modified FAA Procedure as being applicable only for the sizing of single return period control on-site detention basins.
- Added Full Spectrum Detention procedure for the design of on-site detention facilities for tributary areas of one square mile and less.
  - Added guidance for simplified sizing detention volumes.
  - Added guidance for simplified perforated outlet design.
- Added a section titled: *On-Site Detention and UDFCD 100-year Floodplain Management Policy*.
- Expanded on the discussion on use of vegetation in detention basins.
- Revised the submittal checklist.

## **DISCLAIMER**

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