



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
NASHVILLE, TENNESSEE 37243-1402**

**DESIGN DIVISION DRAINAGE MANUAL
REVISION 11-01**

TO: TDOT Design Division Drainage Manual Users

FROM: Ali R. Hangul, C.E. Manager 1
Standards and Guidelines Section

DATE: May 25, 2011

SUBJECT: Addition of Chapter 11 and Revision to Chapter 5 of the Design Division Drainage Manual

Chapter 11, Natural Stream Design, has been added to the Design Division Drainage Manual and is effective as of the date of this memo.

Chapter 5 of the Design Division Drainage Manual was revised on May 15, 2010 and is effective as of the date of this memo. The revisions are as follows:

- Chapter 5
 - Section 5.01 – Added reference to Chapter 11 & updated terminology
 - Section 5.02 – Updated terminology
 - Section 5.03 – Updated terminology
 - Section 5.03.1 – Updated terminology
 - Section 5.03.4 – Updated terminology
 - Section 5.03.4.1 – Updated terminology
 - Section 5.04 – Added reference to Chapter 11 & updated terminology
 - Section 5.04.1 – Updated slope data for low volume roads terminology
 - Section 5.04.5 – Updated terminology
 - Section 5.04.6.3 – Updated terminology
 - Section 5.04.7.1.1.2 – Updated Section Name and terminology. Revised description of ECB types
 - Section 5.04.7.1.1.3 – Updated Section Name and terminology
 - Section 5.04.7.1.1.4 – Updated terminology
 - Section 5.04.7.1.1.5 – Updated terminology
 - Section 5.04.7.1.2 – Updated terminology
 - Section 5.04.7.2 – Revised shear stress for sod, seeded grasses, and turf reinforcement mats and updated terminology
 - Section 5.05 & all subsections – Updated Section Name and terminology. Added reference to Chapter 11
 - Section 5.06 - Updated terminology
 - Section 5.06.1.2 - Updated terminology
 - Section 5.06.1.3.2 - Updated terminology
 - Section 5.06.1.3.6 - Updated terminology
 - Section 5.06.2 – Updated Section Name and terminology. Added reference to Chapter 11
 - Section 5.08.1 – Revised Figure 5A-1, Table 5A-6, Table 5A-7, Table 5A-13, Table 5A-14, Table 5A-15, Table 5A-16, Table 5A-17, Table 5A-18

ARH:jbs



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
NASHVILLE, TENNESSEE 37243-0348**

**DESIGN DIVISION DRAINAGE MANUAL
REVISION 10-01**

TO: TDOT Design Division Drainage Manual Users

FROM: Ali R. Hangul, C.E. Manager 1
Standards and Quality Assurance Section

DATE: June 21, 2010

SUBJECT: Revision to Chapters 2, 4, 5, 6, 7, 9, 10 of the Design Division Drainage Manual

Chapters 2, 4, 5, 6, 7, 9, and 10 of the Design Division Drainage Manual were revised on January 1, 2010 and are effective as of the date of this memo. The chapters have been revised as follows:

- Chapter 2
 - Section 2.02.3.1 – Added evaluation “for the potential to impact downstream systems” to the drainage design process

- Chapter 4
 - Section 4.04.2.1 – Removed TDOT Regression Equations, Updated the USGS Regression Equations
 - Section 4.04.2.2 – Minor Revisions
 - Section 4.04.2.2.1 – Added Section
 - Section 4.04.2.2.2 – Added Section
 - Section 4.04.5.3 – Revised TR-20 to TR-55
 - Section 4.05 – Removed reference to HYDRAIN, Added TDOTV203 and Stream stat USGS WRIR03-4176, and Revised TR-20 to TR-55
 - Section 4.06.2.1.1 – Revised table numbers
 - Section 4.06.2.1.2 – Revised table numbers
 - Section 4.06.2.1.3 – Removed reference to HYDRAIN
 - Section 4.06.2.2.1 – Revised table numbers
 - Section 4.06.4 – Removed reference to HYDRAIN

- Chapter 5
 - Section 5.07 – Removed reference to HYDRAIN
 - Section 5.07.2 – Deleted section
 - Section 5.07.3 – Renamed to 5.07.2

- Chapter 6
 - Section 6.03.2.1 – Added evaluation “for the potential to impact downstream systems” to the drainage design process
 - Section 6.04.2 – Added PVC Pipe
 - Section 6.04.2.4.3 – Added PVC Pipe
 - Section 6.04.3.1.3 – Added PVC Pipe

- Section 6.04.3.3 – Revised HEC-14 reference
- Section 6.06 – Removed reference to HYDRAIN and HYCULV
- Section 6.06.3 – Removed reference to HYDRAIN
- Section 6.06.4 – Deleted section
- Section 6.06.5 – Renamed to 6.06.4. Update for HY-8 version 7.1
- Section 6.07.1 – Added PVC to Tables 6A-3, 6A-4, 6A-5, and 6A-6
- Section 6.07.2.2 – Revised Example Problem #2 for HY-8 version 7.1
- Section 6.07.2.4 – Revised Example Problem #4 for HY-8 version 7.1
- Section 6.07.2.5: Deleted section
- Chapter 7
 - Section 7.03 – Minor Revisions and Added Footnote 4 to Table 7-1
 - Section 7.03.4.1 – Minor Revisions
 - Section 7.03.4.2 – Minor Revisions
 - Section 7.03.6 – Minor Revisions, Added PVC
 - Section 7.04.5.1 – Minor Revisions, Added PVC to Table 7-9
 - New Section – Added Section 7.04.6
 - New Section – Added Section 7.04.6.1
 - New Section – Added Section 7.04.6.1.1
 - New Section – Added Section 7.04.6.2
 - New Section – Added Section 7.04.6.2.1
 - New Section – Added Section 7.04.6.2.2
 - New Section – Added Section 7.04.6.2.3
 - New Section – Added Section 7.04.6.3
 - New Section – Added Section 7.04.6.3.1
 - New Section – Added Section 7.04.6.3.2
 - New Section – Added Section 7.04.6.3.2.1
 - New Section – Added Section 7.04.6.3.2.2
 - New Section – Added Section 7.04.6.3.2.3
 - New Section – Added Section 7.04.6.3.3
 - Section 7.04.6 – Renamed to 7.04.7
 - Section 7.04.6.1 – Renamed to 7.04.7.1
 - Section 7.04.6.2 – Renamed to 7.04.7.2
 - Section 7.04.6.3 – Renamed to 7.04.7.3
 - Section 7.04.6.4 – Renamed to 7.04.7.4
 - Section 7.04.6.5 – Renamed to 7.04.7.5
 - Section 7.04.7 – Renamed to 7.04.8
 - Section 7.05 - Removed reference to HYDRA
 - Section 7.05.1 – Deleted Section
 - Section 7.05.2 – Renamed to 7.05.1
 - Section 7.05.3 – Renamed to 7.05.2. Removed reference to operating systems
- Chapter 9
 - Section 9.03.3.2 – Minor Revisions
 - Section 9.04.2.2.1 – Minor Revisions
 - Section 9.04.2.2.5 – Minor Revisions
 - Section 9.05.1 – Removed reference to HYDRAIN, Removed version number for Windows based HY-8
 - Section 9.05.2 – Deleted Section
 - Section 9.06.1 – Deleted Figure 9A-8
 - Section 9.06.1 – Renamed Figure 9A-9 to 9A-8
 - Section 9.06.2.2 – Revised based on updated procedures in HEC-14
- Chapter 10
 - Section 10.04.3.1 – Minor Revisions
 - Section 10.04.3.2 – Minor Revisions

- Section 10.04.4.1 – Minor Revisions
- New Section - Added Section 10.04.6.2
- Section 10.05.1 – Minor Revisions
- Section 10.05.1.2 – Minor Revisions
- Section 10.05.1.3 – Minor Revisions
- Section 10.05.2 – Minor Revisions
- Section 10.05.3 – Minor Revisions, Replace Figure 10-9
- Section 10.05.3.1 – Rearranged Section, Added paragraph for “EPSC Utility Relocation Notes”, Replaced Figure 10-10
- Section 10.05.3.2 – Minor Revisions
- Section 10.05.3.3 – Minor Revisions
- New Section – Added Section 10.05.3.4
- Section 10.06.2.1 – Minor Revisions
- Section 10.08.1.1 – Minor Revision, Added reference to EC-STR-4B
- Section 10.08.1.1.4 – Replaced Figure 10EP-1
- Section 10.08.1.4.5 – Minor Revisions
- Section 10.08.1.12.4 – Minor Revisions
- New Section – Added Section 10.08.1.17
- New Section – Added Section 10.08.1.18
- Section 10.08.2.2.4 – Replaced Figure 10SC-1a and Figure 10SC-1b



STATE OF TENNESSEE
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NASHVILLE, TENNESSEE 37243-0348

DESIGN DIVISION DRAINAGE MANUAL
REVISION 08-02

TO: TDOT Design Division Drainage Manual Users

FROM: Ali R. Hangul, C.E. Manager 1
Quality Assurance and Standards Office

DATE: May 14, 2008

SUBJECT: Revision to Chapter 10

Effective immediately, the entirety of the Design Division Drainage Manual Chapter 10, "Erosion Prevention and Sediment Control", is revised as follows:

- Revision Date April 1, 2008
- Revised Section Titles, Section Numbers and Page Numbers
- Section 10.01 – Minor revisions
- Section 10.02 – Minor revisions
- Section 10.03 – Minor revisions
- Section 10.04 – Minor revisions
- Section 10.05 – Clarification on format of EPSC Plans
- Section 10.06 – Minor revisions
- Section 10.07 – Minor revisions
- Section 10.08.1 –
 - Revised EPSC Device Names
 - Revisions for clarification
 - Revisions of Data to be added to EPSC Plans for each EPSC Device
 - Removed "Temporary Straw or Hay Bale Erosion Check (EC-STR-5)
- Section 10.08.2 –
 - Revised EPSC Device Names
 - Revisions for clarification
 - Revisions of Data to be added to EPSC Plans for each EPSC Device
 - Removed "Temporary Filter Barrier (EC-STR-3A)
 - Removed "Rock Silt Screen" (EC-STR-11)
 - Removed "Temporary Sediment Trap with Gabion Check Dam (EC-STR-60)
 - Added Section 10.08.2.6 "Enhanced Rock Check Dam" (EC-STR-6A)
 - Added Section 10.08.2.8 "Filter Sock" (EC-STR-8)
 - Added Section 10.08.2.9 "Culvert Inlet Protection" (EC-STR-11 & 11A)
- Section 10.08.3 –
 - Revisions for clarification
 - Revisions of Data to be added to EPSC Plans for each EPSC Device
 - Revised Section 10.08.3.2.5 Example Application
 - Added Section 10.08.3.3 "Level Spreader" (EC-STR-61)
- Section 10.09 –
 - Revised Figure 10A-2
 - Revised Figure 10A-3
 - Revised Figure 10A-4
 - Minor Edits to Table 10A-3 thru Table 10A-12
 - Minor Edits to Section 10.09.3 Glossary
 - Minor Edits to Section 10.09.4 References



STATE OF TENNESSEE
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**DESIGN DIVISION DRAINAGE MANUAL
REVISION 08-01**

TO: TDOT Design Division Drainage Manual Users

FROM: Ali R. Hangul, C.E. Manager 1
Quality Assurance and Standards Office

DATE: March 31, 2008

SUBJECT: Revision to Chapter 7

Effective immediately, the entirety of Chapter 7, "Storm Drainage Systems", is revised to include section 7.03.3.4 "**Use of Longitudinal Drains**". Please refer to the IB 08-05 for the new standard drawing D-TD-1, "Trench Drain".

Attachment



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
DESIGN DIVISION
NASHVILLE, TENNESSEE 37243-0350**

**DESIGN DIVISION DRAINAGE MANUAL
REVISION 07-01**

TO: TDOT Design Division Drainage Manual Users

FROM: Mr. Ali Hangu
CE Manager I

DATE: March 15, 2007

SUBJECT: Revisions to Chapter 6, 7 and 8.

Effective March 15, 2007, the subject chapters of the drainage manual are revised to include the use of HDPE Pipe as a drainage structure. Chapter 8 is revised to include the requirements for detention pond criteria.

Attachment

LOCATIONS WHERE UPDATES HAVE BEEN MADE TO THE TDOT DESIGN DIVISION DRAINAGE MANUAL:

CHAPTER 6

CHANGES MADE TO INCLUDE HDPE PIPE CRITERIA:

- 6.04.1.1.1.4 NON-LINEAR "BROKEN BACK" ALIGNMENTS
- 6.04.1.2 MULTIPLE OPENINGS
- 6.04.3.1.3 END TREATMENTS FOR CULVERTS UNDER PRIVATE DRIVES

Appendix, Table 6A-1
Appendix, Table 6A-3
Appendix, Table 6A-6

OTHER CHANGES:

- 6.01 INTRODUCTION
- 6.03.1 WATERWAY DATA
- 6.04.1.1.1.5 NON-LINEAR ALIGNMENTS FOR VELOCITY CONTROL
- 6.04.2.1 DESIGN FLOOD FLOW RATES
- 6.04.2.2 PIPE SELECTION CRITERIA
- 6.04.2.4.4 ALLOWABLE HEADWATER ELEVATION
- 6.04.3.1.1 END TREATMENTS FOR CULVERTS UNDER MAINLINE
- 6.04.3.4 DEBRIS CONTROL
- 6.05.2 CULVERT SIZING PROCESS
- 6.05.2.2 DETERMINE THE OUTLET CONTROL HEADWATER DEPTH, HW_o
- 6.06 ACCEPTABLE SOFTWARE

Appendix, Table 6A-2
Appendix, Table 6A-4

CHAPTER 7

CHANGES MADE TO INCLUDE HDPE PIPE CRITERIA:

- 7.03.3.4 USE OF LONGITUDINAL DRAINS
- 7.03.4.1 PIPE TYPE AND COVER CRITERIA

OTHER CHANGES:

- 7.03.5.5 PIPE CONNECTIONS TO STRUCTURES
- 7.03.9.2 STORM DRAIN INFORMATION BY PLAN SHEET
- 7.04.5.1 MANNINGS' N-VALUES FOR PIPE MATERIALS

CHAPTER 8

CHANGES MADE TO INCLUDE REQUIREMENTS FOR DETENTION:

- 8.04.1 INTRODUCTION (GUIDELINES AND CRITERIA)
- 8.04.2 HYDROLOGIC AND HYDRAULIC CONSIDERATIONS (New Title)
- 8.04.2.1 EVALUATION CRITERIA (New Section)
- 8.04.2.2 RELEASE RATE AND TIMING (Section Re-Numbered)

CHANGES RELATED TO HDPE PIPE:

- 8.04.6.3.1 MATERIALS
- 8.04.6.3.2 CONSTRUCTION CONSIDERATIONS
- 8.04.6.4.1 ANTI-SEEP COLLARS

OTHER CHANGES:

- 8.01 INTRODUCTION
- 8.02.1 MAINTENANCE NOTE ON PLANS (New Section)
- 8.04.4 GRADING AND DEPTH
- 8.04.4.1 GENERAL RECOMMENDATIONS (GRADING AND DEPTH)
- 8.04.4.3 DETENTION REQUIREMENTS
- 8.04.4.4 RETENTION REQUIREMENTS
- 8.04.5.1 GENERAL CONSIDERATIONS (EMBANKMENTS)
- 8.04.5.3 EMBANKMENT HEIGHT AND FREEBOARD
- 8.04.5.4 TOP WIDTH
- 8.04.5.6 EMBANKMENT SEEPAGE
- 8.04.6.4.2 FILTER AND DRAINAGE DIAPHRAGMS
- 8.04.6.5 DEBRIS CONTROL AND SAFETY GRATES
- 8.04.6.7 OUTLET PROTECTION
- 8.04.7.3 COMPONENT LAYOUT AND CROSS SECTION
- 8.04.7.5 PERMISSIBLE VELOCITIES
- 8.05.5.1 NATURAL BASIN VOLUMES
- 8.05.6 STAGE-DISCHARGE CURVE
- 8.05.7.2.2 BROAD-CRESTED WEIRS
- 8.05.8 MULTI-STAGE RISER DESIGN
- 8.05.9.1 STORAGE INDICATION METHOD
- 8.06.4 CONTROL STRUCTURES
- 8.06.6 INSECT AND ODOR CONTROL



STATE OF TENNESSEE
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Nashville, Tennessee 37243-0348

**DESIGN DIVISION DRAINAGE MANUAL
REVISION 06-03**

To: TDOT Design Division Drainage Manual Users
From: *MA* Michael Agnew, Assistant Director, Design Division
Date: August 1, 2006
Subject: Revisions to Chapter 10 (Erosion Prevention and Sediment Control)

Comments: Dates of all sheets in Chapter 10 revised to August 1, 2006. The Design Division Drainage Manual is revised as follows:

Index

1. Added Chapter 10 and Chapter 10 Appendix to index. (4 sheets)

Chapter 10

1. Added sections 10.08.2.13.1 through 10.08.2.15.5.
2. Added sections 10.08.2.18 through 10.08.2.18.5.

Chapter 10 Addendix

1. Revised Figure 10A-3 (2of3) and (3of3).

MA:ma



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
Nashville, Tennessee 37243-0348

**DESIGN DIVISION DRAINAGE MANUAL
REVISION 06-02**

To: TDOT Design Division Drainage Manual Users
From:  Jeff C. Jones, Civil Engineering Director, Design Division
Date: June 1, 2006
Subject: Addition of Chapter 10 (Erosion Prevention and Sediment Control)

Comments: Revision date June 1, 2006. The Design Division Drainage Manual is revised as follows:

Chapter 10

1. Added chapter to the manual.

Chapter 10 Appendix

1. Added appendix to the manual.

JCJ:MA:ma



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
NASHVILLE, TENNESSEE 37243-0350**

MENORANDUM

TO: TDOT Design Division Drainage Manual Users

FROM: Mr. Ali R. Hangul, P.E., CE Manager I
Design Office

DATE: February 1, 2006

SUBJECT: Revised TDOT DESIGN DIVISION DRAINAGE MANUAL

Comments: Effective date January 1, 2006. The Drainage Manual is revised as follows:

Title Sheet

Updated Manual date to January 1, 2006.

Master Table of Contents

Revised page numbers where necessary for all revisions noted herein. Updated date in header.

Chapter 1

Performed minor text edits and formatting changes to make chapter more consistent with later chapters. Updated date in header.

Chapter 2

Performed minor text edits and formatting changes to make chapter more consistent with later chapters. Updated date in header.

Chapter 3

Performed minor text edits and formatting changes to make chapter more consistent with later chapters. Updated date in header.

Chapter 4

Performed minor text edits and formatting changes to make chapter more consistent with later chapters. Updated date in header. The Table of Contents has been modified to reflect the changes noted below.

Section 4.04.1.1: Minor revisions to both paragraphs in this section.

Section 4.04.1.1: Revised the paragraph in this section to reflect the new IDF zones and curves developed and placed in the chapter Appendix.

Section 4.04.2.1: Revisions to text in both paragraphs of this section. The equations in Table 4-4 have been updated to the 2000 USGS Rural Regression Equations, adopted in 2003. The drainage area limitations in Table 4-5 have been modified to reflect the latest USGS recommendations. There are now two sets of equations for Hydrologic Area 3; one for areas less than 30.2 square miles, and one for areas larger. Only the equations for areas less than 30.2 square miles have been incorporated into the Manual.

Section 4.05: The reference to the National Flood Frequency (NFF) program has been updated to reflect it is no longer a part of the HYDRAIN software package. Revised parts of Table 4-11.

Chapter 4 Appendix

Performed minor text edits and formatting changes to make the Appendix more consistent with later chapters. Updated date in header. The page numbers in the Table of Contents have been modified to reflect the changes noted below.

- Figure 4A-1 has been updated to show the new IDF zones.
- Previous Figures 4A-2 through 4A-5 have been replaced with 10 new IDF curves as Figures 4A-2 through 4A-11. The numbers of the other figures in the Appendix have been adjusted accordingly.
- Previous Figure 4A-6 has been replaced with new Figure 4A-12.
- The Time of Concentration and Curve Number worksheets have been updated and recreated.
- Previous Figure 4-4 was moved to the Appendix as Figure 4A-15.
- Figure 4A-16, Tennessee Physiographic Regions, was added to the document for reference.
- The previous 24-hour rainfall curves presented as Figures 4A-25 through 4A-31 have been replaced with Tables 4A-5 through 4A-10, which are now County specific.
- New Table 4A-11 has been added to the chapter Appendix and is referenced in Section 4.04 of the chapter text.

Section 4.06.2.1.1: The sample problem has been updated to reflect the new IDF curves.

Section 4.06.2.1.2: The sample problem has been updated to reflect the new IDF curves.

Section 4.06.2.1.3: The sample problem has been updated to reflect the new IDF curves. The reference has been corrected to show the new publication data. The HYDRO computer program run has been re-run with the new IDF values.

Section 4.06.2.2.1: The regression equations used in the sample problem have been updated along with the result. Also, the NFF computer program run has been updated and revised using the new Windows-based program published by USGS.

Section 4.06.2.2.2: The 2-yr/24-hr rainfall depth used in the regression equation has been updated. The NFF run was also converted to the new version of the program.

Section 4.06.2.2.3: The sample problem has been deleted since the Regression Equations developed specific to Shelby County are no longer acceptable on TDOT projects.

Section 4.06.4: A number of corrections and updates were made to the references. Additionally, a Glossary of Terms has been added to the chapter Appendix.

Chapter 5

Performed minor formatting edits. Updated date in header. The page numbers in the chapter Table of Contents and MASTER Table of Contents have been modified to reflect the changes noted below.

The following general additions, updates and/or revisions were made to Chapter 5:

- Added Channel Liner Selection Methodology to text
- Update and Additions to miscellaneous other Sections
- Added/Updated Figure 5A-1 Flow Chart of Selection Process
- Added new Tables 5A-13 thru 5A-21. Rearranged and renumbered others.
- Updated entire Chapter and Appendix text to reflect the revised figure and table numbers
- Updated Table of Contents and Sample Problems to reflect all of these changes
- Added TRM information and selection guide

Section 5.04.3 Ditch Grade: 3rd Paragraph revised

Section 5.04.7.1.2 RIPRAP: Added a 3rd paragraph & deleted part of 4th paragraph

Section 5.04.7.1.5 WIRE-ENCLOSED STONE (GABIONS):

Minor edits to the 2nd of 2 paragraphs.

Section 5.04.7.2.2 REQUIRED ANALYSIS LOCATIONS:

Minor edit to the 2nd paragraph.

Section 5.05.7.1.3 PRECAST CONCRETE FORMS:

Significant Overhaul of 2nd and 3rd paragraphs in this section.

Section 5.06.1.2 GENERAL DITCH DESIGN AND ANALYSIS PROCEDURE, Step 9:

Significant overhaul of this step to conform to previously edited section.

Performed minor formatting edits. Updated date in header.

Chapter 6

Performed minor formatting edits. Updated date in header.

Chapter 7

Performed minor formatting edits. Updated date in header.

Section 7.06.2.1 (Sample Problem 1): The sample problem has been updated to reflect the new IDF data in chapter 4. In addition, Figures 7A-15 and 7A-16 were updated to reflect the new results.

Section 7.06.2.2 (Sample Problem 2): The sample problem has been updated to reflect the new IDF data in chapter 4. In addition, Figures 7A-17 was updated to reflect the new results.

Section 7.06.2.3 (Sample Problem 3): The sample problem has been updated to reflect the new IDF data in chapter 4. In addition, Table 7A-13, as well as Figures 7A-20 and 7A-21 were updated to reflect the new IDF data and results.

Chapter 8

Performed minor formatting edits. Updated date in header.

Section 8.06.2.1 (Sample Problem 1): All of the computations, as well as the associated tables and figures were updated to reflect the new IDF data in chapter 4.

Chapter 9

Performed minor formatting edits. Updated date in header. No further changes were necessary.