Section 10-1 General Introduction

10-1-1 Purpose and Objectives
   1.1 Originator
   1.2 Purpose
   1.3 Chapter Organization
   1.4 Glossary

10-1-2 Applicable Laws and Permits
   2.1 Federal, State, and Local Laws and Regulations
   2.2 Transportation Construction General Permit
   2.3 Transportation Separate Storm Sewer System Permit
   2.4 Wis. Adm. Code, Chapter Trans 401
   2.5 Administration Rules for Erosion and Sediment Control on Highway Construction Projects

10-1-3 Erosion Control Plan
   3.1 Limit Off-Site Effects
   3.2 Facilitate Construction and Minimize Cost
   3.3 Laws & Regulations

10-1-5 The Erosion Process

10-1-10 Basic Principles of Erosion and Sediment Control

Section 10-5 Developing An Erosion Control Plan

10-5-1 Communication and Coordination
   1.1 Internal Communication and Coordination
   1.2 External Communication and Coordination

10-5-5 Planning and Location Considerations

10-5-10 Erosion Sensitive Areas

10-5-15 Environmental and Customer Sensitive Areas

10-5-20 Soils Investigation

10-5-25 Geometric Considerations
   25.1 Introduction
   25.2 Topography
   25.3 Alignment and Grade
   25.4 Cross Sections
   25.5 Proper Shaping for Erosion Control
   25.6 Cut-To-Fill Transitions (Cut Runouts)
   25.7 Culverts
   Attachment 25.1 Erosion Control Prevention
   Attachment 25.2 Erosion Control At Cut To Fill Transition
   Attachment 25.3 Transition From Cut of Fill

10-5-30 Drainage Guidance For Erosion Control
   30.1 Natural Drainage
   30.2 Adjacent Areas
   30.3 Local Input
   30.4 Storm Design Guidance and Channel Capacity
   30.5 Storm Water Runoff

10-5-35 Channel and Slope Matrics
   Attachment 35.1 Channel Erosion Control Matrix
   Attachment 35.2 Slope Erosion Control Matrix

10-5-40 Calculating Shear Stress in Channels
   Attachment 40.1 Manning’s Roughness Coefficients Table
FDM Chapter 10 Table of Contents

Attachment 40.2 .... Nomograph for Flow in Triangular Channels

10-5-45 ....... Analyzing Costs
   45.1 ....... Cost vs. Effectiveness

10-5-50 ....... Estimating Erosion Control Quantities
   50.1 ....... Mobilization for Erosion Control
   50.2 ....... Emergency Mobilization for Erosion Control

10-5-55 ....... Erosion Control Plan Preparation
   55.1 ....... Introduction
   55.2 ....... Special Provisions
   55.3 ....... Construction Plans

10-5-60 ....... Checklist for Erosion Control Plans
   Attachment 60.1 .... Erosion Control Plan Checklist
   Attachment 60.2 .... Runoff Coefficient Table

10-5-65 ....... Construction Considerations

10-5-70 ....... Maintenance Considerations

Section 10-10 Erosion and Sediment Control Devices

10-10-1 ....... Devices and Measures Available
   1.1 ....... Introduction
   1.2 ....... Devices Available
   1.3 ....... Devices Required On All Grading Projects
   1.4 ....... Temporary vs. Permanent Measures
   Attachment 1.1 .... Erosion Control Measures
   Attachment 1.2 .... Summary of Control Measure Applications
   Attachment 1.3 .... Example of Selected control Measures Used in Combination

10-10-3 ....... Vegetation

10-10-6 ....... Seeding
   6.1 ....... Definition
   6.2 ....... Application
   6.3 ....... Design Guidance

10-10-8 ....... Water
   8.1 ....... Definition
   8.2 ....... Application
   8.3 ....... Design Guidance
   8.4 ....... Considerations
   8.5 ....... Estimating Quantities

10-10-9 ....... Sodding
   9.1 ....... Definition
   9.2 ....... Application
   9.3 ....... Design Guidance
   9.4 ....... Limitations

10-10-10 ....... Mowing
   10.1 ....... Definition
   10.2 ....... Application
   10.3 ....... Design Guidance
   10.4 ....... Considerations
   10.5 ....... Estimating Quantities

10-10-11 ....... Topsoil
   11.1 ....... Definition
   11.2 ....... Application
   11.3 ....... Design Considerations

10-10-12 ....... Fertilizer
   12.1 ....... Definition
   12.2 ....... Application
   12.3 ....... Design Considerations

10-10-13 ....... Mulching
   13.1 ....... Definition
## FDM Chapter 10 Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.2</td>
<td>Application</td>
</tr>
<tr>
<td>13.3</td>
<td>Design Considerations</td>
</tr>
<tr>
<td>10-10-15</td>
<td>Erosion Mat</td>
</tr>
<tr>
<td>15.1</td>
<td>Definition</td>
</tr>
<tr>
<td>15.2</td>
<td>Application</td>
</tr>
<tr>
<td>15.3</td>
<td>Design Guidance</td>
</tr>
<tr>
<td>15.4</td>
<td>Erosion Mat Classes and Types</td>
</tr>
<tr>
<td>15.5</td>
<td>General Performance Measures</td>
</tr>
<tr>
<td>Attachment 15.1</td>
<td>Erosion Mat</td>
</tr>
<tr>
<td>10-10-17</td>
<td>Interlocking Cells</td>
</tr>
<tr>
<td>17.1</td>
<td>Definition</td>
</tr>
<tr>
<td>17.2</td>
<td>Application</td>
</tr>
<tr>
<td>17.3</td>
<td>Design Guidance</td>
</tr>
<tr>
<td>10-10-19</td>
<td>Riprap or Grouted Riprap</td>
</tr>
<tr>
<td>19.1</td>
<td>Definition</td>
</tr>
<tr>
<td>19.2</td>
<td>Application</td>
</tr>
<tr>
<td>19.3</td>
<td>Riprap</td>
</tr>
<tr>
<td>19.4</td>
<td>Grouted Riprap</td>
</tr>
<tr>
<td>19.5</td>
<td>Design Guidance</td>
</tr>
<tr>
<td>10-10-21</td>
<td>Erosion Bale Barriers</td>
</tr>
<tr>
<td>21.1</td>
<td>Definition</td>
</tr>
<tr>
<td>21.2</td>
<td>Application</td>
</tr>
<tr>
<td>21.3</td>
<td>Limitations</td>
</tr>
<tr>
<td>21.4</td>
<td>Design Guidance</td>
</tr>
<tr>
<td>21.5</td>
<td>Estimating Quantities</td>
</tr>
<tr>
<td>10-10-22</td>
<td>Temporary Ditch Checks</td>
</tr>
<tr>
<td>22.1</td>
<td>Definition</td>
</tr>
<tr>
<td>22.2</td>
<td>Application</td>
</tr>
<tr>
<td>22.3</td>
<td>Limitations</td>
</tr>
<tr>
<td>22.4</td>
<td>Design Guidance</td>
</tr>
<tr>
<td>22.5</td>
<td>Estimating Quantities</td>
</tr>
<tr>
<td>10-10-23</td>
<td>Silt Fence</td>
</tr>
<tr>
<td>23.1</td>
<td>Definition</td>
</tr>
<tr>
<td>23.2</td>
<td>Application</td>
</tr>
<tr>
<td>23.3</td>
<td>Limitations</td>
</tr>
<tr>
<td>23.4</td>
<td>Design Guidance</td>
</tr>
<tr>
<td>23.5</td>
<td>Estimating Quantities</td>
</tr>
<tr>
<td>10-10-25</td>
<td>Stone or Rock Ditch Checks</td>
</tr>
<tr>
<td>25.1</td>
<td>Definition</td>
</tr>
<tr>
<td>25.2</td>
<td>Application</td>
</tr>
<tr>
<td>25.3</td>
<td>Design Guidance</td>
</tr>
<tr>
<td>10-10-27</td>
<td>Storm Drain Inlet Protection</td>
</tr>
<tr>
<td>27.1</td>
<td>Definition</td>
</tr>
<tr>
<td>27.2</td>
<td>Application</td>
</tr>
<tr>
<td>27.3</td>
<td>Design Guidance</td>
</tr>
<tr>
<td>10-10-29</td>
<td>Culvert Inlet Protection</td>
</tr>
<tr>
<td>29.1</td>
<td>Definition</td>
</tr>
<tr>
<td>29.2</td>
<td>Application</td>
</tr>
<tr>
<td>29.3</td>
<td>Design Guidance</td>
</tr>
<tr>
<td>10-10-31</td>
<td>Outlet Protection</td>
</tr>
<tr>
<td>31.1</td>
<td>Definition</td>
</tr>
<tr>
<td>31.2</td>
<td>Application</td>
</tr>
<tr>
<td>31.3</td>
<td>Design Guidance</td>
</tr>
<tr>
<td>10-10-33</td>
<td>Subsurface Drains</td>
</tr>
<tr>
<td>33.1</td>
<td>Definition</td>
</tr>
<tr>
<td>33.2</td>
<td>Application</td>
</tr>
<tr>
<td>33.3</td>
<td>Design Guidance</td>
</tr>
</tbody>
</table>
10-10-37 ..... Diversion Dikes/Intercepting Embankments
   37.1 ........ Definition
   37.2 ........ Application
   37.3 ........ Design Guidance

10-10-39 ..... Benching
   39.1 ........ Definition
   39.2 ........ Application
   39.3 ........ Design Guidance

Attachment 39.1 .... Benched Slope Examples

10-10-41 ..... Dust Control
   41.1 ........ Definition
   41.2 ........ Application
   41.3 ........ Design Guidance

10-10-42 ..... Tracking Pads
   42.1 ........ Definition
   42.2 ........ Application
   42.3 ........ Design Guidance
   42.4 ........ Considerations
   42.5 ........ Estimating Quantities

10-10-43 ..... Silt Screen
   43.1 ........ Definition
   43.2 ........ Application
   43.3 ........ Design Guidance

10-10-45 ..... Turbidity Barrier
   45.1 ........ Definition
   45.2 ........ Application
   45.3 ........ Design Guidance

10-10-47 ..... Soil Stabilizer, Type B (Land Application of Polymers)
   47.1 ........ Definition
   47.2 ........ Application
   47.3 ........ Design Guidance

10-10-48 ..... Water Application of Polymers
   48.1 ........ Definition
   48.2 ........ Application
   48.3 ........ Design Guidance

10-10-49 ..... Intermittent Channels
   49.1 ........ Definition
   49.2 ........ Application
   49.3 ........ Design Guidance

10-10-51 ..... Sediment Traps and Basins
   51.1 ......... Definition
   51.2 ......... Application
   51.3 ......... Design Guidance

10-10-55 ..... Safety Fence
   55.1 ......... Definition
   55.2 ......... Application
   55.3 ......... Design Guidance

10-10-57 ..... Other Devices
   57.1 ......... Pipe Down Drains
   57.2 ......... Preformed Apron Endwalls
   57.3 ......... Mortar Rubble Masonry or Concrete Masonry
   57.4 ......... Anti-Seepage Collar
   57.5 ......... Weep Holes
   57.6 ......... Scour Hole
   57.7 ......... Flumes
   57.8 ......... Gabions
   57.9 ......... Bin Type Retaining Walls
Section 10-15  Appendix

10-15-1  ...... Glossary
10-15-5  ...... Erosion Control CADD Cells

Attachment 5.1  ...... Runoff Coefficient Table
Attachment 5.2  ...... Detail of Sod Slopes at Structures
Attachment 5.3  ...... Sod Detail for Ditches
Attachment 5.4  ...... Sod Inlet Sediment Filter
Attachment 5.5  ...... Sod Treatment at Culverts
Attachment 5.6  ...... Detail of Sod Flume
Attachment 5.7  ...... Sod Flume Detail at Curb Ends
Attachment 5.8  ...... Sod Flume Detail at Curb Ends
Attachment 5.9  ...... Detail of Sod Flume
Attachment 5.10  ...... Erosion Mat Detail for Ditches
Attachment 5.11  ...... Erosion Mat Treatment at Culverts
Attachment 5.12  ...... Detail for Heavy Riprap in Ditches
Attachment 5.13  ...... Detail for Special Ditch with Heavy Riprap & Geotextile Fabric
Attachment 5.14  ...... Detail for Heavy Riprap Ditch
Attachment 5.15  ...... Detail for Riprap in Ditches
Attachment 5.16  ...... Detail for Medium Random Riprap in Ditches
Attachment 5.17  ...... Detail for Special Ditch with Medium Random Riprap & Geotextile Fabric
Attachment 5.18  ...... Detail for Special Ditch with Riprap and Geotextile Fabric
Attachment 5.19  ...... Medium Random Riprap Treatment at Culverts
Attachment 5.20  ...... Riprap Treatment at Culverts
Attachment 5.21  ...... Sod Heavy Riprap & Geotextile Fabric Detail at Apron Endwalls
Attachment 5.22  ...... Sod Heavy Riprap & Geotextile Fabric Detail at Apron Endwalls
Attachment 5.23  ...... Sod Medium Random Riprap & Geotextile Fabric
Attachment 5.24  ...... Heavy Riprap Treatment at Culverts
Attachment 5.25  ...... Erosion Bale Inlet Sediment Barrier
Attachment 5.26  ...... Silt Fence Inlet Sediment Barrier
Attachment 5.27  ...... Plan View Filter Berm
Attachment 5.28  ...... Permanent Stone Ditch Check
Attachment 5.29  ...... Coarse Aggregate Sediment Filter for Inlets
Attachment 5.30  ...... Curb Inlet Sediment Barrier (Sandbag Type)
Attachment 5.31  ...... Curb Inlet Sediment Barrier (Sandbag Type)
Attachment 5.32  ...... Coarse Aggregate Sediment Filter For Drop Inlets
Attachment 5.33  ...... Culvert Inlet Sediment Trap
Attachment 5.34  ...... Silt Screen Detail
Attachment 5.35  ...... Turbidity Barrier Detail
Attachment 5.36  ...... Typical Excavated Sediment Trap
Attachment 5.37  ...... Sediment Basin & Outlet Detail
Attachment 5.38  ...... Silting Pond Detail
Attachment 5.39  ...... Temporary Flexible Slope Drain
Attachment 5.40  ...... Concrete Surface Drain
Attachment 5.41  ...... Split Concrete Block Wall
Attachment 5.42  ...... Typical Section of Temporary Channel Change
Attachment 5.43  ...... Detail for Split concrete Block Retaining Wall

10-15-10  ...... References

Section 10-25  Stormwater Quality

10-25-1  ...... Stormwater Control Measure Selection

1.1  ........ Introduction
1.2  ........ Determining Project Water Quality Objective Goals
1.3  ........ Stormwater Report Development
1.4  ........ Stormwater Quality Matrix
1.5  ........ Stormwater Technical Standard and Procedure Links
1.6 Stormwater Retrofit Projects

Attachment 1.1 Post Construction Stormwater Quality Management Goals
Attachment 1.2 Treatment Efficiencies for WisDOT Stormwater Control Practices as Required for Highway Facilities Covered Under TRANS 401

10-25-5 The Effects of Urbanization on Stormwater Quality

5.1 Introduction
5.2 Urbanization
5.3 Hydrologic Changes
5.4 Pollutants
5.5 References

Section 10-30 Stormwater Quality Analysis

10-30-1 Project Stormwater Quality Analysis Process

1.1 Description and Purpose
1.2 Water Quality Analysis Instructions
1.3 Stormwater Report Applicability
1.4 Water Quality Spreadsheet Description

Attachment 1.1 Water Quality Results Summary Sheet
Attachment 1.2 Water Quality - Wet Detention Ponds Summary Sheet
Attachment 1.3 Water Quality - Catchbasins Summary Sheet

Section 10-35 Stormwater Control Measure Selection

10-35-1 Stormwater Quality Practice Selection

1.1 Introduction
1.2 Project Scoping for Stormwater Quality
1.3 Physical Site Suitability
1.4 Cost Effectiveness
1.5 Maintenance Requirements
1.6 Effect on Other Resources
1.7 Public Acceptance
1.8 Suspended Solids Reduction Design Process
1.9 Effectiveness in Reducing Peak Discharges

10-35-5 Grass Swales

5.1 Description and Purpose
5.2 Target Pollutants
5.3 Planning Issues
5.4 Design Recommendations
5.5 Maintenance
5.6 Grass Swale Water Quality Design Example
5.7 References

Attachment 5.1 Grass Swale Analysis Summary Spreadsheet

10-35-10 Filter Strips

10.1 Description and Purpose
10.2 Targeted Pollutants
10.3 Effectiveness
10.4 Planning Issues
10.5 Design Recommendations
10.6 Maintenance
10.7 Filter Strip Water Quality Design Example
10.8 References

Attachment 10.1 Filter Strip Water Quality Design Charts
Attachment 10.2 Filter Strip Analysis Summary Spreadsheet
Attachment 10.3 Filter Strip Sand Amendment Analysis

10-35-15 Wet Detention Pond Stormwater Quality Design

15.1 Description and Purpose
15.2 Target Pollutants
15.3 Effectiveness
15.4 Planning Issues
15.5 Design Recommendations
15.6 Maintenance
15.7 Wet Detention Pond Water Quality Analysis Using the WisDOT Stormwater Report Spreadsheet

15.8 References

Attachment 15.1 Calculation of Preliminary Permanent Pool Surface Area for TSS Reduction
Attachment 15.2 Pond Volume/Discharge Design Curve
Attachment 15.3 Rainfall and Runoff Tables
Attachment 15.4 Conceptual Pond Design Illustrations
Attachment 15.5 Wet Detention Pond Analysis Summary Spreadsheet

10-35-20 Catchbasin Design and Maintenance

20.1 Description and Purpose
20.2 Target Pollutants
20.3 Effectiveness
20.4 Planning Issues
20.5 Design Recommendations
20.6 Maintenance
20.7 Catchbasin Water Quality Design Example
20.8 References

Attachment 20.1 Typical Cross Section Type 5 Illustration
Attachment 20.2 Catchbasin Water Quality Design Charts for Cross Section Type 5
Attachment 20.3 Typical Cross Section Type 8 Illustration
Attachment 20.4 Catchbasin Water Quality Design Charts for Cross Section Type 8
Attachment 20.5 Catchbasin Analysis Summary Spreadsheet

Section 10-40 Maintenance Best Management Practices (BMPs)

10-40-1 Introduction
10-40-5 Street Sweeping

5.1 Description and Purpose
5.2 Target Pollutants
5.3 Planning Considerations