## TABLE OF CONTENTS

### Chapter 10: Erosion Control and Storm Water Quality

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

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 Sod Flume Detail at Culverts  
Attachment 5.7 Sod Flume Detail at Curb Ends  
Attachment 5.8 Sod Flume Detail at Curb Ends  
Attachment 5.9 Sod Flume Detail at Curb Ends  
Attachment 5.10 Erosion Mat Detail for Ditches  
Attachment 5.11 Erosion Mat Treatment at Culverts  
Attachment 5.12 Heavy Riprap in Ditches  
Attachment 5.13 Erosion Mat Treatment for Special Ditch with Heavy Riprap & Geotextile Fabric  
Attachment 5.14 Heavy Riprap Ditch  
Attachment 5.15 Heavy Riprap in Ditches  
Attachment 5.16 Medium Random Riprap in Ditches
<table>
<thead>
<tr>
<th>Chapter 10 Table of Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attachment 5.17</strong>....Detail for Special Ditch with Medium Random Riprap &amp; Geotextile Fabric</td>
</tr>
<tr>
<td><strong>Attachment 5.18</strong>....Detail for Special Ditch with Riprap and Geotextile Fabric</td>
</tr>
<tr>
<td><strong>Attachment 5.19</strong>....Medium Random Riprap Treatment at Culverts</td>
</tr>
<tr>
<td><strong>Attachment 5.20</strong>....Riprap Treatment at Culverts</td>
</tr>
<tr>
<td><strong>Attachment 5.21</strong>....Sod Heavy Riprap &amp; Geotextile Fabric Detail at Apron Endwalls</td>
</tr>
<tr>
<td><strong>Attachment 5.22</strong>....Sod Heavy Riprap &amp; Geotextile Fabric Detail at Apron Endwalls</td>
</tr>
<tr>
<td><strong>Attachment 5.23</strong>....Sod Medium Random Riprap &amp; Geotextile Fabric</td>
</tr>
<tr>
<td><strong>Attachment 5.24</strong>....Heavy Riprap Treatment at Culverts</td>
</tr>
<tr>
<td><strong>Attachment 5.25</strong>....Erosion Bale Inlet Sediment Barrier</td>
</tr>
<tr>
<td><strong>Attachment 5.26</strong>....Silt Fence Inlet Sediment Barrier</td>
</tr>
<tr>
<td><strong>Attachment 5.27</strong>....Plan View Filter Berm</td>
</tr>
<tr>
<td><strong>Attachment 5.28</strong>....Permanent Stone Ditch Check</td>
</tr>
<tr>
<td><strong>Attachment 5.29</strong>....Coarse Aggregate Sediment Filter for Inlets</td>
</tr>
<tr>
<td><strong>Attachment 5.30</strong>....Curb Inlet Sediment Barrier (Sandbag Type)</td>
</tr>
<tr>
<td><strong>Attachment 5.31</strong>....Curb Inlet Sediment Barrier (Sandbag Type)</td>
</tr>
<tr>
<td><strong>Attachment 5.32</strong>....Coarse Aggregate Sediment Filter For Drop Inlets</td>
</tr>
<tr>
<td><strong>Attachment 5.33</strong>....Culvert Inlet Sediment Trap</td>
</tr>
<tr>
<td><strong>Attachment 5.34</strong>....Silt Screen Detail</td>
</tr>
<tr>
<td><strong>Attachment 5.35</strong>....Turbidity Barrier Detail</td>
</tr>
<tr>
<td><strong>Attachment 5.36</strong>....Typical Excavated Sediment Trap</td>
</tr>
<tr>
<td><strong>Attachment 5.37</strong>....Sediment Basin &amp; Outlet Detail</td>
</tr>
<tr>
<td><strong>Attachment 5.38</strong>....Sitting Pond Detail</td>
</tr>
<tr>
<td><strong>Attachment 5.39</strong>....Temporary Flexible Slope Drain</td>
</tr>
<tr>
<td><strong>Attachment 5.40</strong>....Concrete Surface Drain</td>
</tr>
<tr>
<td><strong>Attachment 5.41</strong>....Split Concrete Block Wall</td>
</tr>
<tr>
<td><strong>Attachment 5.42</strong>....Typical Section of Temporary Channel Change</td>
</tr>
<tr>
<td><strong>Attachment 5.43</strong>....Detail for Split Concrete Block Retaining Wall</td>
</tr>
</tbody>
</table>

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