

EROSION AND SEDIMENT CONTROL
BEST MANAGEMENT PRACTICES:
ORGANIZATIONAL STRUCTURE SURVEY

FHWA/MT-03-005/8165

Final Report

prepared for
THE STATE OF MONTANA
DEPARTMENT OF TRANSPORTATION

in cooperation with
THE U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

March 2003

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RESEARCH PROGRAMS

Erosion and Sediment Control Best Management Practices: Organizational Structure Survey

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February 2003

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. FHWA/MT-03-005/8165		2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Erosion and Sediment Control Best Management Practices: Organizational Structure Survey		5. Report Date February 2003	
		6. Performing Organization Code	
7. Author(s) Darrel M. Stordahl, P.E. Jeffery Jones, EI		8. Performing Organization Report No.	
9. Performing Organization Name and Address CDM 34 North Last Chance Gulch Helena, MT 59601		10. Work Unit No.	
		11. Contract or Grant No. 8165	
12. Sponsoring Agency Name and Address Research Section Montana Department of Transportation 2701 Prospect Avenue PO Box 201001 Helena MT 59620-1001		13. Type of Report and Period Covered Organizational Structure Survey January 2002-December 2002	
		14. Sponsoring Agency Code 5401	
15. Supplementary Notes Research performed in cooperation with the Montana Department of Transportation and the US Department of Transportation, Federal Highway Administration.			
16. Abstract The Erosion and Sediment Control Organizational Structure Report was developed to aid in the development of a construction erosion and sediment control BMP manual and training program. A survey of Department of Transportations (DOTs) was conducted to gain knowledge related to erosion and sedimentation organizational structures, controls, designs, implementation, monitoring, maintenance, and removal. The results of the survey are summarized and discussed in this report.			
17. Key Words erosion and sediment control, construction BMPs, organizational structure		18. Distribution Statement Unrestricted. This document is available through the National Technical Information Service, Springfield, VA 21161.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 65	22. Price

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Contents

Section 1 Introduction

1.1	Survey Background.....	1
1.2	Survey Response Rate.....	2
1.3	Accuracy Considerations.....	2

Section 2 Evaluation of Erosion and Sediment Control Organizational Structures

2.1	E&SC Resources Utilized by the Surveyed DOTs	4
2.1.1	Observations of Resources Utilized by Individual DOTs	4
2.2	Staffing/Budget Comparisons Between Surveyed DOTs	6
2.3	Comparison of Responsibilities for Erosion and Sediment Control	7
2.3.1	Erosion and Sediment Control BMP Planning and Design.....	7
2.3.2	Erosion and Sediment Control Implementation/Oversight	12
2.3.3	Erosion and Sediment Control Maintenance.....	12
2.3.4	Erosion and Sediment Control Monitoring	13
2.3.5	Regulatory Compliance.....	13
2.4	Recommendations for Improving MDT’s Existing Erosion and Sediment Control Organizational Structure	14
2.4.1	Erosion and Sediment Control Planning and Design	14
2.4.2	BMP Implementation/Oversight	16
2.4.3	Maintenance/Monitoring/Removal	16
2.4.4	Regulatory Compliance.....	17

Section 3 E&SC Construction BMP Assessment

3.1	BMP Assessment	18
3.2	BMP Implementation	20
3.3	Innovative Practices	21
3.4	BMP Construction Costs.....	22

Section 4 Summary and Conclusions.....23

Appendices

Appendix A	Blank Organizational Structure Survey Questionnaire.....	24
Appendix B	Compilation of Survey Responses.....	31

Tables

Table 1.1-1	DOTs Requested to Complete E&SC Organizational Structure Survey.....	1
Table 1.2-1	DOTs Responding to E&SC Organizational Structure Survey.....	2
Table 1.3-1	Divisions Completing the Survey	3
Table 2.1-1	BMP/E&SC Database.....	4
Table 2.2-1	Staffing/Budget Comparisons Between the Surveyed DOTs	7
Table 2.3.1-1	Erosion and Sediment Control BMP Planning and Design	8
Table 2.3.2-1	Erosion and Sediment Control Implementation/Oversight.....	12
Table 2.3.3-1	Erosion and Sediment Control Maintenance	12
Table 2.3.4-1	Erosion and Sediment Control Monitoring.....	13
Table 2.3.5-1	Erosion and Sediment Control Regulatory Compliance.....	13
Table 3.1-1	Ineffective BMPs.....	18
Table 3.1-2	Effective BMPs.....	19

Section 1

Introduction

1.1 Survey Background

The Montana Department of Transportation (MDT) has contracted Camp Dresser & McKee Inc. (CDM) and their subcontractor, the Montana State University Reclamation Research Unit (RRU) to provide a construction erosion and sediment control (E&SC) Best Management Practices (BMPs) manual and training program. This project is being carried out under the guidance of a Technical Panel that consists primarily of experts from various divisions within MDT. Individuals from bordering Canadian Provinces, Montana Contractors Association (MCA), the Montana Department of Environmental Quality (DEQ), The Federal Highway Administration (FHWA), and the United States Corps of Engineers (US COE) are also part of the Technical Review Panel.

A survey of other Departments of Transportation (DOTs) E&SC organizational structure was conducted to facilitate internal MDT discussions on how to best manage E&SC design, implementation, monitoring, maintenance, and removal between MDT's Divisions, Bureaus, and Sections. A draft organizational structure survey questionnaire was generated and submitted to the Technical Panel for review and comments prior to sending the final questionnaire to the other DOTs. The survey format was developed to determine how other DOTs successfully and efficiently integrate design, construction, and maintenance of best management practices (BMPs) and how they integrate their operations with regulatory agencies.

The organizational structure survey questionnaire was divided into the following sections: General Information; BMP/Erosion & Sediment Control Database; Service Area/Organization Information; Department Responsibilities; Regulatory Compliance; BMP Assessment; BMP Implementation Success and Failures; Innovative Practices; BMP Construction Costs; and Miscellaneous Information/Additional Comments. The blank survey questionnaire is included in Appendix A.

Distribution of the survey focused primarily on the AASHTO Region IV DOTs because of similarities to Montana's climate and geography. Additional DOTs were added to this list because of their potential to provide relevant information with regard to their E&SC organizational structures. The DOTs that were requested to provide information are shown in Table 1.1-1.

Table 1.1-1 DOTs Requested to Complete E&SC Organizational Structure Survey

<u>State DOT</u>	<u>State DOT</u>
Alaska	Nevada
Arizona	New Mexico
California	New York
Colorado	North Dakota
Florida	Oklahoma
Hawaii	Oregon
Idaho	South Dakota
Illinois	Texas
Maryland	Utah
Montana	Washington
Nebraska	Wyoming

Montana was included in the survey in order to obtain baseline data for comparison to the other DOTs. The five surveys completed by MDT staff, combined with discussions within the Technical Panel meetings for this project, were used as the basis of understanding of MDT’s current E&SC organizational structure.

1.2 Survey Response Rate

Sixteen out of the twenty-two states that were sent a survey either submitted a completed survey or discussed the survey questions over the phone. The overall response rate of 73% was considered good for this survey, especially given the length of the survey. Responding DOTs are shown in Table 1.2-1. Many of the states near Montana participated in the survey, allowing for the identification of geographic preferences in E&SC practices. Similarly, many of the smaller DOTs (in terms of staff and funding) participated in the survey, allowing the identification of procedures that are used by similar-sized DOTs. Some of these procedures may be beneficial to MDT for possible enhancements to MDT’s E&SC program. Finally, the broad range of DOTs that responded to the survey allowed the identification of innovative procedures that also may be useful in enhancing MDT's program.

Table 1.2-1 DOTs Responding to E&SC Organizational Structure Survey

<u>State DOT</u>	<u>State DOT</u>
Arizona	New Mexico
Colorado	North Dakota
Idaho	Oklahoma
Illinois	Oregon
Maryland	South Dakota
Montana	Texas
Nebraska	Washington
Nevada	Wyoming

Two key states that did not participate in the survey were Utah and California. Both of these states have somewhat similar geographies as Montana. California has long been known for its advances in E&SC associated with roadway construction. California Department of Transportation has produced numerous manuals, bulletins, and other guidelines for E&SC. Several of these manuals will be referenced in the development of the MDT Construction E&SC Manual. A compilation of responses to each survey question from the responding DOTs is included in Appendix B.

1.3 Accuracy Considerations

The accuracy of the E&SC organizational structure survey must be taken into consideration when reviewing the results and interpreting the survey information. With the exception of Montana, only one survey from each of the other DOTs was submitted and may not represent all functional units within the surveyed DOT. Inputs from other functional units may or may not have been provided to the person responsible for completing the survey. Some variation in answers could be seen from the five surveys received from MDT. Multiple survey results from each DOT would increase the accuracy and understanding of how other DOTs are organized with respect to E&SC organizational structures. Follow-up phone calls and e-mails were made to the responding DOTs in an attempt to understand the different E&SC organizational structures and to maximize accuracy.

The responders of the survey from the other DOTs do not all work for similar functional units. The level of detail provided or the understanding of the issues presented in the survey can be influenced by the individuals experience within his or her functional unit. Table 1.3-1 lists the various divisions of the individuals completing the survey.

Table 1.3-1 Divisions Completing the Survey

State	Division Completing Survey
Arizona	Roadside Division
Colorado	Natural Resource Unit Manager
Idaho	Roadside Program Administrator
Illinois	Roadside Maintenance Chief, Agricultural Specialist, Landscape Architect
Maryland	Chief, Highway Hydraulics Division
Montana	Engineering Project Manager (Field Construction)
Montana	Supervisor, Erosion Control & Construction Permitting Section
Montana	Design Supervisor
Montana	Engineering Project Manager
Montana	Maintenance Superintendent
Nebraska	Agronomist
Nevada	Principal Hydraulic Engineer
New Mexico	Drainage Development Engineer
North Dakota	Transportation Engineer-Hydraulic Engineer
Oklahoma	Transportation Specialist
Oregon	Erosion Control Program Coordinator
South Dakota	Engineering Supervisor
Texas	Director of Vegetation Management – Maintenance Division
Washington	Statewide Erosion Control Coordinator
Wyoming	Agronomist

Results obtained during this E&SC Organizational Structure Survey will be presented for each section of the survey. General trends and observations will also be presented, keeping in mind the accuracy considerations of this survey mentioned above. Some trends or observations identified in this report may warrant more detailed investigations by MDT of other State's E&SC organizational structure. In such cases, input from various functional units within that DOT may be desirable.

Section 2

Evaluation of Erosion and Sediment Control Organizational Structures

Various resources are used by state DOTs to implement construction BMPs. The first part of the organizational structure survey was used to identify the resources that other DOTs use to organize and incorporate construction E&SC procedures and requirements.

2.1 E&SC Resources Utilized by the Surveyed DOTs

Table 2.1-1 summarizes the resources used by the responding DOTs for E&SC planning, implementation, monitoring, and maintenance. The many variations of document titles and formats have been placed in generalized categories in Table 2.1-1 in order to provide an overall sense of the primary E&SC resources utilized by the other DOTs.

Table 2.1-1 BMP/E&SC Database

	Arizona	Colorado	Idaho	Illinois	Maryland	Montana	Nebraska	Nevada	New Mexico	North Dakota	Oklahoma	Oregon	South Dakota	Texas	Washington	Wyoming
General Design Manual(s)		■	■	■		■	■		■	■			■			
Special Provisions		■	■	■		■	■	■			■	■		■		■
Standard Specifications		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Detailed Drawings		■	■	■	■	■	■		■	■	■	■	■	■		■
Erosion & Sediment Control Design Manual	■	■	■	■	■	■					■	■	■	■	■	
Erosion & Sediment Control Maintenance Manual	■		■		■						■	■		■	■	■
Erosion & Sediment Control Field Manual		■		■			■					■	■	■	■	
Erosion & Sediment Control contractor's Manual		■													■	

2.1.1 Observations of Resources Utilized by Individual DOTs

The information used to generate Table 2.2-1 is summarized below by State and provides more detail with regard to the resources that are relied upon for E&SC design, implementation, monitoring, and maintenance. Links to the state DOTs listed below can be found at <http://www.fhwa.dot.gov/webstate.htm>.

Arizona DOT (ADOT)

The survey response stressed that the ADOT staff take an aggressive attitude toward E&SC and utilize a BMP Manual with Drawings (Revised for 2003) for all of their BMP planning, implementation, and maintenance.

Colorado DOT (CDOT)

The special provisions and standard specifications used by the CDOT are listed in a separate section (Section 208 – Erosion Control). CDOT staff also rely on the *Denver Urban Drainage Manual* for additional E&SC information. The *Erosion Control & SWQ Guide* is listed as their E&SC design manual and the *Erosion Control & SWQ Pocket Book* is listed as their E&SC Field Manual.

Idaho Transportation Department (ITD)

The IDT staff utilize their *Design Manual, Special Provisions, Standard Specifications for Highway Construction, and Standard Drawings*, in conjunction with their *Erosion and Sediment Control Design Manual and Maintenance Manual*.

Illinois Department of Transportation (IDOT)

The IDOT, which stresses that all staff involved in E&SC development and implementation play a key role, uses a *Design & Environmental Manual* along with the *Illinois Urban Manual* for design and detailed drawings. They use contract deficiency deductions as special provisions and have standard specifications (280001-2). The *NRCS Urban Manual* is used for IDOT's E&SC design and the *NRCS Inspection Manual & Inspector's Checklist* is used for the E&SC Field Manual.

Maryland State Highway Administration (SHA)

E&SC is an important issue in the Chesapeake Bay Watershed and has a tremendous impact in the way projects are planned, designed, and constructed by the Maryland SHA. The Maryland Standards and Specifications for E&SC, a Maryland Department of Environment (MDE) publication that was developed collaboratively by MDE and the Maryland SHA contains design and maintenance criteria. Maryland SHA staff also utilize highly detailed construction specifications for each stage and phase of construction, including transitional phases.

Montana Department of Transportation (MDT)

MDT's E&SC manual is outdated and its use for E&SC design and implementation is limited. MDT personnel rely on the *Montana Road Design Manual*, the *MDT Standard Specifications for Highway and Bridge Construction* and the *MDT Detailed Drawings, Metric & English Edition – August 1999*. Special provisions are written as needed to support plans. Some MDT personnel also use the California Transportation Department (Caltrans) manuals and the Guide for Highway Construction Permitting.

Nebraska Department of Roads (DOR)

Nebraska DOR staff use the typical roadway design manual, standard provisions, standard specifications, and detailed drawings for E&SC design and implementation. Nebraska DOR also has an E&SC field manual.

Nevada Department of Transportation (NDOT)

NDOT staff currently use special provisions and standard specifications for E&SC design and implementation. The Caltrans E&SC manuals are being used as a guide to develop *E&SC Design, Maintenance, Field, and Contractor's Manuals* for Nevada DOT.

New Mexico State Highway & Transportation Department (NMSHTD)

NMSHTD staff use the *National Pollutant Discharge Elimination System Handbook (Jan. 1997)* for design and *Standard Specifications for Highway and Bridge Construction, 2000 edition* for standard specifications. NMSHTD has 4 detailed drawing sheets that address temporary E&SC.

North Dakota Department of Transportation (NDDOT)

NDDOT's Erosion and Sediment Control Design Manual is Chapter VI of the NDDOT Design Manual. They use *Standard Specifications for Roads and Bridges* for specifications and MicroStation files for detailed drawings.

Oklahoma Department of Transportation (Oklahoma DOT)

The *ODOT Storm Water Management Guidelines for Design and Construction Activities* are utilized for E&SC design and maintenance. They also have special provisions, standard specifications, and detailed drawings.

Oregon Department of Transportation (Oregon DOT)

Oregon DOT staff use the *AASHTO Drainage Manual* and the *Oregon DOT Hydraulics Manual Vol 2, Erosion and Sediment* for E&SC Design and the *Oregon DOT Routine Road Maintenance, Water Quality Maintenance Manual*. They also have an *Erosion and Sediment Control Field Manual, 11/0*. Oregon DOT referred to the Caltrans and Washington State DOT (WSDOT) manuals when developing their manuals.

South Dakota Department of Transportation (SDDOT)

SDDOT staff use the *Roadside Development & Erosion Control Manual and Road Design Manual (Chapter 14)* for E&SC design and field manuals. They also occasionally refer to Colorado and Minnesota DOT erosion manuals.

Texas Department of Transportation (TXDOT)

TXDOT staff use *Storm Water Guidelines* for their E&SC design manual and the *Practical Guide to Establishing Vegetation on the Highway Right-of-Way* for their E&SC field manual.

Washington State Department of Transportation (WSDOT)

WSDOT staff use an *Erosion Control Design and Construction Course* for E&SC design and field manuals. They also have a *Construction Site Erosion & Sediment Control Certification Course* for use as an E&SC contractor's manual. The certification manual is also the primary education tool for WSDOT staff.

Wyoming Department of Transportation (WYDOT)

WYDOT staff use standard provisions, standard specifications, and detailed drawings for E&SC design and implementation. E&SC maintenance is per contract specifications.

2.2 Staffing/Budget Comparisons Between Surveyed DOTs

The service area/organizational questions in the survey were targeted to compare staff size and budgets of other DOTs. Questions included approximate total number of DOT staff, DOT E&SC staff, area of each state, miles of highway served, state population, DOT total budget, and E&SC program budget. When comparing a particular state DOT E&SC organizational structure to MDT's structure, it is important to keep in mind the relative staff sizes and budgets of these other DOTs as compared to MDT. These staffing/budget comparisons are shown in Table 2.2-1. The data were generated from the information provided in the organizational survey questionnaires and from DOT web sites. The data presented should be used to look at generalized trends between the DOTs only. Of particular concern is the data presented for E&SC budgets. Most DOTs presented these data as estimated percents of total budgets only.

With the exception of Oklahoma DOT, which only has one E&SC staff member, MDT has the highest miles of highway served per E&SC staff member out of all of the responding states. MDT was also the third highest of the DOTs surveyed in the ratio between total DOT staff and E&SC staff. When

evaluating this ratio, the number of E&SC employees related to overall manpower in the design of E&SC BMPs and did not include environmental permitting.

State DOTs that most closely resemble MDT in terms of total DOT budget per miles of highway served include Nebraska, New Mexico, Oklahoma, South Dakota, and Wyoming.

Table 2.2-1 Staffing/Budget Comparisons Between the Surveyed DOTs

	Population/ Square Mile	Population/ DOT Staff	Miles Highway Served/ DOT Staff	Miles Highway Served/ E&SC Staff	DOT Budget/ Miles Highway Served	E&SC Budget/ Miles Highway Served	DOT Staff/ E&SC Staff
Arizona	46	ND	ND	ND	ND	ND	ND
Colorado	42	2,104	4	1,300	109,890	77	300
Idaho	16	722	1	290	ND	430	229
Illinois	221	1,248	1.7	3.78	164,706	882	2
Maryland	546	1,536	1.5	193	178,846	130	130
Montana	6	431	5	5,386	45,767	801	1,050
Nebraska	22	857	5	1,667	50,000	176	333
Nevada	19	1,276	3	1,371	84,412	1,276	412
New Mexico	13	914	5	1,111	50,000	2,500	222
North Dakota	9	8,459	3	67	70,000	ND	25
Oklahoma	50	1,437	5	12,200	43,361	ND	2,408
Oregon	36	681	1.5	2,494	227,212	20	1,700
South Dakota	10	767	8	2,613	54,471	ND	329
Texas	81	1,450	5	5,286	64,512	4,516	981
Washington	90	ND	ND	2,349	235,729	ND	ND
Wyoming	5	199	3	2,333	54,034	405	829

Bold text represents top 5 States in each category that most closely resemble MDT.

ND – No data provided.

2.3 Comparison of Responsibilities for Erosion and Sediment Control

The department responsibility section of the survey focuses on which area of each of the surveyed DOTs is responsible for each portion of the E&SC process. In addition, problems resulting from E&SC program organizational structure were addressed by one of the questions. For those respondents that identified problems, a question was asked as to what possible solutions have been or could be implemented to rectify the problem. The following sections outline the survey responses.

2.3.1 Erosion and Sediment Control BMP Planning and Design

Table 2.3.1-1 identifies the areas that are responsible for planning and design of E&SC BMPs from states that participated in the organizational structure survey. Because each state DOT uses slightly different terminology and organizational structure, the information shown in this Table 2.3.1-1 is provided in very generalized categories in order to determine an overall pattern of how the other DOTs are organized with respect to E&SC.

Table 2.3.1-1 Erosion and Sediment Control BMP Planning and Design

	Arizona	Colorado	Idaho	Illinois	Maryland	Montana	Nebraska	Nevada	New Mexico	North Dakota	Oklahoma	Oregon	South Dakota	Texas	Washington	Wyoming
Road Design ¹	■	■	■	■		■	■				■		■	■	■	■
Environmental				■		■										
Hydraulic Engineering ²					■			■	■	■		■				

¹ Design includes: Road Design, Project Development, Roadside Development, Engineering Division, Individual Design Offices, Landscape Architect, and contractor.

² Hydraulic Engineering includes: Drainage Design and Geo-Hydro Unit

Overall, the survey data clearly show that different DOT areas are responsible for design and permitting. At eleven of the sixteen DOTs surveyed, the E&SC design is completed by an area of the Design Division. The Road Design category shown in Table 2.3.1-1 includes the following DOT sections: Road Design; Project Development; Roadside Development; Engineering Division; Individual Design Offices; Landscape Architect; and Contractor’s Design. Five of the sixteen DOTs surveyed use Hydraulic Engineering for E&SC design. The Hydraulic Engineering category shown in Table 2.3.1-1 includes Drainage Design, and Geo-Hydro Unit. Overall, Environmental or Planning areas addressed E&SC permitting issues separately from E&SC design.

The surveyed DOTs also tend to use distinct E&SC design groups rather than the approach of having all road designers designing E&SC measures. Eleven of the sixteen surveyed DOTs have some form of organization where E&SC design is completed by smaller sections specifically trained in E&SC and associated fields. Only 4 of the surveyed DOTs utilize all of their road designers for E&SC design. Most DOTs that do use this organizational structure have a procedure for E&SC design checking. DOTs from both of these different approaches to E&SC design claimed successes with their programs.

To coordinate activities from different portions of the E&SC program, many DOTs use a defined chain of command where a section of the DOT is responsible for one portion of the program. Once their portion is completed it is given to another section, which completes their portion. This process is passed on until the final task is completed. Some of the states have incorporated a detailed checklist and commitment files to ensure that all of the procedures have been completed along each step of the project. Other DOTs coordinate E&SC through meetings, teams, and communications to ensure that their E&SC programs flow smoothly.

Many of the surveyed DOTs experience some challenges in successfully operating their E&SC programs. Keeping all staff involved in the project development improved some states programs, while others have added additional training and educational programs for inspectors and designers. Nebraska’s Roadside Development personnel take yearly tours to observe, comment, and recommend changes/improvements on selected construction projects.

Another observation from the survey includes the use of landscape architects for E&SC design. Arizona, Colorado, and Texas DOTs all utilize landscape architects. Other DOTs may use landscape architects for E&SC design as well. The State of Arizona requires that a landscape architect review and stamp all E&SC plans.

MDT's approach to E&SC design is a combination of both methods described above. Within the MDT organizational structure, the District Offices, Maintenance Division, Engineering Division, and the Rail, Transit and Planning Division all report to the Director. The Engineering Division is broken into the Preconstruction Bureau, Right-of-Way Bureau, Materials Bureau, Construction Bureau, Construction Oversight Bureau, Environmental Services Bureau, Bridge Bureau, and the Traffic & Safety Bureau. The Road Design Section, which is part of the Preconstruction Bureau, prepares the erosion control plan sheets with pre- and post-construction contours and provides these sheets to the District Project Development Engineers in the Engineering Section of Environmental Services Bureau. These engineers, who are also responsible for generating construction project environmental documents and permits, mark locations and BMP types into the plan sheets by hand and return the sheets to Road Design for final drafting design. MDT has 5 District Project Development Engineering positions at headquarters (one for each district). A staff member from the Erosion Control & Construction Permitting Section also provides E&SC design assistance to the Project Development Engineers.

MDT currently experiences problems in successfully operating the E&SC program in part because the drafting and design are completed in two different areas. Additionally, with the current process, erosion control plans are created late in the project development timeline, which limits the ability to modify the design for increased effectiveness of E&SC. MDT also does not have staff completely dedicated to the E&SC program.

The comments listed below provide more detail as to the E&SC organizational structure of the DOTs that responded to the survey.

Arizona DOT (ADOT)

One landscape architect supervisor and two landscape designers complete E&SC planning and design drawings for ADOT. The E&SC planning and design for all construction projects are routed through the Landscape Architect Section. The three staff members also review E&SC designs submitted by consultants and perform other tasks besides E&SC. The Landscape Architect Section is a part of ADOT's Roadway Design Section.

Colorado DOT (CDOT)

E&SC planning is completed by the Drainage and Landscape Architecture Department of CDOT. This department is a part of the Project Development branch of the Division of Engineering and Maintenance. Seven staff members are involved in the E&SC planning and design for all CDOT projects.

Idaho Transportation Department (ITD)

The Design Division submits project designs to an eight member Erosion and Sediment Committee comprised of various ITD personnel. Depending on the stage of the designs, E&SC measures may or may not be included on the drawing sheets. The Roadside Program Administrator in the Maintenance Section, who is one of the Erosion and Sediment Control Committee members, reviews all project designs and provides comments, suggests products for erosion control and vegetation, and marks up design drawings as required. The Roadside Program Administrator for ITD specializes in permanent and temporary E&SC and vegetation, but also has other duties to perform. It is not clear whether the other members of the committee review and comment on the project's designs with regard to E&SC. The committee also works on the E&SC Design Manual and evaluates BMPs.

Illinois Department of Transportation (IDOT)

IDOT is organized such that the Bureau of Design and Environment implements E&SC planning and design. The completed survey questionnaire states that all staff members involved in project development and implementation play a key role in the E&SC program; no single department is responsible for E&SC success. IDOT policy requires E&SC to be considered in all phases of a project. The project engineers

coordinate E&SC through all phases of a project. The Environmental Unit checks plans for E&SC compliance. IDOT also has an erosion and sediment control committee comprised of members from the various divisions.

Maryland State Highway Administration (SHA)

The Maryland SHA uses its 27 employees in the Highway Hydraulics Division to lead E&SC planning and design; however, consultants complete 80 percent of E&SC work. In addition to design, the Highway Hydraulics Division obtains all approvals, as well as certifies personnel for design and construction.

Montana Department of Transportation (MDT)

The Road Design Section begins the E&SC design process for MDT by preparing draft Erosion Control Plan sheets that contain the pre- and post-construction contours. These drawing sheets are then transferred to the Environmental Services Bureau, which marks up the plan sheets with erosion control features and returns the sheets to Road Design for final drafting. The Environmental Services Bureau completes all applications and written documents with regard to E&SC. Five District Project Development Engineers in the Engineering Section of the Environmental Services Bureau are responsible for temporary E&SC design. These Project Development Engineers are also responsible for consultant term contract administration, environmental documents, and Corps of Engineers and Tribal water resources permits. They spend approximately 10% of their time on temporary E&SC. Environmental Services also has an Erosion Control & Construction Permitting Section, consisting of two professionals who work with the Project Development Engineers on E&SC along with numerous other tasks, including E&SC oversight, construction permitting, and monitoring.

A problem noted in the survey with regard to MDT's current E&SC planning and design is that the drafting and the design are conducted in two different areas within MDT leading to inefficiencies and communication breakdowns. E&SC plans are also generated late in project development. The most significant issue noted is that no staff member is completely dedicated to the E&SC Program. Each of the five District Project Development Engineers and the two staff members from the Erosion Control & Construction Permitting Section have other responsibilities, reducing the amount of time they can dedicate to E&SC planning and design.

Nebraska Department of Roads (DOR)

Nebraska DOR's Roadway Design Division is responsible for following the DOR Design Process Outline. This outline specifies that Roadside Development review all design projects for erosion control requirements. Six staff members from Roadside Development are responsible for final erosion control design.

Nevada Department of Transportation (NDOT)

The Hydraulics Section of the Design Division is the lead section for drainage and E&SC design. NDOT uses three staff members from Hydraulic Design and one staff member from Environmental to complete E&SC planning and design with the Water Quality and Erosion Control Section of Hydraulics currently having the primary responsibility. Similar to MDT, this current organizational system of E&SC is under review and may change following full implementation of NDOT's new E&SC Program. The Specifications Section in coordination with the Environmental Services Division and the Hydraulics Section prepares pollution Control Special Provisions.

New Mexico State Highway & Transportation Department (NMSHTD)

Nine staff members from the Drainage Design Section of the NMSHTD are responsible for E&SC planning and design. These nine Drainage Development engineers complete drainage designs from start to finish and incorporate E&SC BMPs as necessary in their designs. Contractors are ultimately responsible for E&SC compliance and can modify or add E&SC measures as required.

North Dakota Department of Transportation (NDDOT)

NDDOT uses three engineers from Hydraulics for E&SC planning and design. These three engineers also review E&SC plans and designs submitted from consultants.

Oklahoma Department of Transportation (Oklahoma DOT)

One transportation specialist from Oklahoma DOT's Design Division is responsible for in-house E&SC designs. This specialist does not review consultant E&SC designs. The Environmental Division is responsible for planning and permitting.

Oregon Department of Transportation (Oregon DOT)

Oregon DOT's E&SC planning and design is completed in their Geo-Hydro Unit under the Technical Services Division. This unit contains geologists, geotechnical engineers, hydraulic engineers, drillers, hazardous waste specialists, erosion control specialists, drafters, and administrative support personnel. Three staff members are assigned the task of planning and designing E&SC for all projects being conducted by the Oregon DOT. These three individuals plan all E&SC BMPs for all construction projects including road design, lighting, signage, bridges, etc. and two drafters in the Geo-Hydro unit complete the design drawings. These three E&SC planners only work on BMP planning and design with the exception of one staff member who spends ¼ of their time on permit review and culvert sizing. Therefore, Oregon DOT has 2 ¾ staff members devoted full time to E&SC planning and two drafters available for completing E&SC drawings. Oregon DOT's Erosion Control Program Coordinator (one of the three E&SC planners) stated that they are very busy completing E&SC designs. For example, Oregon DOT has incorporated into their Erosion and Sediment Control Manual the Revised Universal Soil Loss Equation (RUSLE) version 1.06 software package that was developed by the United States Department of Agriculture and distributed by the Office of Surface Mining. While Oregon DOT believes the RUSLE version 1.06 model to be a good E&SC design tool, the three full time E&SC planning staff do not have the time to use this tool during the design process and instead rely on experience and intuition in selecting appropriate BMPs for projects.

South Dakota Department of Transportation (SDDOT)

Three members of the SDDOT Road Design Office are responsible for E&SC planning and design.

Texas Department of Transportation (TXDOT)

The TXDOT uses landscape architects and engineers from the design division to complete E&SC planning and design throughout their districts.

Washington State Department of Transportation (WSDOT)

Individual design offices from the six regions of WSDOT are responsible for E&SC planning and design. The project designers follow guidelines established in WSDOT's Highway Runoff Manual. This manual requires that project designs address 9 different components, one of those components being Temporary Erosion and Sediment Control (TESC). Within the TESC component, designers must look at 13 minimum plan requirements. Three staff members from the Environmental Affairs Office at Headquarters review approximately 10% of all design projects. The regional offices review a much higher percent of designs for compliance with E&SC requirements.

The designers at WSDOT also have new Standard Specifications that include the most common BMPs for E&SC. Currently, one of WSDOT's concerns is that E&SC plans only specify BMPs for the final construction phase and do not address the intermediate construction phases of projects.

Wyoming Department of Transportation (WYDOT)

WYDOT takes a different approach to E&SC planning and design by bidding their construction projects as design/build lump sum contracts. The contractors are responsible for providing E&SC design and the WYDOT resident engineering field office is responsible for reviewing the E&SC designs and plans. Environmentally sensitive projects are completed in-house through the Project Development Design staff or by consultants. Three WYDOT Environmental Services personnel, who have many other responsibilities other than E&SC, review these E&SC designs and plans.

2.3.2 Erosion and Sediment Control Implementation/Oversight

All sixteen DOTs that replied to the survey use Construction for implementation/oversight of E&SC programs. Construction may rely on additional assistance from other areas or from the contractor. A summary of the survey data with regard to E&SC implementation/oversight is provided in Table 2.3.2-1.

Table 2.3.2-1 Erosion and Sediment Control Implementation/Oversight

	Arizona	Colorado	Idaho	Illinois	Maryland	Montana	Nebraska	Nevada	New Mexico	North Dakota	Oklahoma	Oregon	South Dakota	Texas	Washington	Wyoming
Construction ¹	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Environmental ²		■														
Maintenance				■												

¹ Construction includes: Implementation, District Engineers, Project Inspectors, Operations Division, and Design Offices.
² Environmental includes: natural resources.

2.3.3 Erosion and Sediment Control Maintenance

Table 2.3.3-1 illustrates that ten of the sixteen responding DOTs use Maintenance to ensure that BMPs were maintained correctly. In addition to Maintenance, six states utilize Construction to maintain their E&SCs.

Table 2.3.3-1 Erosion and Sediment Control Maintenance

	Arizona	Colorado	Idaho	Illinois	Maryland	Montana	Nebraska	Nevada	New Mexico	North Dakota	Oklahoma	Oregon	South Dakota	Texas	Washington	Wyoming
Maintenance	■	■	■		■	■	■	■	■					■		■
Construction ¹		■		■		■						■	■		■	
Environmental ²		■														
Contractor										■	■				■	
Geo-Hydro Section												■				

¹ Construction includes: Implementation and operations.
² Environmental includes natural resources.

2.3.4 Erosion and Sediment Control Monitoring

Table 2.3.4-1 summarizes the E&SC BMP monitoring of the surveyed DOTs. Two of the sixteen surveyed DOTs use Environmental exclusively for monitoring, six DOTs use Construction, and four use a combination of Construction with Environmental, or Construction with Geo-Hydro.

Table 2.3.4-1 Erosion and Sediment Control Monitoring

	Arizona	Colorado	Illinois	Montana	Nevada	New Mexico	North Dakota	Oklahoma	Oregon	South Dakota	Texas	Washington	Wyoming
Environmental	■	■		■								■	■
Construction ¹			■	■		■	■	■	■	■	■	■	■
Maintenance ²					■								
Geo Hydro									■				

¹ Construction includes: Implementation and operations.

² Environmental includes: Natural Resources and Water Quality Programs.

2.3.5 Regulatory Compliance

Table 2.3.5-1 represents which area of the DOTs manages the regulatory compliance issues coinciding with their E&SC plans. Although some of the surveyed DOTs did not respond to this question, a generalized trend can be seen showing that Environmental is used in most cases.

Table 2.3.5-1 Erosion and Sediment Control Regulatory Compliance

	Arizona	Idaho	Illinois	Montana	Nebraska	Nevada	New Mexico	Oklahoma	Oregon	South Dakota	Texas	Washington	Wyoming
Environmental ¹	■		■	■	■	■					■		■
Design ²		■	■					■				■	
Construction ³		■	■							■			
Geo-Hydro							■		■				

¹ Environmental includes: Erosion Control Programs, Department of Environmental Quality, and Project Development Wetlands Sections.

² Design includes: District Engineers and Planning.

³ Construction includes: Implementation and operations.

Many of the states that participated in the survey identified which area is responsible for storm water construction permitting. Four of the states (Arizona, Montana, Nevada, and Texas) delegate their Environmental staff to oversee storm water construction permitting. Illinois uses its Implementation staff to submit the NPDES to the Illinois EPA. The State Departments of Environmental Quality within Idaho, Oregon, and South Dakota are responsible for storm water permitting for the DOTs in these areas. Nebraska uses their Wetlands staff, while New Mexico utilizes its Drainage staff for permitting requirements. Oklahoma DOT Design and Construction staff work on construction permitting, while North Dakota requires the contractor to be responsible for permitting.

A majority of the DOTs surveyed mentioned that they have close coordination between themselves and their regulatory agencies. Some of these states had extensive meetings or onsite visits and inspections. Only a couple of the surveyed DOTs stated that they had little to no interaction with their regulatory agencies, unless violations occur.

The DOTs surveyed use a variety of different measures to minimize the effects of late stage non-compliance from storm water runoff. Some of the states use techniques involving detailed guidelines to ensure that the plans are correct. Other states keep a good relationship with the regulating agencies and

work closely with them and the contractor to resolve non-compliance issues. Maryland has an extensive six-layer oversight system to ensure that problems are identified and immediately corrected.

The use of E&SC inspector certification programs has grown over the years as DOTs maximize the effectiveness of BMPs. Almost all states have either a formalized certification process or annual training program for E&SC. Maryland has a Green Card certification that is regulated and enforced by the Maryland Department of Environment. New Mexico has a similar certification that was created in conjunction with The Associated Contractors of New Mexico. The certification question within the survey had two additional questions to determine if DOTs had staff certification requirements and contractor certification requirements. A majority of the states did not respond to these questions, but the states that did, said that they have some type of training with examinations for their staff members. Contractor staff also was required to complete formal training and pass a test.

MDT's Environmental Services Bureau is currently responsible for storm water construction permitting. The Environmental Services Bureau deals directly with DEQ and EPA to regulate storm water quality during construction activities. To avoid late stage non-compliance issues, the Environmental Services and Construction Bureaus work closely with DEQ to provide compliance assistance.

Currently, MDT does not have an E&SC inspector certification program. The certification would be state driven and legislation is required to establish a statewide certification requirement for contractors or designers.

2.4 Recommendations for Improving MDT's Existing Erosion and Sediment Control Organizational Structure

2.4.1 Erosion and Sediment Control Planning and Design

As mentioned in Section 2.3.1, the survey data clearly show that different sections are responsible for designing and permitting E&SC. The surveyed DOTs also tend to use distinct E&SC design groups rather than having all road designers designing E&SC measures. Eleven of the sixteen surveyed DOTs have some form of structure where E&SC designs are completed by smaller sections, specifically trained in E&SC and associated fields. Four of the surveyed DOTs utilize all of the road designers for E&SC design. MDT's organizational structure appears to utilize both approaches and, based on survey comments and subsequent follow-up discussions, this may not be the most efficient way to effectively design and monitor construction BMPs. The District Project Development Engineers that are tasked with generating the E&SC designs are also performing the planning and permitting aspects of the construction projects. This current E&SC design organizational structure puts the entire E&SC design burden on staff members that are already overloaded with environmental document and permitting duties. It also reduces the design support that the Road Designers could give because they simply provide pre- and post-contour sheets and drafting capabilities. Inefficiencies were noted in the E&SC design process as a result of having designers in one section and drafters in another section.

MDT was ranked (based on survey results as discussed in Section 2.2) as having one of the highest miles of highway served per E&SC staff member. It also has one of the higher ratios between total DOT staff and E&SC staff. These rankings are an indication that MDT may be hindered in complying with EPA's Storm Water Phase II requirements that were in place at the end of 2002, primarily due to a lack of E&SC personnel dedicated to BMP design and monitoring.

To enhance the E&SC planning and design, MDT may want to consider several slight modifications to their organizational structure. CDM is aware that we do not have a complete understanding of MDT's

organizational structure nor do we have knowledge of current proposed or on-going modifications to the organizational structure. We will offer the following suggestions with the anticipation that they can be refined to meet MDT's needs.

A review of MDT's Bridge, Preconstruction, Right-of-Way, and Traffic & Safety Bureaus reveals that MDT has had great success combining efforts from each bureau to plan and design a diverse cross section of projects. By adding E&SC to this list, the E&SC design process could be streamlined, creating less duplication of effort and maximizing division efficiency. Section 3.1-Plan File Reference Scheme within the MDT CADD Standards

(<ftp://ftp.mdt.state.mt.us/caddstd/DOCUMENTATION/CADD/STANDARDS/>) depicts how Right-of-Way, Road Design, and Traffic & Safety work independently to produce complex designs. Referencing different bureaus' drawings combines the independent designs. This enables one bureau to work off another's drawings with minimal impact. The scheme illustrates how Road Design, Right-of-Way, and Traffic & Safety all work to create their portion of the design, which is then incorporated into the other portions of the design.

MDT may consider creating an E&SC Planning and Design Section within the department, which could be added as a separate entity within the planning and design of projects. This section could be separated into E&SC Design and Permitting Units if desired. The E&SC Design unit could consist of a single, full time individual for each district that would be stationed in the Helena headquarters. Each individual would be responsible for E&SC planning and design for all of the projects within their specified district. These five individuals could be thoroughly trained in all aspects of E&SC planning and design to ensure the utmost in quality control. If five positions (one for each district) cannot be established due to budgeting limitations, this staffing configuration could be modified so that a smaller pool of individuals could be responsible for E&SC design for the entire state. These individuals could be within the Environmental Services Bureau or another area of MDT, but clearly should be separated from other responsibilities so that their role is solely design of E&SC and follow-up of BMP successes and failures. Within this section, the plans would be designed and revised as the alignment and grade of the project progressed and coordination with the other bureaus would be maintained.

Creating an E&SC Planning and Design Section would allow construction project drawings to be routed to this section early in the design process as opposed to the current system of incorporating E&SC measures late in the design process. One of the most efficient measures to prevent sediment from entering surface water is to prevent erosion from occurring. Early E&SC involvement in the project design can identify measures to prevent or reduce erosion. Design changes could have an effect on alignments, soil balances, and right-of-way issues, and are best identified early in the design process. The early involvement of E&SC design will allow for better BMP selection and design, streamlining the overall design process.

It is important to note that currently Road Design staff members are providing the Draft Erosion Control Plan Sheets that contain pre- and post-design contours and are drafting the final E&SC designs on these sheets. By establishing the E&SC Planning and Design Section, Road Design staff will no longer have to perform these tasks. Labor hours should be freed up in Road Design and as such, a portion of the E&SC staffing requirements may be met by reassigning individuals to the new E&SC Planning and Design Section. The E&SC designers could mark up drawings by hand and drafters assigned to the E&SC Planning and Design Section can provide the final drawing preparations, or designers can be used that are trained in E&SC design and drafting. Landscape architects can also be used in this new section as done in other state DOTs.

Another benefit in creating an E&SC Planning and Design Section is that the few staff members selected to perform these designs can be trained in BMP design and focus on E&SC issues. They would become

leaders in this increasingly important field. Some states encourage their designers to become Certified Erosion and Sediment Control Professionals. These few design engineers would also have the opportunity to be involved with the monitoring of their designs and can gain valuable feedback of what E&SC designs are working and which ones are failing.

The E&SC designers, as well as Preconstruction and Construction Bureaus, need improved tools for BMP selection, design, implementation, monitoring, and maintenance. With the possible switch to English units, new editions of MDT publications will be required. MDT should consider including references to the new E&SC Manual in updates of all related materials. A section in the Road Design Manual directing the user to the new E&SC Manual is an example of referencing that would be beneficial. Referencing of the E&SC Manual would allow for less duplication of material and would avoid errors with the release of new versions.

In addition to referencing, MDT may consider establishing E&SC standard specifications detailing installation, maintenance, monitoring, and removal of BMPs. By establishing general BMP specifications, better tools are available for the designers and a baseline would be provided for contractors to better understand MDT's requirements for E&SC.

Modifications will need to be made to MDT's detailed drawings to reflect the content of the E&SC manual. In all likelihood, existing drawings will be modified and new, more modern BMP techniques will be added.

A final consideration is that an Erosion and Sediment Control Committee could be formed to help implement any organizational structure changes implemented by MDT, to track E&SC program progress; to conduct research projects that track the effectiveness of BMPs; and/or to provide additional technical support and direction to the E&SC Planning and Design Section. Committees of various forms were mentioned in the survey responses from other DOTs.

2.4.2 BMP Implementation/Oversight

Training appears to be the biggest area of concern for implementation and oversight of E&SC designs. The new training program under development, complemented by the proposed organizational changes noted throughout this section, should all work together to ensure that the designs are implemented properly in the field.

2.4.3 Maintenance/Monitoring/Removal

Since BMP implementation, monitoring, maintenance, and removal appear to be an area where breakdowns in successful E&SC programs occur, MDT should consider adding additional positions, or modifying the organizational structure to accommodate new positions in these areas. While the new E&SC training program that is being developed will help educate MDT construction and maintenance staff, as well as contractors, proper monitoring, maintenance, and removal of the BMPs can only be performed by having staff dedicated to the task. Having a program in place that is structured to accurately monitor the success of the BMPs and where improvements and/or modifications can be made to minimize non-compliance issues. The proposed E&SC Planning and Design Section can include a Monitoring/Maintenance/Removal Unit that would be separated from the Design Unit and/or Permitting Units. These units could be staffed to provide BMP monitoring, maintenance, and removal duties for each of the districts. Again, since this task is already being conducted throughout the state, the personnel assigned to this unit could be re-assigned from other responsibilities. By only having to train a smaller group of staff members for BMP monitoring, maintenance, and removal, it would allow those personnel to become highly educated and experienced in E&SC field issues, as well as reducing educational costs.

To accompany the E&SC manual, additional maintenance and field manuals may be considered for use as pocket references. In addition to the field manuals, the oversight crews and contractor could have a condensed manual to reference for field BMP modification decisions and to increase the understanding of why and how the BMPs are placed.

MDT may want to consider revising its BMP assessment program to include a procedural checklist to determine BMP performance. This checklist should contain basic information about the environment in which the BMP is placed and the BMP objective. MDT may also consider assigning an effectiveness scale to determine the performance of BMPs.

Additionally, MDT may consider creating a database that monitors the performance of different BMPs in different environments. This database could contain installation photos of the device (both proper & improper installation), environmental conditions where the BMP is placed, advantages, disadvantages and the effectiveness of the BMP. This database could be beneficial to design, construction, and maintenance staff in decision making as to which BMP would work best for the proposed environment.

2.4.4 Regulatory Compliance

Currently MDT's Environmental Services Bureau oversees E&SC regulatory compliance. To continue to take a pro-active approach with DEQ, additional steps should be explored that would allow earlier DEQ involvement into projects.

A certification program would assist in the quality control of E&SC. Since the State of Montana may not pass a mandatory E&SC certification requirement, MDT may consider implementing an internal certification program. This program could grow to include contractors by use of voluntary certification or training.

Section 3

E&SC Construction BMP Assessment

This survey section was used to determine how respondents assess BMP effectiveness and to compile lists of BMPs that the surveyed DOTs deem to be effective and those they deem to be ineffective. The information presented in Section 3 was collected from the surveyed DOTs as part of the organizational structure survey in order to gain additional insight for the generation of MDT’s E&SC Construction BMP Manual. Section 3 is independent of the E&SC organizational structure evaluation, but is provided here to document the responses obtained from the responding DOTs.

3.1 BMP Assessment

The assessment of BMPs allows for modification of E&SC devices that may not be working correctly to ensure proper storm water management. The surveyed DOTs all have some form of BMP assessment. A majority of the assessments are field inspections to determine if the BMPs are achieving their goals. Most of the assessments are on a trial and error basis where BMPs have been monitored and observed over many years. Because of the sheer size of the states that DOTs service, most of them are unable to assess all of their BMPs. Nevada and Washington have databases set up to monitor the effectiveness of E&SC devices. Nevada’s program is still early in the development stages, but their maintenance division is documenting the volume of sediment that is captured in their construction BMPs. The information that they are obtaining is useful for assessing BMP effectiveness.

Table 3.1-1 shows different E&SC devices that the surveyed DOTs have deemed ineffective. Some of the responses showed that certain BMPs might be ineffective in certain situations but could be adapted to fit the desired situation. Most of the states that listed ineffective BMPs in Table 3.1-1 have discontinued the use of these devices. Other DOTs have minimized the use as much as possible.

Table 3.1-1 Ineffective BMPs¹

	Arizona	Colorado	Idaho	Illinois	Maryland	Montana	Nebraska	Nevada	New Mexico	North Dakota	Oklahoma	Oregon	South Dakota	Texas	Washington	Wyoming
Straw Bales	■	■	■			■	■		■			■			■	
Silt Fence	■	■	■									■				
Hydro Seeding ²		■	■													■
Silt Fence Ditch Checks				■			■									■
Monofilament Fiber										■						

¹Blank sections indicate information was not provided.

²Hydro seeding includes improper seeding.

Table 3.1-2 shows different E&SC devices that DOTs have deemed effective in E&SC. Some of these devices were mentioned in Table 3.1-1 as being ineffective. They are mentioned in both tables because certain states may not be using the most innovative procedures and/or they are used for specific applications. Many of these BMPs have been monitored over several years to determine effectiveness.

Table 3.1-2 Effective BMPs¹

	Arizona	Colorado	Idaho	Illinois	Maryland	Montana	Nebraska	Nevada	New Mexico	North Dakota	Oklahoma	Oregon	South Dakota	Texas	Washington	Wyoming
Gravel Berms	■					■				■		■				
Native Seeding		■														
Mulch		■										■	■		■	
Mulch Tackifier		■														
Ditch Rounding		■														
Sediment Basins		■				■										
Erosion Logs		■														
Silt Saver		■														
Silt Dike		■										■			■	■
Blankets		■		■		■				■			■			■
Rolled Excelsior Ditch Check				■												
Perimeter Silt Fence Control				■												
Inlet Baskets w/ Filter Fabric				■					■							
Check Dams			■													
Seeding/Planting			■			■						■	■			
Terraces and Benches			■													
Slope Roughening						■										
Clean Water Devices					■											
Silt Fence						■	■		■	■		■	■			
Modified Straw Bale Checks						■	■			■		■				
Earth Berms									■							
Floating Turbidity Barriers												■				
Poly Acrylamide															■	

¹Blank sections indicate information was not provided.

MDT does not currently have an official BMP assessment program. The program that is currently used has an effectiveness that is solely based on experience of the personnel performing the assessment. MDT has found straw bales ineffective because of the difficulties related to installation and maintenance. The use of straw bales on MDT projects has been mostly discontinued because of their perceived ineffectiveness. MDT has found several BMPs to be effective if selected correctly based on site characteristics. One of the most effective BMPs, as seen in Table 3.1-2, is the use of gravel berms.

Washington and Nevada have a very good approach to BMP assessment. The creation a database of E&SC devices and their effectiveness allows for immediate determinations of BMPs effectiveness, as well as the long term overall effectiveness of BMPs. This system may allow an individual to determine if a certain BMP is effective for an area by retrieving statistical information about the type of BMP and its effectiveness in certain environments. This system also allows the user to see why a BMP may have failed and what procedures could be used to modify the BMP to increase its effectiveness.

3.2 BMP Implementation

This section of the survey identified BMPs that are successfully implemented and those that are failures. Questions in this section of the survey probed to determine the area responsible for BMP implementation and what procedures are in place to ensure proper installation. The survey also identified which respondents have performance clauses in place to assign responsibility for BMP implementation.

All of the surveyed DOTs have some difficulties or breakdowns in the implementation of BMPs on construction sites. The most prevalent reason for the breakdown appears to be from the lack of training and communication. Field personnel are not always adequately trained on how each BMP is installed, maintained, and removed, in addition to how each type of BMP works. With the lack of training, the field crews also do not catch improperly installed BMPs. Maryland's 6-layer system corrects for most of these problems. The first level of this system is an erosion control person that is Green Card certified who works with the contractor, but is paid by the Maryland State Highway Administration (MSHA). The second level is a Construction Inspector that is hired by MSHA. This position does not require a Green Card Certification; however, many employees are certified. The third layer is the Field Project Engineer who has a Green Card Certification. The fourth layer is the Construction Area Engineer who is in charge of several projects and occasionally visits the project. The fifth layer is an independent Quality Assurance Inspector who is employed by the MSHA and is Green Card certified. The inspectors grade the project on a standardized A to F letter grade scale. The inspector has the right to shut down projects if substantial problems are noticed. Level six of the oversight system is the Maryland Department of Environment Site Inspector who routinely visits the site. On highly sensitive projects an additional independent Quality Assurance Inspector is brought on site for a seventh level of oversight.

All of the states that participated in the survey provided information about documents that were used to determine responsibility for storm water violations. States either had guidelines in their contracts, special provisions or both, specifying liquidated damages for storm water violations. Illinois implemented a contractor Certification Form that the contractors and their subs are required to sign.

Only a few of the surveyed DOTs have E&SC performance clauses for construction contracts. Most performance clauses focus on fines and shutdown of the project if defined goals are not met. Oregon's performance clause deals strictly with permanent seeding and mulch with a 70% establishment rate. Texas' performance clause, based on established vegetation, is similar to that of Oregon. Illinois DOT is investigating the use of incentive programs.

All of the states responded that oversight and field inspections are used as part of their quality assurance program for BMP installation. Other states use project checklists, submittals, and construction site grading in addition to the oversight and inspection roles. All of the respondents, except for Nebraska, have some sort of training program within their department for proper BMP installation, involving either seminars or hands-on training. In addition to the internal training sessions, at least half of the DOTs had other means of training. The International Erosion Control Association and the National Highways Institute perform some of these external trainings.

MDT experiences difficulties and breakdowns due to contractors or oversight engineers sometimes misunderstanding the intentions of the erosion control plan. The Construction and Environmental Services Bureaus are responsible for ensuring that the construction contractor implements BMPs correctly.

New Mexico has implemented new specifications that pay the contractor for each BMP that is placed. The new strategy has been very beneficial if the BMPs have to be relocated. A new item for their Storm Water Pollution Prevention Plan (SWPPP) includes specifications that allow the contractor to hire an

experienced NPDES certified person to inspect the BMPs and make necessary modification changes with the phasing of the project.

Nevada and New Mexico both have innovative ways of handling storm water violations. Nevada has special provisions that specify that their contractors retain the appropriate permits and they are designated as the permit holder who is responsible for any fines levied for storm water violation. The subsequent coordination between the Resident Engineer, Environmental staff, and the contractors ensure permit compliance and thereby alleviate any Nevada Department of Environmental Protection enforcement. New Mexico has a similar approach where they are the owners of the project and the contractor is the operator. In most cases, both parties get involved with violations, but a liquidated damages schedule in the specification motivates the contractor to place BMPs at the right times and locations to avoid violations as much as possible.

In summary, the surveyed DOTs cite improper BMP implementation as a major cause of erosion and the resulting sediment discharge from construction sites. A small percentage listed improper BMP specification due to a lack of design engineer and inspector training and experience. A large percentage of the surveyed DOTs listed improper installation due to contractor unwillingness to install BMPs, their inexperience with BMP installation, and/or not following proper procedures and methods. Misunderstanding of how BMPs function, untimely BMP installation, and weather related problems were also mentioned in the survey responses.

3.3 Innovative Practices

MDT has requested as part of this project's scope that CDM identify innovative E&SC practices that may be incorporated into the new MDT manual. MDT used this survey section to identify respondent's innovative practices that may be useful to MDT.

Many of the states surveyed had innovative E&SC practices. These practices varied from physical BMPs to procedural BMPs. Arizona uses a very aggressive approach to E&SC. If a BMP is not working correctly, it is quickly removed and replaced by a measure that will work to the required effectiveness.

Colorado implements a variety of innovative practices. Certified training is used to ensure that all staff members have a good understanding of E&SC. This state also employs Erosion Control Advice Teams and trained Storm Water Management Program (SWMP) designers. Colorado pays for all BMPs as a bid item in the contract.

Illinois focuses their efforts on erosion rather than sediment control. The E&SC plans are begun in Phase I and are carried through all phases of the project. Illinois department of transportation is currently developing a training center to be used by all states to demonstrate appropriate BMPs, installation, maintenance, and products effectiveness.

Idaho implements intense training on E&SC with a high level of management support. Feedback is reviewed for both effective and ineffective E&SC methods. Currently, the department is looking at applications of composted manure in soils as well as steep sloped seedbed preparation.

Maryland's use of their six-layer oversight system is a very innovative approach in a state that E&SC has been a concern for many years. This system was described previously in this report.

North Dakota has found great success in the implementation of hay bale checks and fences in their designs.

Nebraska uses the construction of hay bale checks, partially entrenched, with erosion control materials downstream of the bales. Additionally, the use of biodegradable silt fence appears to be effective.

New Mexico is using a process where their Drainage Section provides a Preliminary Storm Water Pollution Prevention Plan (SWPPP) in the plans. The contractor is paid for an item called SWPPP preparation, where the contractor hires a consultant to use the preliminary SWPPP and modifies it according to the construction phasing and timing. Paying the contractor for the SWPPP preparation has helped the department to improve the installed BMPs.

Oregon works with the International Erosion Control Association to learn about the latest innovations in E&SC. Oklahoma utilizes a phase construction approach to minimize the amount of disturbed area at one time. South Dakota has implemented training for the design and construction of BMPs. Washington incorporates its standard specifications and a good training program into their E&SC program. Good communication has become a key piece in their E&SC program. Similar to Oklahoma, Wyoming uses the sequencing of clearing and grubbing procedures to minimize the amount of disturbed surface.

3.4 BMP Construction Costs

Many respondents have developed an awareness of E&SC construction costs. The surveyed DOTs were asked to provide costs for implementing E&SC devices on construction sites. Additionally, respondents were asked if BMPs are included as separate bid items and how measure and payment are addressed.

All of the states that replied to the survey noted that they have bid items for E&SC within the construction contract. Many of the departments are switching from lump sum or force account payment methods to payment per BMP. The exception to the rule is that within most DOTs, maintenance is still paid by force account. Most frequently these DOTs pay for E&SC devices by unit cost, linear foot, square yards, depending on the device. Currently, MDT only occasionally lists BMPs as individual bid items. Instead, force accounts are used to pay for E&SC devices.

Section 4

Summary and Conclusion

The Montana Department of Transportation (MDT) contracted CDM and their subcontractor, the Montana State University Reclamation Research Unit (RRU) to develop an E&SC Best Management Practices (BMP) manual and training program. In order to gain knowledge related to erosion and sedimentation controls, designs, implementation, monitoring, maintenance, and removal, a survey of Department of Transportations (DOTs) was conducted. The questionnaire was divided into the following sections: General Information, BMP/Erosion & Sediment Control Database, Service Area/Organization Information, Department Responsibilities, Regulatory Compliance, BMP Assessment, BMP Implementation Success and Failures, Innovative Practices, BMP Construction Costs, and Miscellaneous Information/Additional Comments. The survey was sent to twenty-two states of which sixteen completed the survey or discussed the questions via telephone.

The DOTs that participated in the survey provided feedback regarding the organization structure that is responsible for the design and planning, monitoring, and maintenance of BMP construction. From the survey, it appears that with the exception of Oklahoma DOT, which only has one E&SC staff member, MDT has the highest miles of highway served per E&SC staff member. The MDT ratio between total DOT staff and E&SC staff is also the third highest.

The survey also indicates that most of the DOTs use different sections for their design than for their permitting requirements. Most DOTs tend to utilize distinct E&SC design groups to design construction E&SC BMPs, while others use Road Design. The first approach appears to be very effective, allowing the design engineers to develop their skills and to be able to focus their attention on E&SC design and development. Currently, MDT utilizes a combination of both of these approaches where road designers draft the E&SC plan sheets and the Environmental Services Bureau marks up the plan sheets.

All sixteen DOTs that responded to the survey use Construction for the implementation and oversight of E&SC programs. The maintenance is mainly conducted by Maintenance, while the monitoring is mostly performed by Construction, but also in some cases by the Environmental, Maintenance, or Geo Hydro Sections depending on the state. Most states utilize Environmental to oversee regulatory compliance issues.

The survey was also used to determine the effectiveness of construction BMPs, their implementation, and steps to ensure proper installation procedures, innovative practices, and construction BMP costs. All of the surveyed DOTs mentioned some difficulties or breakdowns in the implementation of BMPs, mainly due to lack of training and communication. All DOTs have guidelines in their contracts or special provisions to determine responsibilities for storm water violations. Oversight and field inspections are used as part of the quality assurance programs, as well as checklists, submittals, and constructions site grading. All of the states surveyed replied that they have bid items for E&SC within the construction contract, and an increasing number of states are switching from lump sum to unit costs bid items.

Appendix A
Blank Organizational Structure Survey
Questionnaire



**EROSION AND SEDIMENT CONTROL PROGRAM
ORGANIZATIONAL STRUCTURE SURVEY**

CDM

General Information

DOT (Department) Name _____

Mailing Address _____

Name of Contact Person _____

Title _____

Telephone Number _____

Fax Number _____

Contact E-mail _____

Agency 's Web Site Address _____

BMP/Erosion & Sediment Control Database

Of the following, which manuals, help guides, etc., does your department currently have that contain BMP or erosion and sediment control information (please write in correct manual name):

Design Manual(s) _____

Special Provisions _____

Standard Specifications _____

Detailed Drawings _____

Erosion & Sed. Control Design Manual _____

Erosion & Sed. Control Maintenance Manual _____

Erosion & Sed. Control Field Manual _____

Erosion & Sed. Control Contractor's Manual _____

Other _____

Do you use any other State's erosion and sediment control manuals? If so, which?

Service Area/Organization Information

1) Size of Department

Approx. number of staff _____

Approx. staff involved in Erosion & Sediment Control
Program Development & Implementation _____

2) Approx. area served in square miles _____

3) Approx. miles of highway serviced _____

4) Approx. agency budget in 2001 _____
Budget dedicated to Erosion & Sediment Control
Program _____

Department Responsibilities

Which section or bureau in your department is most responsible for the Erosion & Sediment Control Program (Please list section or bureau name and responsible staff):

5) Planning and design? _____

6) Implementation? _____

7) Oversight? _____

8) Maintenance? _____

9) Monitoring? _____

10) Regulatory compliance? _____

11) If different portions of the Erosion & Sediment Control Program are handled by multiple sections or bureaus, how are these activities coordinated?

Please attach an organizational chart or flow chart showing chain of command for Erosion and Sediment
12) Control

Does your department experience any problems in successfully operating the Erosion & Sediment Control
13) Program that may be due to your current organizational structure? If so, what have been possible
solutions?

Regulatory Compliance

14) What section or bureau is responsible for storm water construction permitting? Does this section or bureau have a flow chart that shows the permitting process with timelines? (if yes please attach flow chart)

15) How does your department interact with agencies responsible for regulating storm water quality during construction activities? What section or bureau is responsible?

16) How does your department manage or avoid late stage non-compliance issues? What section or bureau is responsible?

17) Does your department have an Erosion & Sediment Control Inspector Certification Program?

What are the certification requirements for agency staff? _____

What are the certification requirements for contractor staff? _____

BMP Assessment

18) Does your department assess the effectiveness of implemented BMP's? If so, how?

19) Do you assess all BMPs? If no, explain.

20) Please list BMPs that you have found to be ineffective. And why? _____

Have you discontinued use of these BMP's? _____

21) Please list BMPs that your department has found to be particularly useful or effective.

BMP Implementation Success and Failures

22) Do you experience any difficulties or breakdown in BMP implementation? If yes, please explain.

23) Does your department see a need to modify your current sediment and erosion control policies and procedures?

24) Which bureau or section is responsible for ensuring that BMP's are implemented properly by the construction contractors?

25) What provisions does your department have in place with construction contractors to determine responsibility of storm water violations?

26) Does your department use Erosion & Sediment Control performance clauses in construction contracts?

27) What methods are used to ensure proper BMP installation by construction contractors?:

BMP Training by Department? _____

Other means of training? _____

Innovative Practices

- 28) Overall, what is (are) the most innovative practice(s) at your department that you would recommend others to adopt to ensure adequate erosion and sediment control?

BMP Construction Costs

- 29) Are Erosion and Sediment Control Construction BMPs listed as bid items in a construction contract?

- 30) Does your department pay for BMPs by: each, linear measure, lump sum, force account, absorbed/incidental, etc.?

- 31) What is you department annual average BMP construction cost?

Miscellaneous Information/Additional Comments

- 32) Please provide any additional information about your department's management of construction BMPs or supplemental information to previous questions that you feel may be useful.

This has been a survey created by the Montana Department of Transportation in conjunction with CDM. Please return survey results to jonesjw@cdm.com. CDM may be calling with follow-up questions. We thank you for your assistance and if you have any questions or concerns, please contact Jeff Jones at 406-449-2121.

Appendix B

Compilation of Survey Responses

1. Department Of Transportation
 - Arizona Department of Transportation (ADOT)
 - Colorado Department of Transportation (CDOT)
 - Idaho Transportation Department (ITD)
 - Illinois Department of Transportation (IDOT)
 - Maryland State Highway Administration (MSHA)
 - Montana Department of Transportation (MDT) (3 Response)
 - Nebraska Department of Roads (NDR)
 - Nevada Department of Transportation (NDOT)
 - New Mexico State Highway & Transportation Department (NMSHTD)
 - North Dakota Department of Transportation (NDDOT)
 - Oklahoma Department of Transportation (OkDOT)
 - Oregon Department of Transportation (ODOT)
 - South Dakota Department of Transportation (SDDOT)
 - Texas Department of Transportation (TxDOT)
 - Washington State Department of Transportation (WSDOT)
 - Wyoming Department of Transportation (WyDOT)

BMP/Erosion & Sediment Control Database

2. Of the following, which manuals help guides, etc., does your department currently have that contain BMP or erosion and sediment control information (please write in correct manual name):
 - a. Design Manual(s)
 - (ADOT) - N/A
 - (CDOT) - Roadway Design Manual
 - (IDOT) - Design& Environment Manual; Illinois Urban Manual
 - (ITD) - Design Manual
 - (MDT) - Montana Road Design Manual - Current Edition
 - (MSHA) - Maryland Department of Environment Plan Design Requirements
 - (NDDOT) - NDDOT Design Manual
 - (NDOT) - N/A
 - (NDR) - Nebraska Department of Roads "Roadway Design Manual"
 - (NMSHTD) - National Pollutant Discharge Elimination System Handbook Jan. 1997
 - (ODOT) - AASHTO Drainage Manual
 - (OkDOT) - ODOT's Storm Water Management Guidelines for Design and Construction Activities
 - (SDDOT) - Roadside Development & Erosion Control Manual and Road Design Manual (Chapter 14)

- (TxDOT) - N/A
 - (WSDOT) - N/A
 - (WyDOT) - N/A
- b. Special Provisions
- (ADOT) - N/A
 - (CDOT) - Section 208 Erosion Control
 - (IDOT) - Contract Deficiency Deductions
 - (ITD) - Special Provisions, BMP's
 - (MDT) - As needed. They are not intended to replace plans. I tell my crew to draw details and plans first, write specials only as needed to support your plans.
 - (MSHA) - N/A
 - (NDDOT) - N/A
 - (NDOT) - YES
 - (NDR) - Yes
 - (NMSHTD) - N/A
 - (ODOT) - 00280 Special Provisions Boilerplate
 - (OkDOT) - ODOT's Special Provisions
 - (SDDOT) - N/A
 - (TxDOT) - Multiple
 - (WSDOT) - N/A
 - (WyDOT) - per contract or supplemental Specs
- c. Standard Specifications
- (ADOT) - N/A
 - (CDOT) - Section 208 Erosion Control/107.25 Water Quality
 - (IDOT) - Standards 280001-2
 - (ITD) - Standard Drawings
 - (MDT) - MDT Standard Specification for Highway & Bridge Construction
 - (MDT) - Sections 107.11, 107.12, 107.24, 201.03, 202.03.1-C2, 203.03.4-A, 203.03.6, Section 208, Section 610, 622.03.1-C,
 - (MDT) - Yes
 - (MSHA) - Construction Specifications
 - (NDDOT) - Standard Specifications for Road and Bridge (Construction Volumes 1 of 2 1997
 - (NDOT) - Yes
 - (NDR) - Standard Specifications for Highway Construction
 - (NMSHTD) - Standard Specifications for Highway and Bridge Construction 2000 edition.
 - (ODOT) - Supplement Standard 00280
 - (OkDOT) - ODOT's Standard Specifications for Highway Construction
 - (SDDOT) - Standard Specifications for Roads & Bridges 1998
 - (TxDOT) - Multiple
 - (WSDOT) - Standard Specifications for Road, Bridge and Municipal Construction

- (WyDOT) - " Std. Specs for RD & Bridge" 1996
- d. Detailed Drawings
- (ADOT) - N/A
 - (CDOT) - M&S Standards
 - (IDOT) - Same as standards and in Urban Manual
 - (ITD) - N/A
 - (MDT) - Detailed Drawings, Metric & English Edition - August 1999
 - (MDT) - MDT Detailed Drawings
 - (MDT) - yes
 - (MSHA) - N/A
 - (NDDOT) - Microstation files
 - (NDOT) - N/A
 - (NDR) - Yes - Several Detail drawings
 - (NMSHTD) - Temporary Erosion and Sediment Control Sheets, 4 sheets
 - (ODOT) - DET 400 Series
 - (OkDOT) - yes
 - (SDDOT) - Standard Plates
 - (TxDOT) - Multiple
 - (WSDOT) - N/A
 - (WyDOT) - Std. Drawings manual - Env. Service
- e. Erosion & Sed. Control Design Manual
- (ADOT) - N/A
 - (CDOT) - Erosion Control & Storm Water Quality Guide
 - (IDOT) - NRCS Urban Manual
 - (ITD) - Erosion and Sediment Control Design Manual
 - (MDT) - There's an old one, I even have a copy.
 - (MSHA) - N/A
 - (NDDOT) - Chapter VI of NDDOT Design Manual
 - (NDOT) - NO - Currently in Development
 - (NDR) - No
 - (NMSHTD) - N/A
 - (ODOT) - ODOT Hydraulics Manual Vol 2, Erosion and Sediment Control
 - (OkDOT) - see above
 - (SDDOT) - Roadside Development & Erosion Control Manual
 - (TxDOT) - Stormwater Guidelines
 - (WSDOT) - Erosion Control Design and Construction Course
 - (WyDOT) - N/A
- f. Erosion & Sed. Control Maintenance Manual
- (ADOT) - BMP Manual with drawings/Revised for 2003
 - (CDOT) - N/A
 - (IDOT) - N/A
 - (ITD) - Maintenance Manual
 - (MDT) - N/A

- (MSHA) - N/A
- (NDDOT) - N/A
- (NDOT) - NO - Currently in Development
- (NDR) - No
- (NMSHTD) - N/A
- (ODOT) - ODOT Routine Road Maintenance, Water Quality
- (OkDOT) - see above
- (SDDOT) - N/A
- (TxDOT) - Maintenance Manual
- (WSDOT) - Check with Sandie Stephens of WSDOT 360-705-7853
- (WyDOT) - Per contract specs.

g. Erosion & Sed. Control Field Manual

- (ADOT) - N/A
- (CDOT) - Erosion Control & Storm Water Quality Pocket Book
- (IDOT) - NRCS Inspection Manual& Inspector's checklist.
- (ITD) - N/A
- (MDT) - N/A
- (MSHA) - N/A
- (NDDOT) - N/A
- (NDOT) - NO - Currently in Development
- (NDR) - Yes
- (NMSHTD) - N/a
- (ODOT) - Field Manual Erosion and Sediment Control 11/00
- (OkDOT) - no
- (SDDOT) - Roadside Development & Erosion Control Manual
- (TxDOT) - Practical Guide to Establishing Vegetation on the Highway Right-of-Way
- (WSDOT) - Erosion Control Design and Construction Course
- (WyDOT) - N/A

h. Erosion & Sed. Control Contractor's Manual

- (ADOT) - N/A
- (CDOT) - N/A
- (IDOT) - N/A
- (ITD) - N/A
- (MDT) - N/A
- (MSHA) - N/A
- (NDDOT) - N/A
- (NDOT) - NO - Currently in Development
- (NDR) - No
- (NMSHTD) - N/A
- (ODOT) - N/A
- (OkDOT) - No
- (SDDOT) - N/A
- (TxDOT) - N/A

- (WSDOT) - Construction Site Erosion & Sediment Control Certification Course
- (WyDOT) - N/A

i. Other

- (ADOT) - N/A
- (CDOT) - Bulletins
- (IDOT) - N/A
- (ITD) - Standard Specifications for Highway Construction
- (MDT) - Erosion Control Plans (Project Specific)
- (MDT) - Levels 43,44 of the Road Design CADD strip map are used for erosion control and wetland delineation information.
- (MDT) - Permitting Guide for Highway Construction Permitting
- (MSHA) - Maryland Standards & Specifications for Erosion & Sediment Control (MDE)
- (NDDOT) - N/A
- (NDOT) - N/A
- (NDR) - N/A
- (NMSHTD) - N/A
- (ODOT) - N/A
- (OkDOT) - N/A
- (SDDOT) - use various other reference materials
- (TxDOT) - N/A
- (WSDOT) - The certification manual is also the primary education tool for WSDOT staff
- (WyDOT) -N/A

3. Do you use any other State's erosion and sediment control manuals? If so, which?

- (ADOT) - No
- (CDOT) - No, We Refer To Denver's Urban Drainage Manual
- (IDOT) - No, but have reviewed Wisconsin's and Kansas Manuals.
- (ITD) - I don't believe so.
- (MDT) - California
- (MDT) - No
- (MDT) - Yes, I used the Colorado DOT's Vail Pass project as a guide when I designed a reconstruction project many years ago. But that was before there was an Environmental Bureau, say 1982 or 3ish when there where two or three persons at the department to handle all environmental concerns. I don't know how things turned out.
- (MSHA) - N/A
- (NDDOT) - No
- (NDOT) - YES - The Caltrans erosion and sediment control manuals are being used as a guide to develop NDOT's manuals currently in development by CDM. The NDOT manuals should be complete by the end of 2002.

- (NDR) - No - We have reviewed and continue to review various states' erosion control manuals and studies for information to include in our design guides, drawings and specifications.
- (NMSHTD) - no
- (ODOT) - Yes, we referred to Caltrans Manual and WashDot Manual when developing ours
- (OkDOT) - No
- (SDDOT) - Yes, we occasionally refer to Colorado & Minnesota DOT erosion manuals.
- (TxDOT) - No.
- (WSDOT) - No, but we have used portions of other states' manual to develop our program over the last 4-5 years.
- (WyDOT) - N/A

Service Area/Organization Information

4. Organization Information

- a. Approx. number of staff
 - (ADOT) - 4000
 - (CDOT) - 2100
 - (IDOT) - 10,000 +
 - (ITD) - 170
 - (MDT) - I supervise 6-7 Helena Headquarters designers
 - (MSHA) - 3500 Permanent Employees
 - (NDDOT) - Design (only) 72 (Inc. RoW, Traffic, Cultural Res)
 - (NDOT) - 1650
 - (NDR) Two Thousand (2000)
 - (NMSHTD) - 2000
 - (ODOT) - 5100
 - (OkDOT) - 2408
 - (SDDOT) - 986
 - (TxDOT) - 14709
 - (WSDOT) - N/A
 - (WyDOT) - One + 2 Enviro.

- b. Approximate staff involved in Erosion & Sediment Control Program Development & Implementation
 - (ADOT) - 3
 - (CDOT) - 7
 - (IDOT) - 4500
 - (ITD) - committee (8 people), environ & const staff - 150+
 - (MDT) - 2
 - (MDT) - All of us
 - (MSHA) - 27 employees in Highway Hydraulics Division Several Hundred with Consultants
 - (NDDOT) - 3 - Design ? - Construction

- (NDOT) - Hydraulics (3) and Environmental (1)
- (NDR) - Six (6)
- (NMSHTD) - 9
- (ODOT) - 3
- (OkDOT) - 1
- (SDDOT) - 3 in design of BMP's.
- (TxDOT) - N/A
- (WSDOT) - The WSDOT Environmental Affairs Office has 3
- (WyDOT) - N/A

c. Approximate area served in square miles

- (ADOT) - N/A
- (CDOT) - 105000
- (IDOT) - N/A
- (ITD) - 83557
- (MDT) - District 2 Approximately 23767 Square Miles
- (MSHA) - 9,843.62 Square Miles
- (NDDOT) - Entire state of ND
- (NDOT) - 109806
- (NDR) - 77,227 square miles
- (NMSHTD) - 140000
- (ODOT) - 96000
- (OkDOT) - 200,000 plus
- (SDDOT) - 146,000 (approx.)
- (TxDOT) - 1,100,000 Acres
- (WSDOT) - Washington State
- (WyDOT) - 200000

d. Approximate miles of highway serviced

- (ADOT) - N/A
- (CDOT) - 9100
- (IDOT) - 300000
- (ITD) - 2,323 miles
- (MDT) - District 2 Interstate = 740.32, NI-NHS = 402.22, Primary = 1371.36,
Secondary = 1112.92
- (MSHA) - 15,000 Lane Miles / 5,200 Highway Miles
- (NDDOT) - 200 + miles / year
- (NDOT) - 5485
- (NDR) - 10,000 Miles
- (NMSHTD) - 10000
- (ODOT) - 7482
- (OkDOT) - 112509.53
- (SDDOT) - 7839
- (TxDOT) - 79,297 Centerline Miles
- (WSDOT) - 7000
- (WyDOT) - 7,000 designed R/W Federal & State

- e. Approximate agency budget in 2001
- (ADOT) -N/A
 - (CDOT) - 1 Billion
 - (IDOT) - \$ 2.8 Billion
 - (ITD) - I don't know
 - (MDT) - Calendar year 2001 contractor payments = \$52,404,918
 - (MSHA) - \$930 Million
 - (NDDOT) - \$140 M
 - (NDOT) - \$360 mil. Construction and Maintenance, \$73 mil. Maintenance, \$30 mil. Administration, \$463 mil. Total
 - (NDR) - \$ 500,000,000 (\$ 330,000,000 Construction)
 - (NMSHTD) - 500,000,000
 - (ODOT) - 1.7 Billion
 - (OkDOT) - 529000000
 - (SDDOT) - 427 million
 - (TxDOT) - 5115568375
 - (WSDOT) - N/A
 - (WyDOT) - N/A
- f. Budget dedicated to Erosion & Sediment Control Program
- (ADOT) - 2% of construction
 - (CDOT) - 700000 Including Consultant
 - (IDOT) - \$10-20 Million
 - (ITD) - I am not really sure but maybe \$1 million?
 - (MDT) - Beats me, It's not a bid item for us.
 - (MSHA) - 5% - 10% of Budget
 - (NDDOT) - N/A
 - (NDOT) - \$70 mil. Committed to Lake Tahoe Water Quality improvements over a 10-year period. No other funds dedicated.
 - (NDR) - NA - Budget not broken out
 - (NMSHTD) - rough estimate of less than 5%
 - (ODOT) - 150,000
 - (OkDOT) - not enough
 - (SDDOT) - incorporated to project scope and maintenance handled by the maintenance projects
 - (TxDOT) - N/A
 - (WSDOT) - N/A
 - (WyDOT) - <1/2 of 1% Annual Department budget

Department Responsibilities

5. Which section or bureau in your department is most responsible for the Erosion & Sediment Control Program (Please list section or bureau name and responsible staff):
- a. Planning and design?

- (ADOT) - Roadway Design (Landscape Architect Section)
- (CDOT) - Drainage & Landscape Architecture
- (IDOT) - Design & Environment
- (ITD) - Project Development Engineer, District Environmental Planner, and E & S committee
- (MDT) - Environmental Services
- (MDT) - Environmental Services- SEC&CPS, Project Development Engineers
- (MDT) - Road Design, Bridge Bureau, Traffic, Safety Design, Consultants, District Road Design, Maintenance, Construction if plans need to adjusted to better fit field conditions
- (MSHA) - Hydraulic Engineering Design Staff
- (NDDOT) - Design - Esther Vogel, Bill Kuhlman & Arlan Weight
- (NDOT) - Hydraulics (Design), Bill Gall, Principal Hydraulic Engineer
- (NDR) - Roadside Development
- (NMSHTD) - Drainage Design Section
- (ODOT) - Geo-Hydro Unit
- (OkDOT) - Design Division
- (SDDOT) Engineering Division with input from the Operations Division personnel
- (TxDOT) - Design Division
- (WSDOT) Individual Design Offices
- (WyDOT) - John Samson

b. Implementation?

- (ADOT) - Construction
- (CDOT) - Const, Natural Resource, Region Environmental
- (IDOT) - Bureaus of Implementation and Maintenance
- (ITD) - District Engineers and project inspectors
- (MDT) - Construction Bureau - Engineering Project Managers (EPM)
- (MDT) - Construction, Engineering Project Managers and inspectors
- (MDT) - Field Construction
- (MSHA) - N/A
- (NDDOT) - Contractor / Construction
- (NDOT) - Construction Contractors
- (NDR) - District Construction Offices
- (NMSHTD) - District Construction Personnel
- (ODOT) - Construction staff
- (OkDOT) - Field Construction
- (SDDOT) - Operations Division
- (TxDOT) - Construction Division
- (WSDOT) - Individual Design Offices
- (WyDOT) - Const staff - contracts

c. Oversight?

- (ADOT) - Construction
- (CDOT) - ECAT Teams

- (IDOT) - Implementation
- (ITD) - District Engineers and project inspectors
- (MDT) - Construction, Engineering Project Managers and inspectors
- (MDT) - Environmental Services - SEC&CPS, Environ. Const. Reviewer (ECR)
- (MDT) - Field Construction
- (MSHA) - Office of Construction/District Construction Offices
- (NDDOT) - N/A
- (NDOT) - District Construction Crew (Resident Engineer) & Environmental
- (NDR) - N/A
- (NMSHTD) - Construction and Maintenance Bu.
- (ODOT) - Geo-Hydro Unit and Geo-Hydro
- (OkDOT) - Field Construction
- (SDDOT) - Operations Division
- (TxDOT) - Environmental Division
- (WSDOT) - Individual Construction Offices / EAO Erosion Control Program
- (WyDOT) - Const staff - contracts

d. Maintenance?

- (ADOT) - Maintenance
- (CDOT) - Const, Natural Resource, Region Environmental, Maintenance
- (IDOT) - Implementation
- (ITD) - Yes, maintenance section - Cathy Ford
- (MDT) - Construction Bureau - EPM; Maintenance Bureau - Section Chief
- (MDT) - Contractor
- (MDT) - Field Construction
- (MSHA) - Office of Maintenance/District Maintenance Staff
- (NDDOT) - Contractor
- (NDOT) - District Maintenance Crews
- (NDR) - District Maintenance Offices
- (NMSHTD) - District Maintenance Personnel
- (ODOT) - Construction Staff/ and Geo-Hydro
- (OkDOT) - Contractor
- (SDDOT) - Operations Division
- (TxDOT) - Maintenance Division
- (WSDOT) - Contractors and Construction Office
- (WyDOT) - Maintenance forces - WYDOT

e. Monitoring?

- (ADOT) - Natural Resources
- (CDOT) - Enviro Units, NR Consultant
- (IDOT) - Implementation
- (ITD) - Not sure on this one.
- (MDT) - Construction, Engineering Project Managers and inspectors
- (MDT) - Environ. Serv. - SEC&CPR, ECR; Const. Bureau -EPM
- (MDT) - Field Construction & Environmental Services

- (MSHA) - N/A
- (NDDOT) - Construction
- (NDOT) - District Maintenance Crews
- (NDR) - N/A
- (NMSHTD) - N/A
- (ODOT) - Construction for projects, Geo Hydro for program
- (OkDOT) - Field Construction
- (SDDOT) - Operations Division
- (TxDOT) - Construction Division
- (WSDOT) - Individual Construction Offices / EAO Water Quality Program
- (WyDOT) - Const. Staff / Environ. Coord. (2) USNF projects

f. Regulatory compliance?

- (ADOT) - Environmental
- (CDOT) - N/A
- (IDOT) - Design & Environment; Implementation
- (ITD) - District Engineers and project inspectors
- (MDT) - Environmental Services
- (MDT) - Field Construction & Environmental Services
- (MSHA) - N/A
- (NDDOT) - N/A
- (NDOT) - Environmental, Chris Ennes, Water Quality Specialist
- (NDR) - N/A
- (NMSHTD) - N/A
- (ODOT) - Geo-Hydro
- (OkDOT) - Planning and Design
- (SDDOT) - Operations Division
- (TxDOT) - Environmental Division
- (WSDOT) - EAO Erosion Control Program
- (WyDOT) - WY DEQ - WQ

6. If different portions of the Erosion & Sediment Control Program are handled by multiple sections or bureaus, how are these activities coordinated?

- (ADOT) - N/A
- (CDOT) - HQ Natural Resource Unit
- (IDOT) - Policy requires erosion control to be considered in all phases of a project. Project Reports and environmental documents must discuss; all projects are required to have an erosion control plan. Project engineers coordinate and have a commitment file that is passed through all phases.
 - (ITD) - Coordinated by meetings, teams, and communication.
- (MDT) - I personally don't care who designs them as long as we all use the same set of guidelines. As it stands today I have vary little official information to pass on to my designers who must provide erosion control plans to Environmental Services for review. They then return them to our office for revisions. I think you can see the potential for problems.

- (MDT) - Road Design prepares draft Erosion Control Plan sheets then transfers to Environmental Services, Environmental Services designs Erosion Control features transfers to Road Design for final drafting, and Environmental Services completes all applications and written documents.
- (MSHA) - N/A
 - (NDDOT) - Not coordinated
- (NDOT) - N/A
- (NDR) - Activities are coordinated by District Offices which are responsible for requesting projects, construction, and maintenance. (No organizational chart is provided)
- (NMSHTD) - N/A
- (ODOT) - Training is done to ensure that the Construction Staff is well advised of stormwater permit requirements for construction. Contract specifications and plans are designed by Geo-Hydro and Construction Inspectors are required to ensure that the contract specifications and plans are implemented.
- (OkDOT) - N/A
- (SDDOT) - The Road Design Office handles the design of Erosion Control and Roadside Development through formally let projects. The Field Operations administers the contracts
- (TxDOT) - All erosion control activities are handled through standard and special specifications. All division must follow.
- (WSDOT) - The relationship and responsibilities are too intertwined to explain on paper.
- (WyDOT) - compliant driven

7. Does your department experience any problems in successfully operating the Erosion & Sediment Control Program that may be due to your current organizational structure? If so, what have been possible solutions?

- (ADOT) - No
- (CDOT) - Good Q. Yes, we have authority and consistency problems implementing prog. from a branch level.
- (IDOT) - IDOT has taken the approach that all staff involved in project development and implementation plays a key role.
- (ITD) - No.
- (MDT) - Drafting & Design in two different areas, Erosion Control Plans completed late in the project development, No staff completely dedicated to Erosion Control Program (other significant duties)
- (MDT) - Yes, as I described above in my answer to question 11. I believe it would be in the Departments best interest to have the design, implementation, oversight, maintenance, and eventual removal of construction BMP's handled by Environmental Services.
- (MSHA) - N/A
- (NDDOT) - N/A

- (NDOT) - NDOT is just starting the implementation of our Erosion & Sediment Control Program. To this point the majority of our program has taken place in the Lake Tahoe Basin. With the development of our Manuals the scope of the program will expand.
- (NDR) - Yes. Educational Programs provided on a regular basis. Erosion Control tours are taken by Roadside Development personnel yearly to observe, comment and recommend changes / improvements on selected construction projects.
- (NMSHTD) - Design does not have much authority to tell construction what needs to be done. After the completion of the construction plans, Design does not get involved unless the Construction personnel call for help and sometimes this gets ignored and the BMPs are not used correctly.
- (ODOT) - No, not due to our structure. If there are problems, I think it is due to lack of information and too many tasks to do without enough staff on the project inspection side.
- (OkDOT) - Yes
- (SDDOT) - No
- (TxDOT) - The biggest problem comes from the inspection level. The only solution comes from more training.
- (WSDOT) - Standard specifications will make contract administration more effective.
- (WyDOT) - Usual Const. Division mgt., Headquarters - District - Field Eng.

Regulatory Compliance

8. What section or bureau is responsible for storm water construction permitting? Does this section or bureau have a flow chart that shows the permitting process with timelines? (if yes please attach flow chart)
- (ADOT) - Environmental Section
 - (CDOT) - HQ statewide MS4 permits. Regions issue construction permits. na flowchart
 - (IDOT) - The actual stormwater permitting notice (NPDES) is submitted to the Illinois EPA by our Implementation staff; resident engineers. The NPDES permit establishes when the notice is filed. All IDOT projects are required to have an ESC plan in order to go to letting.
 - (ITD) - I think the DEQ (Department of Environmental Quality), I don't know if they have a flow chart.
 - (MDT) - Environmental Services
 - (MDT) - Environmental Services
 - (MDT) - Environmental Services
 - (MSHA) - N/A
 - (NDDOT) - Contractor responsible for obtaining permits from ND Health Depart.
 - (NDOT) - The Water Quality Specialist under the Environmental Services Division at NDOT administers stormwater construction permitting. A flow chart isn't necessary because not only is there just one body that

administers stormwater construction permitting but also because the contractor is the permittee.

- (NDR) Project Development's Wetlands Section.
- (NMSHTD) - The permitting process starts at the Districts level. Many times they send the request to the Drainage Section for review and comments. No flow charts have been developed yet.
- (ODOT) - The Oregon Department of Environmental Quality. Don't have their flow chart, but basically ODOT has 5 Regional 1200-CA Permits that cover all construction activities that occur with the Regions. The permit gives the conditions by which construction can occur, ie. Must have an Erosion Control Plan must install BMPs to industry standards, must monitor and track.
- (OkDOT) - Design and Construction
- (SDDOT) South Dakota Department of Environmental and Natural Resources issues the NPDES permits to SDDOT.
- (TxDOT) - Environmental Division and no flow chart.
- (WSDOT) The Design Offices are responsible for obtaining permits.
- (WyDOT) - General permit 30 days prior to actual const. Individual permit 45-60 days prior to actual const.

9. How does your department interact with agencies responsible for regulating storm water quality during construction activities? What section or bureau is responsible?

- (ADOT) - The Environmental Services section works closely with the EPA to ensure proper permits are obtained and all guidelines are followed.
- (CDOT) - Colorado Department of health and Environmental Water Quality Department oversees permit program. We wrote permits with them and they assist in construction oversight in part.
- (IDOT) - We hold quarterly meetings with the Illinois EPA. IDOT also sits on the statewide Urban Manual Committee and IEPA phase II committee. Bureaus of Design & Environment and Operations.
- (ITD) - Yes, the Environmental Division.
- (MDT) - Environmental Services coordinates with DEQ, Montana Dept. of Fish-Wildlife-Parks, EPA, etc. during the permitting process and then issues an erosion control plan to project manager. During construction activities the field construction section and Environmental Services is responsible
- (MDT) - Environmental Services deals directly with the Montana Department of Environmental Quality (MDEQ) and the Environmental Protection Agency.
- (MDT) - Through Environmental Services
- (MSHA) - N/A
- (NDDOT) - Construction is responsible.
- (NDOT) - Presently, NDOT is the reviewing agency over the construction stormwater permitting process. We require our contractors to file a Notice of Intent (general construction stormwater discharge permit) from the

Nevada Division of Environmental Protection's (NDEP) Bureau of Water Pollution Control if the project disturbs 5 acres or more of land. This process has been in place at NDOT subsequent to the current regulation promulgated by the amended (1990) Clean Water Act enacting Phase 1 of the National Pollutant Discharge Elimination System (NPDES). A Stormwater Pollution Prevention Plan (SPPP) must also be submitted with the NOI pursuant to the NPDES requirements of the Clean Water Act. The SPPP, upon NDEP approval, outlines temporary erosion and sediment controls incorporating BMP's, thereby reducing non-point source pollution that may be generated relative to the construction project. The Water Quality Specialist administers this process, essentially acting as a liaison between our contractors and NDEP.

- (NDR) - No interaction unless a problem is noted. Then joint meetings and onsite visits are scheduled to determine the corrective action necessary. Roadside Development and Hydraulics Engineer act as inter-agency contacts.
- (NMSHTD) - The District Offices and Construction Bu. are responsible; however, many times they request the assistance of the drainage section for filling out forms.
- (ODOT) - We have little interaction except when there is a compliant or violation to the permit conditions, in which case, a Notice of Non-compliance is issued and steps are taken to reach compliance. If compliance is not reached within a set time, a fine is issued. ODOT has not been fined to my knowledge, although NONE have been issued.
- (OkDOT) - DEQ performs routine inspections and Construction and Contractor coordinate remediation
- (SDDOT) - Operations Central Office handles the necessary paperwork for the NPDES permits and the 12 Operations Field Offices administer the contracts to assure we stay in compliance with the permits.
- (TxDOT) - There is very little interaction between agencies.
- (WSDOT) Please refer to our course curriculum for details.
- (WyDOT) - Project Development exception, USNF projects (Enviro. Coord.)

10. How does your department manage or avoid late stage non-compliance issues? What section or bureau is responsible?

- (ADOT) - N/A
- (CDOT) - ECAT Team Responds, Then Colorado Health Department. try to resolve on project level first
- (IDOT) - IDOT requires a plan. However any contract can add pay items for BMPs to a contract to address any non-compliance.
- (ITD) - I don't know.
- (MDT) - Field Construction & Environmental Services monitor the activities closely during construction for avoidance of non-compliance and notifies the Department of Environmental Quality and our legal services if necessary.

- (MDT) - We make every attempt to avoid such problems. We invite representatives from Environmental Services to all Preliminary Field Reviews for our projects. They are involved as needed afterwards throughout the remaining project development and beyond that they review the projects during construction. Environmental Services.
- (MDT) - Work with MDEQ to provide compliance assistance. Environmental Services & Construction Bureau.
- (MSHA) - Sixth Layer of six layer implementation process
- (NDDOT) - Unknown - Construction is responsible
- (NDOT) - The Water Quality Specialist generally gets involved in the design process early and coordinates with key staff to identify issues. NDOT maintains a good relationship with the regulatory agencies. Consequently, if a late stage non-compliance issue should arise, we will work out a solution with the agency involved to resolve the issue. Our continued cooperation with the regulators over the years has established a relationship where a regulatory agency will work with NDOT before taking the enforcement approach.
- (NDR) The Roadway Design - Design Process Outline (DPO) requires Roadside Development review all design projects for erosion control requirements. Contractors are responsible for installing erosion control as designed or modified by the Project Manager / Engineer. Roadway Design is responsible for following DPO, Roadside Development is responsible for final Erosion Control Design, and District Construction Offices are responsible for enforcing erosion control placement.
- (NMSHTD) - I am not sure what late stage non-compliance issues are.
- (ODOT) - The Geo-Hydro Section would be informed and we would work with the contractor, although there is not formal policy that states such actions.
- (OkDOT) - N/A
- (SDDOT) - We monitor during the project and work with the contractor to try and avoid any late stage non-compliance issues
- (TxDOT) - We try to avoid by proper planning and having alternatives for such things in the contract.
- (WSDOT) - Standard specs
- (WyDOT) - Environ. Services

11. Does your department have an Erosion & Sediment Control Inspector Certification Program?

- (ADOT) - In accordance with the State of Arizona, a Landscape Architect must stamp all erosion and sediment control plans. Training is provided by the International Erosion Control Association.
- (CDOT) - Yes, Specifications requires contractors to be certified
- (IDOT) - No, but we are looking at certification. We do have an extensive training program for staff, consultants, municipalities, and contractors.
 - (ITD) - Yes
 - (MDT) - No

- (MDT) - No
- (MSHA) - Green Card Certification, By SHA's six layer inspection process
 - (NDDOT) - No
- (NDOT) - Nothing formal. Because of a lack of staff, the Water Quality Specialist only reviews the SPPP's on high profile projects, however does review all Water Pollution Control Plans (WPCP) submitted. The Resident Engineer is responsible for making sure NDOT contractors comply with the Special Provisions. These provisions specify that the contractor must obtain all the necessary permits. The permits specify the measures necessary for compliance. On occasion, the Water Quality Specialist will visit a project site (coordination with the Engineer) to verify contractor compliance with and effectiveness of SPPP's and WPCP's.
- (NDR) - No
- (NMSHTD) - The Associated contractors of NM (ACNM) in conjunction with the Department have originated a certification program. ACNM is the only agency that runs the program now.
 - (ODOT) - No, just a training course
 - (OkDOT) - No
- (SDDOT) - Yes- we have annual training and technician certification program
 - (TxDOT) - No.
- (WSDOT) Yes
- (WyDOT) -N/A

a. What are the certification requirements for agency staff?

- (ADOT) - N/A
- (CDOT) - not required but encouraged
- (IDOT) - N/A
- (ITD) - Passing a written exam with 80% or higher and attending a 24 hr. training program
- (MDT) - N/A
- (MSHA) - N/A
- (NDDOT) - N/A
- (NDOT) - N/A
- (NDR) - N/A
- (NMSHTD) - None; although it is becoming a requirement that all personnel take the ACNM cert. Class
- (ODOT) - PE, CPESC can stamp plans
- (OkDOT) - None
- (SDDOT) - Earthwork class? Project Engineers and Technicians attend annual training for erosion control and earthwork courses put on by the Materials and Surfacing Program and Operations Division, We also have Project Management Training Course and Manual that touches on the permit requirements
- (TxDOT) - N/A
- (WSDOT) - Please refer to course curriculum for details

- (WyDOT) - N/A
- b. What are the certification requirements for contractor staff?
- (ADOT) - N/A
 - (CDOT) - Required to take course and exam
 - (IDOT) - N/A
 - (ITD) - The same.
 - (MDT) - N/A
 - (MSHA) - N/A
 - (NDDOT) - N/A
 - (NDOT) - N/A
 - (NDR) - N/A
 - (NMSHTD) - All personnel in charge of the inspection of BMPs and filing out inspection reports should have taken the day long certification class at the ACNM and have passed the test.
 - (ODOT) - N/A
 - (OkDOT) - None
 - (SDDOT) - none at this time
 - (TxDOT) - N/A
 - (WSDOT) - Please refer to course curriculum for details
 - (WyDOT) - N/A

BMP Assessment

12. Does your department assess the effectiveness of implemented BMP's? If so, how?
- (ADOT) - ADOT has a very aggressive stance on erosion and sediment control. If a BMP is not working, it is removed and replaced with one that will provide a high level of service.
 - (CDOT) - Sometimes via field reviews and research
 - (IDOT) - We conduct annual reviews; FHWA process reviews; Have an internal committee; and all Districts have an erosion control coordinator.
 - (ITD) - Yes, by monitoring and evaluating over a period of time.
 - (MDT) - No official program, Effectiveness based on experience only.
 - (MDT) - Not directly, we depend on feedback from Construction and Environmental Services.
 - (MDT) - Visual monitoring during installation, after storm events, and as often as necessary.
 - (MSHA) - All devices have been tried over years, and detailed design criteria exist for us. If additional controls are found to be needed on top of this, the field inspectors direct their addition.
 - (NDDOT) - Yes - Design personnel will conduct field investigations & Construction will inform Design of effectiveness.
 - (NDOT) - The NDOT currently has a monitoring program to assess the effectiveness of three separate BMP's designed to capture and remove roadway generated sediment. This monitoring program is being performed by Desert Research Institute with the help of NDOT. This

monitoring program will evaluate the effectiveness of a silt trap, a sediment basin, and a Stormceptor water quality vault in removing roadway generated sediment. Contact Theresa Jones at 775-888-7604 for more information.

- (NDR) - Yes. Erosion control tours are completed yearly across the State and random visits to project sites are made to access erosion control installation and effectiveness. Visits are made to sites with failures to assess reasons for failure. Construction Project Managers / Engineers are constantly requested to provide and are providing input on effectiveness of erosion controls.
- (NMSHTD) - Not on a formal basis. From time to time, personnel from the Drainage Section or Construction Bu. visit the site during construction and a rain storm and verify that the BMPs in place are effective.
- (ODOT) - Are they constructed properly, as per detail, and are they functioning properly
- (OkDOT) - Visually
- (SDDOT) - Yes, by inspections.
- (TxDOT) - Yes, through research programs and site evaluations.
- (WSDOT) - Yes. Field inspections and a database.
- (WyDOT) - Yes - followup field inspection

13. Do you assess all BMPs? If no, explain.

- (ADOT) - No
- (CDOT) - No, do not have staff
- (IDOT) - Yes.
- (ITD) - I believe so.
- (MDT) - N/A, this is a Construction and Environmental Services activity.
- (MDT) - See above answer.
- (MDT) - Yes
- (MSHA) - N/A
- (NDDOT) - Most of them
- (NDOT) - YES - As stated above our program is still early in development but our maintenance division is documenting the volume of sediment being captured in our constructed BMP's for use in assessing effectiveness.
- (NDR) - No. Not enough time and personnel to review all construction sites.
- (NMSHTD) - no
- (ODOT) - Yes, through monitoring of construction project.
- (OkDOT) - N/A
- (SDDOT) - Summer field inspections by central office staff and input from the field staff on what is working and what is not.
- (TxDOT) - All BMP's are assessed.
- (WSDOT) - Yes
- (WyDOT) - No - common BMP's by published documentation

14. Please list BMPs that you have found to be ineffective. And why?

- (ADOT) - Straw Bales and Silt Fences

- (CDOT) - Over use of silt fence and erosion bales pending application. hydro seeding in east plains
- (IDOT) - Silt fence ditch checks. The practice does not allow water to flow over the center of the ditch check and keeps ditches wet too long to work.
- (ITD) - Yes, silt fence, straw bales, misapplied seeding (because of not following proper procedures). Correct use of BMP's not implemented correctly.
- (MDT) - N/A, this is a Construction and Environmental Services activity.
- (MDT) - Situational
- (MDT) - Straw bales. Difficult to install and maintain.
- (MSHA) - N/A
- (NDDOT) - Fiberglass roving (monofilament fiber) Product has been carried off ROW and caused damages - especially in grain fields during harvest.
- (NDOT) - We have minimal information on BMP effectiveness at this time.
- (NDR) - Hay bale checks or other ditch checks that are constructed without erosion control fabrics downstream of the bales. The checks fail too frequently when constructed without erosion control.
- (NMSHTD) - Hay Bale (Straw Bale). Sees to work more as a berm than a filtering device. Our new standard drawings do not include this item anymore.
- (ODOT) - The straw bale check dam system often has failed because of poor construction. Silt fence is sometimes installed incorrectly.
- (OkDOT) - N/A
- (SDDOT) - We have not found any to be totally ineffective. What we have learned is if any BMP is not installed correctly or maintained properly it will be ineffective.
- (TxDOT) - All are effective in certain situations. The problem arises when the wrong BMP is specified.
- (WSDOT) - Straw bale check dams are difficult to install properly.
- (WyDOT) - Hydro seeding - avoid Estib. delay < 7,000 ft., Silt fence ditch barriers - not stable

a. Have you discontinued use of these BMP's?

- (ADOT) - As much as possible
- (CDOT) - NO
- (IDOT) - Yes
- (ITD) - Not at this time.
- (MDT) - For the most part.
- (MSHA) - N/A
- (NDDOT) - Yes
- (NDOT) - NO
- (NDR) - Replaced with ones including fabrics.
- (NMSHTD) - Only on some design/built project it is still used.
- (ODOT) - No, just worked on training about correct install.
- (OkDOT) - N/A
- (SDDOT) - N/A

- (TxDOT) - N/A
- (WSDOT) - Yes
- (WyDOT) - No

15. Please list BMPs that your department has found to be particularly useful or effective.

- (ADOT) - Gravel Berms
 - (CDOT) - Native seeding, mulch and mulch tackifier phased into construction/slope and ditch rounding/sediment basins/erosion logs, silt saver, silt dike, blankets.
 - (IDOT) - Rolled excelsior ditch check; silt fence for perimeter control; erosion control blankets; emphasizing erosion not sediment control; inlet baskets with filter fabric.
 - (ITD) - Vegetation/seeding/planting, check dams, terraces and benches, top soil (when used).
 - (MDT) - Most BMP's are effective if selected correctly, we have found gravel berms to be effective.
 - (MDT) - N/A, this is a Construction and Environmental Services activity. I guess I'd know if we got any official feedback to work from.
 - (MDT) - Silt fence, straw bales, gravel berms, settling basins, slope roughening, temporary seeding, erosion control mats
 - (MSHA) - SHA employs clean water diversion routinely so the sediment control devices function more efficiently
 - (NDDOT) - Coconut blankets, silt fences, bale checks, rock checks, most fiber mats.
- (NDOT) - N/A
- (NDR) - The most effective erosion control is the hay bale check installed in a 8" ditch with erosion control material under the bale check and continued downstream a minimum of 6 feet. Other useful erosion controls include the High Porosity Silt fence and Coir Silt Fence when installed correctly.
 - (NMSHTD) - Silt fence, Drop inlet protection and Earth berm.
- (ODOT) - Silt fence, vegetation establishment, use of compost, aggregate check dams, straw wattles, tri-angular silt dike, floating turbidity barrier, straw mulch
- (OkDOT) - N/A
- (SDDOT) - Erosion blankets--double netted with straw, excelsior or coconut fibers. Early application of permanent seed or cover crop, and mulch Silt Fence and a variety of other BMP's
- (TxDOT) - Disturb as little area as possible.
- (WSDOT) - Poly Acrylamide / Triangular Silt Dikes / Mulching
- (WyDOT) - M-1 inlet geotextile protections, triangular ditch barriers, coconut ditch liners and rod - lined ditches

BMP Implementation Success and Failures

16. Do you experience any difficulties or breakdown in BMP implementation? If yes, please explain.
- (ADOT) - No
 - (CDOT) - Yes, post construction maint is difficult. construction can be diff if contractor does not want to implement...
 - (IDOT) - Yes; due to improper installation and maintenance.
 - (ITD) - Yes, during construction or at final inspection, contractors not following proper procedures and methods
 - (MDT) - Construction phase misunderstanding of intention of Erosion Control Plan.
 - (MDT) - N/A
 - (MDT) - Situational
 - (MSHA) - SHA uses a six layer inspection process to minimize implementation breakdown
 - (NDDOT) - No
 - (NDOT) - Yes - The implementation of BMP's is new to NDOT construction and Maintenance staff who don't always realize the function of each facility and modifications are sometimes made without consultation of design staff. Maintenance of BMP's has not been as timely as desired.
 - (NDR) - Yes. Lack of installation and improper installation.
 - (NMSHTD) - Not so much anymore. Our new spec. pays the contractor for every BMP that gets placed. It pays for it if the BMP has to be relocated. A new item for SWPPP management has been included in the specs that allow the contractor hire an experienced NPDES person to inspect the measures and make necessary changes with the phasing of the project.
 - (ODOT) - Improper installation occurs for every BMP, mostly due to contractor inexperience.
 - (OkDOT) - N/A
 - (SDDOT) - Yes, occasionally there are difficulties as far as installation timeliness due to weather related problems, contractor problems and insufficient training of field personnel.
 - (TxDOT) - Yes, Improper specification, installation and maintenance occur. Contract inspectors and design engineers lack training and experience in these matters.
 - (WSDOT) - Yes. If is mainly from misunderstanding how the BMP functions.
 - (WyDOT) - Yes - contractor bid lump sum (design - build) application per contract. No - written guidelines
17. Does your department see a need to modify your current sediment and erosion control policies and procedures?
- (ADOT) - No
 - (CDOT) - Yes, more training and enforcement

- (IDOT) - We have modified Chapter 59 of the design manual and the 2002 Standard Specifications.
- (ITD) - We are in the process of revising the techniques and procedures to be put into the Erosion and Sediment Control Manual.
- (MDT) - Yes
- (MDT) - Yes
- (MDT) - Yes.
- (MSHA) - N/A
- (NDDOT) - Silt fence specifications need to be improved.
- (NDOT) - Yes - See answers above.
- (NDR) - Yes. We are updating the current design manual to clarify need and reason for erosion control on all projects. Important to inform designers and construction personnel on impact caused by the lack of erosion controls.
- (NMSHTD) - No. Unless the regulations change in the near future. We might have to do some slight modification to the specs as the results of the Phase II regulations.
- (ODOT) - We just did a major overall to specifications, BMP details, and creation of a manual, so now we just have to do some minor tweaking.
- (OkDOT) - Yes
- (SDDOT) - no, not at this time
- (TxDOT) - We are always looking for new and innovative methods. BMP's are always changing.
- (WSDOT) - We have made significant improvements and continuously monitor and change when needed.
- (WyDOT) - No - written guidelines

18. Which bureau or section is responsible for ensuring that BMP's are implemented properly by the construction contractors?

- (ADOT) - Construction Oversight
- (CDOT) - Head Quarters and region oversite teams inspect projects per permit
- (IDOT) - Bureau of Implementation Operations and the Environment section.
- (ITD) - Development committee, environmental and construction staff, and project inspector from the District.
- (MDT) - Construction Bureau and Environmental Services
- (MDT) - Field Construction Section
- (MSHA) - N/A
- (NDDOT) - NDDOT Construction Division
- (NDOT) - The District Construction Crews (Resident Engineer) are responsible for implementation compliance.
- (NDR) - District Construction Offices.
- (NMSHTD) - The District Offices and the Construction Bureau
- (ODOT) - Oregon Highway Division, Construction Section
- (OkDOT) - Construction Division
- (SDDOT) - Area Office/Field Engineer.
- (TxDOT) - The engineer of the project and the contract inspector.

- (WSDOT) - Construction inspectors.
 - (WyDOT) - see # 16 response. Varies by prime contractor, some much less lax on timely installation.
19. What provisions does your department have in place with construction contractors to determine responsibility of storm water violations?
- (ADOT) - N/A
 - (CDOT) - Standard specifications makes them respond
 - (IDOT) - Contractors and subs must sign contractor Certification form. Also have a Special Provision for deficiency deduction for failure to comply and a limit in the 2002 specifications on disturbance.
 - (ITD) - I don't know.
 - (MDT) - Co-permittees on MDEQ authorization.
 - (MDT) - Indemnification Specification 107.15 We are co-permittees with the contractor.
 - (MSHA) - N/A
 - (NDDOT) - NDDOT Construction Division
 - (NDOT) - The Special Provisions specify that our contractors retain the appropriate permits designating them as the permittee who would be responsible for any fines levied for stormwater violations. However, the coordination between the Resident Engineer and Environmental Services staff and subsequent interaction with the contractors would ensure permit compliance thereby alleviating NDEP enforcement.
 - (NDR) - Construction Specification and contract documents lay out responsibilities.
 - (NMSHTD) - Since we are the owners of the project and the contractor is the operator, sees like in most cases we both get involved. We have included a Liquidated Damages Schedule in the specs that motivates the contractor to place the BMPs at the right time in the field at right locations to avoid violations as much as possible.
 - (ODOT) - Contract language states that contractors must comply with NPDES 1200-CA permit. We require that the contractor either adopt our Erosion Control Plan or revise it based upon their schedule and staging of disturbance.
 - (OkDOT) - N/A
 - (SDDOT) - State issued surface water discharge permit which is part of the contract documents and contain the requirements to be met. Standard Specifications and standard plates and erosion control plans.
 - (TxDOT) - The engineer is ultimately responsible. All of the provisions are stated in the contract.
 - (WSDOT) - Please refer to course curriculum and standard specifications for details.
 - (WyDOT) - little to very low incident of cited violations.

20. Does your department use Erosion & Sediment Control performance clauses in construction contracts?
- (ADOT) - Contractors must have materials lines up 45 days after awarded contract.
 - (CDOT) - Yes, disincentive specifications imposes fines for lack of performance
 - (IDOT) - Based upon weekly inspections the deficiency deduction can be implemented. We are looking at some type of incentive like slope rental.
 - (ITD) - Yes.
 - (MDT) - No
 - (MDT) - No
 - (MSHA) - We have provisions to fine the contractor and shut down the operations or project.
 - (NDDOT) - No
 - (NDOT) - NO
 - (NDR) - No
 - (NMSHTD) - No. Just the specs for the most part
 - (ODOT) - Only for Permanent Seeding and Mulching, when we state that 70% establishment of grasses must.
 - (OkDOT) - N/A
 - (SDDOT) - No
 - (TxDOT) - Yes, in some cases. Performance in establishing vegetation and receiving a Notice of Termination is some of the performance measures.
 - (WSDOT) - We use water quality standards as a bench mark definitely.
 - (WyDOT) - Yes - contractor challenges
21. What methods are used to ensure proper BMP installation by construction contractors?:
- (ADOT) - On large projects a Landscape Architect is used as oversight for the contractor. If changes are made to the plans by the contractor, they must be made by a CPESC.
 - (CDOT) - Desinent specifications and oversight, project rating and reporting.
 - (IDOT) - Weekly inspections by IDOT staff.
 - (ITD) - Specifications, construction practices in erosion and sediment control manual, trained inspectors, submittals by contractor for approval by ITD storm water control program, and preconst. conference.
 - (MDT) - Compliance assistance from MDEQ and review by Environmental Construction Reviewer
 - (MDT) - Field inspection, contractor payment or non-payment or work suspension.
 - (MSHA) - Contractors are graded and face fines for improper erosion and sediment control measures.
 - (NDDOT) - NDDOT Construction Division
 - (NDOT) - Construction Crews - This will also be addressed in manuals
 - (NDR) - District Construction Offices have Project Managers / Engineers assigned to all construction projects.

- (NMSHTD) - Inspection by the District Personnel and the fact that they could also be fined by EPA if they do not follow the regulations.
- (ODOT) - Monitoring for effectiveness
- (OkDOT) - N/A
- (SDDOT) - Inspections.
- (TxDOT) - Specification, Inspection and training.
- (WSDOT) - There is a monitoring requirement that you need to check out in our course curriculum and standard specs that will explain this in detail.
- (WyDOT) - Yes - see #22 response

a. BMP Training by Department?

- (ADOT) - N/A
- (CDOT) - YES
- (IDOT) - Yes
- (ITD) - Yes.
- (MDT) - Environmental seminars
- (MDT) - On the job by Environmental Construction Reviewer.
- (MSHA) - N/A
- (NDDOT) - In - house Construction conferences
- (NDOT) - This will occur following development of manuals.
- (NDR) - No
- (NMSHTD) - A while back, staff from the Drainage Section provided some basic training to the District Personnel.
- (ODOT) - Yes
- (OkDOT) - N/A
- (SDDOT) - Earthwork course for technicians. Design personnel attend annual workshop/conference if budget allows.
- (TxDOT) - Yes
- (WSDOT) - WSDOT trains its own staff and we have outside training orgs that train contractors and public entity staff.
- (WyDOT) - Implementing more "in - house" training for WYDOT employees. Invited Wyo. contractor Assoc., prime contractors.

b. Other means of training?

- (ADOT) - N/A
- (CDOT) - ECS class
- (IDOT) - Meet with IECA and conferences.
- (ITD) - Training in coordination with DEQ.
- (MDT) - OJT
- (MSHA) - N/A
- (NDDOT) - NHI Courses when available.
- (NDOT) - N/A
- (NDR) - No
- (NMSHTD) - Anymore, all training is taking place through the ACNM and they are the ones that certify the inspectors as well.
- (ODOT) - N/A

- (OkDOT) - N/A
- (SDDOT) - N/A
- (TxDOT) - Limited
- (WSDOT) - We use in class training only.
- (WyDOT) - Video tapes - contractors use.

Innovative Practices

22. Overall, what is (are) the most innovative practice(s) at your department that you would recommend others to adopt to ensure adequate erosion and sediment control?
- (ADOT) - Aggressive attitude on erosion and sediment control.
 - (CDOT) - Cert training, erosion control advise teams, train swmp designers, pay for all bmp in contract, partnering
 - (IDOT) - Requiring erosion rather than sediment control; engineering a plan that begins in phase I and is carried through all project phases.
 - (ITD) - Training, management backing, feed-back on effective and ineffective methods, 6 month review process of Erosion & Sediment Control Manual, application of composted manure with soil, steep slope seed bed prep by sheep.
 - (MDT) - As I drive around the state I don't pay much attention to the construction going on around me. But when I travel out of state I'm always vary interested in how they do things. One of the most impressive BMP systems I've seen was in Yellowstone Park. The contractor worked the downed trees into the slopes to control erosion until the native vegetation could establish it self. We should try some of the same kind of BMP's they used here. True we don't cut down a lot of trees, but we do sometimes have large rocks and the like that we could be using outside the clear zones. These same BMP's also help blend the slopes into the surrounding landscape.
 - (MSHA) - Six layer inspection process (see question 26)
 - (NDDOT) - Bale checks/fences
 - (NDOT) - N/A
 - (NDR) - Construction of hay bale checks partially entrenched and including erosion control materials downstream of the bales. Biodegradable silt fence is looking to be effective.
 - (NMSHTD) - The Drainage Section provides a preliminary SWPPP in the plans; and the contractor is paid for an item called SWPPP preparation. The contractor hires a consultant to use the preliminary SWPPP and modify it according to the construction phasing and timing. Paying the contractor for the SWPPP preparation has helped the department to get the best BMPs in place.
 - (ODOT) - Just stay in touch with organizations such as the International Erosion Control Assoc. to learn about the latest innovations in erosion and sediment control. Encourage your staff to become Certified Erosion and Sediment Control Professionals (ESCP) for QA/QC.
 - (OkDOT) - Phased Construction

- (SDDOT) - Training from the design and construction side on the use of BMP's.
- (TxDOT) - Training of engineers in erosion and revegetation techniques.
- (WSDOT) - Solid standard specs and a good training program. Good communication is key.
- (WyDOT) - The sequencing of "clearing & grabbing" or prevention approach.

BMP Construction Costs

23. Are Erosion and Sediment Control Construction BMPs listed as bid items in a construction contract?
- (ADOT) - Yes
 - (CDOT) - Yes
 - (IDOT) - Yes, as pay items.
 - (ITD) - Yes.
 - (MDT) - Eventually
 - (MDT) - Occasionally.
 - (MSHA) - SHA pays contractors by sediment control items, which are included as part of the contract document. SHA includes construction of sediment control and also maintenance.
 - (NDDOT) - Yes
 - (NDOT) - Some - silt fence, hay bales, sediment logs, and dust palliative are sometimes in the contract. Other times they are included in a force account item for Temporary Pollution Control.
 - (NDR) - Yes. Construction contracts itemize each type of erosion control - silt fence, bale checks, erosion control fabrics, and temporary erosion control materials.
 - (NMSHTD) - Yes
 - (ODOT) - Yes
 - (OkDOT) - N/A
 - (SDDOT) - Yes
 - (TxDOT) - Yes
 - (WSDOT) - Yes
 - (WyDOT) - Majority lump sum bid within contracts.
24. Does your department pay for BMPs by: each, linear measure, lump sum, force account, absorbed/incidental, etc.?
- (ADOT) - Maintenance is paid for as a force account all other activities are paid for by each, linear measure, etc. Establishment is an additional cost for long term maintenance and removal.
 - (CDOT) - Yes and equipment hours.
 - (IDOT) - BMPs are paid usually by each. Maintenance and those practices added during construction are paid by force account.
 - (ITD) - All of the above, depending on specific BMP, project size, and contract.
 - (MDT) - Force account, Agreed price

- (MDT) - Force account.
- (MSHA) - See question 23
- (NDDOT) - Blanket SY, Silt Bale Fences - CF
- (NDOT) - Varies according to above. Silt fence, sediment logs are linear. Hay bales are each.
- (NDR) - Bid item is dependent on erosion control type - most frequently used are unit costs of each, linear feet, and square yard.
- (NMSHTD) - For silt fence and earth berm, it is by linear measure. For drop inlet protection is by each. IT varies depending on the type of measure.
- (ODOT) - each, linear measure and Lump sum, depending upon the BMP.
- (OkDOT) - N/A
- (SDDOT) - Generally by each and linear measure. Once in a while by lump sum.
- (TxDOT) - All of the above. It depends of what is specified.
- (WSDOT) - Payment is spelled out in WSDOT's standard specifications.
- (WyDOT) - Maintenance after project closure covered under general maint. - budget.

25. What is you department annual average BMP construction cost?

- (ADOT) - N/A
- (CDOT) - 1-3 MILLION
- (IDOT) - Less than 1% of any given contract. Estimate \$ 10-20 Million annually.
- (ITD) - We do not have this broken down. It varies from year to year and depends on budget (statewide and district level), type of project, whether it is emergency response, etc.
- (MDT) - 2-4 million
- (MSHA) - N/A
- (NDDOT) - Unknown
- (NDOT) - Less than 1% of total contract costs.
- (NDR) - \$ 3,500,000 per year ±
- (NMSHTD) - Very roughly about \$5,000,000. It changes dependent on the type of construction whether it is a lot of overlays or reconstruction and also on the size of the program for the particular year.
- (ODOT) - can't say they are all based upon different measures.
- (OkDOT) - N/A
- (SDDOT) - This could be research but would take some time. It's standard practice to incorporate BMP into grading projects and the cost is not tracked.
- (TxDOT) - N/A
- (WSDOT) - It varies from year to year and I do not have that info at my disposal currently.
- (WyDOT) - per contract - \$3,000 - \$20,000 lump sum bid.

Miscellaneous Information/Additional Comments

26. Please provide any additional information about your department's management of construction BMPs or supplemental information to previous questions that you feel may be useful.

- (ADOT) - N/A
- (CDOT) - Creating website database for project ratings and reviews/consultant expert assisting with program/creating bulletins for training/conducting annual conference for engineers.
- (IDOT) - IDOT is developing a training center to be used by all states to demonstrate appropriate bmps, installation, maintenance, and products.
- (ITD) - N/A
- (MDT) - N/A
- (MSHA) - Six layer Inspection Process: Layer 1: Erosion control personnel with Green Card Certification who is paid by Maryland SHA. Layer 2: Construction Inspector hired by Maryland SHA. Green Card Certification not required. Layer 3: Field Project Engineer with Green Card Certification Layer 4: Construction Area Engineer in charge of several projects and occasionally visits project. Layer 5: Independent Quality Assurance Inspectors who are SHA employees with Green Card Certification. Inspectors follow guidelines and give projects an A-F grade rating. Level 6: Maryland Department of Environment site inspections. On sensitive projects an additional Independent QA Inspector is brought in as a seventh layer.
- (NDDOT) - N/A
- (NDOT) - As stated above. NDOT is just starting to include designs for sediment and erosion control in construction plans. (both permanent and temporary) This will increase with the development of our sediment and erosion control manuals.
- (NDR) - N/A
- (NMSHTD) - N/A
- (ODOT) - N/A
- (OkDOT) - N/A
- (SDDOT) - Standard Specifications, Standard Plates on the DOT web site.
- (TxDOT) - N/A
- (WSDOT) - N/A
- (WyDOT) - N/A