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Implementation of the Material Certification Process

Study SD99-03
Final Report

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The contents of this report reflect the views of the authors who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the South Dakota Department of Transportation, the State Transportation Commission, or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

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16. Abstract

The South Dakota Department of Transportation has committed resources to investigate certification practices across the United States, and to develop and implement an improved material certification process. The research team reviewed Study SD96-06 and other studies concerning the material certification process, met with Department personnel and representatives of the local contracting community, and interviewed contacts in FHWA and other transportation agencies involved in materials acceptance. Based on consensus, this report 1) develops a tiered material structure, which places emphasis on materials that are critical to the success of a project; 2) defines new certification processes and verification methods; 3) promotes the use of Umbrella Certificates, Certified Suppliers, and items on the Approved Products List to reduce the number of certification submissions required for a project; and 4) develops administrative procedures and specifications. The report concludes that by tiering materials requiring certification and increasing the use of Certified Suppliers, Umbrella Certificates, and materials on the Approved Products List, the Department will have a more streamlined, practical, efficient, and enforceable material certification process. This report also provides recommendations for implementation of the new process, auditing guidelines, and pilot project parameters.

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Chapter 1 Executive Summary

1.1 Purpose of Study

The material certification process requires substantial effort by the South Dakota Department of Transportation (Department) and its contractors. Often, several documents are required to certify manufactured material components. The Department has indicated that in some cases certifications are not received until after the materials are in place, and that it is difficult to determine if certifications apply to the materials in place. The Federal Highway Administration (FHWA) conducted a study of Department projects that indicated numerous certifications were missing at project completion. The Department has committed resources to improving its material certification process. Previous research (Study SD96-06, *Improvement of the Materials Certification Process*) explored the legal and regulatory requirements of the process, practices by other agencies, and the views of those in the Department involved in materials certification. The previous researchers recommended a number of strategies to improve the certification process. While the research panel agreed with many of the recommendations, the research itself did not result in a final consensus among the research panel, the Department, and the contracting community on how to effectively implement and ensure compliance with the proposed improvements. Thus, the strategies recommended in the research study were ultimately not finalized and implemented by the Department.

The purposes of this study are to:

1. arrive at a consensus among the Department and contracting community regarding what is needed to successfully implement an improved materials certification process,

2. develop the documentation and language necessary to define and implement a certification process,

3. produce a more streamlined, practical, and enforceable certification process, and

4. provide training and support to promote understanding and acceptance of the changes.

1.2 General Approach

The fundamental goal of this research study is to build upon the original research in order to develop and implement a more streamlined, meaningful, practical, and enforceable certification process. To achieve this goal, the research team had to understand the differences of opinion among the key participants in the certification process, identify the benefits and trade-offs for all parties, and build a consensus.

The study began with a review of Study SD96-06, panel recommendations, minutes of the June 1998 meeting on implementation of the research, and SDDOT's current Standard Specifications and Materials Manual. An additional search for information concerning the current process and problems as experienced by the highway industry in South Dakota and generally across the United States was performed. Sources included review of a study conducted by the Federal Highway Administration (FHWA) concerning missing certifications, questionnaire results from other State Highway Agencies (SHAs), interviews with contacts in FHWA and other SHAs involved in materials acceptance, interviews with South Dakota AGC members, interviews with various Department personnel, and our own experience with the transportation industry, the construction process, and the development of contract documentation.

From the information gathered and ongoing discussions with Department personnel, the research team was able to understand how the Department's current material certification process worked, to fully understand the proposed improvements related to material certification, and to formulate a consensus of the opinions gathered. Additionally, the research team gained further insight into the issues related to the acceptance of materials and more specifically materials certification. This background research provided the necessary support to build a consensus among the key participants involved in materials certification.

From the consensus, the research team developed a tiering structure, and detailed written definitions, procedures, and specification language to implement the improved materials certification process. The new processes will then be integrated into the Department's existing project management and acceptance requirements. A pilot project was part of the scope to test the resulting procedures. For the pilot, an actual project DOT-14 was reviewed to evaluate the benefit to the Department in terms of eliminated paperwork (DOT-25s) and to the contractor in terms of eliminating certifications or streamlining the certification process. Finally, to implement the new process, the research team will provide follow-up training and support for the new system.

1.3 Significant Findings

Building on findings from Study SD96-06 and other past studies, in-depth discussions with Department personnel and industry personnel, and surveys of other agency practices, the research team determined the following:

1. Umbrella certification should be used for components of an installed system. The Contractor will keep material acceptance records and the Department will audit the records. DOT-99 form was created to serve as a generic Umbrella Certificate and will be used for the following items:

    - Guardrail Systems
    - Roadway Lighting
    - Traffic Control

- Signing Materials
- Chain-Link Systems
- Bridge Drains
- Cattle Guards

2. A tiered approach, with different levels of certification for materials, should be used. New definitions of the acceptance methods should be developed based on how materials are certified and verified. Specifications will be revised to address the different levels of certification for critical materials versus less critical materials and the new definitions of acceptance methods.

3. DOT-25 forms are not being used as originally intended. Most of the information being recorded on the DOT-25s is duplicative of what should be recorded in the diary. With the implementation of the Department's new Construction Management System (CMS), all of this data and information will have a location to be recorded electronically.

4. Based on an in-depth review of the Materials Manual in conjunction with Department personnel, a significant number of Certificates of Compliance were recommended for elimination or replacement using Umbrella Certificates, Approved Products, or Certified Supplier designation. The Materials Manual and specifications should be modified to reflect the reduced number of certifications required and the procedural changes made.

5. Automation of the certification process, forms, etc. will reduce paperwork and improve efficiency and timeliness of the process.

6. The new process should be monitored through the Certification Engineer.

7. The tiering structure and revised procedures will improve accountability and compliance with the new processes by Department and contractor personnel.

8. The implementation of any new process requires training, follow-up, and "marketing" of the benefits to users. Training is recommended for Department personnel, consulting engineers, contractors, and vendors to ensure that the new processes are understood and properly executed.

Additionally, the Federal Highway Administration (FHWA) reviewed the Material Certifications and supporting documents on a number of the Department's projects. The review concluded that the records on 14 projects documented hundreds of occurrences where the minimum certification and sampling and testing requirements contained in the Department's Materials Manual were not being met. Failure to meet these requirements could jeopardize the Federal funding on the 14 projects reviewed as well as nay other projects with similar shortcomings. These findings motivated the Department to conduct research to assess its current certification process and to develop new methods and procedures that will enable them to avoid such occurrences in future projects.

1.4 Conclusions

The research team concluded the following:

1. DOT-25 forms should be eliminated. Visual inspection requirements will be documented in the diary entry of the CMP.

2. Based on changes to the Department's material certification process, the form of certification required by the MSTR portion of the Materials Manual can be simplified for certain materials. The following materials no longer require submission of a Certificate of Compliance:

   - Admixtures
   - Asbestos, Cement, and Bituminous Fiber
   - Backer Rod (all types)
   - Bituminous Coating
   - Cement
   - Chain-Link System
   - Chlorides (sodium, calcium, and magnesium)
   - Drainage Fabric
   - Drop Inlet Frames, Grates, Box Curb Assemblies, etc.
   - Dust Oil
   - Dust Oil Chlorides
   - Fertilizer
   - Fiber Glass Roving
   - HDPE
   - High-Strength Bolts (for lighting and signing)
   - Hot Poured Elastic Type
   - Latex Emulsion
   - Liquid Membrane Curing Compound
   - Peat Moss
   - Permanent Plastic Pavement Markers
   - Plants and Shrubs
   - PVC
   - Reinforcing Bars (certified supplier or uncoated)
   - Sealant
   - Silicone
   - Silt Fence
   - Strip Seal and Preformed Elastomeric Open Cell Compression Type with Lubricant/Adhesive
   - Treating Oil
   - Wire Basket and Gabions
   - Wood Posts (for signing materials)

3. Based on discussions with Department personnel, it was determined that certain materials were no longer used by the Department or no longer need to be certified before use. The following materials are deleted in their entirety from the MSTR portion of the Materials Manual:

   - Aluminum Bolts, Nuts, Washers, and Fasteners
   - Asbestos, Cement, and Bituminous Fiber
   - Bituminous Coating
   - Dust Oil
   - Dust Oil Chlorides
   - Earth Subgrade Trimming
   - Extruded Insulation Board
   - Fiber Glass Roving
   - Filter Blanket Aggregate
   - Grass, Hay or Straw Mulch
   - Latex Emulsion
   - Peat Moss
   - Plants and Shrubs

4. The number of certifications required will be reduced, thereby reducing the number of items in DOT-14 and paperwork. This will result in faster turn around and project close-out.

5. The benefits derived from this research study are as follows:

   a. Arrival of a consensus among the Department and contracting community regarding what is needed for successfully implementing an improved materials certification process.

   b. Development of documentation and language necessary to define and implement a tiered structure for certifying materials.

   c. Use of umbrella certificates for appropriate work items to expedite the certification process. Items include the following:

      - Guardrail Systems
      - Roadway Lighting
      - Traffic Control
      - Signing Materials
      - Chain-Link Systems
      - Bridge Drains
      - Cattle Guards

   d. Revision of the Materials Manual and specifications thereby reducing paperwork to be submitted by the contractor and reviewed by the

Department. This will result in faster turn around and project close-out.

e. Execution of a more streamlined, practical, and enforceable certification process.

f. Presentation of follow-up training to promote understanding and acceptance of the changes.

In summary, the Department's implementation of this certification process will reduce the effort and paperwork required to install certified materials, and ultimately save both the Department and the contracting community time and money.

1.5 Recommendations

The research team recommends that the Department perform the following to implement the new certification process:

Specification Revisions

1. Accept the changes made to the RSTC document during the course of this project. The new definitions and procedures concerning the suggested materials certification process developed by the research team were incorporated. Specifically, paragraphs 5.10, 5.11, and 5.12 were deleted from Section 5. A new Section 6, entitled "Certification Process", was created. This Section includes definitions and operational procedures for the tiers, certification, certificates, certified suppliers, items on the Approved Products List, umbrella certificates, and verification methods. Additional changes, resulting from the research team's independent review of the RSTC document, were made for consistency as well as to update the document from its last printing.

   For brevity sake, the revised RSTC portion of the Materials Manual was not included within the body of this report but is referenced by Supplementary Notes.

2. Accept the changes made to the MSTR document during the course of this project. The changes made to this document reflect every definition, procedure, and practice developed from this research study. The tiering structure is incorporated into the revised document to classify each material in terms of the level of certification needed for acceptance. The types of certification required and methods of Acceptance testing were modified to reflect the findings and conclusions of this study. Additional changes, resulting from the research team's independent review of the MSTR document, were made for consistency as well as to update the document from its last printing.

For brevity sake, the revised MSTR portion of the Materials Manual was not included within the body of this report but is referenced by Supplementary Notes.

3. Revise the Section 6.3 of the Standard Specifications by Special Provision to ensure compliance with the new certification process. A draft of this Special Provision is included as Appendix A.

Procedural Changes

4. Expand the APL list. Use Study SD95-02, *Product Evaluation Procedure,* as a starting point. With its expansion, fewer certificates will need to be submitted. Products can be included in the CMS for fast access.

5. Expand the list of Certified Suppliers. With its expansion, fewer certificates will need to be submitted and Acceptance tests performed. This should reduce the number of samples and tests needed for each project, thereby reducing the workload on the Materials Certification Office.

6. Eliminate the DOT-25 form. Require inspectors to record information directly into the CMS.

7. Adopt DOT-99 (Umbrella Certificate) form as shown in Figure No. 1.

8. Adopt the tiering structure illustrated in Figure No. 2. In doing so, the Department will promote enforcement of its specifications, especially on payment issues.

9. Accept Umbrella Certificates for the following:

   - Guardrail Systems
   - Roadway Lighting
   - Traffic Control
   - Signing Materials
   - Chain-Link Systems
   - Bridge Drains
   - Cattle Guards

10. Use the CMS to improve efficiency and control of the Material Certification process.

Training

11. Provide training to Department personnel and contractors. A Training Outline is included as Appendix D.

    Training will be scheduled to coincide with the planned implementation of the MAT TEST. Training sessions will be held in Rapid City, Pierre, and Sioux Falls. An additional course may be presented in Aberdeen.

Follow-Up Research

12. Research and develop a formal Construction Manual. By creating a useable Construction Manual, the Department can dictate specific regulations and procedures to be followed on site. In addition, provide a training course to field inspectors.

13. Follow through with the implementation of the revised Approved Products List Process suggested by Study SD95-02.

14. Conduct a pilot project to test the validity of the recommended processes and procedures and to evaluate their integration with the CMS. We provided guidelines and five parameters for selecting a pilot project under Task 8. Furthermore, to implement the new certification process, we recommend that the Department follow the steps outlined in the timeline shown in Figure No. 3.

Chapter 2 Problem Description

The material certification process requires substantial effort by the South Dakota Department of Transportation (Department) and contractors. Often, several documents are required to certify manufactured material components. The Department has indicated that in some cases certifications are not received until after the materials are in place, and that it is difficult to determine if certifications apply to the materials in place. The Department also provided data from a study conducted by the Federal Highway Administration (FHWA). The study indicated that numerous certifications were missing at the time of project completion. However, according to Section 6.3 of the 1998 Standard Specifications, "Materials, will be inspected, tested and approved for use by the Engineer, prior to incorporation in the work. The Contractor shall furnish certifications for all materials designated in the Contract of the Department's Materials Manual that will be accepted by certification."

Concerned that certifications were missing and that its specifications were not being complied with by both contractors and Department staff, the Department committed resources to improving its material certification process. Previous research (Study SD96-06, *Improvement of the Materials Certification Process*) explored the legal and regulatory requirements of the process, current practices by other agencies, and the views of those in the Department involved in materials certification. The research study recommended a number of strategies to improve the process: umbrella certifications, a tiering structure, reduced paperwork, eliminating unnecessary certifications, and developing procedures for ensuring certification compliance. While the research panel agreed with many of the recommendations, the research itself did not result in a final consensus among the research panel, the Department, and the contracting community on how to effectively implement and ensure compliance with the proposed improvements. Thus, the strategies recommended in the research study were ultimately not finalized and implemented by the Department.

This research study will build on the findings from the previous study. The research team will provide the necessary support to reach a consensus among the key participants involved in materials certification, recommend further processes and methods of certification, and restructure the current process accordingly. The result will be a workable plan with sufficient procedures and specifications to implement an improved materials certification process.

Chapter 3 Objectives

The objectives of the research are to assist the Department in implementing an improved material certification process. The stated research objectives are as follows:

1. *To facilitate the restructuring of our material certification process including changes to the Material Sampling and Testing requirements (MSTR) and Required Samples, Tests and Certificates (RSTC).*

2. *To generate the documentation needed to implement the revised material certification process.*

3. *To provide training and support for the transition to the new system.*

To meet these objectives, the research team had to understand the differences of opinion among the key participants in the certification process, identify the benefits and trade-offs for all parties, and build a consensus. The research team summarized the status of the existing research to all of the key participants, determined the specific areas where the participants agreed and disagreed on how to implement the process, and built a common ground among the spectrum of opinions.

The research team then developed a tiering structure for the certification process along with detailed written procedures and specification language that reflected the consensus. The new processes were integrated into the Department's existing project management and acceptance requirements.

The research team intended to test the new processes through a pilot project; however, due to ongoing development of the Department's Construction Management System (CMS) and the need to finalize and approve changes to specifications before implementing them on an actual project, this approach was not feasible during the term of this project. Alternatively, an actual project DOT-14 was reviewed and evaluated in conjunction with the contractor and the Department to assess the benefits to both in terms of reduced paperwork. Training for the transition to the new certification process was postponed until the MAT TEST portion of the CMS is operational.

The fundamental goals of this research study will build upon the original research to develop and implement a more streamlined, meaningful, practical, and enforceable certification process.

Chapter 4 Task Description

4.1 Introduction

The following paragraphs describe each of the research tasks, how each task was performed, the status of the task (total or partial completion), its technical significance, any deviations from the proposed study, and the relationship to the study's objectives.

4.2 Task Descriptions

Task 1

Review research results from SD96-06, panel recommendations, minutes of the June, 1998 meeting on implementation of the research, the Materials Manual and other pertinent documentation.

The research team reviewed the prior research study, meeting minutes, panel recommendations, and the current Materials Manual. The purpose of this review was to understand how the Department's current materials certification process works, fully understand the proposed improvements related to materials certification, and prepare for upcoming meetings. In early January 1999, the research team also contacted other State Highway Agencies (SHAs), including Delaware, Florida, Kentucky, Maryland, New Jersey, and New Mexico. Responses were limited because of the short notice between initial contact and the scheduled meetings required by Tasks 2 and 3. The research team performed follow-up conversations with these and additional SHAs as the project continued.

This task was completed.

Task 2

Meet with the technical panel and other appropriate personnel to review the work plan for the project.

On January 19, 1999, representatives of the research team met with the Technical Panel in Pierre, South Dakota. The research team kicked off the meeting by summarizing Study SD96-06 and the concerns raised by the Department regarding the products of this research. The research team then summarized its proposed work plan. Major tasks of the work plan included proposing a tiering structure, exploring the use of umbrella certifications, revising MSTRs and RSTCs in the Materials Manual, providing a Material Certification Implementation Plan, developing administrative procedures and specifications, and training Department personnel and contractors. The purpose of the kick-off meeting was to develop a common understanding of the project scope, refine the work plan based on input from the panel, and prepare for follow-on meetings with AGC and various Department personnel.

The technical panel and the research team discussed several issues and concerns regarding the proposed work plan and scope. These are summarized as follows:

1. *Current Material Certification Processes and Paperwork.* How can the certification process be streamlined and practically implemented and enforced in a way that will benefit both the Department and the contractor? Specifically, how can DOT-25s and DOT-14s be eliminated or improved such that the certification/material acceptance process will still satisfy the requirements of FHWA for materials incorporated into the work?

2. *Umbrella Certifications.* The prior research recommended that (based on other agency experience) umbrella or package certifications should be used for certain systems involving large numbers and types of materials that are historically difficult to certify or verify, and are not critical to function or safety. Given this recommendation, is this approach a practical solution for both the Department and contractors to streamline the process and reduce paperwork for selected materials systems in the Department's construction program? If so, how can this approach be implemented?

3. *Integration with the Construction Management System (CMS).* The computerized CMS includes a measurement and payment component (CMP), which is currently in place, and a materials testing and acceptance component (MAT TEST), which is currently in beta testing. Linda Peterson expressed concerns regarding the coordination of the new system with our efforts to improve the materials certification process and in particular how to deal with a retainage system.

4. *Retainage System.* Is a retainage system proposed in the prior research the most practical approach to ensure the timely submission of material certifications? If so, how will it be applied (by bid item or by project) and integrated into the CMS? If not, what are the alternatives?

5. *Pilot Project.* A pilot project was proposed in the work plan as a tool to test and refine proposed changes to the material certification process and directly involve the contracting community in the revisions to the materials certification process. The questions are what project or projects are best suited for this and how will this be implemented within the duration of this research study.

6. *Tiering Structure.* The prior research study recommended that a tiering system be used for materials certification and acceptance based on the criticality of the materials, but did not clearly define this structure for materials used on Department projects and how it would be implemented to the benefit of the Department and the contractors. One important objective of this project is to define a tiering structure that will provide a benefit to both sides and be practical and enforceable.

At the conclusion of the meeting, the following consensus and recommendations were made:

1. *Material Certification Processes.* The improvements to materials certification must benefit both the Department and the contractor, and be simple to implement and follow. It was suggested by the Department and Region Materials Engineers that most DOT-25s, with the exception approximately four forms, can be eliminated in the MSTRs and DOT-14s. However, the visual inspection must be captured and documented somewhere. A suggested alternative is the daily diaries that ultimately can be incorporated into the CMP portion of the CMS. The Region Materials Engineers will provide further input in follow-on meetings.

2. *Umbrella Certifications.* Umbrella certifications could best apply to systems such as guardrail where it is historically difficult to trace and verify certifications for materials, and these materials are not critical to safety or are easy to inspect or replace. The submission of one certification may suffice for most of the components. To determine procedures and regulations, the research team must further explore how other agencies are implementing these types of certifications, who supplies the certifications (subs or suppliers), and for what materials. A questionnaire was distributed to other SHAs as part of Task 5.

3. *Electronic System.* Ideally, the revised certification documentation (DOT-14 and DOT-25 information and test reports) should be part of the CMS. This was identified as being beyond the scope of this research, but coordination with BIT will facilitate this process.

4. *Retainage.* The issue of retainage was a main concern of the AGC. As part of Task 3, discussions were held with representatives of AGC to identify concerns that they might have.

5. *Pilot Project.* A pilot project is needed to develop a consensus and test and refine the new procedures. The procedures and requirements that will be revised need to be identified and a candidate project must be selected as soon as possible. It became apparent as early as the initial meetings that the original intentions of the pilot project may not be feasible within the term of this project.

6. *Tiering Structure.* A proposed tiering system should address all the materials in the current MSTRs. The tiering should address different categories in terms of criticality and the required level of certification and the required level of enforcement. The consensus is that the specifications should be enforced for critical items. This will be a significant change from current practices and require support from the Department upper level management.

Those in attendance included:

Gary Ellsworth, Aberdeen Region
Brett Hestdalen, FHWA
Jim Hyde, Pierre Area
Dan Johnston, Office of Research
John Jund, Materials and Surfacing
Joel Jundt, Operations Support
Veronica Moos, Trauner Consulting Services
Daris Ormesher, Office of Research
Linda Peterson, BIT
Sid Scott, Trauner Consulting Services

After the meeting, minutes were provided that summarized the discussions, recommendations, and consensus reached.

This task was completed.

Task 3

Meet with the Region Materials Engineers, other appropriate DOT personnel and contractors to review the MSTR and RSTC and discuss modification to the existing process.

On January 19, 20, and 21, 1999, the research team attended separate meetings with contractors, the Region Materials Engineers, BIT personnel, and other Department personnel.

From these meetings, the research team was able to get a more comprehensive understanding of the Department's intent for this research study. Consistent concerns voiced at these meetings included the following:

1. Certain materials are "critical" to the project and must be certified and accepted.

2. If DOT-25s are eliminated, will pertinent information be lost?

3. Are there any materials that truly require visual inspection? If so, what are they?

4. Why are materials being paid for if they were never inspected or accepted?

5. Why are there specific forms for Certificates of Compliance (DOT-57 for Class M concrete) but not for other materials? Do these forms provide guidance as to what the Department requires or is it just a blank form?

The research team and meeting participants reached the following consensus regarding approaches to improve and streamline the materials certification process:

1. Certain "critical" materials must have a certificate and be accepted before they are allowed to be placed. The tiering structure must take this in to account.

2. DOT-25s, for the most part, are redundant and unnecessary.

3. Those materials identified, as no longer requiring a DOT-25 for acceptance, will require revisions to be made in the MSTR portion of the Materials Manual.

4. Pertinent information acquired through on-site visual inspection and currently documented on the DOT-25 should be recorded in the diary. The CMP will need to have locations designated for the recording of this information as well as for visual inspection comments.

5. The DOT-14 is too lengthy. The Department wants to remove as many items from it as possible.

6. The Department wants to become as "automated" as possible (relying on the CMS where practical).

In order to accomplish the goals of this research study, the research team determined that materials (and systems) should be ranked based on the importance to a project. Additionally, with the assistance of the Chief Materials and Surfacing Engineer and the Region Materials Engineers, the research team will go through the Materials Manual and identify what materials need to be certified.

As an aside to what was discussed during the meetings, in order to implement the new procedures, the consensus was that the Department will need to recognize the following:

1. No exceptions should be made to the tiering structure requirements.

2. The Department must perform timely tests to determine the acceptance of materials. A priority should be made for critical items.

3. A formal Construction Manual should be developed (could also be included in the CMS).

These meetings were attended by the following:

Michael Carlson, Belle Fourche Area
Ron Dahme, Mitchell Region
Gary Ellsworth, Aberdeen Region
Greg Fuller, Office of Bridge Design

Brett Hestdalen, FHWA
Jim Hyde, Pierre Area
Dan Johnston, Office of Research
John Jund, Materials and Surfacing
Joel Jundt, Operations Support
Linda Marzahn, Operations Support
Veronica Moos, Trauner Consulting Services
Linda Peterson, BIT
Jerry Schaefer, Materials and Surfacing
Sid Scott, Trauner Consulting Services
Ron Sherman, Watertown Area
Craig Sisk, Operations Support
Matt Stone, Rapid City Region
Lyle Wagner, Pierre Region
Peter Loren, Software Consultant
Representatives of AGC

After the meeting, minutes were provided that summarized the discussions, recommendations, and consensus reached.

This task was completed.

Task 4

Produce correct and complete definitions of and verification methods (especially DOT 25's) for tiers of construction materials including Manufacturer's Certifications, Approved Products List, Certified Plants, Certified Suppliers and Umbrella Certifications.

The research team participated in several teleconferences to discuss the tier definitions. Based on these discussions, the definitions were revised and resubmitted to the Technical Panel until agreed upon.

The research team suggested the following three tier definitions:

Tier 1:

A material that is critical to safety or costly to replace is considered extremely crucial to the overall success of the project. The Department classifies these crucial materials as Tier 1 materials. The Department will only allow the contractor to install a Tier 1 material on the project when the contractor satisfies both of the following conditions:

1. The contractor furnishes the documents specified under the heading "Certification" in the "Minimum Sample and Test Requirements" of the Materials Manual.

2. The Central Testing Laboratory approves that the certified material conforms to the Specifications.

The Department will make payment according to the Specifications for a Tier 1 material only after the contractor installs the approved material.

Tier 2:

The Department will only allow the contractor to install a Tier 2 material on the project when the contractor satisfies either of the following conditions:

1. The contractor furnishes the documents specified under the heading "Certification" in the "Minimum Sample and Test Requirements" of the Materials Manual, or

2. The contractor uses a material listed on the "Approved Products List" or furnished by a Certified Supplier.

The Department will make payment according to the Specifications for a Tier 2 material only after the contractor installs the material.

Tier 3:

The Department classifies a Tier 3 material as those materials that require no documentation under the heading "Certification" in the "Minimum Sample and Test Requirements" of the Materials Manual. The contractor may install a Tier 3 material on the project at any time.

The Department will make payment according to the Specifications for a Tier 3 material only after the contractor installs the material.

We incorporated these tier definitions into the RSTC portion of the Materials Manual as paragraph 6.1 as part of Task 7.

Addressing the structure of the tiers and their verification methods, the previous research study recommended a matrix tiering structure. We agreed that a hierarchal order for verification methods does exist, as was concluded by moving left to right across the columns of the matrix. However, we disagreed with ranking materials based solely on testing requirements. Instead, we ranked the materials by taking into account the importance of the material with regards to cost and safety. The material's rank, or tier, will dictate the level of testing and the form of certification (if any) required. The resulting tiering structure will place emphasis on both the material and the testing requirements. The proposed tiering structure is discussed in detail as part of Task 6.

In addition to defining the tiers and assigning them to the materials, the research team determined that the following verification methods were sufficient to assure materials placed on the project match those covered by certification:

- Sampling and Testing
- Documented Inspection
- Random Audit of Contractor's Records
- Annual Inspection of Suppliers

We incorporated detailed definitions for these verification methods into the RSTC portion of the Materials Manual as paragraph 6.7 as part of Task 7.

This task was completed.

Task 5

Develop the umbrella certification process and provide recommended guidelines for other processes.

It was recommended by the previous researchers that the Department use an umbrella certification process to certify systems, including guard rail systems, traffic signal systems, lighting systems, chain-link fencing, buildings, rest areas, and signage and delineation. The Department further suggested roadside development and miscellaneous structural steel as perspective candidates.

Following through on these recommendations, the research team investigated the application and usefulness of umbrella certificates in other states. A questionnaire was distributed to 31 SHAs. Fifty-five percent of the SHAs provided a response. Results of the questionnaire are made part this report as Appendix B.

Of those that responded "yes" to using an umbrella certification process or having a comparable method for certifying component materials, notable findings from the questionnaire include the following:

1. Washington State Department of Transportation allows an "after the fact" certification for multiple materials.

2. Arkansas State Highway and Transportation Department (AHTD) accepts certain materials under a blanket certification. AHTD indicated that these materials are generally on their Qualified Products Lists.

3. North Dakota allows contractors to submit a Certificate of Compliance stating that assemblies fully comply with the contract requirements.

4. New York Department of Transportation (NYDOT) uses a blanket certification to cover all of the component materials for guide rail. According to NYDOT, the erector of the guide rail for each Department project provides a Department produced form that itemizes all of the components installed. The form includes an entry for the component, the certifying manufacturer of

that component, the date of the certification, the name of the certifying galvanizer, and the date of the certifying galvanizer's certification.

5. In New York state, the guide rail erector must maintain a file of the certifications identified, for Department review when requested, for a minimum of seven years.

6. NYDOT makes payment for the guide rail only after review and approval of the blanket certification by an appropriate Department representative.

7. On an annual basis, an NYDOT representative visits the guide rail erector's facility and selects samples of guide rail components and copies of the certification representing these components. The samples are tested to verify specification and certification conformance.

8. Idaho Transportation Department indicated that umbrella certificates are provided for some materials and that random sampling and testing is used for verification.

9. Nevada Department of Transportation (NDOT) responded that a blanket certificate is available but that it can be used only for items that do not require any testing or certified test results. NDOT also provided a sample umbrella certificate.

Based on the questionnaire results and the completion of Tasks 1 through 4, the research team determined that the best candidates for an umbrella certification process must fall within the following parameters:

a. be a component of a system or assembly that is difficult to verify in terms of providing an individual certification for that component,

b. be a component material that is not critical to safety and is easy to inspect or replace, and

c. be a material that requires certification as indicated in the current Materials Manual.

Based on discussions with the Technical Panel, the research team decided that a material would have to fall within the parameters stated above in order for the material to be certified by an umbrella certificate. Consequently, the initial list of materials, suggested by the previous researchers and the Department, was revised. The research team identified the following eight systems as best benefiting from the application of an umbrella certification process:

- Guardrail Systems
- Roadway Lighting

- Traffic Control
- Signing Materials
- Chain-Link Systems
- Bridge Drains
- Cattle Guards

The benefit of using an umbrella certification process is that if the contractor knows which materials are intended for use on a project the certificate can be provided before receiving the manufacturer certificates or test reports. This will expedite the work on a project.

The research team proposes the following definition for an umbrella certificate:

> A single written document stating that the materials listed or the identified component materials of a system or assembly, including miscellaneous items, are in conformity with the pertinent specification requirements of the contract.

We suggest that the umbrella certificate include an entry for the following:

a. Contract number
b. PCEMS number
c. Project number
d. County
e. Location
f. Contractor name and address
g. Subcontractor name and address (if applicable)
h. Quantity of each item
i. Item/components
j. Certifying manufacturer of each item/component
k. Heat or lot number (as applicable)
l. Signature, title, and date

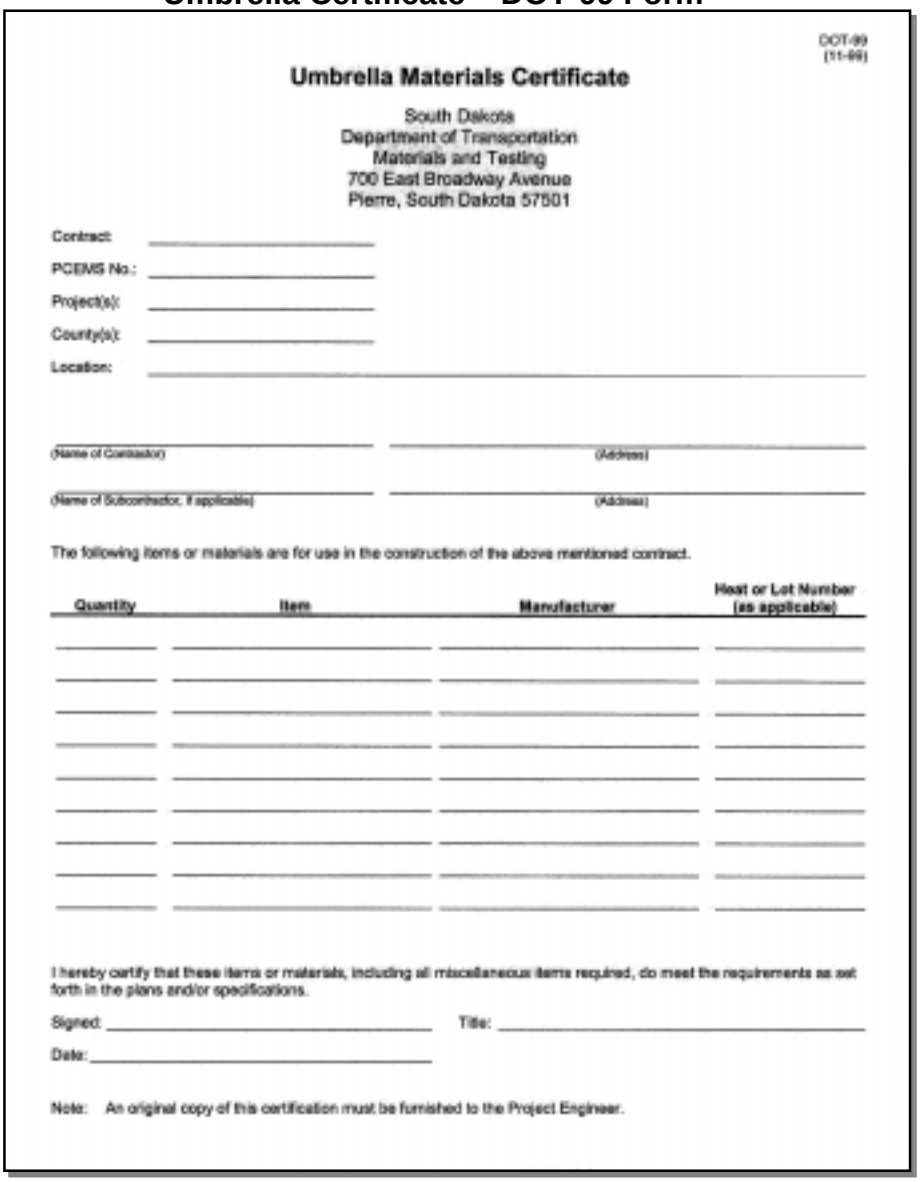
The research team also proposes the following operational procedures:

> Umbrella Certificates shall be submitted for items such as guardrail, lighting and traffic control, signing, chain-link systems, and cattle guards, as required by the "Minimum Sample and Test Requirements". The information specified above shall be provided on Department-furnished forms (DOT-99).
>
> The prime contractor is responsible for completing the certificate. If a subcontractor is going to perform the work covered by the certificate, the subcontractor may fill in the information; however, the prime contractor must sign the certificate. Each component material that is to be included on the Umbrella Certificate will be identified as such on the DOT-14. The contractor will not be allowed to submit individual certification documents for the component materials in lieu of completing a DOT-99 form.

> Materials certified by an Umbrella Certificate will be inspected to confirm that the proper materials are used and are installed according to the plans and specifications.
>
> NOTE: If a contract change order is issued that affects items covered by an already submitted Umbrella Certificate, the Project Engineer will verify that the Umbrella Certificate is still an accurate representation of the items or materials required. Based on the Project Engineer's determination, the contractor may be requested to submit a revised Umbrella Certificate to reflect the changes to the contract.
>
> Payment for the materials or components will be made only after receipt of the Umbrella Certificate by an appropriate Department representative and installation of the material.

We incorporated these umbrella certificate guidelines into the RSTC portion of the Materials Manual as paragraph 6.6 as part of Task 7. With implementation of the umbrella certification process, the Department identified the need for a new form to record the information specified above, which is necessary to verify the items being certified. The research team drafted DOT-99 form, shown in Figure No. 1. We suggest that the contractor complete a separate Department-issued DOT-99 form for each of the eight systems identified above, as needed.

Umbrella Certificate – DOT-99 Form



DOT-99
(11-99)

Umbrella Materials Certificate

South Dakota
Department of Transportation
Materials and Testing
700 East Broadway Avenue
Pierre, South Dakota 57501

Contract: _____

PCEMS No.: _____

Project(s): _____

County(s): _____

Location: _____

_____ _____
(Name of Contractor) (Address)

_____ _____
(Name of Subcontractor, if applicable) (Address)

The following items or materials are for use in the construction of the above mentioned contract.

Quantity	Item	Manufacturer	Heat or Lot Number (as applicable)

I hereby certify that these items or materials, including all miscellaneous items required, do meet the requirements as set forth in the plans and/or specifications.

Signed: _____ Title: _____

Date: _____

Note: An original copy of this certification must be furnished to the Project Engineer.

Figure No. 1

In addition, as part of Task 4, the Department wanted the research team to explore other potential approaches for streamlining or simplifying the certification process. From the questionnaire results and discussions with representatives from other SHAs, the research team identified the following other processes:

1. For materials that are crucial to the success of the project or are difficult to identify (i.e., by lot, heat, etc.), the Department will furnish these materials.

2. For crucial materials, evaluate products at the manufacturing site rather than at the project site. This provides greater assurance that only approved materials will be delivered for installation. If manufacturers do not follow the specified procedures, their products will not be accepted.

3. Allow cross-referencing of products throughout the year. For example, a contractor provides the required certification for materials on one job. The same contractor works on another project for the Department later that year, using the same types of materials (i.e., bolts). Instead of submitting another certification (most likely a copy of the certification submitted on the previous project, the contractor cross references the original certification.

The Technical Panel decided each of these processes were not in the best interest of the Department. The research team did not provide further possible processes.

This task was completed.

Task 6

Submit a proposed tiering structure for all materials requiring certification.

As discussed in Task 4 above, the research team recommended a tiering structure with an emphasis placed on both the material and the testing requirements.

The first step toward developing a successful tiering structure was to develop tier definitions. The tier definitions take into account the importance of material cost and safety on the project. The next step was to apply the definitions and verification methods, by which materials are certified (if any), developed under Task 4. The resulting tiering structure is illustrated in Figure No. 2.

Tiering Structure Flow Chart

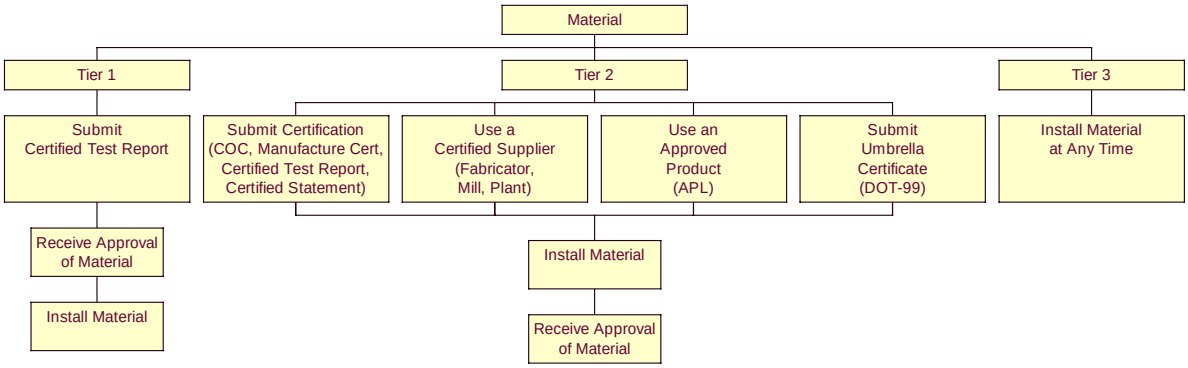


Figure No. 2

This task was completed.

Task 7

Revise tiering structure after review and incorporate into revised MSTR and RSTC documents.

After the Technical Panel reviewed and commented on the proposed tiering structure, the research team addressed the panel's comments. Once the tiering structure was finalized, the research team began revising the RSTC and MSTR documents. While making revisions to these documents, the research team worked closely with representatives of the Department's Office of Materials Certification. In addition to changes generated from this research study, the research team also reviewed and revised the documents for consistency. The end product for Task 7 is a modified Materials Manual that incorporates the work product developed in Tasks 4, 5, and 6. The RSTC and MSTR portions of the modified Materials Manual are included as part of this report by Supplementary Notes.

The research team created a spreadsheet to use a tool for compiling data and to summarize changes being made to the MSTR document. This spreadsheet was also used by the Technical Panel. The Technical Panel requested that this spreadsheet be maintained and submitted as part of this Task. The MSTR Summary spreadsheet is included in Appendix C.

This task was completed.

Task 8

Provide a material certification implementation plan including a timeline, training requirements and potential compatibility with the proposed Construction Management and Payment System (CM&P).

The research team's implementation plan outlines how the research team will assist the Department in implementing the revised materials certification process. This plan was envisioned to include a timeline for implementation of the revised certification process, integration with the CMS, and training Department personnel. Additionally, before full implementation of the improved materials certification process, a pilot project was to be conducted.

The intent of the pilot project was to observe how the proposed revisions to the material certification process and language of the Materials Manual and other contract documents effect the actions and interactions of the contractor, suppliers, and Department personnel, along with the overall flow of the construction procedures.

The Department selected a project in Lincoln County to be the pilot project for this research study. A teleconference was held on March 2, 1999 between the research team, the Department, and Greg Branaugh of D&G Concrete Construction, Inc. (D&G), the contractor for the pilot project. The purpose of the teleconference was to introduce each of the parties involved.

Those present during the teleconference:

Greg Branaugh, D&G Concrete Construction
Dan Johnston, Office of Research
John Jund, Materials Certification

Joel Jundt, Operations
Veronica Moos, Trauner Consulting Services
Sid Scott, Trauner Consulting Services
Larry Weiss, State Construction Engineer

Because of the need to finalize the revised certification process and draft specifications before conducting a pilot project, the research team did not monitor the progress of the pilot project as originally intended. Instead, the research team reviewed the DOT-14 for the pilot project and made suggestions concerning the certifications required for the different materials listed on the DOT-14. D&G provided the research team with some feed back such as what certifications were cumbersome to acquire or redundant to submit to the Department, and what expectations contractors have concerning the new material certification process. Over the course of this project, the research team had discussions concerning the pilot project and the effects the proposed tiering structure might have on it.

The research team recommends the following minimum parameters for a future pilot project:

1. The pilot should be an actual project.

2. The pilot should be capable of being completed in one construction season.

3. The pilot should be complex enough to the extent that a variety of material certification methods and verification levels are encountered during the project.

4. The pilot should be similar in construction procedures to a completed Department project.

5. Throughout the progress of the pilot project, the cost, time, manpower, productivity, and material compliance should be tracked. The data gathered should be compared corresponding data from similar projects already completed.

Task 8 approach was modified because of the way in which the pilot project was conducted. Furthermore, the training component of implementation plan and the integration of the revised material certification process into the CMS was delayed pending the completion and testing of the MAT TEST. The research team concluded that before the new material certification process can be fully implemented, Department personnel and contractors must be comfortable with the new procedures to be implemented by the CMS.

Task 9

Develop administrative procedures and specifications for insuring material certification compliance (e.g. retainage) after conducting a series of meetings with DOT and contractors.

The research team participated in several meetings with Department personnel and contractors to gain a complete understanding of what is necessary to ensure material certification compliance. Based on these meetings, it was concluded that the issue of retainage was not practical in South Dakota. The Department decided that the best method of ensuring compliance was to modify the specifications to tie enforcement to the criticality of the materials.

The tiering structure, by definition of the tiers, takes into account the criticality of materials to the overall success of a project. The tier definitions also stipulate when materials shall be placed and payment will be handled. Additionally, with the new practices and procedures incorporated into the Materials Manual, the research team concluded that only minor modifications were necessary to be made to the SDDOT's 1998 Standard Specifications. Appendix A contains the research team's draft Special Provision, which modifies Section 6.3 of the Standard Specifications.

Furthermore, if the Department implements the umbrella certification process, the research team suggests that random audits of the contractor's records take place to verify that the umbrella certificates are representative of materials that were incorporated into the project. Under Task 5, we identified eight systems that would best benefit from use of an umbrella certificate. Each project's DOT-14 will identify those items that the contractor must include on an umbrella certificate. The contractor is responsible for compiling the necessary certifications for the items being used on the project and referenced on the umbrella certificate, and for keeping these certifications in its project file for a minimum of five years after project completion, beginning on the date that the Region Engineer signs its final project acceptance letter.

Within the five-year period, as defined above, a project is eligible to be audited by the Department. The Department will conduct audits of randomly selected projects and provide selected contractors with 48-hour notice of the pending audit. The contractor shall provide the Department access to the project files. The Department will compare the umbrella certificates submitted for the selected project against the contractor's files to verify that all items identified on the umbrella certificates comply with the requirements for these items, as stated in the MSTR portion of the Materials Manual.

The Department will randomly select projects to audit on an annual basis. We suggest conducting the annual audits in January. A project is considered eligible if it falls within the following parameters:

1. The project is 100 percent complete.

2. The Region Engineer has signed and forwarded its final project acceptance letter.

3. The period of five years, since the date of the Region Engineer's final project acceptance letter, has not expired.

4. The project's DOT-14 requires submission of at least one umbrella certificate.

5. The project has not previously been audited.

We recommend auditing five percent of the eligible projects, or a minimum of three projects, each year.

Since the number of eligible projects is dependent on a sliding five-year period, the best method of selecting projects to be audited is the *systematic random selection method*. Systematic random selection is frequently used for conditions or circumstances where items to be sampled are not in numerical sequence or are intermingled with other items that are not to be sampled. This method selects sample items on a fixed or uniform interval after a random start. The uniform interval between selected items is obtained by dividing the estimated number of universe items by the number of sample items to be selected. The random start is the first number, selected from random, which falls within the uniform interval.

The following example is provided to demonstrate random selection of projects to be audited. Table No. 1 illustrates sample project data to be used for this example.

Table No. 1 – Number of Eligible Projects Started per Year *

Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 6*
1P1	2P1	3P1	4P1	5P1	6P1
1P2	2P2	3P2	4P2	5P2	6P2
1P3	2P3	3P3	4P3	5P3	6P3
1P4	2P4	3P4	4P4	5P4	6P4
1P5	2P5	3P5	4P5	5P5	6P5
1P6	2P6	3P6	4P6	5P6	6P6
1P7	2P7	3P7	4P7	5P7	6P7
1P8	2P8	3P8	4P8	5P8	6P8
1P9	2P9	3P9	4P9	5P9	6P9
1P10	2P10	3P10	4P10	5P10	6P10
1P11	2P11	3P11	4P11	5P11	6P11
1P12	2P12	3P12	4P12	5P12	6P12
1P13	2P13	3P13	4P13	5P13	6P13
1P14		3P14	4P14	5P14	6P14
1P15		3P15	4P15	5P15	6P15
1P16		3P16	4P16	5P16	6P16
1P17		3P17		5P17	6P17
1P18		3P18		5P18	
1P19		3P19		5P19	
		3P20		5P20	
		3P21		5P21	
		3P22			
		3P23			

* Eligible projects are determined according to the five parameters specified above.

According to Table No. 1, after the first year of implementation of the umbrella certification process, there are 19 eligible projects. Therefore, the universe of items consists of these 19 projects. The sample size would be five percent or a minimum of three projects. Since five percent of 19 equals 0.95 projects, the Department will audit three projects in Year 1.

The three projects are selected by first determining the interval number. Divide the universe if items by the sample size to obtain the interval number (19÷3=6.33); therefore, the interval number is 6. A starting point is determined by choosing a random start number between 1 and the interval number, 6. Assume 3 is chosen. Starting with the third item in the universe, select every sixth item until the required number of samples is selected. The shaded projects in Table No. 2 indicate that the Department will audit projects 1P3, 1P9, and 1P15.

Table No. 2 – Projects to be Audited in Year 1

Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 6*
1P1	2P1	3P1	4P1	5P1	6P1
1P2	2P2	3P2	4P2	5P2	6P2
1P3	2P3	3P3	4P3	5P3	6P3
1P4	2P4	3P4	4P4	5P4	6P4
1P5	2P5	3P5	4P5	5P5	6P5
1P6	2P6	3P6	4P6	5P6	6P6
1P7	2P7	3P7	4P7	5P7	6P7
1P8	2P8	3P8	4P8	5P8	6P8
1P9	2P9	3P9	4P9	5P9	6P9
1P10	2P10	3P10	4P10	5P10	6P10
1P11	2P11	3P11	4P11	5P11	6P11
1P12	2P12	3P12	4P12	5P12	6P12
1P13	2P13	3P13	4P13	5P13	6P13
1P14		3P14	4P14	5P14	6P14
1P15		3P15	4P15	5P15	6P15
1P16		3P16	4P16	5P16	6P16
1P17		3P17		5P17	6P17
1P18		3P18		5P18	
1P19		3P19		5P19	
		3P20		5P20	
		3P21		5P21	
		3P22			
		3P23			

For Year 2, the same procedure will be followed with the exception that projects 1P3, 1P9, and 1P15 are no longer eligible. The universe of items for Year 2 consists of 29 projects (16+13=29). Five percent of 29 is 1.45; therefore, three projects again will be selected for audit in Year 2. The interval number is 9 (29÷3=9.66). (Note: Always round down.) Assume the random number, between 1 and 9, chosen is 6. Table No. 3 indicates that projects 1P11, 2P2, and 2P11 will be audited in Year 4.

Table No. 3 – Projects to be Audited in Year 2

Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 6*
1P1	2P1	3P1	4P1	5P1	6P1
1P2	2P2	3P2	4P2	5P2	6P2
1P3	2P3	3P3	4P3	5P3	6P3
1P4	2P4	3P4	4P4	5P4	6P4
1P5	2P5	3P5	4P5	5P5	6P5
1P6	2P6	3P6	4P6	5P6	6P6
1P7	2P7	3P7	4P7	5P7	6P7
1P8	2P8	3P8	4P8	5P8	6P8
1P9	2P9	3P9	4P9	5P9	6P9
1P10	2P10	3P10	4P10	5P10	6P10
1P11	2P11	3P11	4P11	5P11	6P11
1P12	2P12	3P12	4P12	5P12	6P12
1P13	2P13	3P13	4P13	5P13	6P13
1P14		3P14	4P14	5P14	6P14
1P15		3P15	4P15	5P15	6P15
1P16		3P16	4P16	5P16	6P16
1P17		3P17		5P17	6P17
1P18		3P18		5P18	
1P19		3P19		5P19	
		3P20		5P20	
		3P21		5P21	
		3P22			
		3P23			

For Years 3, 4, and 5, continue with this method to determine the projects to be audited each year. The results for Years 3, 4, and 5 are provided in Table No. 4. Calculations are shown in brackets for convenience.

Table No. 4 – Determination of Projects to be Audited

	Year 3	*Year 4*	*Year 5*
Universe of Items	49 [(29-3)+23]	62 [(49-3)+16]	80 [(62-3)+21]
Sample Size, minimum of 3	3 [49×5%=2.45]	3 [62×5%=3.10]	4 [80×5%=4.00]
Interval Number	16 [49÷3=16.33]	20 [62÷3=20.67]	20 [80÷4=20.00]
Starting Number (Randomly Selected)	16	2	7
Projects Selected for Audit	2P1, 3P6, & 3P22	1P2, 2P9, & 3P18	1P10, 3P4, 4P4, & 5P8

For determining those projects to be audited in Year 6, remember to remove projects that have been complete for more than five years, as specified in the parameters for eligible projects. For the purpose of this example, we assumed that projects 1P6 and 1P8 were still eligible. Table No. 5 indicates those projects that would be eligible for audit in Year 6.

Table No. 5 – Eligible Projects for Year 6

Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 6*
1P1	2P1	3P1	4P1	5P1	6P1
1P2	2P2	3P2	4P2	5P2	6P2
1P3	2P3	3P3	4P3	5P3	6P3
1P4	2P4	3P4	4P4	5P4	6P4
1P5	2P5	3P5	4P5	5P5	6P5
1P6	2P6	3P6	4P6	5P6	6P6
1P7	2P7	3P7	4P7	5P7	6P7
1P8	2P8	3P8	4P8	5P8	6P8
1P9	2P9	3P9	4P9	5P9	6P9
1P10	2P10	3P10	4P10	5P10	6P10
1P11	2P11	3P11	4P11	5P11	6P11
1P12	2P12	3P12	4P12	5P12	6P12
1P13	2P13	3P13	4P13	5P13	6P13
1P14		3P14	4P14	5P14	6P14
1P15		3P15	4P15	5P15	6P15
1P16		3P16	4P16	5P16	6P16
1P17		3P17		5P17	6P17
1P18		3P18		5P18	
1P19		3P19		5P19	
		3P20		5P20	
		3P21		5P21	
		3P22			
		3P23			

The universe of items for Year 6 consists of 84 projects (2+11+19+15+20+17=84). Five percent of 84 is 4.20; therefore, four projects will be selected for audit in Year 6. The interval number is 21 (84÷4=21.0). Assume the random number, between 1 and 21, chosen is 18. Table No. 6 indicates that projects 3P7, 4P8, 5P14, and 6P14 will be audited in Year 6.

Table No. 6 – Projects to be Audited in Year 6

Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 6*
1P1	2P1	3P1	4P1	5P1	6P1
1P2	2P2	3P2	4P2	5P2	6P2
1P3	2P3	3P3	4P3	5P3	6P3
1P4	2P4	3P4	4P4	5P4	6P4
1P5	2P5	3P5	4P5	5P5	6P5
1P6	2P6	3P6	4P6	5P6	6P6
1P7	2P7	3P7	4P7	5P7	6P7
1P8	2P8	3P8	4P8	5P8	6P8
1P9	2P9	3P9	4P9	5P9	6P9
1P10	2P10	3P10	4P10	5P10	6P10
1P11	2P11	3P11	4P11	5P11	6P11
1P12	2P12	3P12	4P12	5P12	6P12
1P13	2P13	3P13	4P13	5P13	6P13
1P14		3P14	4P14	5P14	6P14
1P15		3P15	4P15	5P15	6P15
1P16		3P16	4P16	5P16	6P16

Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 6*
1P17		3P17		5P17	6P17
1P18		3P18		5P18	
1P19		3P19		5P19	
		3P20		5P20	
		3P21		5P21	
		3P22			
		3P23			

The above example was provided solely to demonstrate how the *systematic random selection method* would apply to selecting projects randomly for audit. If the Department would like to increase the sample size of projects to be audited, the percentage of the universe of items should also be increased. Furthermore, if the Department wants to audit fewer projects, the minimum sample size of three could be reduced.

To ensure compliance with this umbrella certification process, the research team suggests penalizing those contractors that do not comply with the procedures and requirements required by the Department, as specified in the Specifications and Materials Manual. We suggest that an initial penalty, for not providing the "back-up" certifications to an umbrella certificate when audited, would be for the contractor to loose the right to provide umbrella certificates in place of individual certificates for each component. If the contractor repeatedly fails to provide the required back-up certifications, then the Department should consider disqualifying the contractor from bidding on all Department projects that include any material or item requiring an umbrella certificate, as specified in the Materials Manual, for up to a period of five years. We suggest that the Department has the authority to reduce this period as necessary or appropriate. After being re-qualified, in writing, we suggest that the Department place the contractor on probation for two years. While the contractor is on probation, the Department may request to review the contractor's project files at any time. The contractor's failure to provide the requested documentation may result in the contractor being permanently disqualified from bidding on such Department projects.

This task was completed.

Task 10

Provide training of DOT personnel and contractors as well as any necessary process modifications prior to final implementation.

Before implementation of the new material certification process, training is necessary for users to gain a complete understanding of the new documents and procedures related to the new material certification process. The research team will provide at least three training sessions to Department personnel and the contracting community. The Department felt it was best to postpone the training sessions until the new MAT TEST was ready for implementation; therefore, training is tentatively scheduled for April 2000. The course will be presented in Rapid City, Pierre, and Sioux Falls at locations to be determined by the Department; a fourth session may be presented in Aberdeen, as decided by the Department

It is anticipated that each session will be approximately four hours in length and that the Department will be responsible for providing training materials to the participants.

An outline for the training course is included in Appendix D.

This task is not complete. The Department will inform the research team of the actual training dates.

Task 11

Submit a final report summarizing relevant literature, research methodology, findings and conclusions.

The final report is a culmination of the research and review of the draft report by the Technical Panel.

This task was completed with the production of this final report.

Task 12

Make an executive presentation to the SDDOT Research Review Board at the conclusion of the project.

The recommendations of the research team were presented to the SDDOT Research review Board on November 23, 1999, by the Principal Investigator. The presentation can be found in Appendix E.

This task was completed.

Chapter 5 Findings and Conclusions

5.1 Significant Findings

Building on findings from Study SD96-06 and other past studies, in-depth discussions with Department personnel and industry personnel, and surveys of other agency practices, the research team determined the following:

1. The number of SHAs focusing on the area of material certification is increasing. SHAs are attempting to improve their current process by whatever means possible - including automation of the entire process; testing new product; increased use of approved products; Department-furnished materials; blanket or umbrella certificates; annually certifying plants, suppliers, and fabricators; and prequalification.

2. Umbrella certificates for components of an installed system will reduce the number of certifying documents to be submitted by the contractor. The Contractor will be responsible for maintaining material acceptance records. The Department will conduct random audits of those projects requiring umbrella certificates each year to verify that contractor files and records are in conformance with the specifications. We developed DOT-99 form to serve as a generic umbrella certificate to be used for the following items:

    - Guardrail Systems
    - Roadway Lighting
    - Traffic Control
    - Signing Materials
    - Chain-Link Systems
    - Bridge Drains
    - Cattle Guards

3. Tiering materials that require certification on the basis of safety and cost will distinguish the materials that are critical from those materials that are not as critical. New definitions of the acceptance methods should be developed based on how materials are certified and verified. Specifications will be revised to address the different levels of certification for critical materials versus less critical materials and the new definitions of acceptance methods.

4. DOT-25 forms are not being used as originally intended. Most of the information being recorded on the DOT-25s is duplicative of what should be recorded in the diary. With the implementation of the new CMS, all of this data and information will have a location to be recorded electronically.

5. Based on an in-depth review of the Materials Manual in conjunction with Department personnel, a significant number of Certificates of Compliance

were recommended for elimination or replacement using Umbrella Certificates, Approved Products, or Certified Supplier designation. The Materials Manual and specifications should be modified to reflect the reduced number of certifications required and the procedural changes made.

6. Automation of the certification process, forms, etc. will reduce paperwork and improve efficiency and timeliness of the process.

7. The new process should be monitored through the Certification Engineer.

8. The tiering structure and revised procedures will improve accountability and compliance with the new processes by Department and contractor personnel.

9. The implementation of any new process requires training, follow-up, and "marketing" of the benefits to users. Training is recommended for Department personnel, consulting engineers, contractors, and vendors to ensure that the new processes are understood and properly executed.

Additionally, the Federal Highway Administration (FHWA) reviewed the Material Certifications and supporting documents on a number of the Department's projects. The review concluded that the records on 14 projects documented hundreds of occurrences where the minimum certification and sampling and testing requirements contained in the Department's Materials Manual were not being met. Failure to meet these requirements could jeopardize the Federal funding on the 14 projects reviewed as well as nay other projects with similar shortcomings. These findings motivated the Department to conduct research to assess its current certification process and to develop new methods and procedures that will enable them to avoid such occurrences in future projects.

5.2 Conclusions

Our findings indicate that the Department's biggest concern is consistent enforcement of its current Specifications and eliminating redundant or unnecessary certifications required in the Materials Manual. The Department indicated that its current Standard Specifications are not being followed consistently for each project. The previous researchers concluded in Study SD96-06 that:

> In practice the procedures are not followed in all cases. This is likely because the people involved do not feel the effort is warranted. The reasons given for not following procedures include the ideas that there are: duplications of certifying and testing of some materials; no verifications of certifications so there is no activity which encourages a supplier or contractor to be honest if they an inclination not to be … ; no penalties for contractors who do not provide the certifications before the materials are used in the projects; lack of time during the construction so activities with more perceived value are done instead.

In our review of the documentation, we also found ambiguities and duplication that promote inconsistent practices. We concluded that revisions to the Department's procedures and practices are necessary to promote consistent use.

To determine the best course of action, we participated in numerous discussions with Department personnel, local contractors, and industry contacts to form a consensus. With an agreement on what is necessary to successfully implement and promote a modified certification process, we developed new administrative procedures and specifications to ensure certification compliance. The number of certifications called for in the MSTR was reduced by eliminating the usage of the DOT-25 forms, developing an umbrella certification process, expanding the Approved Products List, deleting unnecessary or duplicative certification requirements for a single material. These actions, in turn, reduced the number of items listed in DOT-14 for a project.

We concluded the following:

1. DOT-25 forms should be eliminated. Visual inspection requirements will be documented in the diary entry of the CMP.

2. Based on changes to the Department's material certification process, the form of certification required by the MSTR portion of the Materials Manual can be simplified for certain materials. Table No. 7 below lists those materials that no longer require submission of a Certificate of Compliance. The table indicates the recommended form of certification in accordance with suggested revisions to the MSTR portion of the Materials Manual.

3. Based on discussions with Department personnel, it was determined that certain materials were no longer used by the Department or no longer need to be certified before use. The following materials are deleted in their entirety from the MSTR portion of the Materials Manual:

    - Aluminum Bolts, Nuts, Washers, and Fasteners
    - Asbestos, Cement, and Bituminous Fiber
    - Bituminous Coating
    - Dust Oil
    - Dust Oil Chlorides
    - Earth Subgrade Trimming
    - Extruded Insulation Board
    - Fiber Glass Roving
    - Filter Blanket Aggregate
    - Grass, Hay or Straw Mulch
    - Latex Emulsion
    - Peat Moss
    - Plants and Shrubs

Table No. 7 – Eliminated Certificates of Compliance

	Revised Requirement*					
Description	***UC***	***APL***	***CS***	***BL***	***N/R***	***DEL***
Admixtures		X				
Asbestos, Cement, and Bituminous Fiber						X
Backer Rod (all types)		X				
Bituminous Coating						X
Cement			X			
Chain-Link System	X					
Chlorides (sodium, calcium, and magnesium)				X		
Drainage Fabric		X				
Drop Inlet Frames, Grates, Box Curb Assemblies, etc.		X				
Dust Oil						X
Dust Oil Chlorides						X
Fertilizer				X		
Fiber Glass Roving						X
HDPE		X				
High-Strength Bolts (for lighting and signing)	X					
Hot Poured Elastic Type		X				
Latex Emulsion						X
Liquid Membrane Curing Compound		X				
Peat Moss						X
Permanent Plastic Pavement Markers		X				
Plants and Shrubs						X
PVC					X	
Reinforcing Bars (certified supplier or uncoated)					X	
Sealant		X				
Silicone		X				
Silt Fence		X				
Strip Seal and Preformed Elastomeric Open Cell Compression Type with Lubricant/Adhesive		X				
Treating Oil					X	
Wire Basket and Gabions		X				
Wood Posts (for signing materials)	X					
Total COCs Eliminated:	**3**	**13**	**1**	**2**	**3**	**8**

* The revised requirements are defined as: UC – Umbrella Certificate, APL – Approved Products List, CS – Certified Supplier, BL – Bill of Lading, N/R – None required, and DEL – Deleted.

4. The number of certifications required will be reduced, thereby reducing the number of items in DOT-14 and paperwork. This will result in faster turn around and project close-out.

5. The benefits derived from this research study are as follows:

a. Arrival of a consensus among the Department and contracting community regarding what is needed for successfully implementing an improved materials certification process.

b. Development of documentation and language necessary to define and implement a tiered structure for certifying materials.

c. Use of umbrella certificates for appropriate work items to expedite the certification process. Items include the following:

- Guardrail Systems
- Roadway Lighting
- Traffic Control
- Signing Materials
- Chain-Link Systems
- Bridge Drains
- Cattle Guards

d. Revision of the Materials Manual and specifications thereby reducing paperwork to be submitted by the contractor and reviewed by the Department. This will result in faster turn around and project close-out.

e. Execution of a more streamlined, practical, and enforceable certification process.

f. Presentation of follow-up training to promote understanding and acceptance of the changes.

In summary, the Department's implementation of this certification process will reduce the effort and paperwork required to install certified materials, and ultimately save both the Department and the contracting community time and money.

Chapter 6 Implementation Recommendations

The research team recommends that the Department perform the following to implement the new certification process:

Specification Revisions

1. Accept the changes made to the RSTC document during the course of this project. The new definitions and procedures concerning the suggested materials certification process developed by the research team were incorporated. Specifically, paragraphs 5.10, 5.11, and 5.12 were deleted from Section 5. A new Section 6, entitled "Certification Process", was created. This Section includes definitions and operational procedures for the tiers, certification, certificates, certified suppliers, items on the Approved Products List, umbrella certificates, and verification methods. Additional changes, resulting from the research team's independent review of the RSTC document, were made for consistency as well as to update the document from its last printing.

   For brevity sake, the revised RSTC portion of the Materials Manual was not included within the body of this report but is referenced by Supplementary Notes.

2. Accept the changes made to the MSTR document during the course of this project. The changes made to this document reflect every definition, procedure, and practice developed from this research study. The tiering structure is incorporated into the revised document to classify each material in terms of the level of certification needed for acceptance. The types of certification required and methods of Acceptance testing were modified to reflect the findings and conclusions of this study. Additional changes, resulting from the research team's independent review of the MSTR document, were made for consistency as well as to update the document from its last printing.

   For brevity sake, the revised MSTR portion of the Materials Manual was not included within the body of this report but is referenced by Supplementary Notes.

3. Revise the Section 6.3 of the Standard Specifications by Special Provision to ensure compliance with the new certification process. A draft of this Special Provision is included as Appendix A.

Procedural Changes

4. Expand the APL list. Use Study SD95-02, *Product Evaluation Procedure*, as a starting point. With its expansion, fewer certificates will need to be submitted. Products can be included in the CMS for fast access.

5. Expand the list of Certified Suppliers. With its expansion, fewer certificates will need to be submitted and Acceptance tests performed. This should reduce the number of samples and tests needed for each project, thereby reducing the workload on the Materials Certification Office.

6. Eliminate the DOT-25 form. Require inspectors to record information directly into the CMS.

7. Adopt DOT-99 (Umbrella Certificate) form as shown in Figure No. 1.

8. Adopt the tiering structure illustrated in Figure No. 2. In doing so, the Department will promote enforcement of its specifications, especially on payment issues.

9. Accept Umbrella Certificates for the following:

   - Guardrail Systems
   - Roadway Lighting
   - Traffic Control
   - Signing Materials
   - Chain-Link Systems
   - Bridge Drains
   - Cattle Guards

10. Use the CMS to improve efficiency and control of the Material Certification process.

Training

11. Provide training to Department personnel and contractors. A Training Outline is included as Appendix D.

    Training will be scheduled to coincide with the planned implementation of the MAT TEST. Training sessions will be held in Rapid City, Pierre, and Sioux Falls. An additional course may be presented in Aberdeen.

Follow-Up Research

12. Research and develop a formal Construction Manual. By creating a useable Construction Manual, the Department can dictate specific regulations and procedures to be followed on site. In addition, provide a training course to field inspectors.

13. Follow through with the implementation of the revised Approved Products List Process suggested by Study SD95-02.

14. Conduct a pilot project to test the validity of the recommended processes and procedures and to evaluate their integration with the CMS. We provided guidelines and five parameters for selecting a pilot project under Task 8. Furthermore, to

implement the new certification process, we recommend that the Department follow the steps outlined in the timeline shown in Figure No. 3.

Implementation Timeline

Date	Direction
February 2000	Accept recommendations and adopt the tiering structure and procedures and processes inserted in the Materials Manual. (to be performed by the Certifications Engineer)
March 2000	Make adjustments and finalize Materials Manual, and revise the Standard Specifications or release Special Provision until revisions are made.
April 2000	Provide training to Department personnel. (to be performed by the Research Team)
April 2000	Department must seek FHWA approval of the proposed changes. Necessary information should be presented to FHWA by _____.
2000 - 2001	Conduct an actual pilot project

Figure No. 3

In closing, the Department needs to be more in tune with the practices and procedures being conducted in the field. If materials are identified that are not critical to safety or quality of the end product, and are historically found to be reliable with or without certification, these materials should be reconsidered and possibly deleted from the MSTR portion of the Materials Manual. Likewise, similar action should be taken if the form of certification required or the verification method used is not well suited for a particular material due to latest industry practices, improved materials, or level of criticality to the project.

References

1. South Dakota Department of Transportation Study SD96-06 Final Report, Improvement of the Material Certification Process, January 1998.

2. National Cooperative Highway Research Program Synthesis of Highway Practice 102, Material Certification and Material-Certification Effectiveness, Transportation Research Board, National Research Council, Washington, DC, November 1983.

3. National Cooperative Highway Research Program Synthesis of Highway Practice 212, Performance-Related Specifications for Highway Construction and Rehabilitation, Transportation Research Board, National Research Council, Washington, DC, 1995.

4. National Cooperative Highway Research Program Synthesis of Highway Practice 263, State DOT Management Techniques for Materials and Construction Acceptance, Transportation Research Board, National Research Council, Washington, DC, 1998.

5. Construction Material Process Review Study, Wisconsin Department of Transportation, 1995.

Appendix A Special Provision

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
MATERIAL CERTIFICATION PROCESS

_____, PCEM _____
_____ COUNTY

NOVEMBER 3, 1999

Replace Section 6.3 of the Standard Specifications with the following:

SECTION 6.3
SAMPLES, TESTS, CITED SPECIFICATIONS

The Contractor shall furnish certifications for all materials designated in the Contract or the Department's Materials Manual that will be accepted by certification. The materials included in the "Minimum Sample and Test Requirements" have been assigned tiers based on how crucial the material is to the overall success of the project. The most critical materials are classified as Tier 1 materials. Tier 1 materials must be inspected, tested, and approved for use by the Engineer, prior to incorporation in the work. Tier 2 materials require certification; however, these materials may be placed in the work pending approval. Tier 3 materials are non-critical materials. Certification is not required for Tier 3 materials, and the material may be placed in the work at any time. Unapproved materials shall not be used and will be subject to inspection, test, rejection, and removal at no additional cost to the Department. Copies of tests will be furnished to the Contractor's representative when requested.

Materials may be certified by the following methods, defined in Section 6 of the "Required Samples,

Tests, and Certificates”, and as required in the “Minimum Sample and Test Requirements”:

A. Certificates of Compliance

B. Certified Supplier

C. Approved Products List

D. Umbrella Certificates

Samples taken and tests made will be in accordance with the most recent standard or approved interim standard methods of AASHTO, ASTM, and the South Dakota Department’s Materials Manual, which are current on the date of advertisement for bids. Samples will be taken and tests made by a representative of and at the expense of the Department except as otherwise stipulated.

If a discrepancy exists, the order of precedence is as follows:

A. Department’s Materials Manual

B. AASHTO

C. ASTM

In addition to revisions to the Standard Specifications, significant changes have been made to the Materials Manual. A complete rewrite of the “Minimum Sample and Test Requirements” portion has been performed. The “Required Samples, Tests, and Certificates” portion was also revised to include new definitions and procedures.

Revisions in the “Minimum Sample and Test Requirements” portion include the following:

1. Each item is identified by a tier. The purpose of the tiers is to classify the items from the most critical (Tier 1) to non-critical (Tier 3 or not applicable). Tier definitions are included in Section 6.1 of the “Required Samples, Tests, and Certificates”.

2. Where possible, the requirement for a Certificate of Compliance was deleted. Instead, these materials can be provided from a Certified Supplier, be found on the Approved Products List, or be included under an Umbrella Certificate.

3. All references to the DOT-25 form were deleted. The Department will no longer use this form.

4. The Process Control requirements were deleted.

For use as a reference guide only, a summary spreadsheet, entitled “MSTR Summary”, was created. At the end of the spreadsheet is a list of those items that were deleted, renamed, or reorganized.

Revisions in the “Required Samples, Tests, and Certificates” portion include the following:

1. The Process Control requirements were deleted.

2. Section 4 was revised to reflect new terms.

3. Text from Sections 5.10 through 5.12 was revised and included in the new Section 6. Original Sections 6 and 7 were renumbered accordingly.

4. The new Section 6 addresses the revised Material Certification process, including the Tiering Structure, verification methods, additional certification processes, and updated definitions and operational procedures.

* * * * * * * *

Appendix B Questionnaire Results

1. SDDOT is exploring the use of an umbrella or blanket certification to certify materials that are components of a system. (Examples include materials that make up lighting systems, guardrail, fence, roadside development, signing and delineation, miscellaneous structural steel, rest areas, and buildings.)

   a. Does your State allow any materials to be certified under an umbrella or blanket certification?

	Response			
Contact State	**Yes**	**No**	**Similar**	**No Reply**
Wyoming				X
West Virginia				X
Washington			X	
Pennsylvania				X
Arkansas			X	
Illinois				X
Connecticut		X		
Maryland				X
Montana				X
Wisconsin		X		
Ohio				X
Virginia				X
Maine				X
Nebraska		X		
North Dakota	X			
Oklahoma		X		
New Hampshire				X
Kentucky		X		
Kansas				X
New York	X			
Iowa				X
Idaho			X	
Missouri		X		
Georgia				X
Mississippi				X
Florida		X		
Oregon		X		
Nevada	X			
South Carolina		X		
New Jersey		X		
Delaware		X		

Note: Discussions with Delaware took place; however, Delaware did not respond to this questionnaire.

b. If so, list the "system" and its component materials.

Contact State	System
Washington	Certification is after the fact. All materials listed are accepted and tested as components.
Arkansas	Lighting systems, rest area, and buildings would be accepted based upon certifications and product information on material the contractor proposes for use. Guardrail, fence, and roadside development items are on QPL; these items are accepted by brand and manufacturer.
North Dakota	Allow a COC for assemblies. Did not list specifically; responded "yes" to question.
New York	Blanket certification to cover all component materials for guide rail.
Idaho	Did not list specifically; responded "some materials" to question.
Nevada	Provided a generic sample of a blanket certificate. Only use for materials that do not require any testing or certified test results.

c. How are the "systems" tested? Are the component materials tested separately, is the completed system tested as a whole, or is the system randomly tested?

Contact State	Whole	Random	Other/Comment
Washington		X	Sampled and tested on lot by lot basis.
Arkansas		X	Selected by lot. Most tested by component.
North Dakota		X	At our lab or at a private lab.
New York	X		
Idaho		X	
Nevada		X	On various items.

d. How are the materials paid for? (I.e., before the receipt of certification, when the materials are placed, when the system is completed, or after acceptance of the system.)

Contact State	Before certifying	When placed	After approval	Other/Comment
Washington				After receiving a proper manufacturer's Certificate of Compliance
Arkansas		X		In addition, may be partially paid with stockpiling on site.
North Dakota		X		
New York			X	After being placed. Partial payment for some approved materials to be installed at a later date.
Idaho			X	
Nevada				After approved certification is on file; not always true.

2. SDDOT is particularly interested in the certification process for crucial materials. How does your State handle certification, acceptance, testing, measurement, and payment for the following materials?

   a. High-strength bolts.

Contact State	Response
Washington	Sampled as per AASHTO M 164, ASTM A 449, and ASTM F 606. Galvanized bolts are tested for hydrogen embattlement as per ASTM F 606, Section 7.
Arkansas	Manufacturer's certification. Also, must be 'Made in America'. Measurement based on the table. Payment is based on a unit of pay.
Connecticut	Generally test according to Standard Specifications. Measured and paid in a manner consistent with its use – varies project to project.
Wisconsin	Random tests.
Nebraska	A lab test and required manufacturer mill tests.
North Dakota	Certificate of Compliance, accepted upon installation. Tested randomly at private lab. Measured individually. Paid by regular contacts.
Oklahoma	Not included in materials list.
Kentucky	Accepted by testing and certification. Testing performed on a prescribed frequency per shipping lot. Bolts tested according to ASTM A 325 and ASTM F 606 requirements. Bolts considered incident to structural steel which is paid for by lump sum.
New York	Structural steel connections are accepted after random sampling and testing. Bolts required to have manufacturer's certification to be reviewed by a Department representative. Random representative samples are selected and tested at Department labs. Bolts required to be manufactured with corrosion resistant steel/chemistry of steel also tested. Approved bolts are then installed and paid for as part of the structural steel item.
Idaho	Tested and certified by the supplier. Spot testing by DOT.
Missouri	Certification and random lot testing.
Florida	Certified.
Oregon	Certified, accepted on the basis of certification and ODOT inspection and testing. Tested, lab report from materials. Measured, incidental to another item. Paid for incidental to another item.
Nevada	Acceptable AASHTO or ASTM, Mill/Refinery test results. Not tested unless there is a question concerning its strength. Measurement is by lump sum or kilogram and payment is the same.
South Carolina	Accepted by manufacturer certification and sampling and testing. Measured by lump sum and paid by lump sum.
New Jersey	100% testing of each bolt.

b. Precast, pre-stressed items.

Contact State	Response
Washington	Use of WSDOT's Fabrication Inspection Section to inspect materials statewide at the point of fabrication or manufacture of precast, pre-stressed concrete items. WSDOT only uses PCI certified production facilities having QC plans approved by inspections and testing. Most precast items are paid by minimum bid prices, where pre-stressed girders are usually part of the 'lump sum superstructure' items.
Arkansas	Approved currently have on file a letter of agreement with the Arkansas Highway and Transportation Department to furnish concrete pipes manufacturers in accordance with AHTD Standard Specifications and referenced AASHTO. Must be 'Made in America'. Miscellaneous precast concrete products are accepted based on a certificate of delivery furnished by the manufacturer to the Resident Engineer.
Connecticut	Generally test according to Standard Specifications. Measured and paid in a manner consistent with its use – varies project to project.
Wisconsin	Suppliers are certified. The certification is substantiated with tests.
Nebraska	Most by inspection and testing at the manufacturer's plant, with component materials sent to the lab for analysis.
North Dakota	Certified and accepted based on QC/QA program, randomly tested and inspected, measured individually, paid by regular contact procedures.
Oklahoma	Materials sampled and tested by the central laboratory for acceptance.
Kentucky	Accepted by in-plant sampling and testing for the ingredient materials and inspection of the finished product. Beams paid for by the linear meter (foot) and drainage structures by the unit.
New York	Typically evaluated by a Department representative during fabrication. Concrete tested for slump, compressive strength, and percent air content by the manufacturer as well as witnessed by the Department representative. Quality of finished concrete is randomly evaluated by coring to confirm the compressive strength and air content. Subsequently to a satisfactory evaluation, the units are accepted for shipment to the project site. Payment made after installation and final acceptance at the project site.
Idaho	Inspected and tested during fabrication by DOT.
Missouri	Inspection of raw materials, inspection of casting process, and reporting of inspected items to the job, as containing suitable materials constructed per the plans.
Florida	FDOT stamp, inspection.
Oregon	Certified. Accepted on the basis of certifications and ODOT inspection and testing. Tested, lab report from materials. Measured, usually as each or linear. We are moving to linear to allow us to prepare better engineering estimates. Paid for generally as a separate bid item, paid for with a unit price for the measured quantity.
Nevada	Applicable AASHTO or ASTM for materials used to create, testing of seven-wire stressing strand, precast concrete members are measured and paid for on 'each' basis, pre-stressed items are measured and paid for on an 'each' basis.
South Carolina	Accepted by testing individual components. Measured by linear foot and paid for by linear foot.
New Jersey	100% testing of each item.

c. Epoxy-coated reinforced steel.

Contact State	Response
Washington	Only acceptable from approved coating facilities. On-site inspection by the WSDOT fabrication inspectors to check for compliance with the specification. Always used in the top mat of roadway decks and paid as part of the 'lump sum superstructure'. When epoxy-coated rebar is a separate bit item, it is paid by the pound for the steel placed.
Arkansas	Those listed must agree to the requirements for certification. Failure to follow the certification agreement and/or failing results of tests of random samples will be cause for removing from this QPL.
Connecticut	Generally test according to Standard Specifications. Measured and paid in a manner consistent with its use – varies project to project.
Wisconsin	Approved list.
Nebraska	Certification of epoxy coating is required to be conducted by Department personnel. Test samples of each heat of steel is required to be sent to the NDR lab for testing. Mill tests also required.
North Dakota	Certificate of Compliance, accepted upon installation, tested randomly at private lab, measured individually, paid by regular contract procedures.
Oklahoma	Materials sampled and tested by the central lab for acceptance.
Kentucky	Accepted by mill certification, epoxy plant coating reports along with project sampling and testing. Paid by the kilogram in place.
New York	Materials attained from the NY State Department approval list of suppliers.
Idaho	Tested and certified by supplier, spot tested by DOT.
Missouri	Typically from a pre-qualified coater with samples on job for black steel properties and epoxy bending properties using pre-qualified coating material.
Florida	N/A
Oregon	Come from a source on our qualified products listing (QPL). Typically receive certification and material origin for both steel and the epoxy. Accepted based on QPL for coating and for steel manufacturer. If not on the QPL, the ODOT lab will provide testing and inspection. Normally not measured, paid lump sum. Occasionally changes require computations and an adjustment based on kilograms (pounds). Paid for by lump sum, occasionally this is supplemented by an adjustment to reflect necessary changes made in the field.
Nevada	Applicable AASHTO or ASTM, certifications for epoxy and process. Rebar is tested per each 2200 kg for each size bar, along with mill reports. Rebar is measured and paid for by the kilogram.
South Carolina	Accepted by certification (coating) and tested for strength. Measured by pound and paid for by the pound.
New Jersey	100% inspection.

d. Critical structural steel for bridges.

Contact State	Response
Washington	Inspected at the point of fabrication by the WSDOT fabrication inspectors. Only firms that possess the necessary capabilities are approved for this work. Measured and paid for on a lump sum basis.
Arkansas	This item shall consist of furnishing, fabricating, assembling, erecting, and painting structural metals for bridge structures and other steel products according to these specifications and plans. All structural steel fabricators shall be certified for AISC Category SBr (Simple Steel Bridge Structures) or MBr (Major Steel Bridges) as appropriate, except as provided.
Connecticut	Generally test according to Standard Specifications. Measured and paid in a manner consistent with its use – varies project to project.
Wisconsin	Certification and shop inspection.
Nebraska	Plant inspection and mill tests required.
North Dakota	Certified and tested by private lab during fabrication, accepted upon installation, measured individually, paid for by regular contract procedure.
Oklahoma	Materials sampled and tested by the central lab for acceptance.
Kentucky	Accepted by inspection and testing at the fabrication shop. Paid for by lump sum.
New York	Performed as witnessed by a Department representative. Certification of the steel is reviewed by the representative for the fabrication process and loading for shipment. The structural steel is paid based upon weight at the project site.
Idaho	Tested and certified by supplier.
Missouri	Shop inspected by bridge personnel, now going to a lot of QC/QA processes for this.
Oregon	Certified. Accepted, on the basis of certifications and ODOT inspection and testing. Tested, lab report from materials. Measured, generally lump sum, occasionally in the past some items have been linear or square area. Paid for as lump sum or by unit price.
Nevada	Applicable AASHTO or ASTM, certifications for all materials used, fabrication reports, ultrasonic, NDT reports. Measured and paid for on each basis.
Florida	Certification QC plan.
South Carolina	Accepted by mill certification. Measured by lump sum and paid for lump sum.
New Jersey	100% inspection.

3. SDDOT requires certain crucial materials to be certified, tested, AND accepted before allowing them to be placed. Does your State have any materials that fall under these requirements?

   a. If so, please list the materials.

Contact State	List of materials
Kentucky	Asphalt mixtures gradation and asphalt content, asphalt mixtures thickness tolerances, overlay thickness tolerances, deduction table for non-specification cement, payment deduction schedules for fine and coarse aggregates, asphalt cement price adjustment schedule, fly ash test payment reduction schedule, payment adjustment schedules for geo-textile fabrics.
New Jersey	Structural steel bridge members.

Note: Those States not mentioned did not specify any specific materials.

b. & c. How are these requirements enforced? Are there any penalties for not complying with these requirements?

Contact State	Response
Washington	Contractor may have payment withheld on the next progress estimate or until doubt concerning the quality of material is erased for placement prior to testing, or failure to provide certificates prior to placement.
Arkansas	No penalties; however, items would be required to be removed and replaced if they fail to meet specifications or payment will be withheld until the items were approved.
Connecticut	Contractor may be made to remove and replace suspect materials, or an appropriate pay adjustment will be made in a manner consistent with our policies.
Wisconsin	Yes. In addition, we have incentive and disincentive projects.
Nebraska	Deducts and material removal can be imposed upon the prime contractor.
North Dakota	Such materials would not be allowed on the project.
Oklahoma	If the material or/and workmanship is not successful, the material should be rejected. Contractor will not be paid 100% of the money earned.
Kentucky	We have penalty/price reductions.
New York	Products are to be accepted prior to installation. Evaluation of products takes place at the manufacturing site rather than the project site. This provides greater assurance that only approved materials will be installed. If manufacturer doesn't comply with the above requirements, their products will not be accepted. The contractor is charged with liquidation damages if the contract extends beyond the contract date if the prime contractor's selected manufacturers who do not follow the specification requirements, causing delay in the receipt of products.
Idaho	Correction if feasible. Replacement if the application is critical. Price reduction if correction isn't feasible and the application isn't critical.
Missouri	No penalty. Per specs, the contractor is required to bring and only use inspected materials on job. Responsibility lies on contractor to ask for inspection. Theoretically, no inspection and approval, no intermediate payment, however this is somewhat lax. Little sympathy for non-spec materials incorporated into work, but if the material used then tested OK after fact, no penalty.
Florida	QPL items have a two-event penalty. First occurrence is noted, second occurrence is removal from QPL.
Oregon	Oregon doesn't have any formal internal penalties but it is strongly discouraged. Some field offices withhold payment for items that are placed prior to formal acceptance/documentation. This is a very difficult situation, as it usually becomes apparent that we allowed the placement of the materials and they have a value and are generally suitable for the intended use. Then the contractor is paid.
Nevada	If the materials, after testing, are shown not to meet the applicable specification it is possible that the materials could be accepted on a non-payment or reduced payment, depending on the type of material or failure.
South Carolina	Materials used without prior test and approval or written permission of the Engineer may be considered as defective and unauthorized and may not be paid for SC Standard Specification 106.03.
New Jersey	Enforced by quality assurance inspection by NJDOT. Material is not accepted if requirements are not followed.

Appendix C MSTR Summary

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
1	**Asphalt Construction**				
1.1	Asphalt Concrete, Hot Mix				
A.	-Aggregate, Composite	3	See General Notes	S&T (DOT-3) (DOT-68)	S&T
B.	-Rock, Sand, Filler, etc.	3	N/R	S&T	N/R
C.	-Asphalt Cement	2	Certificate of Compliance	RS&T (SD 301)	S&T or observe AT
D.	-Asphalt Content	N/A	N/R	calculate from measured quantities (DOT-89) and spot check (DOT-66)	N/R
E.	-Density, In-Place	N/A	N/R	S&T (DOT-42)	S&T or observe AT
F.	-Density, Standard	N/A	N/R	S&T (DOT-42)	S&T
1.2	Asphalt Surface Treatment				
A.	-Cover Aggregate, Types 1 and 2	3	N/R	S&T (DOT-3)	N/R
B.	-Cover Aggregate, Type 3	3	N/R	S&T (DOT-3)	N/R
1.3	Asphalt Liquid				
A.	-Material	2	Certificate of Compliance	S&T	N/R
1.4	Crack Sealing of Asphalt Concrete				
A.	-Sealant	2	APL	S&T	N/R
B.	-Backer Rod	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
2	**Subbase, Base Course, and Cushion Construction**				
2.1	Untreated Subbase, Base Course, and Cushion				
A.	-Aggregate, Composite	3	See General Notes	S&T (DOT-3)	S&T
B.	-Rock, Clay, Sand, Filler, etc.	3	N/R	S&T	N/R
C.	-Density, In-Place (Excludes Gravel Cushion)	N/A	N/R	S&T (DOT-41)	S&T
D.	-Density, Standard (Excludes Gravel Cushion)	N/A	N/R	1-point or 4-point determination (DOT-41)	S&T
2.2	Asphalt Treated Subbase, Base Course, and Cushion (Cold Mix)				
A.	-Aggregate, Composite-Uncoated	3	N/R	S&T (DOT-3)	S&T
B.	-Rock, Clay, Sand, Filler, etc.	3	N/R	S&T	N/R
C.	-Asphalt	2	Certificate of Compliance	RS&T	N/R

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
D.	-Asphalt Content	N/A	N/R	calculate from measured quantities (DOT-89) and spot check (DOT-66)	N/R
E.	-Density, In-Place	N/A	N/R	S&T (DOT-41)	S&T
F.	-Density, Standard	N/A	N/R	S&T (DOT-41)	S&T
3	**Miscellaneous Granular Materials**				
3.1	Gravel and Sand for Maintenance Stockpiles				
A.	-Aggregate	3	N/R	S&T (DOT-3)	N/R
3.2	Gravel Surfacing				
A.	-Aggregate	3	N/R	S&T (DOT-3)	S&T
B.	-Rock, Stone, Sand, Clay, etc.	3	N/R	S&T (DOT-26) (DOT-3)	S&T
3.3	Blotting Sand for Prime Coat and Sand for Flush Seal				
A.	-Aggregate	3	N/R	S&T (DOT-3)	N/R
3.4	Bridge End Backfill				
A.	-Aggregate	3	N/R	S&T (DOT-3)	N/R
3.5	Gabion Fill (Rock or Stone)				
A.	-Aggregate	3	N/R	documented visual inspection	N/R
3.6	Porous Backfill				
A.	-Aggregate	3	N/R	S&T (DOT-3)	N/R
3.7	Riprap				
A.	-Aggregate	3	N/R	documented visual inspection	N/R
3.8	Slope Protection Aggregate				
A.	-Aggregate	3	N/R	S&T	N/R
3.9	Base Course Salvage, Cold Recycling, and Processed In-Place Materials				
A.	-Aggregate	3	N/R	S&T (DOT-3)	N/R
B.	-Density, In-Place	N/A	N/R	S&T (DOT-41)	N/R
3.10	Granular Box Culvert Undercut Backfill				
A.	-Aggregate	3	N/R	S&T (DOT-3)	N/R
B.	-Density, In-Place	N/A	N/R	S&T (DOT-41)	N/R
C.	-Density, Standard	N/A	N/R	1-point determination	N/R
3.11	Miscellaneous Granular Materials (Pit-Run/Box Culvert Bedding/Etc. When Specifications are Noted)				
A.	-Aggregate	3	N/R	S&T	N/R
4	**Subgrade Construction (Embankments)**				
4.1	Specified Density (In-Place)				

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
A.	-Embankment (Includes Subgrade Topping)	N/A	N/R	S&T (DOT-41)	S&T
B.	-Berms	N/A	N/R	S&T (DOT-41)	S&T
C.	-Pipe Culvert Undercut Backfill (Includes Box Culverts)	N/A	N/R	S&T (DOT-41)	N/R
D.	-Pipe Backfill (Includes Box Culverts) (a) Cross, Storm Sewer, Sanitary Sewer, and Water Main Pipe (b) Approach Pipe	N/A	N/R	S&T (DOT-41) S&T (DOT-41)	S&T N/R
E.	-Density, Standard (Target)	N/A	N/R	S&T (DOT-41)	S&T
4.2	Ordinary Compaction Method				
A.	-Density	N/A	N/R	S&T (DOT-41)	N/R
B.	-Density, Standard (Target)	N/A	N/R	S&T (DOT-41)	S&T
4.3	Moisture Content				
A.	-Embankment (Includes Select Subgrade Material, Berms, Box Culvert, and Pipe Backfill; Excludes Ordinary Compaction)	N/A	N/R	S&T (DOT-35)	N/R
B.	-Moisture, Standard (Target)	N/A	N/R	S&T	N/R
5	**Portland Cement Concrete Paving Construction**				
5.1	Materials				
A.	-Aggregate, Fine and Coarse	3	N/R	S&T (DOT-3)	S&T
B.	-Aggregate, Fine and Coarse, Moisture Content	N/A	N/R	S&T (DOT-35)	N/R
C.	-Cement	2	*Certified Supplier:* N/R *Non-Certified Supplier:* Certificate of Compliance	S&T	N/R
D.	-Water	3	N/R	S&T	N/R
E.	-Admixtures (Includes Air Entraining, Water Reducing, Accelerators, Retarders, etc.)	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
F.	-Fly Ash	2	Certificate of Compliance	RS&T	S&T or observe AT
5.2	Strength Tests				
A.	-Compressive Strength	N/A	N/R	S&T (DOT-9)	N/R
5.3	Fresh (Plastic) Concrete Tests				
A.	-Air Content, Slump, and Temperature	N/A	N/R	S&T (DOT-23)	S&T or observe AT (DOT-23)
B.	-Unit Weight (Yield)	N/A	N/R	S&T (DOT-23)	N/R
5.4	Measurements				

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
A.	-Surface	N/A	N/R	profilograph test or SD 417	N/R
B.	-Texture	N/A	N/R	S&T (SD 418) (DOT-55)	N/R
C.	-Thickness	N/A	N/R	S&T core or depth checks	N/R
D.	-Width	N/A	N/R	S&T	N/R
5.5	Curing Materials				
A.	-Liquid Membrane Curing Compound	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
B.	-Burlap and Cotton Mat	3	N/R	documented inspection	N/R
C.	-Polyethylene Sheeting	3	N/R	documented inspection	N/R
5.6	Joint Materials				
A.	-Preformed Expansion Type (Includes Non-Extruding and Resilient Bituminous and Non-Bituminous Types)	3	N/R	S&T	N/R
B.	-Hot Poured Elastic Type	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
C.	-Backer Rod (Hot Pour)	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
D.	-Silicone	2	APL	S&T *In-Place:* S&T	N/R
E.	-Backer Rod (Silicone)	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
5.7	Keyways				
A.	-Material	3	N/R	documented inspection	N/R
5.8	Treating Oil				
A.	-Material	3	N/R	S&T or documented visual inspection of certified analysis from container label	N/R
6	**Portland Cement Concrete Structure Construction**				
6.1	Materials				
A.	-Aggregate, Fine and Coarse	3	N/R	S&T (DOT-3)	S&T
B.	-Aggregate, Fine and Coarse, Moisture Content	N/A	N/R	S&T (DOT-35)	N/R

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
C.	-Cement	2	*Certified Supplier:* N/R *Non-Certified Supplier:* Certificate of Compliance	S&T	N/R
D.	-Water	3	N/R	S&T	N/R
E.	-Admixtures (Includes Air Entraining, Water Reducing, Accelerators, Retarders, etc.)	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
F.	-Fly Ash	2	Certificate of Compliance	RS&T	N/R
6.2	Strength Tests				
A.	-Compressive Strength	N/A	N/R	S&T (DOT-9)	N/R
6.3	Fresh (Plastic) Concrete Tests				
A.	-Air Content, Slump, and Temperature	N/A	N/R	S&T (DOT-23)	S&T or observe AT (DOT-23)
B.	-Unit Weight (Yield)	N/A	N/R	S&T (DOT-23)	N/R
6.4	Curing Materials				
A.	-Liquid Membrane Curing Compound	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
B.	-Burlap	3	N/R	documented inspection	N/R
C.	-Film (Sheet Materials Including Water Proof Paper, Polyethylene Sheeting, White Burlap-Polyethylene Sheeting, etc.)	3	N/R	documented inspection	N/R
6.5	Joint Materials				
A.	-Strip Seal and Preformed Elastomeric Open Cell Compression Type with Lubricant/Adhesive	2	*APL:* N/R *Non-APL:* Certificate of Compliance	documented visual inspection	N/R
B.	-Preformed Expansion Type (Includes Non-Extruding and Resilient Bituminous and Non-Bituminous Types)	3	N/R	S&T	N/R
C.	-Hot Poured Elastic Type	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
D.	-Silicone	2	APL	documented visual inspection	N/R
E.	-Backer Rod	2	*APL:* N/R *Non-APL:* Certificate of Compliance	documented visual inspection	N/R
6.6	Commercial Textured and Special Surface Finish				
A.	-Material	2	APL	documented visual inspection	N/R

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
6.7	Abutment Backwall Coating				
A.	-Material	2	APL	documented visual inspection	N/R
6.8	Treating Oil				
A.	-Material	3	N/R	S&T or documented visual inspection of certified analysis from container label	N/R
6.9	Measurement of Texture				
A.	-Tined Surface	N/A	N/R	S&T (SD 418) (DOT-55)	N/R
7	**Portland Cement Concrete Miscellaneous Construction - Class M (Class I)**				
7.1	Materials and Plant				
A.	-Requirements	2	Certified Statement (DOT-57)	documented visual inspection and S&T (DOT-23)	N/R
8	**Roadway Lighting and Traffic Control**				
8.1	Materials				
A.	-Standard Items of Electrical Equipment	3	N/R	documented visual inspection	N/R
B.	-Miscellaneous Hardware Items	3	N/R	documented visual inspection	N/R
C.	-Items that are on the "Approved Products List"	2	APL	documented visual inspection	N/R
D.	-Items Requiring Approval of Catalogue Cuts or Shop Drawings	1	Traffic Design Engineer's approval	documented visual inspection	N/R
E.	-Items Requiring an Umbrella Certificate for the Materials	2	Umbrella Certificate (DOT-99)	documented visual inspection	N/R
F.	-High-Strength Bolts	2	Umbrella Certificate (DOT-99)	S&T (SD 507) (SD 503) (DOT-96)	N/R
9	**Roadside Development**				
9.1	Materials				
A.	-Burlap, Excelsior Blanket, and Jute Mesh (Includes Fasteners)	3	N/R	documented inspection	N/R
B.	-Fertilizer	2	Bag Label or Bill of Lading	N/R	N/R
C.	-Fiber Mulch	2	Certificate of Compliance	documented visual inspection	N/R
D.	-Seeds	2	Certificate of Seed Analysis or Certified test report prior to seeding	RS&T and documented visual inspection of tags	N/R
10	**Building and Rest Area Construction**				
10.1	Materials				
A.	-Brick	3	N/R	S&T or documented visual inspection	N/R
B.	-Insulation	3	N/R	documented visual inspection	N/R

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
C.	-Building Block (Hollow or Solid)	3	N/R	S&T	N/R
D.	-Basin and Manhole Block	3	N/R	documented visual inspection	N/R
E.	-Miscellaneous Hardware Items	3	N/R	documented visual inspection	N/R
11	**Miscellaneous Incidental and Manufactured or Fabricated Items**				
11.1	Aluminum				
A.	-Cast, Framing, Guard Rail, Handrail, Hardware, and Sheet (Includes Extruded Types)	2	Certified copy of mill test	documented visual inspection and measurement	N/R
11.2	Bearing Pads				
A.	-Bronze or Copper	2	Certificate of Compliance	documented visual inspection	N/R
B.	-Canvas and Red Lead	3	N/R	documented visual inspection	N/R
C.	-Elastomeric	2	Certificate of Compliance	N/R	N/R
D.	-Neoprene	2	Certificate of Compliance	N/R	N/R
E.	-Fabric (Preformed)	3	N/R	S&T	N/R
11.3	Bridge Drains				
A.	-Material	2	Umbrella Certificate (DOT-99)	documented visual inspection	N/R
11.4	Castings and Cast Iron				
A.	-Bridge Hardware	2	Certificate of Compliance	N/R	N/R
B.	-Drop Inlet Frames, Grates, Box Curb Assemblies, etc.	2	APL	documented visual inspection	N/R
C.	-Grid Floor	2	Certificate of Compliance	N/R	N/R
11.5	Cattle Guards				
A.	-Material	2	Umbrella Certificate (DOT-99)	documented inspection and measurement	N/R
11.6	Chloride				
A.	-Calcium, Sodium, and Magnesium	2	Bill of Lading	S&T	N/R
11.7	Epoxy-Resin Adhesive				
A.	-Material	2	Certificate of Compliance	N/R	N/R
11.8	Fencing				
A.	-Barb Wire	3	N/R	S&T	N/R
B.	-Chain-Link System (Includes Fabric, Posts, Rails, Fittings, and Hardware)	2	Umbrella Certificate (DOT-99)	S&T (fabric only) and documented visual inspection	N/R
C.	-Woven Wire	3	N/R	S&T	N/R
D.	-Brace Wire	3	N/R	documented inspection	N/R
E.	-Miscellaneous Fasteners, Staples, Ties, etc.	3	N/R	documented visual inspection and measurement	N/R

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
F.	-Gates (Tubular Frame)	3	N/R	documented visual inspection and measurement	N/R
G.	-Steel Posts	3	N/R	documented visual inspection and measurement	N/R
H.	-Wood Posts	2	*Job Site Accepted Posts:* Certificate of Compliance *Plant Site Accepted Posts:* N/R	documented inspection and S&T DOT tags or S&T	N/R
11.9	Glass Beads				
A.	-Material	3	N/R	S&T (SD 508)	N/R
11.10	Paint				
A.	-Material	2	Certificate of Compliance or Manufacturer's certified analysis from label	S&T	N/R
11.11	Permanent Plastic Pavement Markings				
A.	-Material	2	*APL:* N/R *Non-APL:* Certificate of Compliance	documented visual inspection	N/R
11.12	Piling				
A.	-Pre-Cast and Pre-Stressed Concrete *(reference paragraph 11.14)*	**Note**			
11.14 A	-Materials *(reference paragraph 6.1 – exceptions noted)*				
6.1 A.	-Aggregate, Fine and Coarse	3	N/R	S&T (DOT-3)	N/R
6.1 B.	-Aggregate, Fine and Coarse, Moisture Content	N/A	N/R	S&T (DOT-35)	N/R
6.1 C.	-Cement	2	*Certified Supplier:* N/R *Non-Certified Supplier:* Certificate of Compliance	S&T	N/R
6.1 D.	-Water	3	N/R	S&T	N/R
6.1 E.	-Admixtures (Includes Air Entraining, Water Reducing, Accelerators, Retarders, etc.)	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
6.1 F.	-Fly Ash	2	Certificate of Compliance	RS&T	N/R
11.14 B	-Concrete, Strength Tests	N/A	N/R	S&T cylinder	N/R

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
11.14 C	-Metal Components	2			N/R
	(a) Bars, Plates, Structural Shapes, and Anchorage Assembly		Certified copy of mill test	N/R	
	(b) Pre-Stressing Strands		Certified copy of mill test	S&T	
	(c) Reinforcing Wire Mesh		Certified copy of mill test	N/R	
	(d) Reinforcing Bars *(reference paragraphs 11.17 E.(2) and 11.17 E.(3))*		*Certified Supplier & Uncoated Bars:* N/R	documented visual inspection and measurement	
			Non-Certified Supplier & all Epoxy Coated Bars: Certified copy of mill test and Certificate of Compliance for epoxy coating and coating process	documented visual inspection and S&T	
B.	-Steel Beam or Sheet (Includes Corrugated)	2	Certified copy of mill test	N/R	N/R
C.	-Timber (Treated)	2	Treatment Certificate and Certified Statement	N/R	N/R
D.	-Piling Shoes	3	N/R	documented visual inspection and measurement	N/R
11.13	Pipe				
A.	-Concrete	2			N/R
	(a) Concrete		N/R	RS&T at the plant (Concrete Pipe Release Report) and documented visual inspection (DOT-214)	
	(b) Reinforcing Wire Mesh		*Certified Supplier:* N/R	documented visual inspection	
			Non-Certified Supplier: Certified copy of mill test	S&T	
B.	-Corrugated Metal	2	*APL:* N/R	documented visual inspection	N/R
			Non-APL: Shipping list and Certified copy of mill test	S&T	
C.	-PVC	3	N/R	documented visual inspection	N/R
D.	-Polyethylene Underdrain	2	APL	documented visual inspection	N/R
E.	-HDPE	2	*APL:* N/R	documented visual inspection	N/R
			Non-APL: Certificate of Compliance		

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
11.14	Pre-Cast and Pre-Stressed Concrete	**Note**			
A.	-Materials *(reference paragraph 6.1 - exceptions noted)*				
6.1 A.	-Aggregate, Fine and Coarse	3	N/R	S&T (DOT-3)	N/R
6.1 B.	-Aggregate, Fine and Coarse, Moisture Content	N/A	N/R	S&T (DOT-35)	N/R
6.1 C.	-Cement	2	*Certified Supplier:* N/R *Non-Certified Supplier:* Certificate of Compliance	S&T	N/R
6.1 D.	-Water	3	N/R	S&T	N/R
6.1 E.	-Admixtures (Includes Air Entraining, Water Reducing, Accelerators, Retarders, etc.)	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
6.1 F.	-Fly Ash	2	Certificate of Compliance	RS&T	N/R
B.	-Concrete, Strength Tests	N/A	N/R	S&T cylinder	N/R
C.	-Metal Components (a) Bars, Plates, Structural Shapes, and Anchorage Assembly (b) Pre-Stressing Strands (c) Reinforcing Wire Mesh (d) Reinforcing Bars *(reference paragraphs 11.17 E.(2) and 11.17 E.(3))*	2	 Certified copy of mill test Certified copy of mill test Certified copy of mill test *Certified Supplier & Uncoated Bars:* N/R *Non-Certified Supplier & all Epoxy Coated Bars:* Certified copy of mill test and Certificate of Compliance for epoxy coating and coating process	 N/R S&T N/R documented visual inspection and measurement documented visual inspection and S&T	N/R
11.15	Right-Of-Way Monuments				
A.	-Material	3	N/R	documented visual inspection	N/R
11.16	Signing Materials				
A.	-Aluminum (Sheet and Extruded)	2	Umbrella Certificate (DOT-99)	documented visual inspection and measurement	N/R
B.	-High-Strength Bolts	2	Umbrella Certificate (DOT-99)	S&T (SD 507) (SD 503) (DOT-96)	N/R

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
C.	-Posts	2			N/R
	(a) Steel		Umbrella Certificate (DOT-99)	documented visual inspection and measurement	
	(b) Wood		Umbrella Certificate (DOT-99)	documented visual inspection and measurement	
D.	-Reflective Sheeting	2	Umbrella Certificate (DOT-99)	documented visual inspection	N/R
11.17	Steel				
A.	-Bolts, Nuts, Washers, and Direct Tension Indicators				N/R
	(a) Bolts (Excluding those addressed in (b) and (c) below), Nuts, and Washers	2	Certified copy of mill test	documented visual inspection and measurement	
	(b) Guardrail Bolts (A-307), Eye Bolts, Ribbed and Unfinished Bolts, Nuts, and Washers	3	N/R	documented visual inspection and measurement	
	(c) High-Strength Bolts, Nuts, and Washers	1	Certified copy of mill test	S&T (SD 507) (DOT-96)	
	(d) Direct Tension Indicators	1	Certified copy of mill test	S&T (SD 503) (DOT-96)	
B.	-Cable	2	Umbrella Certificate (DOT-99)	documented visual inspection	N/R
C.	-Smooth Dowel Bars (Includes Bars in Dowel Bar Assemblies)	2	Certified copy of mill test and Certificate of Compliance for epoxy coating and coating process	N/R	N/R
D.	-Support Baskets for Dowel Bars (Includes Baskets in Dowel Bar Assemblies)	3	N/R	documented visual inspection	N/R
E.	-Reinforcing Bars, Deformed Dowel Bars, and Deformed Tie Bars	2	*Certified Supplier & Uncoated Bars:* N/R	documented visual inspection and measurement	N/R
			Non-Certified Supplier & all Epoxy Coated Bars: Certified copy of mill test and Certificate of Compliance for epoxy coating and coating process	documented visual inspection and S&T	
F.	-Wire Ties and Spacers	3	N/R	documented visual inspection	N/R
G.	-Reinforcing Wire Mesh (Miscellaneous)	3	N/R	documented visual inspection and measurement	N/R
H.	-Structural (Includes Beams, Framing, and Plate)	1	Certified copy of mill test and Shop Fabrication Inspector's Report	documented visual inspection and measurement	N/R

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
I.	-Guard Rail and Guard Rail Posts	2	Umbrella Certificate (DOT-99)	documented visual inspection and measurement	N/R
J.	-Multiple Bolt Assemblies	2	*APL:* N/R *Non-APL:* Certified copy of mill test	documented visual inspection	N/R
11.18	Timber				
A.	-Structural	2	Grade Certificate and Treatment Certificate and Certificate of Origin	N/R	N/R
B.	-Guard Rail Posts	2	*Job Site Accepted Posts:* Certificate of Compliance *Plant Site Accepted Posts:* N/R	documented inspection and S&T DOT tags or S&T	N/R
C.	-Plank, etc.	2	Certificate of Compliance	documented visual inspection	N/R
11.19	Wire Basket and Gabions				
A.	-Material	2	*APL:* N/R *Non-APL:* Certificate of Compliance	documented inspection if fabricated on site, S&T or if pre-fabricated, N/R	N/R
11.20	Drainage Fabric				
A.	-Material	2	*APL:* N/R *Non-APL:* Certificate of Compliance	documented inspection	N/R
11.21	MSE/Geotextile Fabric				
A.	-Material	2	Certificate of Compliance	S&T	N/R
11.22	Silt Fence				
A.	-Material	2	*APL:* N/R *Non-APL:* Certificate of Compliance	documented visual inspection	N/R
11.23	Controlled Density Fill/Flowable Fill				
A.	-Material	2	Certified Statement (DOT-77)	N/R	N/R
B.	-Aggregate, Fine	3	N/R	S&T (DOT-3)	N/R
11.24	Polyethylene Sheeting				
A.	-Material	3	N/R	documented visual inspection	N/R
12	**Pavement Restoration**				
12.1	PCC Pavement Repair				
A.	-Silicone	2	APL	S&T *In-Place:* S&T	N/R

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
B.	-Backer Rod	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
12.2	Joint and Spall Repair				
A.	-Concrete from Ready-Mix Plants *(reference paragraph 5.1 A. and paragraphs 6.1 B. through 6.1 E.)*				
5.1 A.	-Aggregate, Fine and Coarse	3	N/R	S&T (DOT-3)	S&T
6.1 B.	-Aggregate, Fine and Coarse, Moisture Content	N/A	N/R	S&T (DOT-35)	N/R
6.1 C.	-Cement	2	*Certified Supplier:* N/R *Non-Certified Supplier:* Certificate of Compliance	S&T	N/R
6.1 D.	-Water	3	N/R	S&T	N/R
6.1 E.	-Admixtures (Includes Air Entraining, Water Reducing, Accelerators, Retarders, etc.)	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
B.	-Commercial Pre-Packaged Mix	2	APL	documented visual inspection	N/R
C.	-Fly Ash *(reference paragraph 6.1 F.)*				
6.1 F.	-Fly Ash	2	Certificate of Compliance	RS&T	N/R
D.	-Silicone	2	APL	S&T *In-Place:* S&T	N/R
E.	-Backer Rod	2	*APL:* N/R *Non-APL:* Certificate of Compliance	S&T	N/R
12.3	Pavement Jacking and Undersealing				
A.	-Portland Cement *(reference paragraph 6.1 C. - exceptions noted)*				
6.1 C	-Cement	2	*Certified Supplier:* N/R *Non-Certified Supplier:* Certificate of Compliance	S&T	N/R
B.	-Fly Ash *(reference paragraph 6.1 F.)*				
6.1 F.	-Fly Ash	2	Certificate of Compliance	RS&T	N/R

MSTR ID	*Description*	*(1) Tier*	*(2) Certification*	*(3) Acceptance*	*(4) Independent Assurance*
C.	-Water *(reference paragraph 6.1 D.)*				
6.1 D	-Water	3	N/R	S&T	N/R
D.	-Strength Tests *(reference paragraph 6.2 A. - exceptions noted)*				
6.2 A	-Compressive Strength	N/A	N/R	S&T (DOT-9)	N/R
E.	-Flow Test	N/A	N/R	S&T (ASTM C 939)	N/R
13	**Bridge Deck Restoration**				
13.1	Density Tests, Low Slump Concrete				
A.	-Density, In-Place	N/A	N/R	S&T	S&T or observe AT
B.	-Density, Standard	N/A	N/R	S&T (DOT-56)	S&T
13.2	Measurement of Texture				
A.	-Material	N/A	N/R	S&T (SD 418) (DOT-55)	N/R

KEY:

N/R	none required
N/A	not applicable to tiering
S&T	sample and test
RS&T	random sample and test
Note	Item categorized as Tier 1, but components as Tier 2 and/or Tier 3

The following changes have been made to the 1999 MSTRs:

Original Paragraph		Change
1.1 G.	Measurements	deleted
1.3 A.	Material	added for consistency
1.4	Dust Oil	deleted
1.5	Crack Sealing of Asphalt Concrete	became 1.4
1.5 A.	Sealant and Backer Rod	became 1.4 A. Sealant and 1.4 B. Backer Rod
2.1 E.	Measurements	deleted
2.2 G.	Measurements	deleted
3.5	Filter Blanket	deleted
3.5 A.	Aggregate	deleted
3.6	Gabion Fill (Rock or Stone)	became 3.5
3.6 A.	Aggregate	became 3.5 A.
3.7	Porous Backfill	became 3.6
3.7 A.	Aggregate	became 3.6 A.
3.8	Riprap	became 3.7
3.8 A.	Aggregate	became 3.7 A.
3.9	Slope Protection Aggregate	became 3.8
3.9 A.	Aggregate	became 3.8 A.
3.10	Base Course Salvage, Cold Recycling, and Processed In-Place Materials	became 3.9
3.10 A.	Aggregate	became 3.9 A.
3.10 B.	Density, In-Place	became 3.9 B.
3.11	Granular Box Culvert Undercut Backfill	became 3.10
3.11 A.	Aggregate	became 3.10 A.
3.11 B.	Density, In-Place	became 3.10 B.
3.11 C.	Density, Standard	became 3.10 C.
3.12	Miscellaneous Granular Materials (Pit-Run/Box Culvert Bedding/Etc. When Specifications are Noted)	became 3.11
3.12 A.	Aggregate	became 3.11 A.
4.1 E.	Earth Subgrade Trimming	deleted
4.1 F.	Density, Standard (Target)	became 4.1 E.
4.3 A.	Embankment (Including Subgrade Topping, Berms and Box Culvert Pipe Backfill) Excludes Ordinary Compaction	Embankment (Includes Select Subgrade Material, Berms, Box Culvert, and Pipe Backfill; Excludes Ordinary Compaction)
4.3 B.	Earth Subgrade Trimming	deleted
4.3 C.	Moisture, Standard (Target)	became 4.3 B.
4.4	Measurements (Thickness and Width)	deleted
4.4 A.	Subgrade Topping (Select Soil)	deleted
5.1 E.	Admixtures	Admixtures (Includes Air Entraining, Water Reducing, Accelerators, Retarders, etc.)

5.5 A.	Liquid Membrane Forming Compound	Liquid Membrane Curing Compound
5.6 B.	Hot Poured Elastic Type and Backer Rod	became 5.6 B. Hot Poured Elastic Type and 5.6 C. Backer Rod (Hot Pour)
5.6 C.	Silicone and Backer Rod	became 5.6 D. Silicone and 5.6 E. Backer Rod (Silicone)
5.8	Oil Treatments	Treating Oil
5.8 A.	Treating Oil	Material
6.1 E.	Admixtures, (Air entraining, water reducing, water proofing and bonding agents, accelerators, retarders, etc.)	Admixtures (Includes Air Entraining, Water Reducing, Accelerators, Retarders, etc.)
6.1 G.	Latex Emulsion	deleted
6.3 B.	Unit Weight	Unit Weight (Yield)
6.4 A.	Liquid Membrane Forming Compound	Liquid Membrane Curing Compound
6.5 D.	Silicone and Backer Rod	became 6.5 D. Silicone and 6.5 E. Backer Rod
6.8	Oil Treatment	Treating Oil
6.8 A.	Treating Oil	Material
8.1 E.	Items Requiring Certification of the Materials	Items Requiring an Umbrella Certificate for the Materials
8.1 F.	High-Strength Bolts	added
9.1 C.	Fiber Glass Roving	deleted
9.1 D.	Grass, Hay or Straw Mulch	deleted
9.1 E.	Fiber Mulch	became 9.1 C.
9.1 F.	Peat (Peat Moss)	deleted
9.1 G.	Plants and Shrubs	deleted
9.1 H.	Seeds	became 9.1 D.
11.2 A.	Bronze or Comer	Bronze or Copper
11.6 B.	Dust Oil Chlorides	deleted
11.7 A.	Materials	deleted subtitles “Bridge Dowel Applications” and “PCCP Dowel and Tie Bar Applications”
11.8 B.	Chain-Link (Industrial)	Chain-Link System (Includes Fabric, Posts, Rails, Fittings, and Hardware
11.8 H.	Chain-Link Posts Rails, Fittings, and Hardware	incorporated into 11.8 B.
11.8 I.	Wood Posts	became 11.8 H.
11.13 C.	PVC and Polyethylene Underdrain	became 11.13 C. PVC and 11.13 D. Polyethylene Underdrain
11.13 D.	Asbestos, Cement, and Bituminous Fiber	deleted
11.13 E.	Bituminous Coating	deleted

11.13 E.	HDPE	added
11.15	Right Of Way Monuments and Permanent Highway Benchmarks	Right-Of-Way Monuments
11.16 B.	Aluminum Bolts, Nuts, Washers, and Fasteners	deleted
11.16 B.	High-Strength Bolts	added
11.17 A.	Bolts, Nuts, and Washers	Bolts, Nuts, Washers, and Direct Tension Indicators
11.17 I.	Guard Rail, Guard Rail Posts, and Multiple Bolt Assemblies	became 11.17 I. Guard Rail and Guard Rail Posts and 11.17 J. Multiple Bolt Assemblies
11.23	Extruded Insulation Board	deleted
11.23 A.	Material	deleted
11.24	Controlled Density Fill/Flowable Fill	became 11.23
11.24 A.	Materials and Plant	became 11.23 A. Material became 11.23 B. Aggregate, Fine
11.25	Polyethylene Sheeting	became 11.24
11.25 A.	Material	became 11.24 A.
12.1 A.	Silicone and Backer Rod	became 12.1 A. Silicone and 12.1 B. Backer Rod
12.2 D.	Silicone and Backer Rod	became 12.2 D. Silicone and 12.2 E. Backer Rod

The items below originally required Certificates of Compliance but now require the following:

Item	**Certification Method**
Admixtures	APL
Asbestos, Cement and Bituminous Fiber	deleted
Backer Rod (All Types)	APL
Bituminous Coating	deleted
Cement	Certified Supplier
Chain-Link System	Umbrella Certificate
Chlorides (Calcium, Sodium, and Magnesium)	Bill of Lading
Drainage Fabric	APL
Drop Inlet Frames, Grates, Box Curb Assemblies, etc.	APL
Dust Oil	deleted
Dust Oil Chlorides	deleted
Fertilizer	Bag Label or Bill of Lading
Fiber Glass Roving	deleted
HDPE (new)	APL
High-Strength Bolts (for Roadway Lighting, Traffic Control, and Signing)	Umbrella Certificate
HOT POURED ELASTIC TYPE	APL

Latex Emulsion	deleted
Liquid Membrane Curing Compound	APL
Peat	deleted
Permanent Plastic Pavement Markers	APL
Plants and Shrubs	deleted
PVC	none required
Reinforcing Bars (Certified Supplier or Uncoated)	none required
Sealant	APL
Silicone	APL
Silt Fence	APL
Strip Seal and Preformed Elastomeric Open Cell Compression Type with Lubricant/Adhesive	APL
Treating Oil	none required
Wire Basket and Gabions	APL
Wood Posts (for Signing Materials)	Umbrella Certificate

Appendix D Training Outline

1. ***Implementation of the Material Certification Process***

2. ***Purpose for Materials Certifications***
   - To comply with 23 CFR
   - To ensure quality products meeting specs are furnished and incorporated in the work
   - To reduce the amount of testing the Department has to perform
   - Represents the quality control testing of the manufacturer

3. ***Value of Certifications***
   - Highway user gets a safe, efficient highway
   - Design engineers can specify with confidence
   - Construction engineers have basis for accepting materials that fulfill the design
   - Contractors and manufactures have basis for fair, competitive bidding

4. ***Motivation for Project SD99-03***

   FHWA Study Concerning Missing Certs
   - 16 projects reviewed
   - 1 project; closed out
   - 1 project; no Federal funding

5. ***FHWA Study***

   Summary of Study
   - Using 14 of 16 projects
   - Hundreds of Occurrences Where Minimum Certification and Sampling and Testing Requirements Not Being Met
   - Failure to Meet Requirements Could Jeopardize Federal Funding on the Projects

6. ***Objectives for Project SD99-03***

   ✓Improve the process for both sides
   ✓Restructure the MSTR and RSTC
   ✓Streamline the Material Certification Process
   ✓Generate documentation
   - Definitions of processes
   - Specifications and administrative procedures

   ✓Integrate with the MATTEST/CMP System

7. ***Tier Definitions***

   Tier 1:

   A material that is critical to safety or costly to replace is considered extremely crucial to the overall success of the project. The Department classifies these crucial materials

as Tier 1 materials. The Department will only allow the contractor to install a Tier 1 material on the project when the contractor satisfies the following conditions:

1. The contractor furnishes the documents specified under the heading "Certification" in the "Minimum Sample and Test Requirements" of the Materials Manual.
2. The Central Testing Laboratory approves that the certified material conforms to the Specifications.

The Department will make payment according to the Specifications for a Tier 1 material only after the contractor installs the approved material.

8. ***Tier Definitions (continued)***

Tier 2:

The Department will only allow the contractor to install a Tier 2 material on the project when the contractor satisfies the following conditions:

1. The contractor furnishes the documents specified under the heading "Certification" in the "Minimum Sample and Test Requirements" of the Materials Manual.
2. The contractor uses a material listed on the "Approved Products List" or furnished by a Certified Supplier.

The Department will make payment according to the Specifications for a Tier 2 material only after the contractor installs the material.

9. ***Tier Definitions (continued)***

Tier 3:

The Department classifies a Tier 3 material as those materials that require no documentation under the heading "Certification" in the "Minimum Sample and Test Requirements" of the Materials Manual. The contractor may install a Tier 3 material on the project at any time.

The Department will make payment according to the Specifications for a Tier 3 material only after the contractor installs the material.

10. ***Tiering Structure***

(graphic)

11. ***Methods of Verifications***

- Sampling and testing
- Documentation inspection
- Random audit of Contractor's records
- Annual inspection of suppliers

12. ***Need for Verifications***

- Certifications without verifications are worthless
- Verification represents quality assurance testing
- Not used for acceptance directly

13. ***Umbrella Certificate***
- Categorized as Tier 2 materials
- DOT-99 created
  - Revised DOT-14 will identify the components to be included on DOT-99 forms
- Liability not an issue
- Contractors on panel receptive
- Applies to:
  - Guardrail Systems, Roadway Lighting, Traffic Control, Signing Materials, Chain-Link Systems, Bridge Drains, and Cattle Guards
  - Includes High-Strength Bolts for Roadway Lighting, Traffic Control, & Signing Materials
- One document listing "critical" items
- Can be provided before all backup is in place
- Prime contractor will retain all back-up for 5 years
- Random audit for verification

14. ***Approved Products List (APL)***
- No certification to be submitted
- Will develop increased usage of materials
- Manufacturer's name in CMP System
- SD95-02 Product Evaluation Procedure will provide process for APL's
- List available at job-site

15. ***Certified Supplier***
- Either a fabricator, mill, or plant
- No certification to be submitted
- Will develop increased usage
- Acceptance testing reduced to:
  - Random sampling and testing
  - Documented visual inspection
- Results in fewer samples and tests needed for each project

16. ***Goals of Changes***
- Reduce time and effort required by all
- Reduce delays in process
- Reduce hassle and rework
- Maintain quality of construction

17. ***Results***
- Eliminated Certificates of Compliance
  - 16 were replaced by:
    - Umbrella certificates (2)
    - APL (13)
    - Certified supplier (1)
  - 2 were reduced to submitting a Bill of Lading

- 3 no longer require certification
- 8 were reevaluated and deleted

- Eliminated unnecessary certifications for:
  - Aluminum nuts, bolts, and washers
  - Asbestos, cement, and bituminous fiber
  - Bituminous coating
  - Dust oil
  - Dust oil chlorides
  - Earth subgrade trimming
  - Extruded insulation board
- Additional eliminated certifications:
  - Fiber glass roving
  - Filter blanket
  - Grass, hay or straw mulch
  - Latex emulsion
  - Peat moss
  - Plants and shrubs
  - Subgrade topping (select soil)

18. ***Findings and Conclusions***

+ Elimination of DOT-25
+ Reduction of items on DOT-14
+ Reduction of certs, therefore:
  ~ Less paperwork
  ~ Faster turn around
  ~ Faster project close-out
+ Expanded APL and Certified Supplier
  ~ Incentive to get more materials on APL
  ~ Less sampling and testing

19. ***Implementation Recommendations***

- Adopt tiering structure
- Accept revisions to the Materials Manual
  - RSTC - definitions and procedures
  - MSTR - tiers identified and revisions made
  - MSTR Summary - developed for quick and easy reference
- Accept Special Provision
- Enforce provisions in Specifications
- Develop training course for field inspectors
  - organize guidelines, procedures, and forms in to a construction manual
  - include in CMP System
- Follow-up on SD95-02 findings
  - expand on existing PL as recommended
  - may require further research
- Run pilot project(s)
  - determine how revisions will integrate with MATTEST/CM4P system

- assess value to industry and SDDOT Region & Area Materials Engineers

Appendix E Executive Presentation Outline

SD99-03 Implementation of the Materials Certification Process

1. ***Implementation of the Material Certification Process***

2. ***Purpose for Materials Certifications***
   - To comply with 23 CFR
   - To ensure quality products meeting specs are furnished and incorporated in the work
   - To reduce the amount of testing

3. ***Motivation for Project SD99-03***
   FHWA Study Concerning Missing Certs
   - 16 projects reviewed
   - 1 project; closed out
   - 1 project; no Federal funding

4. ***FHWA Study***
   Summary of Study
   - Using 14 of 16 projects
   - Hundreds of Occurrences Where Minimum Certification and Sampling and Testing Requirements Not Being Met
   - Failure to Meet Requirements Could Jeopardize Federal Funding on the Projects

5. ***Objectives for Project SD99-03***
   ✓Improve the process for both sides
   ✓Restructure the MSTR and RSTC
   ✓Streamline the Material Certification Process
   ✓Generate documentation
   - Definitions of processes
   - Specifications and administrative procedures

   ✓Integrate with the MATTEST/CMP System

6. ***Tasks***
   1. Review SD96-06 results and other documents
   2. Meet with technical panel to review workplan
   3. Meet with DOT and AGC
   4. Define certification and verification methods
   5. Develop umbrella certification method
   6. Propose a tiering structure for materials

7. ***Tasks (continued)***
   7. Revise tiering structure and insert into MSTR and RSTC

8. Provide Material Certification Implementation Plan
9. Develop procedures and specifications
10. Provide training to DOT and AGC
11. Submit final report
12. Make executive presentation to RRB

8. ***Progress***

- Tasks 1 though 7 complete
  - Three tiers established
  - Tiering structure developed
  - Umbrella certificate created (DOT-99)
  - APL expanded
  - Certified supplier expanded
  - Reduced the number of COCs required
  - Unnecessary certifications eliminated
  - DOT-25 forms eliminated (visual inspection to be documented in MATTEST)

9. ***Progress (continued)***

- Tasks 8 and 9 partially complete
  - Follow-up meetings were held in August
  - Implementation Plan
  - Special Provision was drafted
  - Materials Manual revisions on going
    - RSTC - definitions and procedures developed
    - MSTR - tiers identified and findings from Tasks 1 through 8 incorporated
  - "MSTR Summary" developed for quick and easy referencing

10. ***Progress (continued)***

- Tasks 10, 11, and 12 reversed order
  - Executive Presentation on November 23, 1999 (Today)
  - Draft Final Report to be submitted November 30, 1999
  - Training to be held in December 1999

11. ***Tier Definitions***

Tier 1:

A material that is critical to safety or costly to replace is considered extremely crucial to the overall success of the project. The Department classifies these crucial materials as Tier 1 materials. The Department will only allow the contractor to install a Tier 1 material on the project when the contractor satisfies the following conditions:

1. The contractor furnishes the documents specified under the heading "Certification" in the "Minimum Sample and Test Requirements" of the Materials Manual.
2. The Central Testing Laboratory approves that the certified material conforms to the Specifications.

The Department will make payment according to the Specifications for a Tier 1 material only after the contractor installs the approved material.

12. ***Tier Definitions (continued)***

Tier 2:

The Department will only allow the contractor to install a Tier 2 material on the project when the contractor satisfies the following conditions:

1. The contractor furnishes the documents specified under the heading "Certification" in the "Minimum Sample and Test Requirements" of the Materials Manual.
2. The contractor uses a material listed on the "Approved Products List" or furnished by a Certified Supplier.

The Department will make payment according to the Specifications for a Tier 2 material only after the contractor installs the material.

13. ***Tier Definitions (continued)***

Tier 3:

The Department classifies a Tier 3 material as those materials that require no documentation under the heading "Certification" in the "Minimum Sample and Test Requirements" of the Materials Manual. The contractor may install a Tier 3 material on the project at any time.

The Department will make payment according to the Specifications for a Tier 3 material only after the contractor installs the material.

14. ***Tiering Structure***

(graphic)

15. ***Umbrella Certificate***

- Tier 2 materials
- DOT-99 created
  - Revised DOT-14 will identify the components to be included on DOT-99 forms
- Liability not an issue
- Contractors on panel receptive
- Applies to:
  - Guardrail, Lighting, Traffic Control, Signing, Chain-Link, Bridge Drains, Cattle Guards
  - High-Strength Bolts are Tier 1 (still requires separate cert)
- One document listing "critical" items
- Can be provided before all backup is in place
- Prime contractor will retain all back-up for 5 years
- Random audit for verification

16. ***Approved Products List (APL)***

- No certification to be submitted

- Will develop increased usage of materials
- Manufacturer's name in CMP System
- SD95-02 Product Evaluation Procedure will provide process for APL's
- List available at job-site

17. ***Certified Supplier***
    - Either a fabricator, mill, or plant
    - No certification to be submitted
    - Will develop increased usage
    - Acceptance testing reduced to:
      - Random sampling and testing
      - Documented visual inspection
    - Results in fewer samples and tests needed for each project

18. ***Results***
    - Eliminated Certificates of Compliance
      - 16 were replaced by:
        - Umbrella certificates (2)
        - APL (13)
        - Certified supplier (1)
      - 2 were reduced to submitting a Bill of Lading
      - 3 no longer require certification
      - 8 were reevaluated and deleted

19. ***Results (continued)***
    - Eliminated unnecessary certifications for:
      - Aluminum nuts, bolts, and washers
      - Asbestos, cement, and bituminous fiber
      - Bituminous coating
      - Dust oil
      - Dust oil chlorides
      - Earth subgrade trimming
      - Extruded insulation board

20. ***Results (continued)***
    - Additional eliminated certifications:
      - Fiber glass roving
      - Filter blanket
      - Grass, hay or straw mulch
      - Latex emulsion
      - Peat moss
      - Plants and shrubs
      - Subgrade topping (select soil)

21. ***Findings and Conclusions***
    + Elimination of DOT-25

+ Reduction of items on DOT-14
+ Reduction of certs, therefore:
  ~ Less paperwork
  ~ Faster turn around
  ~ Faster project close-out
+ Expanded APL and Certified Supplier
  ~ Incentive to get more materials on APL
  ~ Less sampling and testing

22. ***Implementation Recommendations***

- Adopt tiering structure
- Accept revisions to the Materials Manual
- Enforce provisions in Specifications
- Develop training course for field inspectors
  - organize guidelines, procedures, and forms in to a construction manual
  - include in CMP System

23. ***Implementation Recommendations (continued)***

- Follow-up on SD95-02 findings
  - expand on existing PL as recommended
  - may require further research
- Run pilot project(s)
  - determine how revisions will integrate with MATTEST/CM4P system
  - assess value to industry and SDDOT Region & Area Materials Engineers

24. ***Questions***

- 1)
- 2)
- 3)
- 4)
- Thank You!

25. ***Contacts***

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