TRANSPORTATION RESEARCH SYNTHESIS

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TRS 1308
Published June 2013

BRIDGE SAFETY INSPECTION AND NBIS BRIDGE INSPECTION PROGRAM ADMINISTRATION

Introduction

The Minnesota Department of Transportation has been actively working in recent years to develop a comprehensive bridge inspection manual. The intent of this manual is to address all aspects of bridge inspections including administrative policies and procedures, field inspection procedures, a state-specific recording and coding guide, and procedures for maintaining a bridge management system. The purpose of this research project was to review the current "State of Practice" in other states with regard to bridge safety inspections and NBIS bridge inspection program administration, identify any "Best Practices", and then utilize this information as appropriate to enhance the program in Minnesota.

The five states identified for research were Iowa, Illinois, Wisconsin, New York and Pennsylvania. These states were selected because of their well-respected bridge inspection programs at the national level, and to obtain a sampling of Border States as well as programs in other areas of the country. This research included a detailed review of available materials listed on each state's web site as well as information gathered from a questionnaire sent to each state identified above.

Organization of the Synthesis Report

The results of this research are organized into eight different areas to focus the discussion on specific aspects of a bridge inspection program. These specific discussion topics will include the current "State-

of-Practice" in Minnesota, discussion on what other states are doing, and then any recommendations on "Best Practices" to enhance the MnDOT Bridge Inspection Program. The discussion areas are as follows:

- Administrative Policies and Procedures
- Field Inspection Procedures
- Monitoring the Quality of Field Inspections
- QC/QA Procedures
- Critical Findings
- Team Leader Certification and Refresher Training
- Inspection of Ancillary Structures
- State-Specific Recording and Coding Guide

Administrative Policies and Procedures

MnDOT:

Currently MnDOT has several technical memorandums, policy letters and stand-alone manuals/documents that cover different aspects of bridge inspection. Their documents are not housed in one central location, rather spread across several different web sites and manuals. This leads to confusion for many Program Administrators and Team Leaders at both the State and Local level when trying to access documents relating to bridge inspection. There is also potential for conflicting information due to overlaps when these documents get updated independently, or gaps where no policy may currently exist.

Additionally, bridge inspection policy is governed by State Statute 165.01 and 165.03. These Statutes were updated recently and approved by the State Legislature to bring MnDOT inline with the current Federal guidelines governing bridge inspection. These State Statutes and all other bridge related documents are available on various MnDOT web sites.

Current State-of-Practice:

Each state that was part of this research project included their policy letters and/or other technical documents within their bridge inspection manual, with the exception of Iowa. Iowa has an "Instructional Memorandum" to Local Public Agencies that contains administrative policies and

procedures relating to bridge inspection. They also have a "Policy and Procedures" manual that also governs bridge inspections within their state.

Pennsylvania has a unique system of using "Strike-Off" Letters to update current policies and procedures. Each of these strike-off letters are shown in the front of their bridge inspection manual, which also includes references to where in the manual each of the changes were made. This system allows for changes to be made in a logical manner where each update is documented and included as a permanent record within the manual. This same procedure is used exclusively throughout PennDOT to update all agency manuals.

By comparison, Illinois' changes are promulgated with a revised version of their Structural Services Manual. The interim measure includes a memo to all Districts, Local Agencies and via email to those with a subscription service until the manual gets updated.

Recommended Best Practice:

(1) Include a mechanism to update agency manuals. One certainty, whenever policy is set, is that changes are inevitable. It is imperative to include an effective mechanism to update agency manuals within the base manual when it is first introduced. Additionally, a chronological listing of manual updates with brief descriptions will be a valuable record of revisions for future users.

(2) Eliminating or minimizing the use of stand-alone manuals/policy letters/etc. Having all policy letters, procedures and all other stand-alone documents located within a comprehensive bridge inspection manual creates streamlined procedures that everyone can access. This also helps prevent gaps and overlaps in current policies and procedures.

Field Inspection Procedures

MnDOT:

Currently MnDOT has a stand-alone bridge inspection field manual. This manual includes information covering the National Bridge Inspection (NBI) condition ratings, element level condition states, bridge component and structure types, bridge load ratings and information on bridge safety features. This manual has gone through several revisions and is well-suited for inspectors to use as a guide during a typical routine bridge inspection.

Current State-of-Practice:

The level of detail included in each state's field inspection manual varies significantly from state to state. For example, Wisconsin has a very detailed field manual that reads much like the FHWA Bridge Inspector's Reference Manual. The manual begins with a review of bridge mechanics, bridge components, materials, and structure type classifications, and then discusses each bridge element condition rating in detail.

The New York field manual does not include the review of bridge mechanics, bridge components, etc., but does discuss in detail condition ratings of each bridge component. New York is unique in that they conduct element level inspections on a span and component bases, rather than using the AASHTO CoRe elements. Their ratings are based on a 1-7 scale, where 1 is essentially a failed condition and 7 is a new condition. Additionally, a rating of 2 is used to shade between 1 and 3, a rating of 4 is used to shade between 3 and 5, and a rating of 6 is used to shade between 5 and 7.

In contrast, Pennsylvania and Illinois provide general guidelines for each inspection type such as the purpose, scope, frequency, etc. in their inspection manual, and then provide more detailed condition descriptions for each bridge component in their state-specific Recording and Coding Guide.

Recommended Best-Practice:

(1) Maintain the current Field Manual to be incorporated into the comprehensive bridge inspection manual with only minor revisions as noted in Item (2) and (3) below.

(2) Appendix B in the current Field Manual, Bridge Load Capacity Ratings, should be included as a topic within the Policies and Procedures section of the comprehensive bridge inspection manual, rather than included in the Field Manual.

(3) Appendix C in the current Field Manual, Safety Features, should be moved to a state-specific Recording and Coding Guide. This would help maintain consistency within the bridge manual by keeping appraisal items determined in the field separate from inventory items.

Monitoring the Quality of Field Inspections:

MnDOT:

MnDOT's annual Quality Assurance bridge inspection review process evaluates the quality of field inspections. They perform field reviews of state and local structures to verify the accuracy and

assessments of Inventory Items, NBI Condition Ratings, and Structural Element Condition Ratings, as well as appropriate levels of quantitative and qualitative notes. They also look at the timeframe of the inspection and discourage inspections during the winter months of December, January and February. The concern being the potential difficulty of fully inspecting some elements, especially the foundation footings, stream bed, culvert bottom and stream banks with snow and ice present.

Current State-of-Practice:

Four of the states conduct some level of review of specific Team Leader inspection performance. Listed below is a summary of how each state conducts their reviews:

- Illinois - At least once every 24 months, Program Managers must accompany each Team Leader functioning within their area of responsibility to observe their performance of NBIS bridge inspections on at least three (3) structures over the course of a 30-day period.
- Iowa – At the state level, a formal review of two of the six bridge inspection teams is conducted annually. Four bridges inspected within the current calendar year, by each team under review, are assessed. They are assessed on consistency and accuracy of their bridge inspection documentation by performing site visits of each bridge. At the Local Level, an independent party review by a Professional Engineer qualified as a Team Leader is conducted every four years. This includes a field review of inspection data for 10 bridges inspected during the past 12 months. The Reviewer findings include corrective recommendations and/or actions taken to resolve the findings. These findings are reported to the Office of Bridges and Structures.
- New York - Quality Assurance is centralized in their Main Office and they conduct unannounced field inspections when teams are inspecting. The technical discussions pertaining to the conduct of the inspections and safety aspects are documented. Recently, NYSDOT conducted a review to study the consistency of bridge inspections within the state. The study included a process where 21 teams inspected the same four bridges. Findings from this research project have yet to be published.
- Pennsylvania - PennDOT administers a 5-year contract for a Consultant to perform QA field inspections on 20 structures/per District and/or Toll Authority per year. These are totally independent inspections where the Consultant does not have any previous inspection notes or rating information with them during the inspection. The Consultant develops a report of their findings and conducts a close-out meeting with each agency.

Wisconsin's program to review the quality of field inspections is much like the program in Minnesota, where field reviews are conducted looking at the overall bridge program within various State and Local Agencies. This type of review looks at effectiveness of the program as a whole and not the conduct of specific team leaders within the agency being reviewed.

Recommended Best Practice:

(1) Investigate the viability of a program where Program Administrators accompany each Team Leader within their area of responsibility on a set number of structures each year. This number can be increased as necessary to address any issues with Team Leader performance. These performance reviews should be considered during the Team Leader re-certification process.

(2) Findings from Team Leader reviews should form a basis for future refresher training conducted at the annual Bridge Inspection Safety Seminars.

(3) Develop a program at the state level to conduct audits of Team Leaders while they are performing inspections. These inspector specific audits would help identify underperforming Team Leaders while providing valuable feedback to the inspector on their performance. The information gained could be used as a basis for future refresher training conducted at the annual Bridge Inspection Safety Seminars.

QC/QA Procedures:

MnDOT:

MnDOT currently has a stand-alone Bridge Inspection Quality Control and Quality Assurance Plan that was first published in 2011. This plan is separated into specific Quality Control (QC) areas of emphasis as well as Quality Assurance (QA) activities conducted by the Department to ensure compliance with the National Bridge Inspection Standards (NBIS). The plan clearly articulates QC roles and responsibilities, inspection personnel qualifications, inspection types and the frequency of each, critical deficiency reporting procedures, and various other inspection program activities. It also identifies Agency QA roles and responsibilities, and the format used for compliance reviews of State and Local Agency bridge programs.

Current State-of-Practice:

Each state included in this research project has adopted some level of formal QC/QA procedures to enhance and improve their bridge inspection programs. Wisconsin, Illinois and New York have formal QC/QA procedures that are topics within their bridge inspection manuals. Wisconsin and Illinois are

very similar in scope and depth, covering a variety of topics that span the breath of bridge inspection activities. New York focuses specifically on procedures related to performing the inspection.

Pennsylvania appears to have the most aggressive QC/QA program of the states researched. Their bridge inspection manual covers many of the same topics previously discussed, but in addition they have a separate publication titled Bridge Safety Inspection Quality Assurance Manual. This manual specifically covers activities performed by the independent team of inspectors contracted by their Central Office to perform QA activities statewide.

Iowa addresses QC/QA procedures in both their Policies and Procedures Manual, as well as in their Bridge Inspection Instructional Memorandum for the Local Agencies. The program outlined in both documents emphasizes QC/QA procedures for field inspection work.

Recommended Best Practice:
(1) Integrate the current Bridge Inspection Quality Control and Quality Assurance Plan into a comprehensive bridge inspection manual.

Critical Findings:

MnDOT:
MnDOT issued a Technical Memorandum in 2011 titled "Critical Deficiencies" found during bridge inspections. This memorandum defines a "critical deficiency" as well as a "hazardous deficiency" in an effort to differentiate between the two and how reporting of each differs significantly. This memorandum also clearly defines the reporting process and responsibilities of the Team Leader, Engineer (Program Administrator) and the MnDOT Bridge Office. The Bridge Inspection QC/QA Plan and Best Practices document also discuss "critical findings" and reference this Technical Memorandum. Unlike some states, MnDOT does not mandate a specific NBI Rating for the Deck, Superstructure, Substructure and/or Culvert Items when a condition meets the definition of a critical deficiency. The only requirement is that the "Critical Finding Smart Flag" must be changed from a coding of "1" to a coding of "2".

The MnDOT process begins with the Team Leader assessing the need for an emergency closure of the structure and prompt verbal notification to the Engineer (Program Administrator). The Engineer is

required to quickly access the situation to confirm or refute the finding, and to initiate any necessary traffic restrictions to safeguard the public. If the Engineer is not the Bridge Owner, the Engineer is responsible for notifying the Bridge Owner. Submittal of the inspection report to the MnDOT Bridge Inspection Engineer is required within 7 days after a Critical Deficiency has been reported. The Bridge Office records the finding in a Critical Deficiency log, monitors the situation as necessary until the situation has been resolved, and reports the status of all critical finding to the FHWA annually.

Current State-of-Practice:

Each state researched, with the exception of Iowa, has written procedures to follow when critical deficiencies are discovered during inspections. The first step generally involves securing the structure to protect the safety of the traveling public. Beyond that, the specific procedures differ for each state with a general outline of their procedures summarized below:

- Illinois - Critical deficiency reporting procedures for Illinois are outlined in their bridge inspection manual and involve immediate reporting of the critical deficiency to the State Program Manager. On the State System, the Team Leader will immediately report the finding to the District/Area Program Manager who will then report the findings to the State Program Manager or designee by phone, fax, email or other means. The District/Area Program Manager and the State Program Manager will develop an initial Plan of Action (POA) to mitigate the critical finding and determine an estimated timeline for accomplishing the necessary actions. They must also complete an Initial Critical Finding Report and submit it to the Bureau of Bridges and Structures. The State Program Manager will then initiate a Special Inspection for the structure, wherein subsequent inspection reports are submitted by the District/Area Program Manager to the State Program Manager on an agreed to schedule. The State Program Manager tracks all critical deficiencies and reports them to the FHWA twice per year. A similar process is used for reporting critical deficiencies on Local Agency structures. IDOT also provides criteria for the purpose of identifying findings as critical. These guidelines include lowering of the NBI Deck, Superstructure, Substructure, and/or Culvert Item to a "2", lowering the Channel & Channel Protection Item to a "3" and/or lowering the Scour Critical Evaluation Item to a "3".
- New York – New York uses a system referred to as a "Red Flag" to identify critical findings, which is outlined in their bridge inspection manual and labeled as "Inspection Flagging Procedures for Bridges". These flagging procedures include "Red Flags", "Yellow Flags" and "Safety Flags". Red Flags identify a failure of a primary structural member or potential failure

of a member before the next scheduled biennial inspection. Yellow Flags identify a "clear or present danger" or failure of a secondary structural member or potential failure before the next scheduled biennial inspection. Safety Flags identify potential hazards to the public, but pose no danger of a structural failure. Team Leader responsibilities for Red Flags include a "Prompt Interim Action Decision" (PIA), verbal notification to the Regional Bridge Engineer and verbal notification of the "Responsible Party", which are the Regional Bridge Maintenance Engineers on the State System. Follow-up procedures involve flag documentation within 3 days of the finding and written notification to the Bridge Owner within one week. The responsible party must provide a written response within six weeks from receiving the notification.

- Wisconsin – Critical deficiency reporting procedures are outlined in their bridge inspection manual. Of the states researched, Wisconsin provides the greatest amount of detail in their manual for handling critical findings. They include a detailed flowchart to clearly articulate the process with examples of the different types of critical findings. The WisDOT system involves using "911 Smart Flags" with four condition states. Condition State 4, "Urgent Response Action", is used to report the failure or imminent failure of a primary structural component. Imminent is further defined as a "short period of time". Condition State 3, "Needed Response Action", is used to report a potentially hazardous condition, which if left unattended beyond the next scheduled inspection, would likely become dangerous to persons or property. This condition state is also used to report the failure or imminent failure of a non-critical structural component. Condition State 2, "Safety Considered Action", is used to report a potentially hazardous condition that is non-structural in nature which, if left unattended beyond the next scheduled inspection, would likely become dangerous to persons or property. They further clarify that such failures would not affect the load carrying capacity of the structure. Condition State 1, "Action Completed", is used only after the structure is fully or partially closed, load posted, or repairs have been made. Notification procedures are very similar to New York where the Team Leader determines if a "Prompt Interim Action" is warranted to close the structure. They are also required to immediately notify the Region Program Manager and follow-up with written documentation within 24 hours. If the structure is on the State system and a closure is required, the Region Program Manager must notify the Region Director as well as the Statewide Program Manager. The Statewide Program Manager monitors the list of all Condition State 3 and Condition State 4 "911 Smart Flags". An overdue notice is sent out whenever a "911 Smart Flag" response exceeds six weeks from the initial date of notification.

- Pennsylvania – In Pennsylvania, Team Leaders are required to immediately notify the District Bridge Unit of a critical finding. The District Bridge Unit then conducts a review of the deficiencies, which involves a review by a registered Professional Engineer (PE). If the PE concurs with the Team Leader, the inspection findings are reviewed by the District Bridge Engineer. The District Bridge Engineer develops a Plan of Action (POA) to resolve or mitigate the deficiencies and tracks the progress of the POA. To guide this process, PennDOT has a section in their bridge manual labeled "Plan of Action for Critical and High Priority Maintenance Items". Critical findings are included with other maintenance items being reported rather than having a separate system for each. Critical (Priority 0) and High (Priority 1) maintenance items are defined as having deficiencies that threaten either the structural integrity of the bridge or public safety. From the documents available, further definitions of either Critical or High priority items could not be determined. However, the manual indicates that damaged or missing vertical clearance or load limit signs are examples where there may be no immediate structure safety problem, but where public safety is compromised and immediate action is required. One item discussed in detail in their manual is the "Plan of Action" (POA) for Critical or High priority maintenance items. The POA must identify the action or actions to be taken to repair and/or mitigate the deficiency that warranted the critical or high priority recommendation. Their policy for handling critical deficiencies indicates that the development and acceptance of Priority 0 POAs be completed in 2 days on 90% of occurrences and within 3 days on 100% of occurrences. Development and acceptance of a Priority 1 POA should be completed within 7 days on 100% of occurrences. The timeframe for resolving or mitigating POAs is 7 days and 6 months for Priority 0 and Priority 1 maintenance items, respectively. Pennsylvania also includes a flow chart that shows the process of handling critical findings from notification, through development and implementation of the POA, as well as tracking requirements.

Recommended Best Practice:

(1) Provide recommended guidelines for lowering the NBI Deck, Superstructure, Substructure, Culvert and/or Channel & Channel Protection Item when a Critical Finding is identified, unless the Critical Finding is promptly removed via repair actions.

(2) Incorporate the procedures outlined in the current MnDOT Technical Memorandum covering critical deficiencies found during bridge inspections into a comprehensive bridge inspection manual.

(3) Include a flowchart in a comprehensive bridge inspection manual that clearly articulates how critical findings are processed for both the State and Local Agency systems.

Team Leader Certification and Refresher Training:

MnDOT:

MnDOT has a published document titled "MnDOT Bridge Safety Inspection Certification Information" originally published in 2010, and recently revised in December 2012. This document outlines the requirements for certification as a Bridge Inspection Team Leader in Minnesota, which generally follows the NBIS requirements. The one additional requirement in Minnesota is that all inspectors need to take and pass a field proficiency test to become a Team Leader.

Team Leaders are also required to attend periodic refresher training to maintain their certification. Minnesota conducts refresher training as part of their annual Bridge Safety Inspection Seminars. Team Leaders need to attend a minimum of two bridge inspection seminars within a 4-year re-certification period to maintain their certification. Team Leaders who perform Fractural Critical inspections need to have taken the NHI Course: Fracture Critical Inspection Techniques for Steel Bridges, or have experience and/or classes related to fracture critical inspections that may be substituted at the discretion of the State Program Manager. MnDOT maintains a database of certified bridge inspection Team Leaders.

Current State-of-Practice:

Each state researched has some type of certification process for Team Leaders that generally follows the NBIS requirements. For comparison purposes, these NBIS requirements will not be restated here; however, individual state-specific requirements are outlined below:

- Illinois - Illinois does not have any state-specific requirements that exceed the NBIS requirement to become a Team Leader. For refresher training, IDOT conducts a one-day Bridge Inspection Calibration class that can be taken in lieu of the NHI Bridge Inspection Refresher Course. However, the NHI course is still required at least every other 5-year re-certification period. Illinois places much emphasis on "relevant" bridge inspection experience. Within their bridge inspection manual, they provide a detailed procedure for calculating relevant bridge inspection experience for Engineering and Technical personnel. For Fracture Critical inspection work, Illinois does not require specific training courses for Team Leaders. However, they do indicate

that inspectors performing Fracture Critical inspections must have the skills, training and equipment suitable for the inspection being performed. The various Program Managers are responsible for ensuring their personnel are knowledgeable of required inspection methods and procedures for the structures assigned to them for inspection.

- New York – Of the states researched, New York has the most stringent requirements for Team Leaders. All Team Leaders must be Professional Engineers. They must also have three years of bridge related experience, attend a week long NYSDOT Bridge Inspection Workshop and pass a proficiency test at the end of the course. For refresher training, Team Leaders must attend their "Annual Bridge Inspectors Meeting" at least once every four years. New York does not have specific requirements for Team Leaders performing Fracture Critical inspections.
- Wisconsin – There are only three ways to be certified as a Team Leader in Wisconsin. WisDOT does not recognize the following two methods allowed by NBIS: (1) BS degree in Engineering, passed the Fundamentals of Engineering Examination and two years of bridge inspection experience; and (2) Associates Degree in Engineering or Engineering Technology and four years of bridge inspection experience. Wisconsin does not have specific requirements for Team Leaders performing Fracture Critical inspections. Also, from the available documents, a specific requirement for any refresher training is not listed.
- Pennsylvania – The most significant difference between PennDOT and the other agencies researched is that PennDOT conducts their own bridge safety training that is separate from the 2-week NHI Comprehensive Course, but is sanctioned by the FHWA as equivalent training. Attendance of this course is required for all inspectors, whether they are the Team Leader or Assistant Team Leader. The other requirements for Team Leaders generally follow the NBIS requirements. PennDOT also conducts their own 3-day refresher training that is separate from the NHI Course. Refresher training is required for all bridge inspectors every two years. Pennsylvania does not have specific requirements for Team Leaders performing Fracture Critical inspections.
- Iowa – Iowa refers to CFR Title 23, Part 650.309 for qualifications of bridge inspection personnel and does not provide any additional requirements beyond what is defined by the NBIS. Similar to Illinois, they emphasize and provide detailed discussion on what constitutes relevant bridge inspection experience. They also provide an equation to calculate inspection experience based on an inspector's background. All bridge inspection personnel are required to complete the NHI Bridge Inspection Refresher Training Course every 5 years. Team Leaders whose

qualifications have expired have 12 months from the expiration date to successfully complete the Bridge Inspection Refresher Training Course before they are disqualified. Team Leaders can perform inspection duties during the 12 month "Grace Period"; however, if they have not completed the Bridge Inspection Refresher Training Course within the 12 months they will be disqualified as a Team Leader until they complete this required course. Team Leaders who perform Fracture Critical inspections must complete the NHI Fracture Critical (FC) Inspection Techniques for Steel Bridges Training Course. This requirement is relatively new, taking effect at the end of 2012.

Recommended Best-Practice:

(1) Require Team Leaders to attend the 3-Day NHI Bridge Inspection Refresher Course at least once every other 4-year recertification period. It is important to re-calibrate inspectors periodically to bring them back to a common reference point.

(2) Develop a state-specific bridge inspection calibration class. This class could be offered by video conferencing or live depending on the audience or requests by various Agencies.

Inspection of Ancillary Structures:

MnDOT:

MnDOT has no formal procedures or policies in place for the inspection of ancillary structures such as overhead sign structures, high mast light poles, retaining walls and/or noise walls. However, they do currently have an inspection program for high mast light poles that is run through the Bridge Office where they are inspected every four years. Most Districts inspect their overhead signs on a four year frequency as well. MnDOT is currently in the process of creating a more comprehensive program with set inspection procedures and reporting requirements. This formal program is scheduled to be completed later this year.

Current State-of-Practice:

Pennsylvania was the only state with specific policies and procedures in place for the inspection of ancillary structures. Within their bridge manual, PennDOT includes specific requirements for the inspection and reporting of sign structures and retaining walls. Included is a general discussion of the different types of sign structures and retaining wall structures, inspection procedures for each, and inspection frequencies based on the type of structure.

Wisconsin includes a section in their bridge inspection manual titled "Mandated vs. Recommended Inspections". Here they discuss several types of ancillary structures and provide a recommended inspection interval. They reinforce that these inspections are strongly "recommended" per WisDOT policy and may become mandates in the future.

Illinois, New York and Iowa are silent on the inspection and reporting of these structure types. Illinois does include a definition for an "Ancillary Structure" in their bridge inspection manual; however they define it as a structure, measured along the center of roadway to be less than six feet, and having a passageway for carrying traffic or other moving loads.

Recommended Best Practice:

(1) Develop formal policies and procedures for the inventory and inspection of ancillary structures constructed over or adjacent to the traveled roadway such as overhead signs, high mast light poles and wall structures.

(2) Develop inspection criteria for ancillary structures on both the State and Local Agency systems.

State-Specific Recording and Coding Guide:

MnDOT:

MnDOT currently does not have a published state-specific Recording and Coding Guide. They have relied on the Federal guidelines, FHWA publication Recording and Coding Guide for the Structural Inventory and Appraisal of the Nation's Bridges, for the majority of their Inventory Items. This Federal guide has been revised several times since the initial publication in 1971 with the latest revisions made in 2000. The current version of this guide contains 116 items for each bridge to be included in the national bridge inventory database.

MnDOT has created a set of state-specific inventory items that are currently in use, but no formal publication currently exist for these items. Recently, MnDOT has funded a project to develop a state-specific Recording and Coding Guide, which is currently under development.

Current State-of-Practice:

Pennsylvania, New York and Illinois each have a state-specific Recording and Coding guide. Wisconsin and Iowa are similar to Minnesota wherein they follow the Federal guidelines with no state-specific coding items. The number of coding items varies significantly from state to state with approximately 270, 395 and 835 for New York, Illinois and Pennsylvania, respectively.

Illinois is the only state researched that maintains the original 116 data items, then expands from these core data items. As an example, Item #58, Deck Condition, is the same in both the Federal guide as well as in the IDOT coding guide. The other states have an entirely separate system that includes all 116 Federal coding items, but have a completely different set of Item Numbers. Pennsylvania does include a conversion chart for easy reference between the two coding guides. New York does not include such a reference and is more difficult to follow with no quick reference between the two systems.

Another unique aspect of the Illinois coding guide is that they group "like items" together using the same core NBI Item number. For example, both the Federal guide and Illinois match for Item #71, Waterway Adequacy Appraisal. However, Illinois adds Items 71A (Waterway Drainage Area), 71B (Flood Design Frequency), 71C (Flood Design Q), 71D (Flood Design Natural High Water Elevations), etc. This coding method maintains a central focus on a specific area relating to the bridge inventory data, allowing for a more streamlined system. This system appears to make it less burdensome for Team Leaders when checking Inventory items in the field.

Each state with a state-specific recording and coding guide significantly expands NBI Item #43 (Structure Type, Main) and Item #44 (Structure Type, Approach Spans). The Federal guide only includes 23 separate codes, wherein Pennsylvania, New York and Illinois have 40, 46 and 52 structure types, respectively. Undoubtedly, each of these states sees great benefits of breaking down their bridge inventory by a very specific set of structure types. This could be quite advantageous if problems develop within a specific structure type, where an Agency could quickly produce a list of affected structures.

Recommended Best Practice:

(1) Develop a state-specific Recording and Coding Guide that closely mirrors what Illinois has been using for many years. This guide should be part of a comprehensive bridge inspection manual.

(2) Develop procedures for Team Leaders and Program Administrators to review existing Inventory Items and accurately record any new Inventory Items created when the state-specific guide is adopted.

Summary

Each state takes great ownership of their bridge inspection program. These programs have developed over the course of many years and continue to be revised and updated since the early 1970s when they were first mandated by the Federal Government. The state programs have many similarities, but vary significantly in scope and specific areas of emphasis. Some states rely heavily on the Federal guidelines, while other states completely overhaul these core guidelines and develop their own system for bridge inspections. These state-specific procedures still meet the Federal requirements, but look significantly different when compared to each other.

"Best Practices" are not always easy to identify and then uniformly adopt in another state. Many times these practices are intertwined within several other procedures or programs. Rather than wholly adopting best practices from another state, it may be more effective to look at the goal or key outcome of specific practices, then develop a state-specific procedure that is tailored to their organization and consistent with their overall bridge inspection program to achieve the desired outcome.