



**CONNECTICUT
WORK ZONE SAFETY and MOBILITY
PROCESS REVIEW REPORT**

June 2011

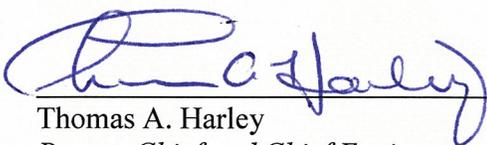
**CONNECTICUT DEPARTMENT of TRANSPORTATION
and
FEDERAL HIGHWAY ADMINISTRATION
Connecticut Division**

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PROCESS REVIEW REPORT**

June 2011

This Work Zone Safety and Mobility Process Review Report was jointly prepared by the Connecticut Department of Transportation and the Federal Highway Administration, and is evidence of Connecticut's compliance with 23 CFR 630.1008(e).

**STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION**

By:  _____ Date: July 11, 2011
Thomas A. Harley
Bureau Chief and Chief Engineer

FEDERAL HIGHWAY ADMINISTRATION

By:  _____ Date: 7/11/2011
Michelle C. Hilary
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EXECUTIVE SUMMARY

This Process Review was conducted jointly by the Connecticut Department of Transportation (CTDOT) and the Federal Highway Administration (FHWA) Connecticut Division during the 2010 calendar year to comply with the requirements of 23 CFR Part 630, Preconstruction Procedures, Subpart J—Work Zone Safety and Mobility. It is the first such process review conducted for this program area since this regulation became effective on October 12, 2007.

To satisfy the biennial process review requirement, this review was conducted as two separate activities:

1. Work Zone Mobility and Safety Self Assessment
2. Work Zone Field Reviews of Active Projects

Work Zone Self Assessments have been conducted annually by FHWA since 2001 to help States evaluate their work zone practices, and to help assess work zone practices nationally. The results of the 2010 Work Zone Self Assessment were compiled and published in a standardized report prepared by FHWA using the scoring and comments provided by CTDOT.

The Work Zone Field Review was initiated as an immediate and direct result of the Self Assessment that identified *Program Evaluation* as the area most in need of improvement for Work Zone Safety and Mobility in Connecticut. *Leadership and Policy* was identified as an area needing some improvement. CTDOT commented in the assessment that “Work zone safety reviews for night and day operations will be more frequent and will include the review of traffic control devices, sign installation and removal methods, sign recognition and visibility, and a survey of workers on what is working and not working.” Work Zone Field Reviews for ten active construction projects were conducted and documented in a separate report prepared and distributed by CTDOT for the 2010 construction season.

Copies of the Self Assessment and Field Review reports are included as appendices to this Process Review.

In addition to identifying several successful Connecticut practices for work zone safety and mobility, action items for improvement were also identified in both of the above reports. Many of these action items are already being addressed by CTDOT. Future discussion is planned between CTDOT and FHWA to develop an action plan to pursue opportunities for additional improvement. The next required Work Zone process review must be completed in 2013.

BACKGROUND

23 CFR Part 630, Preconstruction Procedures, Subpart J—Work Zone Safety and Mobility, contains the requirements and guidance for systematically addressing and managing work zone safety and mobility impacts on Federal-aid highway projects. This Process Review was prepared to comply with 23 CFR Part 630.1008, paragraph (e), *State-level processes and procedures*, that requires States to perform a process review every two years in order to assess the effectiveness of work zone safety and mobility procedures.

To help States evaluate their work zone practices, and to assess work zone practices nationally, FHWA developed the Work Zone Safety and Mobility Self Assessment (WZ SA) tool. The WZ SA tool consists of a set of 46 questions designed to assist those with work zone management responsibilities in assessing their programs, policies, and procedures against many of the good work zone practices in use today. The policies, strategies, processes, and tools identified in the WZ SA were gathered from the best practices currently in place in State departments of transportation (DOTs), metropolitan planning organizations, and local municipalities. Many of the items can be found in the [Work Zone Best Practices Guidebook](#).

The WZ SA helps FHWA Division Offices work with their State partners to:

- Assess their past work zone activities
- Identify actions and priority areas for improvement as appropriate for a given State
- Establish a baseline of their state of the practice and monitor changes over time
- Gain information that States can use as part of their inputs when they perform the process reviews that are required by the [Work Zone Safety and Mobility Rule](#).

At the National level, the WZ SA serves several important roles:

- Helps raise the level of awareness of practices and strategies used in mitigating work zone congestion and crashes
- Facilitates communication and sharing of best practices among transportation professionals
- Provides an opportunity to benchmark progress in work zone management
- Helps FHWA identify work zone congestion and safety management strategies that need more investigation and evaluation
- Helps FHWA identify areas where there is a need for additional training and guidance
- Assists in identifying States that are on the "leading edge" in a particular area and may be well-suited to share their experiences through case studies, as part of scanning tours or workshops, or as peers in the [WZ Peer-to-Peer Program](#)

Section 6 of the Work Zone Safety and Mobility Self Assessment Tool covers Program Evaluation. Program Evaluation is necessary to identify successes and analyze failures. Work zone performance monitoring and reporting at a nationwide level can increase the knowledge base on work zones and help lead to the development of better tools to help agencies better plan, design, and implement road construction and maintenance projects. At the local level,

performance monitoring and reporting provides an agency with valuable information on the effectiveness of congestion mitigation strategies, contractor performance, and work zone safety.

Under the Program Evaluation section, field reviews are conducted to help evaluate varying aspects of work zones, with particular attention focused on current practices and designs used in a state DOT's highway construction work zones.

For additional information concerning the use of the self assessments, refer to the FHWA memorandum dated January 28, 2010 (see [Appendix 1](#)) and the Work Zone Mobility and Safety Self Assessment User Guide (see [Appendix 2](#)).

PURPOSE and OBJECTIVE

The purpose and objective of this process review is to comply with the requirements contained in 23 CFR Part 630.1008, paragraph (e) and to determine whether the Connecticut Department of Transportation (CTDOT) is adequately and programmatically identifying, addressing, and managing work zone safety and mobility impacts on its highway projects.

The results and follow-up actions in this process review are intended to produce systematic improvements to work zone processes and procedures with the objective of improving safety and mobility on current and future highway projects in the State of Connecticut.

SCOPE and METHODOLOGY

This process review was conducted jointly by CTDOT and the FHWA Connecticut Division Office. Typically a process review includes the development of a team charter and work plan; however, these were not developed since both the self assessment and the field reviews are annual tasks conducted by CTDOT and were already in progress. The scope of this process review included two (2) separate tasks to provide a statewide and programmatic perspective regarding the current status of work zone safety and mobility in Connecticut.

The Work Zone Mobility and Safety Self Assessment and the field reviews of active highway construction projects were both conducted utilizing a multi-disciplinary review team approach. These reviews included participation by CTDOT planning, design, traffic, construction, maintenance, operations, and safety personnel as well as FHWA personnel. Core members of the Process Review Team were accompanied during the construction project field reviews by CTDOT District construction staff, construction inspection staff and safety personnel to tour selected projects during active construction activities by the contractors.

2010 Work Zone Mobility and Safety Self Assessment

The first task was the 2010 Work Zone Mobility and Safety Self Assessment¹. This task was included to utilize its results which identified areas for future action planning and improvement. The six (6) categories evaluated in the Self Assessment were:

- Leadership and Policy
- Project Planning and Programming
- Project Design
- Project Construction and Operation
- Communications and Education
- Program Evaluation

The 2010 Work Zone Mobility and Safety Self Assessment (see [Appendix 3](#)) was conducted in accordance with the methodology, scoring method, guidance, and documentation contained in FHWA's 2010 User's Guide for conducting these assessments.

The Self Assessment was conducted utilizing a multi-disciplinary team representing various offices at CTDOT, including Planning, Design, Construction, Maintenance, and Operations staff, and facilitated by Mr. Robert Ramirez of the FHWA Connecticut Division Office. Scoring for each question was determined by a consensus of the participants. Group discussion and supporting justification for each question were documented as comments submitted with the Self Assessment.

2010 Work Zone Field Reviews of Active Projects

The second task involved conducting in-depth work zone field reviews of randomly selected active highway construction projects throughout Connecticut administered by the Connecticut Department of Transportation. These field reviews were performed in order to assess current field practices relative to applying work zone safety and mobility processes and procedures on these projects.

In-depth field reviews included key personnel from the project, the CTDOT Office of Construction, Division of Traffic, Division of Safety and the Federal Highway Administration. Reports were created to document both successes and needed areas of improvement for the individual projects reviewed, as well as for Department policies or procedures in general. The reviews included an overview of traffic control devices, sign installation and removal methods, sign recognition and visibility, and a survey of project personnel to determine strengths and weaknesses in work zone procedures. The goal was to identify "Lessons Learned" and improve coordination among the various disciplines involved with work zone design and implementation.

¹ The annual update of this self assessment was conducted in May 2011. A preliminary copy of this update is included in the appendices. The Connecticut scores remained unchanged from 2010; however many revisions to the supporting comments were made. Final reports for all states will be published by FHWA in October 2011.

Projects were chosen from each of the four (4) districts in the state:

- District 1 – central Connecticut
- District 2 – eastern Connecticut
- District 3 – southwestern Connecticut
- District 4 – western Connecticut

There was an attempt to review projects that had some unique features to address in the plans and specifications. Once a project was selected, the review team was notified and a date for the field review was scheduled. The field review team typically met with project personnel at the field office for an initial meeting, and then proceeded to conduct a field review to observe all aspects of the work zone with key project personnel. Upon completion of the field review, a report was generated detailing the observations and findings. The report was circulated to the review team and project personnel for comments before being finalized.

The 2010 Work Zone Safety and Mobility field reviews were conducted using a Work Zone Review Form and Checklist developed for these construction project reviews. Projects were selected with the objective of conducting reviews of projects in construction during daylight hours as well projects in construction at night. Five main types of construction work were selected for these 2010 field reviews. Over the course of four months, ten (10) field reviews were conducted. The primary focus areas for the reviews were:

- Detour Operations
- Night reviews
- Pedestrian issues
- Stage construction
- Temporary Signalization

The table below summarizes the number of reviews conducted for active construction projects in each of the CTDOT Districts, as well as the type of work activity that was the primary focus of each review.

Review Type	District 1	District 2	District 3	District 4	TOTAL
Detour				1	1
Night		1	2		3
Pedestrian	2				2
Stage Construction			1	1	2
Temporary Signalization	1	1			2
Total Projects	3	2	3	2	10

The Work Zone Safety Field Review Final Report (see [Appendix 4](#)) contains an executive summary, copies of work zone reviews, a table of action items (see [Appendix 5](#)), an additional white paper from one project and an overview of the database created. It should be noted that this is an evolving process. The field review form has undergone three revisions or refinements. An ACCESS® database was created so that issues can be categorized and queried to produce reports. Another outcome of the field reviews has been a discussion about future reviews of work zone operations by different CTDOT offices. While this has not yet been implemented, it is a topic for future discussion. It is CTDOT's intent that work zone field reviews will continue every construction season in order to continually improve work zone safety for construction crews and the traveling public.

PROCESS REVIEW TEAM MEMBERS

The principal members of this Work Zone process review team that coordinated and conducted the 2010 work zone self assessment were:

Edward F. Girolamo, *Transportation Maintenance Planner 2 (CTDOT Maintenance)*
 Charles S. Harlow, *Transportation Principal Engineer (CTDOT Traffic)*
 David Head, *Transportation Supervising Planner (CTDOT Planning)*
 Jeffery H. Hunter, *Transportation Engineer II (CTDOT Construction)*
 John F. Korte, *Transportation Supervising Engineer (CTDOT Highway Operations)*
 Terrence M. Phelan, *Transportation District Service Agent 1 (CTDOT Permits)*
 Robert Ramirez, *ITS, Traffic & Safety Engineer (FHWA)*
 Terri L. Thompson, *Transportation Supervising Engineer (CTDOT Construction)*

The principal members of this Work Zone process review team that coordinated and conducted the 2010 construction project work zone field reviews were:

Nicholas P. Ambrosino, *Transportation Engineer II (CTDOT Construction)*
 Philip J. Cohen, *Transportation Supervising Engineer (CTDOT Traffic)*
 Charles S. Harlow, *Transportation Principal Engineer (CTDOT Traffic)*
 Jeffery H. Hunter, *Transportation Engineer II (CTDOT Construction)*
 Michael W. Lalone, *Transportation Supervising Engineer (CTDOT Traffic)*
 Robert Ramirez, *ITS, Traffic & Safety Engineer (FHWA)*
 Terri L. Thompson, *Transportation Supervising Engineer (CTDOT Construction)*
 Robert W. Turner, *Safety / Area Engineer (FHWA)*

Contributing participants for this Work Zone process review were:

Stephen P. Curley, *Transportation Engineer III (CTDOT Traffic)*
 Steve Sartirana, *Safety Advisor 1 (CTDOT Safety)*
 Yevgeniy Saykin, *Transportation Engineer II (CTDOT Traffic)*
 Barry Schilling, *Transportation Engineer II (CTDOT Traffic)*
 Michael VanNess, *Safety Advisor 1 (CTDOT Safety)*

OBSERVATIONS and RECOMMENDATIONS

2010 Work Zone Mobility and Safety Self Assessment

The final scores and comments are included as [Appendix 3](#) to this process review report. The assessment was effective in assisting the FHWA Connecticut Division and CTDOT to evaluate the effectiveness of Work Zone Management activities in Connecticut and identify areas needing improvement. This provides an opportunity for a future joint effort to develop annual work plan items aimed at improving work zone safety and mobility in Connecticut. The information contained in this self assessment will also be useful as a baseline for the preparation of future process reviews, risk assessments and unit performance goals by the Division Office.

Four of the six categories evaluated in the assessment scored at an acceptable to excellent level:

- **Project Planning and Programming**
- **Project Design**
- **Project Construction and Operations**
- **Communications and Training**

Two of the six categories evaluated in the assessment are in need of attention:

- **Leadership and Policy**

CTDOT could strengthen its work zone program by establishing and/or implementing strategic goals to:

- a) Reduce congestion and delays in work zones; and
- b) Reduce crashes in work zones

To support these goals, it is recommended that CTDOT establish and/or implement performance measures to:

- a) Track work zone congestion and delay; and
- b) Track work zone crashes

- **Program Evaluation**

In order to accurately assess impacts from work zone operations, CTDOT needs to collect, track, and evaluate the following types of work zone data:

- a) Work zone congestion and delay performance data and measures; and
- b) Work zone safety performance data and measures

Customer surveys could also be conducted to evaluate work zone traffic management practices and policies on an area, corridor, or state-wide basis.

2010 Work Zone Field Reviews of Active Projects

The following issues were identified from the work zone field reviews:

1. **Sign reflectivity issue** – illegibility of signs at night and proper use of sheeting – bright fluorescent vs. Type III.
2. **Portable light plants** – position of lights causing glare and distraction to the traveling public, inadequate lighting maintained throughout work area.
3. **Pedestrian Access** – obstructions, unclear guidance, unsuitable pathways, inaccessibility to crosswalks, pedestrian button devices.
4. **Movable Barrier application** – positive protection for traffic and workers, limited area for use.
5. **Warning Lights on signs for secondary roadways** – Photocell type do not work very well in areas with trees.
6. **Traffic control in work zones** – experience and understanding of work zone safety training, levels of effectiveness (presence versus enforcement).
7. **Variable Message signs** – proper placement (distance from anticipated queue), legibility, ineffective messaging.
8. **Environmental conditions** – pavement marking visibility during rain and fog, poor lighting conditions limiting retro-reflectivity, VMS solar backups, sightline restrictions due to trees, construction equipment, work area.

General Observations, Comments and Recommendations

- Field Reviews need to include more photographs.
- Need to expand number of field visits to get a better understanding of how pervasive an issue may be.
- Is it a localized concern based on road type, material type, project type?
- Accessibility of tools and checklists such as MUTCD for personnel.
- Temporary signalization on secondary roads needs to consider emergency services, school busses/stops.
- Mail delivery services, and also farm equipment.
- For night projects include additional separate lighting for use by inspection staff provided by contractor.
- Trooper suggestion to include training on how to perform a moving road block.

SUCCESSFUL PRACTICES

FHWA and CTDOT identified the following noteworthy practices during the 2010 and 2011 Work Zone Self Assessments:

- CTDOT Design Manual has been updated to provide for the consideration of positive separation devices for Type I and II projects²
- Transportation Management Plans (TMPs) are being consistently developed to address the operational impacts of significant projects
- A CTDOT work zone website has been developed to provide traveler information for Type I, II, and III projects
- Intelligent Transportation System (ITS) technologies are frequently used to collect and disseminate information to motorists and agency personnel on work zone conditions
- CTDOT uses uniformed law enforcement personnel in work zones³
- CTDOT does an excellent job of sponsoring and promoting National Work Zone Awareness week annually and throughout each construction season
- Incident Management services are utilized on Type I and II projects

FHWA and CTDOT identified the following noteworthy practices during the 2010 Work Zone Field Reviews:

- A temporary moveable concrete barrier system was utilized for median work on an interstate highway to protect construction workers, inspection personnel and motorists
- Traffic queues were either nonexistent or minimal for all projects reviewed
- Work zones were clearly identified and marked with appropriate construction signs and delineated with appropriate channelization devices and temporary pavement markings as warranted
- Warning lights were in use on most of the projects reviewed
- Equipment and materials storage areas were located either off-site, beyond a 30-foot clear zone, or protected by temporary concrete barrier

² In the Work Zone Self Assessment, four (4) project types are defined to reflect the magnitude of impact that a work zone may have on travelers as summarized below. The complete definitions are included as Table 4, *Work Impact Types* in the Work Zone Mobility and Safety Self Assessment User Guide (see [Appendix 2](#)).

- **Type I** represents the most complex and costly projects that an agency may undertake. These projects impact the traveling public at the metropolitan, regional, intrastate, and possibly at the interstate level.
- **Type II** projects are less complex projects that impact the traveling public predominately at the metropolitan and regional level and have a moderate to high level of public interest and user cost/impacts.
- **Type III** projects impact the traveling public at the metropolitan or regional level and have a moderate to low level of public interest and impacts.
- **Type IV** projects impact the traveling public to a small degree.

³ Currently, law enforcement personnel are used for traffic control on most projects; however, CTDOT recognizes a need to develop a policy to better define the types of traffic control personnel, as well as to establish guidelines on when to use law enforcement and flagger personnel within work zones, and their roles for work zone safety management (see comments for question 4.4.7 in [Appendix 3](#) and [Appendix 6](#)).

- All construction personnel were wearing proper reflective equipment/clothing
- Uniformed law enforcement personnel (State or municipal police officers) were being used for temporary traffic control on all but one project

CONCLUSIONS

A number of successful practices were identified during the annual Self Assessments and the 2010 Field Reviews that continue to be employed by CTDOT in their construction projects as noted in the previous section. As always, there is room for further improvement, particularly in the area of work zone performance monitoring, data collection and evaluation.

ACTION ITEMS

The following action item areas are recommended for improvement based on the scores for the 46 questions in each of the 2010 and 2011 Work Zone Mobility and Safety Self Assessments (see [Appendix 3](#) and [Appendix 6](#)):

- Establish strategic goals specifically to reduce congestion and delays in work zones⁴
- Implement strategic goals specifically to reduce crashes in work zones⁵
- Establish performance measures (e.g., vehicle throughput or queue length) to track work zone congestion and delay
- Implement performance measures (e.g., crash rates) to track work zone crashes⁶
- Collect data to track, analyze and evaluate work zone congestion and delay performance⁷
- Collect data to track, analyze and evaluate work zone safety performance⁸
- Conduct customer surveys to evaluate work zone traffic management practices and policies on a statewide/area-wide basis
- Develop strategies to improve work zone performance based on work zone performance data and customer surveys

⁴ Reducing congestion and delays in work zones is one of the items identified in the Work Zone Safety emphasis area included in CTDOT's 2010 Strategic Highway Safety Plan (SHSP).

⁵ Work zone crash reduction goals have been established by CTDOT and are detailed in the Bureau of Planning, Transportation Safety Section's [2011 Highway Safety Plan \(HSP\)](#).

⁶ The 2010 Joint Stewardship and Oversight Agreement between the FHWA Connecticut Division and CTDOT included the Number of Serious Crashes in Work Zones as a Safety and Security Performance Measure.

⁷ See 23 CFR §630.1008(c) *Work Zone Data*

⁸ See Footnote 7

The following action item issues are recommended based on observations from the 2010 Work Zone field reviews:

- Construction Sign Retroreflective Issues
- Pedestrian /Bicycle Access issues
- Project Lighting for Night Construction
- Lighting for night time Inspection
- Barricade warning lights High intensity
- Traffic Control in Work Zones
- Variable Message Signs
- Movable Barrier systems
- Environmental Conditions
- Safety Review Self Assessment

For each of the above recommended action item issues identified from the 2010 Work Zone field reviews, a table was prepared (see [Appendix 5](#)) with the following details:

- Problem description
- Actions taken
- Actions to be taken

For most of the above issues identified from the 2010 Work Zone field reviews, follow-up actions have already been initiated by CTDOT. Many more action items are pending, and future discussions are planned between CTDOT and FHWA to develop a formal action plan to pursue opportunities for additional improvement. The next required Work Zone process review must be completed in 2013.

APPENDIX 1

**FHWA Memorandum, Traffic Incident Management and Work Zone Self
Assessments (January 28, 2010)**



U.S. Department
of Transportation
**Federal Highway
Administration**

Memorandum

Via Electronic Mail

Subject: Action: Traffic Incident Management and
Work Zone Self Assessments

Date: January 28, 2010

From: 
Jeffrey A. Lindley
Associate Administrator for Operations

In Reply Refer To:
HOTO-1

To: Directors of Field Services
Federal Lands Highway Division Engineers
Director of Technical Services
Division Administrators

The purpose of this memorandum is to provide the results of the 2009 Traffic Incident Management and Work Zone Self Assessments and announce the Self Assessment cycle for fiscal year (FY) 2010. These assessments are valuable in supporting Agency efforts to achieve our System Performance, National Leadership, and Program Delivery goals. The Self Assessments have proven to be valuable to our State and local partners in evaluating the effectiveness of Traffic Incident Management and Work Zone Management activities, and charting paths for improvement in these areas. The Self Assessments have provided critical input to the Office of Operations for assessing the success of our programs, and enable us to better define our priorities and identify and share best practices nationwide. The assessments are also important for the development of FHWA's annual performance goals. The Work Zone Self Assessment can also support the process reviews required every other year by the Work Zone Safety and Mobility Rule, and a Division might find it helpful to work with their State DOT and other stakeholders to conduct the assessment as part of the State's process review.

Similar to past years, the FY 2010 assessment process allows each Division Office to determine when the assessments in their State will be conducted as well as the appropriate level of effort. Some years might require an in-depth reassessment involving a myriad of stakeholders. In other years, only an update to current scores based on observations and an ongoing knowledge of program practices and activities is warranted. Whatever method is used, the goal is to accurately capture the state-of-the-practice for the traffic incident management and work zone programs within your State. We recommend that an in-depth reassessment be done at least every 2 to 3 years.

Because the Self Assessment scores are used to develop annual performance goals for the Agency, the Office of Operations must receive completed Self Assessments by **June 1, 2010**. In the next couple weeks, your Division Office contact persons for these assessments will be sent specific guidance for each assessment.



Please find attached the FY 2009 National Summary Reports for each of the two Self Assessment areas. These reports provide useful benchmarking information, example practices and ideas for program improvements, and related national efforts. I encourage you to share good ideas from your State when you submit the Self Assessments. We incorporate your comments (anonymously) into the National Summary Reports and in this way provide a venue for peer-to-peer exchange of useful practices.

If you have any questions on the Self Assessment process or need assistance, please contact the following program managers in the Office of Operations:

- Traffic Incident Management: Paul Jodoin, 202-366-5465, Paul.Jodoin@dot.gov
- Work Zones: Tracy Scriba, 202-366-0855, Tracy.Scriba@dot.gov.

2 Attachments

APPENDIX 2

Work Zone Mobility and Safety Self Assessment User Guide (2010)

Work Zone Mobility and Safety Self Assessment

User Guide

Federal Highway Administration

2010

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1 Introduction and Background

In 2007, there were 41,059 traffic fatalities in the United States, with 835 identified as work zone crashes¹. Congestion and bottlenecks can cause fatalities, degrade air quality, slow commerce, increase energy consumption, and threaten our quality of life. An estimated 24% of all nonrecurring congestion on freeways is due to work zone activities.² To meet our nation's mobility needs, adequately address growing congestion, and provide for safe travel during roadwork, we must share information about strategies and techniques that work.

To help States evaluate their work zone practices, and to help assess work zone practices Nationally, the Federal Highway Administration (FHWA) developed the Work Zone Mobility and Safety Self Assessment (WZ SA) tool. The WZ SA tool consists of 46 questions designed to assist those with work zone management responsibilities in assessing their programs, policies, and procedures against many of the good work zone practices in use today. The policies, strategies, processes, and tools identified in the WZ SA were gathered from the best practices currently in place in State departments of transportation (DOTs), Metropolitan Planning Organizations, and local municipalities. Many of the items can be found in the *Work Zone Best Practices Guidebook* (available at <http://www.fhwa.dot.gov/workzones>).

The WZ SA helps FHWA Division Offices work with their State partners to:

- Assess their past work zone activities
- Identify actions and priority areas for improvement as appropriate for a given State
- Establish a baseline of their state of the practice and monitor changes over time
- Gain useful information that States can use as part of their inputs when they perform the process reviews that are required by the Work Zone Safety and Mobility Rule (http://www.ops.fhwa.dot.gov/wz/resources/final_rule.htm).

On a National level, the WZ SA serves several important roles. It:

- Helps raise the level of awareness of practices and strategies used in mitigating work zone congestion and crashes
- Facilitates communication and sharing of best practices among transportation professionals
- Provides an opportunity to benchmark progress in work zone management at the National level
- Helps FHWA identify work zone congestion and safety management strategies that need more investigation and performance evaluation
- Helps FHWA identify areas where there is a need for additional training and guidance
- Assists in identifying States that are on the "leading edge" in a particular area and may be well-suited to share their experiences through case studies, as part of scanning tours or workshops, or as peers in the WZ Peer-to-Peer Program (<http://www.ops.fhwa.dot.gov/wz/p2p/index.htm>).

¹ http://www.workzonesafety.org/crash_data/workzone_fatalities/2007

² Oak Ridge National Laboratory study

The WZ SA and its results illustrate what transportation agencies around the country are doing to reduce the impacts of construction and maintenance work on traveler delays and roadway safety. All of the practices addressed in the WZ SA do not necessarily need to be used on all road projects to have a successful work zone program.

In 2010 the WZ SA contains the same 5 supplemental questions that were added in 2008. These questions are intended to provide an indication of how States' practices may have changed as a result of the Work Zone Safety and Mobility Rule (23 CFR 630 Subpart J). These questions will be rated using a separate rating scheme and will not be used in calculating an agency's WZ SA score. The answers to these 5 questions, along with changes in the National average ratings for the existing WZ SA questions, will help FHWA assess the effects of the Rule.

Sections 2 and 3 of this User Guide describe how to conduct and score the WZ SA. Section 4 delineates and explains the WZ SA questions. Appendix A provides background information on the scoring calculations.

2 Conducting the Self Assessment

The method in which the WZ SA is accomplished is up to the FHWA Divisions to determine (working with their States). In the past the assessment process has been completed by both a comprehensive process and an abbreviated update approach. Whatever method is used, the goal is to accurately capture the state of the practice for work zone management within your State. We recommend that a comprehensive re-assessment be done at least every 2 to 3 years.

When conducting a comprehensive assessment, the WZ SA process works best as a group exercise and should be facilitated by a Division Office representative. To get the most out of the meeting, facilitators should read the *Work Zone Mobility and Safety Self Assessment Facilitator Guide*. Table 1 provides some brief suggestions.

If the abbreviated approach is used, the Division Office Work Zone representative scores the WZ SA using first hand knowledge gained by working with their State partners over the past year. When this method is used it is essential that all appropriate Division Office personnel provide their input on the work zone practices of the State.

Because of the complexity of operational, economic, and political issues that affect work zone practices and procedures, you should take care to ensure that the score you are recording represents the most accurate state of the practice for your State. Use the “comment” portion of the WZ SA tool to record specific qualifications or observations to better explain/describe current practices in the State.

Table 1. Suggestions for the Self Assessment

- Assemble a team of participants that is fully versed in planning, designing, constructing, maintaining, and operating the transportation system.
- Provide participants with the assessment guide and score sheet in advance so that they may become familiar with the questions and the basis for the questions.
- Ask the participants to bring their score sheets and guide with them to the assessment exercise.
- Have a designated facilitator for the meeting(s).
- Encourage open discussion about each topic area to better understand the participants' responses.
- Discuss the final score in each topic section and collect information on any practices, policies, and procedures that are proving successful for the participant in reducing congestion and crashes in work zones.

3 Scoring the Self Assessment

Each question in the WZ SA describes a policy, strategy, process, or tool that contributes to the reduction of congestion, delay, and crashes in work zones. For each question in the SA, you are assessing two things:

- The *adoption phase* of the policy, process, product, or practice (i.e., the extent to which the agency has adopted it), and
- The *level of effort* that the agency has applied.

3.1 Assess the Adoption Phase

To identify the extent to which an agency has adopted a policy, strategy, process, or tool, Table 2 shows five *adoption phases*: initiation, development, execution, assessment, and integration.

For each question in the SA, consider the questions in Table 2 and decide which phase best fits the overall item response. **Note: The characteristics indicated within each phase are general guidance and may vary based on your State’s project execution process. Use this table as a general guideline.**

Table 2. Characteristics of Each Phase

Phase	Characteristics
Initiation	<ul style="list-style-type: none"> • Does agency management acknowledge the need for a particular item? • Has exploratory research taken place to assess the benefits of this item? • Does management support further development of this item’s requirements?
Development	<ul style="list-style-type: none"> • Has the agency developed a plan or approach to address the item’s requirements? Has the agency started to investigate the feasibility of implementation? • Does the agency have standards and guidance to enable the item’s implementation? • Does the agency have the approvals necessary for implementation? • Are resources in place to support the adoption of this item?
Execution	<ul style="list-style-type: none"> • Is the agency implementing/carrying out the requirements of this item? • Has the agency allocated financial or staff resources necessary for the item’s execution? • Have appropriate personnel been trained to execute the item’s requirements? • Has a process owner been established?
Assessment	<ul style="list-style-type: none"> • Has the agency assessed how well this item reduces work zone congestion and crashes? • Has the agency assessed the process for carrying out this item? • Has the agency implemented appropriate changes to the requirements of this item based on performance assessments?
Integration	<ul style="list-style-type: none"> • Has the agency integrated the requirements of this item into quality improvement processes? • Are the requirements of this item integrated into agency culture? • Are the requirements of this item included as part of the employee performance rating system?

3.2 Level of Effort

Next, assign the score on a scale of 0 to 15 using the scoring ranges shown in Table 3. To assign the actual score within the range, evaluate the level of effort that has been applied within a particular phase of the adoption process:

- If the agency has applied only a minimal effort, assign the *lowest rating* in a range.
- If the agency has applied a moderate effort, assign the *mid-point rating*.
- If the agency has applied an extensive effort, assign the *highest rating*.

Table 3. Scoring Guidelines

Adoption Phase	Scoring Range	Description
Initiation	(0–3)	Agency has acknowledged the need for this item
Development	(4–6)	Agency has developed a plan or approach to address this item
Execution	(7–9)	Agency is executing or has executed an approach to address this item
Assessment	(10–12)	Agency has assessed this item’s performance and its success in achieving agency goals and objectives
Integration	(13–15)	Agency has integrated this item into its project execution process and culture

Again, overall “best fit” does not require total agreement with the description for the scoring range.

3.3 Section Scoring

The overall score for a section averages the assigned scores for each question in that section. Once you have assigned the score for all questions in a section, the scoring sheet steps you easily through the scoring calculations. A weighted average score will be calculated for each section. Appendix A shows the basis for the calculations. These calculations are done automatically in the Score Sheet on the WZ SA website where you must enter your scores (<http://www.workzonesurvey.com/WZSurvey/intro.cfm>).

4 Assessment Areas

The WZ SA consists of six primary assessment areas:

- Leadership and Policy
- Project Planning and Programming
- Project Design
- Project Construction and Operation
- Communications and Education
- Program Evaluation

Within the topics, work zone projects are categorized into four types, which are characterized by the various levels of impact each will have on travelers. Table 4 shows some suggested characteristics of these types of projects.

Table 4. Work Impact Types

Type	Characteristics	Examples
Type I	<ul style="list-style-type: none"> • Affects the traveling public at the metropolitan, regional, intrastate, and possibly interstate level. • Very high level of public interest. • Directly affects a very large number of travelers. • Significant user cost impacts • Very long duration 	<ul style="list-style-type: none"> • Central Artery/Tunnel in Boston, Massachusetts • Woodrow Wilson Bridge in Maryland/Virginia/District of Columbia • Springfield Interchange “Mixing Bowl” in Springfield, Virginia • I-15 reconstruction in Salt Lake City, Utah.
Type II	<ul style="list-style-type: none"> • Affects the traveling public predominantly at the metropolitan and regional level. • Moderate to high level of public interest. • Directly affects a moderate to high number of travelers. • Moderate to high user cost impacts • Duration is moderate to long. 	<ul style="list-style-type: none"> • Major corridor reconstruction • High-impact interchange improvements • Full closures on high-volume facilities • Major bridge repair • Repaving projects that require long term lane closures
Type III	<ul style="list-style-type: none"> • Affects the traveling public at the metropolitan or regional level. • Low to moderate level of public interest. • Directly affects a low to moderate level of travelers. • Low to moderate user cost impacts • May include lane closures for a moderate duration. 	<ul style="list-style-type: none"> • Repaving work on roadways and the National Highway System (NHS) with moderate Average Daily Traffic (ADT) • Minor bridge repair • Shoulder repair and construction • Minor interchange repairs
Type IV	<ul style="list-style-type: none"> • Affects the traveling public to a small degree. • Low public interest. • Duration is short to moderate. • Work zones are usually mobile and typically recurring. 	<ul style="list-style-type: none"> • Certain low-impact striping work • Guardrail repair • Minor shoulder repair • Pothole patching • Very minor joint sealing • Minor bridge painting • Sign repair • Mowing

NOTE: These levels may not encompass all possible combinations or degrees of work zone categories. Become familiar with the work impact levels and relate them to work being accomplished in your state, regional, or local area. Some terms are general to allow flexibility in categorizing borderline project types.

In 2010 the WZ SA contains the same 5 supplemental questions that were added in 2008. These questions are intended to provide an indication of how States' practices may have changed as a result of the Work Zone Safety and Mobility Rule (23 CFR 630 Subpart J). These questions will be rated using a separate rating scheme and will not be used in calculating an agency's WZ SA score. The answers to these 5 questions, along with changes in the National average ratings for the existing WZ SA questions, will help FHWA assess the effects of the Rule.

All practices addressed in the WZ SA support the intent of the Rule. In some cases a WZ SA question can be related (directly or indirectly) to a specific provision of the Rule. In these cases a linkage to the appropriate section of the Rule is provided in this User Guide so that agencies can more readily identify where it may be appropriate to adjust their WZ SA scores to reflect all their work on the Rule. On the website where the WZ SA scores need to be entered (<http://www.workzonesurvey.com/WZSurvey/intro.cfm>), these links are made electronically by connecting the question on the Score Sheet to the applicable section(s) of the online version of the FHWA Work Zone Safety and Mobility Rule Implementation Guide. As you complete the survey, refer to the applicable sections of the Implementation Guide for information and examples on the provisions as they relate to your policies, practices, and WZ SA responses.

The following sections describe each assessment area and explain essential components of each question.

4.1 Leadership and Policy

Agency leadership support should drive overall policy making for the agency. This support fosters an environment conducive to developing an effective work zone program. Project planning, design, and construction and maintenance activities should all incorporate work zone mobility and safety impacts and mitigation strategies. Agency management should facilitate and encourage a multidisciplinary approach to traffic management throughout all phases in the life of a project. Senior managers should be personally, visibly, and proactively involved in efforts to minimize work zone delays and enhance the safety of the motorist and workers in work zones.

Goals provide high-level direction and establish expectations for agency staff. Clear and specific goal statements such as "Reduce congestion and delay in work zones by 10% in 5 years" establish a basis on which to develop strategies and actions. Use performance measures to assess progress toward fulfillment of a goal. For example, to track progress toward reduction of work zone delays, an agency may gather information regarding the total vehicle hours of delay in work zones and track these values over time.

4.1.1 Process to Determine Project Impact Type

Question: *Has the agency developed a process to determine whether a project is impact type I, II, III, or IV?*

Relevant Sections of the WZ Rule:

- ◆ [630.1006 - Work Zone Policy](#)
- ◆ [630.1010b - Significant Projects \(Policy Provisions\)](#)

Agencies should have a process to classify projects into project types, given likely travel time and delay impacts. Such a process will be useful in developing policies and practices for the design and management of work zones for several reasons. First of all, the process will help the agency staff understand how and when to develop work zone strategies. The process will also help agency staff understand the importance of work zone activities and enable them to discuss with the public why actions are being implemented.

Generally, the process will classify projects into those with a high impact and those with a low impact. Considerations to determine the classification include the project size and complexity, construction time, and traffic volume affected. Agency processes for defining and identifying significant projects meet the intent of this question.

4.1.2 Strategic Goals to Reduce Congestion and Delays in Work Zones

Question: *Has the agency established strategic goals specifically to reduce congestion and delays in work zones?*

Relevant Sections of the WZ Rule:

- ◆ [630.1006 - Work Zone Policy](#)

An agency should adopt written strategic goals to reduce congestion and delay in work zones. The process of developing and adopting goals enables the agency to examine the importance of reducing congestion and delay in work zones and opens an agency-wide dialogue about addressing the identified challenges. The products of these discussions should include specific goals that can set direction and establish expectations. To provide clear guidance and direction to operating departments, top management should support the development of goals that focus on reducing work zone congestion and delay. Such goals would provide a basis for priority setting and resource allocation and would signal to agency staff members and stakeholders the importance of considering work zone congestion and delay while planning and making decisions.

Strategic goals set the agency's vision, expectations, and direction. For example, an agency may adopt the following goal: "Reduce congestion and delay in work zones by 10% over the next 5 years." This goal would then serve as the basis for actions designed to meet this requirement in the specified time frame.

4.1.3 Strategic Goals to Reduce Crashes in Work Zones

Question: *Has the agency established strategic goals specifically to reduce crashes in work zones?*

Relevant Sections of the WZ Rule:

◆ [630.1006 - Work Zone Policy](#)

Over recent years, the number of people killed in motor vehicle crashes in work zones has increased from 789 in 1995 to an all-time high of 1,026 in 2000. Each year, more than 80% of all fatalities in work zone crashes are motor vehicle occupants. In addition, crashes cause more than 40,000 injuries in work zones each year.

To eliminate fatalities, injuries, and property damage, and to enhance the safety of the traveling public and workers, agencies should adopt strategic goals focused on reducing crashes in work zones. By adopting such goals, agencies would signal to staff members and stakeholders the importance of considering crash reduction during decision-making and when they are planning, designing, constructing, maintaining, and operating work zone projects.

An agency may adopt a goal such as “Reduce crashes in work zones by 25% over the next 5 years” to provide direction to agency staff and stakeholders and to signal to agency staff members that reducing crashes in work zones is an important part of the agency’s mission. Tracking progress toward goals provides a basis to formulate and evaluate actions designed to reduce crashes.

4.1.4 Performance Measures for Work Zone Congestion and Delay

Question: *Has the agency established measures (e.g., vehicle throughput or queue length) to track work zone congestion and delay?*

Relevant Sections of the WZ Rule:

◆ [630.1006 - Work Zone Policy](#)

◆ [630.1008c - Work Zone Data](#)

Measuring the performance of work zones is an important element of total quality management, because the feedback provided to management from performance measures (e.g., vehicle throughput, queue length, or vehicle delay) establishes a basis from which to examine progress toward goals.

For example, suppose an agency establishes a goal to reduce total delay in work zones by 10% during the next 5 years. To measure progress toward this goal, the agency must develop a method to measure delay. The agency may choose to measure delay by gathering data on the total vehicle hours of delay experienced by the traveling public each year in all work zones. The number of total vehicle hours of delay could be tracked to determine whether it is increasing, decreasing, or remaining the same. If it is not decreasing, then the agency needs to examine and adjust its strategies to reduce delay.

4.1.5 Performance Measures for Work Zone Crashes

Question: *Has the agency established measures (e.g., crash rates) to track work zone crashes?*

Relevant Sections of the WZ Rule:

◆ [630.1006 - Work Zone Policy](#)

◆ [630.1008c - Work Zone Data](#)

As with work zone congestion and delay, agencies should develop performance measures to track work zone crashes over time. These measures should be based on agency goals and should provide a basis to assess progress toward these goals. The agency should collect crash data on a systematic basis, store these data, and analyze them to develop appropriate performance measures such as crash rates. The resources available to support the development of these performance measures would reflect a strong agency commitment to reducing crashes in work zones.

4.1.6 Policies to Develop Transportation Management Plans

Question: *Has the agency established a policy for the development of Transportation Management Plans to reduce work zone congestion and crashes?*

Relevant Sections of the WZ Rule:

◆ [630.1006 - Work Zone Policy](#)

◆ [630.1012b - Transportation Management Plans](#)

◆ [630.1012b4 - Including Stakeholders in TMP Development](#)

A Transportation Management Plan (TMP) describes the expected level and nature of impacts resulting from work zone activities and identifies specific mitigation strategies. The detail of a TMP will depend on the potential traffic impact (i.e., type I, II, III, or IV).

Agencies should establish written policies that describe how TMPs will be developed to reduce congestion and crashes caused by work zones. These policies should address when in the process and how TMPs will be developed, and who will develop them.

The TMP can include both supply management as well as demand management plans to mitigate impacts. Supply management plans would include alternative detour routes, traffic signing plans, traffic signal plans, and public involvement and outreach. Demand management plans would include staggered work hours, ridesharing, increased public transportation, and accurate and current travel information.

The TMP also describes how information will be distributed to the public regarding impacts and alternative mitigation strategies.

A Traffic Control Plan for the project would be a sub element of the broader TMP. A Traffic Control Plan handles traffic through a specific highway work zone and includes plans to address requirements of Part 6 of the *Manual on Uniform Traffic Control Devices* (MUTCD).

4.1.7 Work Zone Traffic Performance Guidance

Question: *Has the agency established work zone performance guidance that addresses maximum queue lengths, the number of open lanes, maximum traveler delay, etc.?*

Relevant Sections of the WZ Rule:

- ◆ [630.1006 - Work Zone Policy](#)
- ◆ [630.1008c - Work Zone Data](#)
- ◆ [630.1012d - Method-Based and Performance-Based Specifications](#)

Agencies should develop guidance that addresses traffic performance issues such as maximum queue length, the number of lanes to remain open, and maximum traveler delay. Such guidance provides specific measures to help agency staff members plan and manage work zone performance. This guidance will be useful in establishing acceptable performance levels for work zone operations, and can also serve as a basis for developing appropriate mitigation strategies and actions. In addition, these measures communicate to the public the performance goals of the agency and establish expectations regarding performance.

4.1.8 Criteria to Support Night Work and Full Closure Strategies

Question: *Has the agency established criteria to support the use of project execution strategies (e.g., night work and full closure) to reduce public exposure to work zones and reduce the duration of work zones?*

Relevant Sections of the WZ Rule:

- ◆ [630.1006 - Work Zone Policy](#)
- ◆ [630.1012b2 - Transportation Operations Component](#)

Agencies should develop criteria to determine when night work or full closure strategies are appropriate. Working at night, when traffic volumes are usually lower, can reduce overall vehicle delay through the work zone. In addition, fully closing a road may result in accelerating construction time and therefore reducing motorist delay. Agencies may formulate specific criteria or thresholds to determine when to implement night work or full closure strategies. These criteria include factors such as the length of the construction period, traffic volume, user costs, and other perceived impacts. This question is asking about criteria for the use of **design strategies** that affect how construction is carried out.

4.1.9 Innovative Contracting Strategies

Question: *Has the agency developed policies to support the use of innovative contracting strategies to reduce contract performance periods?*

Relevant Sections of the WZ Rule:

- ◆ [630.1006 - Work Zone Policy](#)
- ◆ [630.1012b2 - Transportation Operations Component](#)

Agencies should develop policies that support the use of innovative contracting strategies to accelerate construction time periods. Accelerating construction time will reduce the amount of time motorists are exposed to delay and congestion. Innovative contracting strategies minimize the duration of work zone activities by providing contractors with financial or other incentives to improve the efficiency and timeliness of project activities. Some examples of innovative contracting strategies are flexible start times, A+B contracting, and incentive or disincentive (I/D) clauses. I/D clauses may include “window specifications” and “flexible start date contracts”. This question is asking about criteria for the use of **contracting strategies** that affect how construction is carried out.

4.1.10 Memorandum of Understanding

Question: *Has the agency established Memoranda of Understanding (MOU) between utility suppliers to promote the proactive coordination of long-range transportation plans with long-range utility plans, with the goal of reducing project delays and minimizing the number of work zones on the highway?*

Relevant Sections of the WZ Rule:

- ◆ [630.1012b4 - Including Stakeholders in TMP Development](#)

To avoid prolonged delay in work zones, agencies should develop MOUs with utility providers to coordinate construction schedules and to define how coordination occurs. It may be desirable to overlap or, in some cases, avoid overlapping, utility and transportation projects.

4.2 Project Planning and Programming

While transportation planning and implementation processes differ significantly from state to state, they all focus on developing increased capacity and efficiency in the transportation system. They do this by developing long-range transportation plans (LRTP), transportation improvement program plans (TIP), unified planning work programs (UPWP), and in some cases congestion management system (CMS) plans.

Transportation management and operations (M&O) processes are increasingly important to the planning professional. Metropolitan areas account for 75% of the nation's population and 83% of its economic output. They are centers for social as well as economic activity and are the hubs of the national transportation system. In addition, they are portals for people and freight moving between the United States and other countries. To meet the challenge of continued social mobility, the planning community will need to take a more active role in the development and implementation of transportation system M&O strategies.

Although the role of planners in the development of project-specific criteria has not been universally defined, the complexity of our transportation systems and the impact of congestion on our nation will necessitate input from planners during the project development process, as shown by the following example roles:

- Use analytical traffic models to assess the system-wide impacts of specific project requirements.
- Evaluate programming estimates to ensure that the proper level of funding is included to mitigate traffic congestion and improve safety through work zones.
- Provide the critical "bridge" of knowledge between the planning world and the design world to reduce the impacts of work zones on the traveling public.

4.2.1 Use of Analytical Tools

Question: *Does the agency's planning process actively use analytical traffic modeling programs to determine the impact of future type I and II road construction and maintenance activities on network performance?*

Relevant Sections of the WZ Rule:

◆ [630.1008b - Assessment of Work Zone Impacts](#)

Current and future network capacity forecasts are focused on providing a certain level of mobility to the traveling public. The planner plays a key role in looking forward to determine what network system improvements are needed and when they should be in place. To accurately assess the performance of a network system, the planner must know the configuration of the network and use analytical models to determine projected volume capabilities. Being aware of conditions that affect the configuration and capacity of a roadway is essential to making accurate capacity predictions. To maintain the projected traffic volumes on any facility, the planner should actively involve operation planners and designers in the early planning process to account for system operational impacts caused by type I and II reconstruction and maintenance. This question pertains

to whether **modeling is used during the planning process** to consider what impacts future work zones might have.

4.2.2 Alternative Network Options

Question: *Does the agency's planning process include developing alternative network options (e.g., frontage roads, increased capacity on parallel arterials, beltways, or strategically placed connectors) to maintain traffic volumes during future road construction and maintenance?*

Relevant Sections of the WZ Rule:

◆ [630.1012b2 - Transportations Operations Component](#)

A critical part of planning a transportation network is the process of analyzing origins and destinations, links and nodes, attractions, modes, etc. The desired outcome of this process is a transportation network that allows the public to move from point to point with a certain degree of efficiency and comfort. To accomplish this, the transportation planner should be aware of the operational impacts that future construction, repair, and maintenance activities have on system performance. Input from operations, design, construction, and maintenance engineers is critical to knowing what future system constraints and impacts will be caused by repair and maintenance activities. Knowing future system impacts will enable the agency to plan for them and provide alternative network options for the traveling public. Planners should anticipate the need to reconstruct and maintain principal arterials and know what the capacity reduction factors will be. Planners should analyze the surrounding network to determine the best mitigation strategies (e.g., rerouting alternatives, larger volumes on parallel facilities, and strategically placed lateral connectors) to properly scope a project.

4.2.3 Project Prioritization

Question: *Does the agency's planning process manage the transportation improvement program to eliminate network congestion caused by poorly prioritized and uncoordinated execution of projects?*

Relevant Sections of the WZ Rule:

◆ [630.1010b - Significant Projects \(Work Zone Characteristics\)](#)

To avoid multiple uncoordinated projects on major traffic corridors, agencies should coordinate the schedules for projects and programs among the various implementing organizations. If planners do not consider the entire network performance when developing the transportation improvement program, major corridor disruptions can affect the entire network's performance. For example, if a major corridor project forces travelers to alternate routes, planners should ensure that the alternate routes can accommodate the additional traffic. When ranking transportation improvement projects, planners should develop project prioritization criteria that include analysis of the impacts on system operations.

4.2.4 Operational and Traffic Management Costs

Question: *Does the agency's transportation planning process include a planning cost estimate review for project types I, II, and III that accounts for traffic management costs (e.g., incident management, public information campaigns, positive separation elements, uniformed law enforcement, and intelligent transportation systems [ITS])?*

Relevant Sections of the WZ Rule:

- ◆ [630.1012b2 - Transportations Operations Component](#)
- ◆ [630.1012b3 - Public Information](#)

At the planning/programming stage, project cost estimators should consider the added costs of traffic management that are associated with work zones. Some agencies routinely include these costs, while others do not. Failure to consider these costs often causes projects to be inadequately funded to support items such as ITS, public information campaigns, police enforcement teams, and positive separation devices when design begins. Failure may also result in work zones with poor traffic management strategies, leading to work disruptions, contract extensions, angry travelers, and unsafe conditions.

4.2.5 Planning Support During Design Activities

Question: *Does the agency's transportation planning process include the active involvement of planners during the project design stage to assist in the development of congestion mitigation strategies for type I and II projects?*

Relevant Sections of the WZ Rule:

- ◆ [630.1012b4 - Including Stakeholders in TMP Development](#)

During the project delivery process, planners spend considerable time analyzing the impacts of future growth and development on the transportation network. This network includes minor and major transportation corridors that are the backbones of public mobility and links that are significant for the distribution of goods to the region. Disruption of these corridors can have a devastating impact on the local and regional economy and only increases the frustration of the traveling public with work zone congestion. Planners have a unique perspective on the entire network and can best assess the impacts of specific operational strategies on the system. Because of this perspective, planners should provide the designers with system-level insight and advice on *specific* design solutions. Planners should champion solutions that will best facilitate network operational performance and should maintain contact with project team members throughout the process to provide system-level input at project review meetings.

4.2.6 Transportation Management Plan Development

Question: *Does the agency's transportation planning process engage planners as part of a multidisciplinary/multiagency team in the development of Transportation Management Plans involving major corridor improvements?*

Relevant Sections of the WZ Rule:

◆ [630.1012b4 - Including Stakeholders in TMP Development](#)

This question specifically asks whether planners are involved in Transportation Management Plan (TMP) development, since often they have not traditionally been as involved in such efforts. The WZ Rule encourages beginning TMP development early when more options are available, thus planners can play a key role. Planners should be involved in the TMP development team as early as possible to bring a regional perspective to transportation program requirements. Planners should provide the link between technical design considerations and social and political considerations.

The TMP describes the expected level and nature of impacts resulting from work zone activities and identifies specific mitigation strategies for a particular road project. The detail of a TMP will depend on the potential traffic impact (i.e., type I, II, III, or IV).

A TMP generally consists of some combination of traffic control, operational strategies, and public information. A traffic control plan for handling traffic through a specific highway work zone is always an element of the TMP. For operational strategies, a TMP often addresses both demand management and supply management strategies to mitigate the impact of work zone activities on congestion and traveler delay. Demand management strategies may include alternative work hours, carpooling, promotion of alternative modes, and public involvement and outreach. Supply management strategies may include detour routes, signing, traffic signal plans, ITS, and relevant, timely, and accurate traveler information. The TMP also describes how information will be distributed to the public regarding impacts and alternative mitigation strategies.

4.3 Project Design

Project designers, working in concert with other functional experts, should consider work zone maintenance of traffic issues early in the design process. Designers should examine the use of different project execution strategies that can accelerate construction, thereby reducing construction time and minimizing the exposure of travelers to work zones and workers to traffic. In addition, designers should actively lead the preparation of Transportation Management Plans, including Traffic Control Plans, which will mitigate the impact of work zone activities.

4.3.1 Road User Costs

Question: *Does the agency have a process to estimate road user costs and use them to evaluate and select project strategies (full closure, night work, traffic management alternatives, detours, etc.) for type I and II projects?*

Relevant Sections of the WZ Rule:

- ◆ [630.1008b - Assessment of Work Zone Impacts](#)
- ◆ [630.1012b2 - Transportations Operations Component](#)

Reducing the amount of time drivers are exposed to work zones will result in less congestion and delay. Among the strategies to accelerate construction are full road closures and working at night. Closing a facility during construction activities removes the need to maintain traffic flow during the construction period, while conducting work at night exposes fewer drivers to work zone congestion and delay because traffic is generally lighter at night.

Agencies should apply a process to evaluate the costs of full road closure and night work strategies during the design phase of project development. While no standard process is recommended, road user costs include vehicle operation and maintenance as well as travel time and delay costs associated with using a highway. The process should include the calculation of road user costs while maintaining traffic in and around the work zone using traditional strategies. Road user costs should also be developed for full road closure and night work scenarios. If road user costs are lower under full road closure or night work scenarios, the agency then has a basis to explain to its stakeholders the desirability of pursuing these “innovative” project strategies.

4.3.2 Development of Transportation Management Plan during Design

Question: *Does the agency develop a Transportation Management Plan that addresses all operational impacts focused on project congestion for type I and II projects?*

Relevant Sections of the WZ Rule:

- ◆ [630.1012b - Transportation Management Plans](#)

The Transportation Management Plan (TMP) for type I and II projects should be developed during the design phase of project development, when the final project

scope, cost, and schedule are refined. As described earlier, a TMP describes the actions to be implemented to mitigate work zone congestion and delay during project construction (e.g., alternative work hours, carpooling, promotion of alternative modes, public involvement and outreach, detour routes, signing, channelization, ITS, and relevant, timely, and accurate traveler information). Because many strategies in the TMP may influence the project scope, cost, and schedule, designers should address this plan as part of the design process. For example, a mitigation action contained in the TMP may include the construction of a temporary detour route around a construction site. This would have to be included in project design activities to ensure that temporary facilities are properly incorporated into the project design.

4.3.3 Use of Multidisciplinary Teams to Develop Transportation Management Plans

Question: *Does the agency use multidisciplinary teams consisting of agency staff to develop Transportation Management Plans for type I & II projects?*

Relevant Sections of the WZ Rule:

◆ [630.1012b4 - Including Stakeholders in TMP Development](#)

The quality and effectiveness of a Transportation Management Plan (TMP) can be enhanced through the use of a multidisciplinary team drawn from planning, design, traffic engineering, and maintenance. Any TMP for a type I or II project should make use of a multidisciplinary team.

Planners may help the team understand the relationship between a particular project and an overall transportation program; for example, they may bring overlapping projects to the attention of the design team. Maintenance engineers may identify unique post-completion project maintenance problems that may affect the development of the TMP, such as including full-depth shoulders in a design because maintenance vehicles may have to access the project site during construction.

Such teams can generate more effective, proactive TMPs.

4.3.4 Constructability Reviews

Question: *Does the agency perform constructability reviews that include project strategies to reduce congestion and traveler delays during construction and maintenance for type I and II projects?*

Relevant Sections of the WZ Rule:

◆ [630.1012b - Transportation Management Plans](#)

A constructability review enables the design team to understand issues that may influence the final project design. Such reviews often involve a site visit to examine the physical characteristics of the site. This review defines when the project will start and end, how the project will be integrated into the existing transportation system, and which utilities will need removal or relocation. The constructability review also considers work zone strategies that would reduce delay and congestion during construction and

maintenance activities. The review determines whether it is possible to execute some features of the Transportation Management Plan or elements of the Traffic Control Plan. Constructability reviews ensure that a plan can be implemented in the field and should be conducted early in the design process to avoid major redesign. This question focuses on whether an agency conducts constructability reviews that include consideration of work zone impacts. These reviews could be done **solely in-house**, or **could involve outside parties**.

4.3.5 Construction Process Reviews Using Independent Contractors

Question: *Does the agency use independent contractors or contractor associations to provide construction process input to expedite project contract time for type I and II projects?*

Relevant Sections of the WZ Rule:

◆ [630.1008e - Process Review](#)

The length of construction time is a key component in determining how long motorists will be exposed to work zone congestion and delay. Contractor experience in executing plans should be used to better understand this component. In addition, involving contractors early in the design process can help identify alternative designs that may speed construction time and reduce motorist exposure. It is important to recognize that a disinterested, third-party contractor can provide objectivity to contract time estimates. This question focuses on whether an agency gets **input from independent contractors** for the purpose of identifying ways to reduce contract and construction times.

4.3.6 Use of Scheduling Techniques

Question: *Does the agency use scheduling techniques that are based on time and performance, such as the critical path method or parametric models, to determine contract performance times for type I and II projects?*

The use of scheduling tools will provide an initial roadmap for determining the amount of time that motorists are exposed to construction congestion and delays. Techniques such as the critical path method (CPM) can establish construction performance periods. Developing parametric models to determine contract performance times can leverage previous experience in construction time periods for other similar projects.

4.3.7 Intelligent Transportation System Technology Strategies

Question: *Does the agency have a process to evaluate the appropriate use of ITS technologies to minimize congestion in and around work zones for type I, II, and III projects?*

Relevant Sections of the WZ Rule:

- ◆ [630.1006 - Work Zone Policy](#)
- ◆ [630.1012b2 - Transportations Operations Component](#)

Agencies should examine the use of ITS to mitigate work zone congestion and delay during the design process for type I, II, and III projects. Deployment of ITS technologies can encompass technologies such as portable traffic management or traveler information systems, warning systems, speed management systems, enforcement systems, and other supporting technologies. ITS offers opportunities to provide essential information to travelers to help them avoid work zones, plan trips, and safely travel through work areas.

Deployment of ITS in work zones is currently not widespread. However, as technologies are improved, ITS will likely become a more significant element in managing traffic in and around work zones.

4.3.8 Life-Cycle Costing

Question: *Does the agency use life-cycle costing when selecting materials to reduce the frequency and duration of work zones for type I, II, and III projects?*

Life-cycle costing should be part of the design process for type I, II, and III projects. Life-cycle costing accounts for the total cost of a project over its useful life, including the need to construct, maintain, and operate facilities, and is an important element in selecting materials for construction. The use of life-cycle costing to select materials, products, and processes can provide designers with a way to maximize project service life and minimize required repair. By minimizing the frequency of repair, agencies can reduce the frequency and duration of work zones required to repair facilities. This means that the total exposure to work zone delay and congestion can be minimized.

4.3.9 Positive Barrier Systems

Question: *Does the agency have a process to assess projects for the use of positive separation devices for type I and II projects?*

Relevant Sections of the WZ Rule:

- ◆ [630.1006 - Work Zone Policy](#)
- ◆ [630.1012b2 - Transportations Operations Component](#)

For type I and II projects, during the project scope development, the designer should examine the need for positive separation devices. It is critical that this element be considered early enough to include appropriate funding to provide adequate safety and operational elements in the design and ultimately in the work zone. Processes should take into account the facility type, daily and peak hour traffic, adjacent hazards, location, facility geometry, weather conditions, available space, and vehicle types. The deployment of positive barrier systems can contribute to a safer environment for workers, higher-quality work, faster construction performance, and a higher rate of

travel flow through the work zone and can provide a system of capacity control (e.g., reversible flow).

4.3.10 Mitigation of Future Congestion

Question: *Does the agency anticipate and design projects to mitigate future congestion impacts of repair and maintenance for type I, II, and III projects?*

Agencies should consider the need to mitigate future congestion associated with repair and maintenance activities during the design of type I, II, and III projects. The project design should incorporate features that accommodate the need for future repair and/or maintenance activities. Wider shoulders, for example, ensure that maintenance vehicles can access the facility without affecting the flow of traffic significantly. While it is not possible to include all features that may assist in accommodating future repair activities, it is useful to recognize these needs as part of the design process to ensure that such features are included in the project design.

4.3.11 Contractor Involvement in Traffic Control Plans

Question: *When developing the Traffic Control Plan for a project, does the agency involve contractors on type I and II projects?*

Relevant Sections of the WZ Rule:

- ◆ [630.1012b1 - Temporary Traffic Control Plans](#)
- ◆ [630.1012b4 - Including Stakeholders in TMP Development](#)

A Traffic Control Plan (TCP) directs traffic through a specific highway or street work zone or project. TCPs may be very detailed and may include references to standard plans, a section of the MUTCD, or a standard highway agency manual. Contractors can contribute to more efficient and effective TCP design because they have extensive experience in managing work zone design and operations. Agencies should capture this knowledge as part of the design process and the resulting TCPs.

4.3.12 Use of Computer Modeling to Develop Traffic Control Plans

Question: *When developing the Traffic Control Plan for a project, does the agency use computer modeling to assess Traffic Control Plan impacts on traffic flow characteristics such as speed, delay, and capacity for type I and II projects?*

Relevant Sections of the WZ Rule:

- ◆ [630.1012b1 - Temporary Traffic Control Plans](#)
- ◆ [630.1008b - Assessment of Work Zone Impacts](#)

For type I and II projects, agencies should use computer models to evaluate Traffic Control Plans (TCPs). Models show the impact of alternative work zone strategies on motorist delay. There are many such models, ranging in complexity from spreadsheet models to sophisticated computer network simulation. Designers use information from

these tools to create estimates of travel congestion and delay, leading to effective and efficient TCPs. This question pertains to whether **modeling is used during design**, when more detailed project information is available and the TCP is being developed.

4.4 Project Construction and Operation

A roadway construction or maintenance site can be a very complex orchestration of activities affecting the public in many ways. Approximately 13% of the NHS, totaling 20,876 miles, has a work zone on it during the peak summer work season, and approximately 24% of all nonrecurring congestion on freeways is due to work zones. A recent study by the Texas Transportation Institute revealed that from a sampling of 4 states, an average of 26% of the NHS was under contract for construction. The average project length was 3.7 miles, and the average active time (without weekends) was approximately 62% of the total contract time. There are many pieces of the project delivery process and everyone has a critical role, but what the public mostly sees and experiences is the construction end. By focusing on letting strategies, quality-based contractor selection, time-sensitive bidding, efficient operations, aggressive contract management, and good public information, we can improve the execution and public perception of transportation improvements.

4.4.1 Letting Schedules and Industry Capabilities

Question: *Is the letting schedule altered or optimized to reflect the available resources and capabilities of the construction industry?*

To obtain the most efficient and highest-quality product from a construction contract, you need quality materials and trained personnel. In any given part of the country, there are a limited number of qualified road builders and material suppliers to support road projects across the country. To obtain the best quality of labor and materials, the transportation agency should regularly evaluate the capabilities of the construction industry and material suppliers and balance those capabilities with the agency's letting schedule. Lettings should reflect the market's capability to handle the workload available. Above capacity letting strategies can contribute to unqualified workers on the job, longer work zone duration, poor materials, injuries, increased driver frustration with inactive work zones, and so on.

4.4.2 Letting Schedules to Minimize Disruptions

Question: *Is the letting schedule altered or optimized to minimize disruptions to major traffic corridors?*

Relevant Sections of the WZ Rule:

◆ [630.1008b - Assessment of Work Zone Impacts](#)

Effective letting schedules take into consideration the type and location of the projects being let and are organized to minimize disruption of the transportation system. The agency should assess the impacts of all ready-to-let projects on the transportation system prior to developing the letting schedule. In this assessment they should look at the type of work being done, duration of the work, traffic impacts, and adjacencies to other work in the corridor. Failure to coordinate the letting of projects could lead to multiple projects on the same corridor and on adjacent arterials, with no mitigation strategies to minimize traffic disruption and congestion.

4.4.3 Road User Costs

Question: *When bidding type I and II projects, does the agency include road user costs in establishing incentives or disincentives (e.g., I/D, A+B, or lane rental) to minimize road user delay caused by work zones?*

Relevant Sections of the WZ Rule:

◆ [630.1006 - Work Zone Policy](#)

◆ [630.1012d - Method-Based and Performance-Based Specifications](#)

Several contracting methods can give contractors an incentive to complete work as quickly as possible. These methods often rely on road user costs as a basis to determine contract incentives or disincentives. The objective of these strategies is to reduce the contract time and minimize traveler delay. The agency should have a process to evaluate the need to apply road user costs to projects.

4.4.4 Performance Based Selection

Question: *When bidding type I, II, and III projects, does the agency use performance-based selection to eliminate contractors who consistently demonstrate their inability to complete a quality job within the contract time?*

Quality design and quality construction results produce a product expected to perform a certain function over a given period. Performance-based selection is the process of taking past performance and integrating it into the contractor selection process to get the best performer to accomplish the work. The agency should have a process that uses past performance to select contractors for current work.

This process should lead to fewer contract delays, thus reducing time that travelers are exposed to the work zone, and should improve the quality of the product, thus causing fewer work zones in the future.

4.4.5 Incident Management Services

Question: *When bidding type I and II project contracts, does the agency use incident management services (e.g., wreckers, push vehicles, and service patrols)?*

Relevant Sections of the WZ Rule:

◆ [630.1012b2 - Transportations Operations Component](#)

Vehicle crashes and breakdowns are a significant source of congestion and delays in and around work zones. As congestion builds and approaching work zone crash rates increase, incident management teams can help reduce the time required to clear incidents in and around work zones, reducing overall congestion and delay. The agency should have a process to evaluate the degree of incident management strategies that will be used in projects.

4.4.6 Flexible Starting Times

Question: *When bidding contracts, does the agency use flexible starting provisions after the Notice to Proceed is issued?*

Relevant Sections of the WZ Rule:

◆ [630.1006 - Work Zone Policy](#)

Flexible start times are used for two primary reasons: 1) reducing the public's exposure time to construction conditions and 2) increasing the frequency of contract completion within authorized contract times. A flexible start time after the Notice to Proceed is issued encourages competition in the bidding process and enables a contractor to have more flexibility in scheduling the use of equipment and manpower. As one more tool to reduce contract time and public exposure to work zones, the agency should have a process to determine the appropriate use of this strategy.

4.4.7 Use of Uniformed Law Enforcement

Question: *During type I, II, and III projects, does the agency use uniformed law enforcement?*

Relevant Sections of the WZ Rule:

◆ [630.1012b2 - Transportations Operations Component](#)

The use of law enforcement in work zones is a widely accepted traffic management tool. Uniformed law enforcement personnel can ensure that proper speeds are maintained and that travelers more often observe posted signs, signals, and markings through a work zone. The agency should have a process to determine the necessity of uniformed law enforcement in work zones to improve driver behavior. This process should be considered early in the programming stage to ensure appropriate funding.

4.4.8 Traffic Control Device Training

Question: *Does the agency provide/require training of contractor staff on the proper layout and use of traffic control devices?*

Relevant Sections of the WZ Rule:

◆ [630.10008d - Training](#)

Many complaints from the traveling public focus on the proper use and maintenance of traffic control devices such as cones, drums, signs, barricades, barriers, striping, and changeable message signs. Signs inform travelers of conditions that do not exist, striping is misleading and dangerous, changeable signs show the wrong message, cones and drums are improperly spaced, and so on. These inconsistencies have a tremendous impact on agency credibility with the traveling public. Drivers develop work zone habits that are based on past observations. If you want them to slow down when they see a "Work Zone Ahead" sign, make sure there is work ahead! The agency

should require and provide incentives for work zone contractor personnel to be trained in the proper application and maintenance of traffic control devices in work zones.

4.4.9 Work Zone Training for Law Enforcement

Question: *Does the agency provide training to uniformed law enforcement personnel on work zone devices and layouts or ensure law enforcement personnel receive proper training elsewhere?*

Relevant Sections of the WZ Rule:

◆ [630.10008d - Training](#)

Many conditions affect the work zone layout and the devices to be used. Without adequate training on how to use and place work zone traffic control devices, law enforcement personnel put themselves at risk. The agency should sponsor or require training specifically for law enforcement personnel on work zone types and traffic control devices. This training program should establish a standard placement and use of law enforcement in the work zone. The focus of this question is the training itself. If the agency is making sure that law enforcement personnel are trained in relevant work zone topics they are meeting the intent of the question.

4.5 Communications and Education

To reduce public anxiety and frustration, it is important to sustain effective communications and outreach with the public regarding road construction and maintenance activity and its potential impacts. This also increases the public's awareness of such activity. Lack of information is often cited as a key cause of frustration for the traveling public; therefore, the agency should identify and consider key issues from a public outreach and information perspective.

4.5.1 Web Site

Question: *Does the agency maintain and update a work zone Web site providing **timely and relevant** traveler impact information for type I, II, and III projects to allow travelers to make effective travel plans?*

Relevant Sections of the WZ Rule:

◆ [630.1012b3 - Public Information](#)

Agencies should establish a Web site to provide timely and accurate information to travelers regarding potential work zone impacts. Web sites can include information on routes currently under construction and those with work planned in the near future. Details can include locations of work zones, schedules for completing work, alternate route information, and the magnitude of impacts to traffic. Information on work zone Web sites should be updated with current delay estimates as often as changes occur. Specifically, Web sites should include the dates of expected work, specific hours of work, exact location of the work, and quantitative estimates of traffic impacts, such as miles of expected backup and expected delay.

4.5.2 Sponsor Work Zone Awareness Initiatives

Question: *Does the agency sponsor National Work Zone Awareness week?*

Agencies should sponsor activities associated with National Work Zone Awareness Week. The sponsorship of national and state work zone awareness initiatives provides a focal point for work zone policymaking and implementation. Sponsoring these events requires an agency to focus on important planning and development activities. It helps the agency develop a message about work zones and provides the public with the information required to appreciate the strategies under way to mitigate congestion and reduce crashes.

To heighten motorist and worker awareness of the safety and mobility issues in work zones, FHWA has, since 2000, collaborated with the American Association of State Highway and Transportation Officials (AASHTO) and the American Traffic Safety Services Association (ATSSA) to sponsor National Work Zone Awareness Week during the second week in April each year.

4.5.3 Leadership in Educational Efforts

Question: *Does the agency assume a proactive role in work zone educational efforts?*

Significant reductions in work zone crashes and delays cannot be achieved without the highway community becoming actively involved in developing and presenting educational programs. Programs should include information on work zone safety, the meaning of traffic control devices, the reason why work is necessary, and what the agency is doing to reduce work zone impacts.

An important part of public information campaigns is the development and distribution of materials. Fliers, brochures, and other educational materials can help motorists become more aware of and knowledgeable about work zones.

The media provide an avenue to efficiently disseminate information. Media partnerships are an important part of the public information process, and meetings with media representatives can effectively inform the public about work zones. News reports on work zone lane closures, as an example, can assist the public and allow them to make better route decisions.

4.5.4 Traffic and Traveler Information

Question: *During type I, II, and III project construction, does the agency use a public information plan that provides specific and timely project information to the traveling public through a variety of outreach techniques (e.g., agency Web site, newsletters, public meetings, radio, and other media outlets)?*

Relevant Sections of the WZ Rule:

◆ [630.1012b3 - Public Information](#)

A public information plan is the result of a deliberate process to consider what information the public needs to better cope with project issues. Providing specific and timely project information to travelers helps roadway users avoid prolonged delays at work zones and improves the efficiency of travel through a work zone. Recent studies indicate that travelers use many sources (television, radio, newspaper, transportation agency Web sites, etc.) to determine the status of road conditions to better plan their trips. The information provided should consist of the work location, duration, estimated travel times, alternate route recommendations, maps, and other significant traveler impact items.

4.5.5 Use of ITS Traffic Management Systems

Question: *During type I, II, and III projects, does the agency use ITS technologies to collect and disseminate information to motorists and agency personnel on work zone conditions?*

Relevant Sections of the WZ Rule:

- ◆ [630.1012b2 - Transportations Operations Component](#)
- ◆ [630.1012b3 - Public Information](#)

Portable or fixed traffic management systems (e.g., portable, changeable message signs; fixed message signs; speed monitoring devices; network ITS's; ramp metering; and camera monitoring) can be used to manage traffic flow in and around a work zone. These systems can keep the traveler informed of changing road conditions and delays, allowing better travel decisions and time planning. The devices can also collect system performance information that can be used to monitor construction contract compliance, support contract incentive/disincentive decisions, and provide emergency medical services (EMS), fire, and law enforcement officials with real-time system impacts. The agency should use an appropriate level of ITS applications in each project to reduce congestion and enhance driver awareness to work zone hazards. The agency should also use ITS technologies to support the traveler and traffic management Information strategies in question 4.5.4.

4.6 Program Evaluation

Evaluation is necessary to analyze failures and identify successes. Work zone performance monitoring and reporting at a nationwide level can increase the knowledge base on work zones and help better plan, design, and implement road construction and maintenance projects. At the local level performance monitoring and reporting provides the agency with valuable information on the effectiveness of congestion mitigation strategies, contractor performance, and work zone safety.

4.6.1 Tracking Performance Measures

Question: *Does the agency collect data to track work zone congestion and delay performance in accordance with agency-established measures? (See section 4.1.4.)*

Relevant Sections of the WZ Rule:

- ◆ [630.1008c - Work Zone Data](#)
- ◆ [630.1008e - Process Review](#)

Agencies should track how well work zone strategies achieve agency goals. As mentioned previously, performance measures can be tracked to assess impacts from work zone operations. These measures include assessing delay caused by nonrecurring congestion in and around work zones. Tracking performance in concert with establishing specific goals and objectives provides a basis for total quality improvement. Performance measures provide the required feedback to make adjustments and evaluate strategy effectiveness.

4.6.2 Tracking Safety Performance Measures

Question: *Does the agency collect data to track work zone safety performance in accordance with agency-established measures? (See section 4.1.5.)*

Relevant Sections of the WZ Rule:

- ◆ [630.1008c - Work Zone Data](#)
- ◆ [630.1008e - Process Review](#)

Agencies should track the performance of work zones strategies in achieving agency goals. As mentioned previously, performance measures can be tracked to assess impacts from work zone operations. These measures include assessing measurements of safety, such as crash rates and fatality statistics. Tracking performance in concert with the establishment of specific goals and objectives provides a basis for total quality improvement. Performance measures provide the required feedback to make program adjustments and evaluate the effectiveness of program strategies.

4.6.3 Customer Surveys

Question: *Does the agency conduct customer surveys to evaluate work zone traffic management practices and policies on a statewide/area-wide basis?*

Relevant Sections of the WZ Rule:

◆ [630.1008e - Process Review](#)

Agencies should conduct customer surveys to assess work zone traffic management practices. Feedback from the public is a vital component of determining whether public expectations are being met. The public can provide valuable information for improving work zone programs through customer satisfaction surveys. Assessment of performance on a statewide basis or within a specific area can provide information for updating practices and policies to meet customer needs.

4.6.4 Strategy Development

Question: *Does the agency develop strategies to improve work zone performance on the basis of work zone performance data and customer surveys?*

Relevant Sections of the WZ Rule:

◆ [630.1008c - Work Zone Data](#)

◆ [630.1008e - Process Review](#)

The collection of performance measures should support strategy development. Data collected and not used is of little value in developing improved programs. Work zone performance data and customer surveys can be valuable in determining field conditions for comparison with performance metrics. Strategies can be developed to update and revise performance metrics based on such data.

5 Supplemental Questions – Effects of the WZ Rule

Select only ONE response to each question.

1. While planning and designing road projects, the agency is expanding planning beyond the project work zone itself to address corridor, network, and regional issues (e.g., alternate routes and/or modes, truck traffic, special events, etc.) – particularly when congestion is an issue.

The Rule Has Caused Change	<input type="radio"/> The agency has significantly experienced this as a result of the Rule. <input type="radio"/> The agency has somewhat experienced this as a result of the Rule.
The Rule Has NOT Caused Change	<input type="radio"/> This was already taking place prior to the Rule and has not changed since the Rule was implemented. <input type="radio"/> This was not taking place prior to the Rule and is still not occurring.
Other	<input type="radio"/> It is too early to tell if the Rule has caused this to occur (but I might know later).

2. The agency is seeing enhanced consideration and management of work zone safety and mobility impacts, starting during planning and continuing through project completion.

The Rule Has Caused Change	<input type="radio"/> The agency has significantly experienced this as a result of the Rule. <input type="radio"/> The agency has somewhat experienced this as a result of the Rule.
The Rule Has NOT Caused Change	<input type="radio"/> This was already taking place prior to the Rule and has not changed since the Rule was implemented. <input type="radio"/> This was not taking place prior to the Rule and is still not occurring.
Other	<input type="radio"/> It is too early to tell if the Rule has caused this to occur (but I might know later).

3. The agency is expanding work zone management beyond traffic safety and control to address mobility through the consideration and use of transportation operations and public information strategies.

The Rule Has Caused Change	<input type="radio"/> The agency has significantly experienced this as a result of the Rule. <input type="radio"/> The agency has somewhat experienced this as a result of the Rule.
The Rule Has NOT Caused Change	<input type="radio"/> This was already taking place prior to the Rule and has not changed since the Rule was implemented. <input type="radio"/> This was not taking place prior to the Rule and is still not occurring.
Other	<input type="radio"/> It is too early to tell if the Rule has caused this to occur (but I might know later).

4. As a result of its work zone policy, the agency is using a more consistent approach to planning, designing, and constructing road projects.

The Rule Has Caused Change	<input type="radio"/> The agency has significantly experienced this as a result of the Rule. <input type="radio"/> The agency has somewhat experienced this as a result of the Rule.
The Rule Has NOT Caused Change	<input type="radio"/> This was already taking place prior to the Rule and has not changed since the Rule was implemented. <input type="radio"/> This was not taking place prior to the Rule and is still not occurring.
Other	<input type="radio"/> It is too early to tell if the Rule has caused this to occur (but I might know later).

5. The agency has updated/changed training for its staff (designers, planners, construction staff, etc.) to address broader consideration of work zone impacts and management in the scheduling, design, and implementation of projects.

The Rule Has Caused Change	<input type="radio"/> The agency has significantly experienced this as a result of the Rule. <input type="radio"/> The agency has somewhat experienced this as a result of the Rule.
The Rule Has NOT Caused Change	<input type="radio"/> This was already taking place prior to the Rule and has not changed since the Rule was implemented. <input type="radio"/> This was not taking place prior to the Rule and is still not occurring.
Other	<input type="radio"/> It is too early to tell if the Rule has caused this to occur (but I might know later).

Appendix A. Scoring Calculations

The scoring sheet steps you easily through the calculations needed. For those who would like to understand the calculations, this appendix shows the basis for the scores.

Section	A. Number of Questions	B. Weighted Average Score	C. Maximum possible average weighted score
1. Leadership and Policy	10	10%	1.50
2. Project Planning and Programming	6	15%	2.25
3. Project Design	12	25%	3.75
4. Project Construction and Operation	9	25%	3.75
5. Communications and Education	5	15%	2.25
6. Evaluation	4	10%	1.50
TOTAL	46	100%	15.00

The following equations produce the % Possible Weighted Score for each section.

$$\frac{\text{Total raw score}}{\text{Number of questions (Col A)}} = \text{Average raw score}$$

$$\frac{\text{Average raw score}}{\text{Possible average raw score (15)}} \times 100 = \% \text{ Possible average raw score}$$

$$(\text{Average raw score} \times \text{Weight (Col B)}) = \text{Weighted Score}$$

$$\frac{\text{Weighted score}}{\text{Possible weighted score (Col C)}} \times 100 = \% \text{ Possible weighted score}$$

APPENDIX 3

2010 Work Zone Mobility and Safety Self Assessment – Connecticut Summary Report (October 2010)

**2010 Work Zone Mobility and Safety
Self Assessment**

CONNECTICUT

Summary Report

Federal Highway Administration
Office of Operations

October 2010

1. Background and Methodology

To help agencies evaluate their work zone practices and to help assess work zone practices nationally, the Federal Highway Administration (FHWA) developed the Work Zone Mobility and Safety Self Assessment (WZ SA) tool. The WZ SA tool consists of a set of 46 questions designed to assist those with work zone management responsibilities in assessing their programs, policies, and procedures against many of the good work zone practices in use today. The questions are scored on a 0 to 15 scale. Beginning in 2003, FHWA Division Offices have worked in partnership with their respective States to complete a WZ SA each year to assess their own work zone practices and program. The goal of the 2010 WZ SA was to evaluate the progress made since the last WZ SA in 2009 and to reassess program initiatives both at the local and national levels. In 2010, each FHWA Division Office was asked to re-examine and update their scores from 2009 to reflect any changes in their practices related to the 46 WZ SA questions. This report presents the WZ SA results for Connecticut in 2010, with data from 2009 included as a reference.

For a description of the structure of the WZSA and scoring guidelines, please refer to Appendix A. Along with providing a score for each of the 46 questions, respondents had the option of providing comments related to their response. Comments submitted by Connecticut are included in Appendix B.

In 2010 the WZ SA contains the same five supplemental questions that were added in 2009. They are intended to provide an indication of how a State's practices may have changed as a result of the Work Zone Safety and Mobility Rule (23 CFR 630 Subpart J). These questions were not used in calculating an agency's WZ SA score. The answers to these five questions, along with changes in the national average ratings for the existing WZ SA questions, help FHWA assess the effects of the Rule.

Agencies are encouraged to use their WZ SA results to identify actions and priority areas for improvement in their State, and as part of their inputs when they perform the process reviews that are required by the Work Zone Safety and Mobility Rule (http://www.ops.fhwa.dot.gov/wz/resources/final_rule.htm).

2. Summary of Results

Section 2.1 presents the overall 2010 WZ SA results for Connecticut. The 2009 results for Connecticut, as well as the national results for both years, are included for reference. Section 2.2 displays the 2010 results for Connecticut on both a section-by-section and question-by-question basis, with 2009 results for reference.

2.1 Overall Results

Table 1 presents the overall score for Connecticut on the WZ SA. In calculating the overall score on the WZ SA, a weighting scheme has been applied to reflect the relative importance of each section on the overall score. This scheme assigns the following weights to each section:

1. Leadership and Policy - 10%
2. Project Planning and Programming - 15%
3. Project Design - 25%
4. Project Construction and Operation - 25%
5. Communications and Education - 15%
6. Program Evaluation - 10%

After applying the weighting scheme, the Connecticut overall score on the WZ SA is 11.2 for 2010. The national average score for 2010 is 10.0.

Table 1. Overall Self Assessment Score

	2009 Weighted Score	2010 Weighted Score	Percent Change from 2009 to 2010
Connecticut	11.1	11.2	0.9%
National Average	9.7	10.0	3.1%

Unweighted scores are also provided, in Table 2, since these values indicate the average score for each section on the 0 to 15 WZ SA scoring scale. The individual section weights are applied to each of the unweighted section scores and the resulting six values are added to obtain the final overall/weighted score.

Table 2. Mean Scores for Each Section

Section	2009 Connecticut Unweighted Score	2010 Connecticut Unweighted Score	Percent Change from 2009 to 2010	2010 National Unweighted Average
Section 1 – Leadership and Policy	9.8	9.9	1.0%	9.9
Section 2 – Project Planning and Programming	12.0	12.7	5.8%	8.7
Section 3 – Project Design	12.1	12.1	0.0%	10.2
Section 4 – Project Construction and Operation	11.1	11.2	0.9%	10.5
Section 5 – Communications and Education	14.0	14.2	1.4%	12.3
Section 6 – Program Evaluation	3.8	3.8	0.0%	7.2

Note: Individual section averages and overall scores have been rounded for presentation purposes.

2.2. Section-by-Section Results

2.2.1 Leadership and Policy

Table 3 presents the Connecticut scores for the questions in the Leadership and Policy section. Leadership support should drive overall policy making in an agency. The direction provided by this support fosters an environment that is conducive to developing an effective work zone program. Consideration and management of work zone mobility and safety impacts should be part of project planning, design, and construction and maintenance activities. Agency management should facilitate and encourage a multidisciplinary approach to traffic management throughout all phases in the life of a project. Senior managers should be personally, visibly, and proactively involved in efforts to minimize work zone delay and enhance the safety of motorists and workers in work zones.

Table 3. Leadership and Policy Scores

Item	Question	2009 Connecticut Score	2010 Connecticut Score	2010 National Average
4.1.1	Has the agency developed a process to determine whether a project is impact type I, II, III, or IV?	13	13	10.7
4.1.2	Has the agency established strategic goals specifically to reduce congestion and delays in work zones?	8	8	9.1
4.1.3	Has the agency established strategic goals specifically to reduce crashes in work zones?	8	8	9.8
4.1.4	Has the agency established measures (e.g., vehicle throughput or queue length) to track work zone congestion and delay?	6	6	7.9
4.1.5	Has the agency established measures (e.g., crash rates) to track work zone crashes?	5	5	10.6
4.1.6	Has the agency established a policy for the development of Transportation Management Plans to reduce work zone congestion and crashes?	13	13	11.2
4.1.7	Has the agency established work zone performance guidance that addresses maximum queue lengths, number of open lanes, maximum traveler delay, etc.?	13	13	10.1
4.1.8	Has the agency established criteria to support the use of project execution strategies (e.g., night work and full closure) to reduce public exposure to work zones and reduce the duration of work zones?	14	14	11.8
4.1.9	Has the agency developed policies to support the use of innovative contracting strategies to reduce contract performance periods?	9	9	11.2
4.1.10	Has the agency established Memoranda of Understanding (MOU) between utility suppliers to promote the proactive coordination of long-range transportation plans with long-range utility plans, with the goal of reducing project delays and minimizing the number of work zones on the highway?	9	10	6.3

2.2.2 Project Planning and Programming

Table 4 presents the Connecticut scores for the questions in the Project Planning and Programming section. While transportation planning and implementation processes differ significantly from State to State, they all focus on developing increased capacity and efficiency in the transportation system. They do this with the development of long-range transportation plans (LRTPs), transportation improvement program plans (TIPs), unified planning work programs (UPWPs), and in some cases congestion management system (CMS) plans. Although the role of the planner in the development of project-specific criteria has not been universally defined, it is clear that the complexity of our transportation systems and the impact of congestion on our nation necessitate input from planners during the project development process in order to better assess and manage work zone impacts.

Table 4. Project Planning and Programming Scores

Item	Question	2009 Connecticut Score	2010 Connecticut Score	2010 National Average
4.2.1	Does the agency's planning process actively use analytical traffic modeling programs to determine the impact of future type I and II road construction and maintenance activities on network performance?	10	11	8.5
4.2.2	Does the agency's planning process include developing alternative network options (e.g., frontage roads, increased capacity on parallel arterials, beltways, or strategically placed connectors) to maintain traffic volumes during future road construction and maintenance?	13	13	8.4
4.2.3	Does the agency's planning process manage the transportation improvement program to eliminate network congestion caused by poorly prioritized and uncoordinated execution of projects?	11	13	8.7
4.2.4	Does the agency's transportation planning process include a planning cost estimate review for work types I, II, and III that accounts for traffic management costs (e.g., incident management, public information campaigns, positive separation elements, uniformed law enforcement, and Intelligent Transportation Systems [ITS])?	12	13	8.8
4.2.5	Does the agency's transportation planning process include the active involvement of planners during the project design stage to assist in the development of congestion mitigation strategies for type I and II projects?	13	13	8.9
4.2.6	Does the agency's transportation planning process engage planners as part of a multidisciplinary/multiagency team in the development of Transportation Management Plans involving major corridor improvements?	13	13	9.1

2.2.3 Project Design

Table 5 presents the Connecticut scores for the questions in the Project Design section. Project designers, working in concert with other functional experts, should consider work zone maintenance of traffic issues early in the design process. Designers should examine the use of different project execution strategies that can accelerate construction, thereby reducing construction time and minimizing the exposure of travelers to work zones and workers to traffic. In addition, designers should actively lead the preparation of Transportation Management Plans, including Traffic Control Plans, that will mitigate the impact of work zone activities.

Table 5. Project Design Scores

Item	Question	2009 Connecticut Score	2010 Connecticut Score	2010 National Average
4.3.1	Does the agency have a process to estimate road user costs and use them to evaluate and select project strategies (full closure, night work, traffic management alternatives, detours, etc.) for type I and II projects?	13	13	10.7
4.3.2	Does the agency develop a Transportation Management Plan that addresses all operational impacts focused on project congestion for type I and II projects?	13	13	10.9
4.3.3	Does the agency use multidisciplinary teams consisting of agency staff to develop Transportation Management Plans for type I and II projects?	13	13	11.1
4.3.4	Does the agency perform constructability reviews that include project strategies to reduce congestion and traveler delays during construction and maintenance for type I and II projects?	13	13	11.6
4.3.5	Does the agency use independent contractors or contractor associations to provide construction process input to expedite project contract times for type I and II projects?	10	10	8.6
4.3.6	Does the agency use scheduling techniques that are based on time and performance, such as the critical path method or parametric models, to determine contract performance times for type I and II projects?	13	13	10.9
4.3.7	Does the agency have a process to evaluate the appropriate use of ITS technologies to minimize congestion in and around work zones for type I, II, and III projects?	13	13	9.0
4.3.8	Does the agency have a process to consider life-cycle costing when selecting materials that reduce the frequency and duration of work zones for type I, II, and III projects?	13	13	10.6
4.3.9	Does the agency have a process to assess projects for the use of positive separation devices for type I and II projects?	14	14	12.2
4.3.10	Does the agency anticipate and design projects to mitigate future congestion impacts of repair and maintenance for type I, II, and III projects?	13	13	10.0
4.3.11	When developing the Traffic Control Plan for a project, does the agency involve contractors in developing the Traffic Control Plan for type I and II projects?	9	9	7.6

Item	Question	2009 Connecticut Score	2010 Connecticut Score	2010 National Average
4.3.12	When developing the Traffic Control Plan for a project, does the agency use computer modeling to assess Traffic Control Plan impacts on traffic flow characteristics such as speed, delay, and capacity for type I and II projects?	8	8	9.6

2.2.4 Project Construction and Operation

Table 6 presents the Connecticut scores for the questions in the Project Construction and Operation section. A roadway construction or maintenance site can be a very complex orchestration of activities impacting the public in many ways. There are many pieces to the project delivery process and everyone has a critical role, but what the public mostly sees and experiences is the construction end of the process. The use of letting strategies, quality-based contractor selection, time-sensitive bidding, efficient operations, traffic management, aggressive contract management, and good public information can help transportation agencies improve the execution and public perception of transportation improvements.

Table 6. Project Construction and Operation Scores

Item	Question	2009 Connecticut Score	2010 Connecticut Score	2010 National Average
4.4.1	Is the letting schedule altered or optimized to reflect the available resources and capabilities of the construction industry?	8	8	9.9
4.4.2	Is the letting schedule altered or optimized to minimize disruptions to major traffic corridors?	13	13	10.7
4.4.3	When bidding type I and II projects, does the agency include road user costs in establishing incentives or disincentives (e.g., I/D, A+B, or lane rental) to minimize road user delay caused by work zones?	11	11	11.2
4.4.4	When bidding type I, II, and III projects, does the agency use performance-based selection to eliminate contractors who consistently demonstrate their inability to complete a quality job within the contract time?	8	8	7.4
4.4.5	When bidding type I and II project contracts, does the agency use incident management services (e.g., wrecker, push vehicles, and service patrols)?	14	14	11.0
4.4.6	In bidding contracts, does the agency use flexible starting provisions after the Notice to Proceed is issued?	10	10	10.5
4.4.7	During type I, II, and III projects, does the agency use uniformed law enforcement?	14	14	13.2
4.4.8	Does the agency provide/require training of contractor staff on the proper layout and use of traffic control devices?	14	14	12.4
4.4.9	Does the agency provide training to uniformed law enforcement personnel on work zone devices and layouts or ensure law enforcement personnel receive proper training elsewhere?	8	9	8.3

2.2.5 Communications and Education

Table 7 presents the Connecticut scores for the questions in the Communications and Education section. To reduce public anxiety and frustration regarding work zones, it is important to sustain effective communications and outreach with the public regarding road construction and maintenance activity, and the potential impacts of the activities. This also increases the public's awareness of such activities. The lack of information is often cited as a key cause of frustration for the traveling public. Agencies should identify and consider key issues from a public information and outreach perspective.

Table 7. Communications and Education Scores

Item	Question	2009 Connecticut Score	2010 Connecticut Score	2010 National Average
4.5.1	Does the agency maintain and update a work zone website providing timely and relevant traveler impact information for project types I, II and III that allows travelers to effectively make travel plans?	13	14	12.7
4.5.2	Does the agency sponsor National Work Zone Awareness week?	15	15	12.3
4.5.3	Does the agency assume a proactive role in work zone educational efforts?	14	14	12.6
4.5.4	During type I, II, and III project construction, does the agency use a public information plan that provides specific and timely project information to the traveling public through a variety of outreach techniques, (e.g., agency website, newsletters, public meetings, radio, and other media outlets)?	14	14	13.2
4.5.5	During type I, II, and III projects, does the agency use ITS technologies to collect and disseminate information to motorists and agency personnel on work zone conditions?	14	14	10.9

2.2.6 Program Evaluation

Table 8 presents the Connecticut scores for the questions in the Program Evaluation section. Evaluation is necessary to identify successes and analyze failures. Work zone performance monitoring and reporting at a nationwide level can increase the knowledge base on work zones and help lead to the development of better tools to help agencies better plan, design, and implement road construction and maintenance projects. At the local level, performance monitoring and reporting provides an agency with valuable information on the effectiveness of congestion mitigation strategies, contractor performance, and work zone safety.

Table 8. Program Evaluation Scores

Item	Question	2009 Connecticut Score	2010 Connecticut Score	2010 National Average
4.6.1	Does the agency collect data to track work zone congestion and delay performance in accordance with agency-established measures? (See Section 1, item 4.1.4)	4	4	6.3
4.6.2	Does the agency collect data to track work zone safety performance in accordance with agency-established measures? (See Section 1, item 4.1.5)	4	4	9.1
4.6.3	Does the agency conduct customer surveys to evaluate work zone traffic management practices and polices on a statewide/area-wide basis?	3	3	6.3
4.6.4	Does the agency develop strategies to improve work zone performance based on work zone performance data and customer surveys?	4	4	7.3

2.2.7 Effects of the WZ Rule

In order to assess how States' practices may have changed as a result of the Work Zone Safety and Mobility Rule, the following five supplemental questions were added in 2008 and revisited in 2010:

1. While planning and designing road projects, the agency is expanding planning beyond the project work zone itself to address corridor, network, and regional issues (e.g., alternate routes and/or modes, truck traffic, special events, etc.) - particularly when congestion is an issue.
2. The agency is seeing enhanced consideration and management of work zone safety and mobility impacts, starting during planning and continuing through project completion.
3. The agency is expanding work zone management beyond traffic safety and control to address mobility through the consideration and use of transportation operations and public information strategies.
4. As a result of its work zone policy, the agency is using a more consistent approach to planning, designing, and constructing road projects.
5. The agency has updated/changed training for its staff (designers, planners, construction staff, etc.) to address broader consideration of work zone impacts and management in the scheduling, design, and implementation of projects.

States were asked to select from one of the following five responses on how the Rule has changed their practices:

The Rule Has Caused Change:

- The agency has significantly experienced this as a result of the Rule.
- The agency has somewhat experienced this as a result of the Rule.

The Rule Has NOT Caused Change:

- This was already taking place prior to the Rule and has not changed since the Rule was implemented.
- This was not taking place prior to the Rule and is still not occurring.

Other:

- It is too early to tell if the Rule has caused this to occur (but I might know later).

The 2009 and 2010 Connecticut responses to the supplemental questions are as follows:

Table 9. Responses to Supplemental Questions

Item	Supplemental Question	2009 Response	2010 Response
1	While planning and designing road projects, the agency is expanding planning beyond the project work zone itself to address corridor, network, and regional issues (e.g., alternate routes and/or modes, truck traffic, special events, etc.) - particularly when congestion is an issue.	The Rule Has Caused Change - The agency has somewhat experienced this as a result of the Rule.	The Rule Has Caused Change - The agency has somewhat experienced this as a result of the Rule.
2	The agency is seeing enhanced consideration and management of work zone safety and mobility impacts, starting during planning and continuing through project completion.	The Rule Has NOT Caused Change - This was already taking place prior to the Rule and has not changed since the Rule was implemented.	The Rule Has Caused Change - The agency has somewhat experienced this as a result of the Rule.
3	The agency is expanding work zone management beyond traffic safety and control to address mobility through the consideration and use of transportation operations and public information strategies.	The Rule Has Caused Change - The agency has somewhat experienced this as a result of the Rule.	The Rule Has Caused Change - The agency has somewhat experienced this as a result of the Rule.
4	As a result of its work zone policy, the agency is using a more consistent approach to planning, designing, and constructing road projects.	Other - It is too early to tell if the Rule has caused this to occur (but I might know later).	The Rule Has Caused Change - The agency has somewhat experienced this as a result of the Rule.
5	The agency has updated/changed training for its staff (designers, planners, construction staff, etc.) to address broader consideration of work zone impacts and management in the scheduling, design, and implementation of projects.	The Rule Has Caused Change - The agency has somewhat experienced this as a result of the Rule.	The Rule Has Caused Change - The agency has somewhat experienced this as a result of the Rule.

Appendix A

2010 Work Zone Self Assessment

WZ SA Structure and Scoring Guidelines

The WZ SA asked respondents to rate the extent to which a particular policy, strategy, process, or tool, has been adopted into an agency’s way of doing business. The adoption process consisted of five progressive levels based on the quality improvement process model used by industry: 1) initiation, 2) development, 3) execution, 4) assessment, and 5) integration. Respondents were asked to rate each question using a 0 to 15 scale following the guidance contained in Table 1.

Table A1. Scoring Guidelines

Adoption Phase	Scoring Range	Description
Initiation	(0-3)	Agency has acknowledged the need for this item
Development	(4-6)	Agency has developed a plan or approach to address this item
Execution	(7-9)	Agency is executing or has executed an approach to address this item
Assessment	(10-12)	Agency has assessed this item’s performance and its success in achieving agency goals and objectives
Integration	(13-15)	Agency has integrated this item into its project execution process and culture

The 46 questions are grouped into six sections: Leadership and Policy, Project Planning and Programming, Project Design, Project Construction and Operation, Communications and Education, and Program Evaluation. For each question, respondents had the option of providing comments related to their response.

For the WZ SA, four project types were defined to reflect the magnitude of impact a work zone may have on travelers:

- **Type I** represents the most complex and costly projects that an agency may undertake. These projects impact the traveling public at the metropolitan, regional, intrastate, and possibly at the interstate level.
- **Type II** projects are less complex projects that impact the traveling public predominately at the metropolitan and regional level and have a moderate to high level of public interest and user cost/impacts.
- **Type III** projects impact the traveling public at the metropolitan or regional level and have a moderate to low level of public interest and impacts.
- **Type IV** projects impact the traveling public to a small degree.

The larger and more complex a project, the greater the likelihood it will cause greater impacts and the higher the level of attention and resources an agency generally needs to invest in mitigating work zone congestion and crashes. Therefore, some items in the WZ SA were limited to particular project types (e.g., types I and II) since it was unlikely they would apply to all project types. These work zone impact levels were intended to be an assistance tool and may not encompass all possible combinations or degree of work zone categories. States were encouraged to use their own categories provided that they could align their categories to the four categories defined in the WZ SA.

Appendix B

2010 Work Zone Self Assessment

Comments Submitted

Connecticut

Leadership and Policy

4.1.1 Comments: The department does not classify projects using an impact type numeric score. The process is the same for all projects, treating all projects equally, meaning that each operating unit uses an internal checklist to address the process. Considerations to determine the classification include the project size, complexity, construction time, and traffic volume. The process consists of assigning a designation of significant based on criteria being developed at the policy level. The department takes into account road issues, property issues, and the complexity of the projects. The department checks all construction phases and makes a determination of what impacts the project may have on the public. This process is in place and is documented. The department has formalized a policy for identifying significant projects based on FHWA's final rule for work zones.

4.1.2 Comments: At present, the department has not established a strategic goal for the reduction of congestion and delays in work zones. The State's 2006 Strategic Highway Safety Plan (SHSP) includes Work Zone Safety as an emphasis area with identified strategies for implementation. However, it also does not include a strategic goal within the Work Zone area for reducing congestion and delays in work zones. The Department suggests that before establishing a "goal" the first step is to develop performance measures. Performance measures can be monitored and acted upon. The Department is currently in the process of considering and investigating methods for establishing baseline data and developing performance measures relative to congestion and delays in work zones. This would be a first step in the process of developing a strategic goal in this area.

4.1.3 Comments: Connecticut's Strategic Highway Safety Plan (SHSP), which was approved in September 2006, includes work zone safety as an emphasis area. The State did not establish a strategic goal to specifically reduce crashes in work zones in this plan nor does one exist elsewhere. Furthermore, the utilization and analysis of crash data in work zones to develop project-specific and program-level countermeasures and performance measures to achieve crash reductions in work zones have been considered but are not developed. However, strategies to place emphasis on work zone training, driver behavior and education, and work zone design are continuing. Work zone crash reduction goals have been established by the department and are detailed in the Bureau of Planning, Transportation Safety Section's 2010 Highway Safety Plan. This plan provides funding to specifically support local work zone safety activities. The plan provides historic, trend, and current Fatality Analysis Reporting System (FARS) and State-provided data detailing highway safety in Connecticut. One of the identified problem areas detailed in the plan is "Roadway Safety" that includes emphasis on construction work zone crashes. The performance goal is to reduce the number of work zone related crashes by 48 percent from 1,348 in 1995 to 700 by the year 2011. In 2007, work zone crashes totaled 1073 – an impressive 21 percent reduction from 1995. There are two primary performance objectives detailed

in the plan. One is to finalize the statewide work zone safety grant program (work zone safety related signs, barricades, cones, and, vests, etc.) in an effort to increase work zone safety at work zone sites in all municipalities by the close of Fiscal Year 2011. The second is to increase the enforcement of work zone related traffic laws in designated work zone areas and to increase the public's perception of work zone related traffic law enforcement.

4.1.4 Comments: There is a need to investigate what is being done elsewhere as a quantitative measure in terms of time delays. Specific performance measures to track work zone congestion and delay have not been established. However, efforts have begun that involve reviewing the various databases maintained by other units within the Department to see if data being stored can be used as a means to establish performance measures. There has been increased interest from the public in providing delay messages in the field. The Department is considering demonstrations of various types of ITS products that can measure delays, queue times and lengths. Funding sources to conduct pilots on State projects will also be pursued.

4.1.5 Comments: Improvements to the State's system for electronically reporting, storing, tracking, and analyzing work zone crash data in a timely and accurate manner are needed. Data obtained from CTDOT'S crash file system currently is 1 to 1 year 1 month old. The current crash database does have a field titled "Construction or Maintenance Related". This is a yes or no field that the investigating officer fills out, and it is subjective. Queries can be run on this field to determine the incidents that have occurred within work zones. The department is considering other ways to obtain information in order to determine work zone strategies and establish performance measures. Research into what other states are doing from the reporting side and also the use of performance-based strategies is being investigated.

4.1.6 Comments: CTDOT established a policy and Implementation Plan Guidance in August 2007 for the development of Transportation Management plans (TMPs) to reduce work zone congestion and crashes due to work zones at the project level. Prior to TMP policy development the State had an internalized process to assess safety and mobility. The department's Design and Traffic Operation offices review project plans to determine what methods and procedures will have the least impact to the public. At the beginning stages of project development, it is determined how the information will be distributed to the public regarding impacts and alternatives prior to release to the field. By doing this, the department believes this will minimize work zone congestion and crashes.

4.1.7 Comments: The maximum queue length is determined based on volumes for larger projects (type I & II). The number of lanes to remain open and the traveler delay are recommended by the Office of Design. During the design phase, a maximum queue length with a maximum threshold is set. Other performance guidance that addresses queue lengths, number of open lanes, and delay for project for other projects (types III and IV) is developed specific to the site. For larger projects (types I and II), guidance and adjustments should be made prior to the P.S.&E. approval. If a project reaches a

maximum number (queue length), the department's only possible action is to shut down a construction activity. When traffic hits a certain threshold (4 mile delay) department's Highway Operations personnel will notify the specific Department Head to inform them of their observations. A decision to continue, terminate, or have periodic work stoppages to alleviate congestion would be made by the Department.

4.1.8 Comments: The majority of projects that are on the interstate system continue to have most of the work completed during the off-peak hours to minimize congestion and delays. Full closures of the roadway have been used for installing overhead structures such as bridge girders, overhead sign trusses or for expedited completion of work to minimize cost and delays. Traffic volumes (vehicles per hour) are typically used to define hours of construction activity with lane closures. However accessibility to alternate routes, ability to provide advance warning, constructability, contractor accessibility and work duration are also considered when determining project execution. Some strategies are considered during the construction phase as alternative methods to complete work safely, more efficiently and with less overall impact to the traveling public. A recent case involved the transporting and setting of main bridge girders that were to be placed on piers over the interstate in a major interchange (I-95 at I-91 in New Haven). Meetings and discussions with various stakeholders that included the project personnel, contractor, law enforcement, oversize/overweight permitting division and the city occurred prior to the event to determine the best strategy for moving the girders down the highway and setting them in place over the roadway considering traffic volumes, safety of workers and motorists and impact to area businesses and connecting roadways. The process was very effective and the work was able to be done during early morning hours and resulted in minimal delays and allowed contractor to work within a safe and secure area.

4.1.9 Comments: The Department uses the low bid, incentive/disincentive, and value engineering to reduce contract performance periods. The department has not used innovative contracting strategies such as A + B bidding or lane rental because of legislation limitations. The Department does consider incentive clauses and value engineering to reduce contract time. These are mostly considered on Type I and II projects that would have significant work zone mobility impacts.

4.1.10 Comments: The department does not have a formal MOU with utility providers. To reduce utility delays and reduce work zone durations, the department has implemented three items in conjunction with the local FHWA office. First, the Stewardship Agreement has been revised to provide early detection of utility impacts. Second, the department has created a new policy and procedures manual to provide incentives to utilities to include their work in the State's project contracts. And finally, a pilot program including 10 to 15 projects was started in March 2008 which created a Utility line item in the ROW phase to allow the early start of utilities. The department will be assessing the performance of these changes over the construction season. In assessing these items, the department has found that internal funding procedures and constraints made the last item unsuccessful and the department has gone back to utility breakout projects and revised the policy and procedures manual to give more clear

direction on the use of these projects. In addition, the Office of Construction updated the Construction Manual to give better direction in resolving utility issues on construction projects.

Project Planning and Programming

4.2.1 Comments: The department uses VSIM, HCS, and others network systems, such as SYNCHRO, on major projects (type I and II). Using a 20-25 year horizon the department develops existing and future volumes, making adjustments to the program to develop year of construction volumes. As the department reaches a certain level of design, the department can utilize the network systems tools to determine potential impacts and assess the viability of various improvement alternatives. The department use network tools on a case-by-case basis. Data, such as tracking existing traffic volumes as well as future volumes, are collected on a sight specific basis. The department assesses performance through field verification to compare with results obtained from traffic software. As studies are begun for all major feasibility studies a team from disciplines throughout CTDOT is put together to review and comment on all phases of the study, including the use of these programs. This team is then kept consistent throughout the project's journey from planning to construction to ensure all commitments are kept throughout the process.

4.2.2 Comments: The department analyzes the operational impacts that future construction, repair, and maintenance activities will have on system performance. There is an established process for evaluating construction, repair and maintenance activities. When necessary, alternative routes are upgraded to accommodate additional traffic volumes during major construction operations. When maintenance work is scheduled, notices are sent to stakeholders in advance. Timely information about operations activities are critical to mitigating impact that will result during repair and maintenance activities. Improved coordination between operating bureaus has resulted in higher confidence in the traffic control plans currently being developed. Feedback from construction is being used to refine strategies and implementation of alternative network options.

4.2.3 Comments: The department coordinates projects and programs with various implementing organizations. During the planning process various disciplines are asked to provide input relative to future network performance when developing a project. Multidisciplinary teams are also developed for major planning studies to ensure consistency and coordination objectives are satisfied. When projects move to design, permitting and construction phases, coordination with planning continues to ensure that stated project objectives are consistent with current planning programs. Refinement of ITS strategies during the design phase are implemented and assessed during construction operations. This is done for all major corridor improvement planning. For example all of the items noted in 4.2.3 were completed for the I-95 Q-Bridge, I-84 and Route 8 Interchange, I-95 Bridgeport Planning studies, among others.

4.2.4 Comments: The department develops detailed year of construction estimates for projects in the planning stage using current CTDOT Cost Estimating Guidelines. Conceptual cost estimates are developed for each Preliminary Alternative and include approximated unit costs to obtain order of magnitude comparison between alternatives (right of way, environmental, maintenance and operation cost estimates are not included). Later, more detailed construction cost estimates are developed during the Refinement of Improvement Alternatives, and during Development of Final Transportation recommendations (which includes items such as Maintenance and Protection of Traffic). ITS costs are included in the construction cost estimate IF heavy delays are expected during construction (closure of one lane to complete work, etc). Currently, engineering reviews these estimates for consistency. For corridor planning studies the Work Zone Safety and Mobility Implementation Plan guidance is followed per the Department's "Policy on Systematic Consideration and Management of Work Zone Impacts", dated August 6, 2007.

4.2.5 Comments: The department has made process changes, e.g. Intermodal planning is now part of Environmental planning with system-level input. Also, for example, Planning is copied on the Office of Engineering's transmittal memos for Preliminary design and Semi-Final Design plans, and are given the opportunity to review plans, comment and attend related meetings. The result of this is that planners are involved in the process through the various design and permitting stages and provide the designers insight on specific mitigation strategies. Planners review access modification request that are developed as part of the design process. Policies and Procedure for New or Revised Access in Connecticut (August 2009) manual explains the FHWA national policy and outlines procedures developed for applying that policy in Connecticut, for new or revised Interstate approval, regardless of the funding source. Planners analyze networks to ensure adequate levels of service can be maintained during construction operations and suggest appropriate mitigation strategies on a project specific basis.

4.2.6 Comments: The department establishes multidisciplinary/multi-agency teams which review potential transportation management plans. These teams consist of planners, designers, and other professional who collectively review projects. This review includes all phases of project development through transportation management plan development. This is done to ensure that the plan is comprehensive and addresses all concerns. In Planning, it is added to the Scope of major corridor studies that during the development of final transportation recommendations, the alternatives undergo a qualitative assessment to determine the significance of each. This assessment is conducted in accordance with FHWA regulations and the CTDOT Policy and Implementation Guideline for Work Zone Safety and Mobility. Based on this assessment, appropriate measures are identified (but not developed), i.e. a Transportation Management Plan (TMP), to ensure that safety and mobility are addressed during reconstruction operations.

Project Design

4.3.1 Comments: Yes, the department has software to determine the number of drivers exposed to work zones. The department's Traffic Engineering division uses the Quewz's guide to determine lane closures and to give the department delay based data to help determine strategies. Quewz's data is just one component of the decision process. The department uses experience, engineering judgment, and historical knowledge with Quewz's data in making final decisions on use of detours and night work. The department usually assumes night work is better with volumes above 1600 vehicle per lane per hr. For larger projects (type I, II), work is generally done at night.

4.3.2 Comments: The department is implementing TMPs as prescribed by the work zone final rule. These plans address all operational impacts for significant projects (type I & II). The plan describes the actions to be implemented to reduce work zone congestion and delay during project construction. The department addresses impacts during the project development stage thru the design phase. TMPs have been developed on a number of Type 1/2 projects, and these have been implemented or are being implemented. Examples include the I-95 New Haven Corridor (Q-Bridge) Projects and the Putnam Bridge Project.

4.3.3 Comments: On all significant projects, the department will involve players from Design, Planning, Maintenance, Highway Operation, and Construction in development of TMPs. The department's approach is to include stakeholders (local citizens, elected officials, etc) depending on the project's requirements and also to include context sensitive solutions. A number of Type 1/2 projects have TMP's currently under development. TMPs have been developed on a number of Type 1/2 projects, and these have been implemented or are being implemented. Examples include the I-95 New Haven Corridor (Q-Bridge) Projects and the Putnam Bridge Project.

4.3.4 Comments: Within the Office of Quality Assurance (OQA) the Constructability Review Unit (CRU) will perform constructability reviews in-house on select small to medium projects. CRU coordinates closely with the Department's Traffic Division. Per the Department's Constructability Review process, CTDOT has the ability to utilize and administer consulting engineering services to perform constructability reviews on larger projects and specific issues. A critical component of all reviews is to ensure that the availability of the roadway to travelers, as well as contractors, is optimized. CTDOT makes a concerted effort to minimize delays while maximizing productivity on construction projects.

4.3.5 Comments: A process did exist for special projects. This mechanism is done on case-by-case basis to expedite the project. The Department asked contractors to develop recommendations to reduce congestion and delays. However, contractors viewed this as an opportunity to gain advance knowledge before they bid on the project. The appearance of giving contractors advance knowledge is a concern to the State. The department does not currently use this process.

4.3.6 Comments: The Department has implemented a scheduling requirement for all projects regardless of their size. There are varying requirements depending upon the project size and scope. As the value of the project increases so do the requirements of the schedule. For projects valued less than \$10 million dollars a comprehensive bar chart is required. The bar chart schedule is defined by the minimum requirements designated in the specification and payment of the contract item "Mobilization" is linked to the successful submission of this schedule. For Projects over \$10 million dollars in value, or complex projects valued less than \$10 million, an electronic critical path method (CPM) schedule utilizing Primavera software is required, and the contractor is required to designate a project coordinator to develop and maintain the schedule. As projects increase in size and scope towards a Type 1 project as defined in this self assessment, the requirements of the CPM schedule increase to meet the needs of the project. For projects approaching 100 million dollars in value, specialized CPM specifications are crafted. For larger projects, the Department's Planning Office develops a basic schedule. The schedule is then refined through the design process. The designer builds upon this and provides a "template" which lists all of the "major elements" of the project and indicates key time frames such as winter shutdowns, and environmental windows. The Contractor then utilizes the template provided by the Department and develops the full CPM schedule. Throughout construction, the contractor updates the schedule and the schedule is reviewed by the Department's Construction Office. The Department employs Program Management for multiple projects grouped together such as in the I-95 New Haven harbor crossing corridor improvement program. These projects utilize Expedition software and the CPM schedules contain detailed information from the planning phase through the construction phase.

4.3.7 Comments: There is utilization of ITS in and around major work zones. Many projects are stand alone projects; others are part of a corridor ITS Management Plan. During the planning phase strategies are identified to minimize congestion caused by work zones on significant projects. During the design phase, these strategies are evaluated and refined to maximize potential effectiveness during the implementation phase. During the operations or construction phase of the project the strategies are employed and assessed for effectiveness. Feedback from the field is used to evaluate the effectiveness of various strategies for future use.

4.3.8 Comments: Life cycle cost analysis, in a rudimentary form, is utilized extensively in Bridge Design and Pavement Design. In the Department's bridge design process, the initial phase (Structure Type Study or Rehabilitation Study) involves identification of alternatives and a comparison of those alternatives with respect to "serviceability, constructability, and economics." This practice is outlined in the department's "Bridge Design Manual." High performance materials often play a significant role in life cycle vs. cost decision making process. Furthermore, if the magnitude of the project transcends the norm, a full life cycle cost analysis as defined in Federal Policy guidelines will be employed. In the Pavement Design arena, a life cycle cost analysis is performed routinely in conjunction with corridor studies where longer sections of the highway

system are proposed to be reconstructed and/or widened. To a lesser extent, life cycle analysis is also used on major reconstruction projects, where alternative pavement types/strategies can still be considered.

4.3.9 Comments: The department takes into consideration the facility before deployment of any positive separation device. The department's position is to always consider the use of positive barrier systems on Interstates and during major construction projects on high-speed facilities. Although no written procedure exists, the State feels they are doing a great job in practice of putting positive separation devices on type I & II projects. The Department has Chapter 14 in the Highway Design Manual (HDM) that gives guidance to the Designer in developing positive separation for worker safety. This chapter is currently under review by the Department for updating to further consider worker safety.

4.3.10 Comments: This practice is well implemented within the Department's culture. It is considered from planning through the design phase. More often wider shoulders are considered on projects, when its use as a pull off area is anticipated. A wider left and/or right shoulder, as far as maintenance is concerned, impacts traffic less and VMS systems and static signs can be maintained better. During design, signs are positioned to lessen future impacts for inspection and maintenance of the sign and structure.

4.3.11 Comments: The department does not involve the contractor in developing the TCP. However, after award the contractor provides input to modify and improve the TCP. This knowledge is captured in the construction phase and may be used in future designs of TCP's.

4.3.12 Comments: For the development of Traffic Control Plans (TCPs), the department continues to use a demand vs. capacity analysis to determine allowable hours for construction. Typical traffic capacity volumes used to support lane closures are as follows: 1800 vehicles per hour (vph) for the Route 15 parkway, 1750 vph for ramps, and 1500 vph for all other roadways. The department hopes that new software will become available to assist them in determining impacts to routes and delay times. The Department will continue its efforts to develop modeling expertise in this area.

Project Construction and Operation

4.4.1 Comments: The department tries to spread projects out so a larger number of contractors have a chance to bid on jobs. The department's letting schedule is largely driven by fiscal constraints. For signal projects, it is developed based on the number of contractors that can do the job.

4.4.2 Comments: The Department has a process for considering the timing for letting projects to minimize traffic disruption and congestion for larger projects (type I, II). The department reviews and assesses projects at the planning and design phase to determine if there may be any traffic problems. At present, funding constraints can

influence schedules for projects on major traffic corridors. The development and implementation of TMP's has helped this process.

4.4.3 Comments: For all projects on limited access roadways (type I& II), the Department has a process to evaluate methods for road user costs. The department can use liquidated damages as a disincentive and accelerated work as an incentive. On other projects, the department feels there is no one method of determining road user cost to establish incentive or disincentives. There is some room for improvement in establishing incentive or disincentives. The Department does not use A+B. In the past, the Department has implemented methods similar to lane rentals to limit the length of work zone closures and to keep contractors from impacting traffic at peak hours.

4.4.4 Comments: The department has in the past eliminated contractors who have consistently demonstrated their inability to complete a quality job within the contracted time. Although a rating system is performed on contractor, the rating has no role in awarding projects to contractors. The rating is not used to disqualify the contractors from the bidding process, regardless of past performance of the contractors.

4.4.5 Comments: Service Patrol vehicles are provided by CTDOT to help assist and clear incidents within work zones. The Department's practice is to utilize Highway Advisory Radio (HAR), Changeable message Signs (CMS), CCTV cameras, the Interactive Travel Information Map on the department's website, e-alert messages, and service patrols (CHAMPS) as incident management resources both internally and externally. Push-bumpers are available on State police vehicles and many maintenance trucks for use in incident clearance whenever possible. All of the resources with the exception of service patrols are operational 24/7 and managed from the two highway operation centers located in Newington and Bridgeport. The service patrols currently operate 5:30am - 7:00pm along the state's interstate corridors that include all of I-95 and portions of I-91, I-291, I-84, and major routes crossing these interstates. Projects in major corridors may also include a wrecker service provision to assist in moving vehicles off road, thus minimizing congestion within the work zone and potential incidents.

4.4.6 Comments: All types of projects have some flexibility between award and notice to proceed. The Notice to Proceed (NTP) normally occurs within 45 days of the award. An exception would be in instances that a winter shutdown date occurs during or immediately after the 45-day window. In that case the NTP may be extended to have Contractor begin work after winter shutdown period (Dec 1 to March 31). Two-part NTP's may also be included in contract. They usually are to allow for procurement of materials prior to actual construction, such as for traffic signal projects or for critical time frame work.

4.4.7 Comments: Currently law enforcement personnel are used for traffic control on most projects. State troopers are used exclusively on expressway (limited access roadways). Projects on other roads that are under a contractor's control require certified flag persons or uniformed law enforcement. Typically, a town or city will require at least

one officer at a site to assist with traffic control. Operations that are completed by DOT maintenance operations do not require the use of uniformed law enforcement, and the department's own certified flaggers will handle traffic control. Operations on expressways conducted by department maintenance personnel have a limited use of State troopers under a program entitled Operation Big Orange, which is a random patrol and speed enforcement operation funded by the department. Along with Operation Big Orange, DOT maintenance has fostered cooperation with state and local police with random enforcement in temporary work zones. Presence roles at the work zone ranges from a trooper/officer pulling into a work zone to complete police reports (high visibility police presence) to trooper/officers conducting routine traffic enforcement in the work zone or area of the work zone. Normally uniformed law enforcement assigned to a project only performs traffic control. However, the department has been pursuing an initiative to do speed enforcement in work zones and is gathering data on speeds and types of infractions issued. The enforcement activity uses on-site troopers that are assigned to the project as traffic control to complete the task. Further work is in progress to develop a department regulation to better define the types of traffic control personnel that are used on projects, also set guidelines as to when the use of law enforcement and flaggers are used within work zone areas, and what role they will have in work zone safety management.

4.4.8 Comments: The Department requires uniformed flaggers to be persons who have successfully completed flagger training by the American Traffic Safety Services Association (ATTSSA), National Safety Council (NSC) or other programs approved by the Engineer. A copy of the Flagger's training certificate shall be provided to the Engineer before the flagger performs any work on the project. Contractors have the option to become certified trainers and train their personnel or to use other contractors for this service or use uniformed officers.

4.4.9 Comments: Public Act 08-114 and Section 4-1a of the Connecticut General Statutes established a Highway Work Zone Safety Advisory Council to address issues related to work zone safety, including worker training, driver education, new technology implementation, review of current design and safety protocols, and enforcement strategies. Current activity of the Council includes the review and recommendation of a work zone safety training program curriculum for law enforcement. The curriculum is based on a course developed by the Federal Highway Administration (FHWA), entitled "Safe and Effective Use of Law Enforcement Personnel in Work Zones", National Highway Traffic Safety Administration (NHTSA), International Police Chiefs Association (IACP) and the National Sheriffs Association (NSA). The course was adapted for Connecticut as a result of two pilot courses and also work performed by the University of Connecticut's Transportation Technology Transfer Center (T2). The T2 center is now offering a course as part of a series of Connecticut Legal Traffic Authority program workshops. The State Police are looking to add additional instruction on work zone traffic control as part of their academy training.

Communications and Education

4.5.1 Comments: The department currently has a website for traveler information that includes a Google-based interactive map populated with notices of incidents, traffic cameras, road construction information, variable message sign locations and messages, as well as travel resources, such as ferries, park and ride facilities, airports, and train stations. An e-alert system is in place to notify subscribers of incidents, delays and construction news which are also available through Twitter. Certain high-profile projects also have a separate web page to provide updates to project status and construction activities. This is a precursor to a fully activated 511 system. The interactive map is currently being populated with construction projects (includes project location and description) on state roads. Incident reporting has expanded to include road work advisory and is triggered upon start of lane closure patterns reported to the two operation centers. The department also coordinates with regional traffic services from area states and commuter service companies to share information related to work zones and highway incidents that may result in traveler delays and congestion.

4.5.2 Comments: Since 2000, the department has had a dedicated working group, referred to as the Work Zone Safety Awareness Group, that has focused on not only work safety but also on the driver awareness risks associated with work zones. Each year the presiding Governor has proclaimed at least one week in April as Connecticut Work Zone Safety Week in support of the state and national efforts. In 2010, the working group will be focusing on driver behavior measures that will produce a change in how drivers perceive a work zone and the need to slow down and pay attention. More emphasis is being focused on better work zone consistency in signing, configuration, and use of portable devices to monitor and alert motorists of the need to pay attention to speeds and hazards and the need to slow down in work zones.

4.5.3 Comments: The department has taken a proactive approach in educating drivers, workers, and the public in general about safe practices in and around work zones and the hazards associated with them. The department uses a marketing firm when funding is available to develop work zone safety and public awareness campaigns comprised of, television and radio, and printed media such as pamphlets, posters, bumper stickers, and other promotional materials. Recent legislation has resulted in new law passed on charges for assaulting or endangering a highway worker. The legislation also resulted in the formation of a Highway Work Zone Safety Advisory Council which is responsible for reviewing current policy and practices related to Work Zone Safety. Most recently, the State Department of Motor Vehicles has included additional information and guidance to drivers about work zone safety, including a section the driver's manual.

4.5.4 Comments: The department provides major project updates on its website and also publishes project information and travel impact information via the DOT's website (see comment 4.5.1). Highway advisory radio, cameras images, media releases, interactive maps and a cooperative effort by various commuter and travel services helps to inform the public on construction and maintenance activities. The cameras provide real-time images operating on I-84, I-91, I-95 Route 2, Route 8, Route 15, I-395 and I-

384. Information sharing is definitely part of CTDOT's culture. The department has implemented an e-traffic alert advisory system to alert subscribers at no cost of highway and rail incident and notifications as well as ferry status information. Additional cameras and variable message signs recently added to the Waterbury, Danbury and the southeast corridor. A tie into State Police Computer Aided Dispatch (CAD) has enhanced the ability to receive notification about more incidents statewide in a real time environment. Expansion of cameras technology to other locations is also under design and construction. The department has a policy and procedure which requires that a public information component is included as part of the Transportation Management Plan at the project and corridor level. This public information component is a requirement for identifying strategies that seek to inform road users, the general public, area residences and businesses about the project, the expected work zone impacts, and the changing conditions on the project.

4.5.5 Comments: Yes. Please see 4.5.4. Systems are in place to address work zone and congestion issues. VMS, E-alert, cameras and HAR devices are deployed to inform the public. The department manages the data internally before the data is disseminated to the public. When the Department receives calls where cameras do not exist, it verifies this information through the state police, DOT field personnel and Connecticut Highway Assistance Motorist Patrol (CHAMP). Connecticut State Police has provided Computer Aided Dispatch workstations to the Highway Operations centers, which provide for quicker activation of ITS response times. ITS technology is used to monitor traffic conditions at various work sites within its range to check whether significant delays are occurring. Project personnel also communicate directly with the staff at the operation centers that manage the ITS devices so that messages and alerts can be broadcast through the system when work is actually ongoing within the travel lanes that may result in motorist delay. During a recent project on a major interstate corridor, ITS information was used as a tool to warn motorists of significant delays that would be occurring as a result of the work zone. These alerts were also broadcast in adjacent states to provide adequate warning to motorists to seek alternate routing. The strategy was effective in reducing traffic volumes in work zone area and thus reducing congestion and delays.

Program Evaluation

4.6.1 Comments: The Department is currently looking at equipment that will assist in tracking work zone information such as speed, volume, and delay (length of queues) in order to establish some performance parameters that can be used in the design of work zones. Incident related delays are collected currently but no delay information due to work zones that are long term or short term. Highway Operations personnel is currently in the planning stage of considering involving its consultant (IBI) to produce monthly reports from the Crescent program to be shared with other agencies within the DOT. The use of collected data has not progressed.

4.6.2 Comments: The Department collects the fatalities data but the data, is not broken down in something useful for work zone performance measures. Fatality data is collected but the Department questions the accuracy of that data. A big question is whether an accident outside and downstream of the construction zone is related to the construction zone itself. The department realizes the need for improvements with data collection. However, to date, there is no measure to assess work zones performance. The Department realizes that the police need to provide more detailed information on the accident report (PR-1 form), so that the department can determine a statistical baseline to help the designer develop a more comprehensive and safe design with regard to the management and handling of traffic during construction. The department developed policy regarding work zone safety and mobility final rule; however, the policy is still relatively new. The use of collected data has not progressed and will require considerable resources and manpower, which is currently not available.

4.6.3 Comments: The Department has not conducted a specific survey related to work zone traffic management but has not ruled out a survey as an option to assess current programs and strategies. The use of customer surveys as a tool to improve performance is being considered. The criteria and strategies for using surveys as means to improve performance needs further study. The Department has conducted public information meetings during design and also during construction to allow the public to bring their concerns, needs or ideas to the department. This has been a success on some of the higher profile projects where there is much public interest in the project. The Department also has an e-mail address for feedback on its website.

4.6.4 Comments: The department is working on several strategies in hopes to develop some performance based measures. Public relations efforts include the establishment of an e-mail address and redesign of the department's work zone safety website. The website will direct visitors to other work zone web pages for information on worker and contractor safety topics, education and training, FAQ's surveys and Connecticut guidelines, policies and regulations. Additional on-site efforts include deployment of portable speed monitoring devices for data collection and as a motorist advisory tool. The Department is also reviewing current guidance and practices for traffic control specific to workers, contractors, and law enforcement. Development of criteria to define the limits of work zones and related queues is also being studied, and it can be used to establish best practices on how to manage queue lengths. Work zone safety reviews for night and day operations will be more frequent and will include the review of traffic control devices, sign installation and removal methods, sign recognition and visibility, survey of workers on what is working and not working. Through these reviews, changes and improvements can be made to assist motorists and workers. Additional research into performance measurements for work zone strategies is ongoing in various states and by safety organizations. Specific types of data collection that will have relevance and assist in strategies to establish performance metrics continues to be researched.

APPENDIX 4

Work Zone Safety – An In-Depth Look at Policy and Practice (CTDOT 2010)



AN IN-DEPTH LOOK AT POLICY AND PRACTICE

SAFETY

Minimize potential hazards to road users and highway workers

- IDENTIFY
- MITIGATE
- MANAGE
- ENFORCE



State of Connecticut

2010

Work Zone Safety Reviews

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Connecticut Department of Transportation

Office of Construction

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Work Zone Review 2010

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Introduction

The FHWA's 2010 Work Zone Mobility and Safety Self Assessment document contains a section titled program evaluation. Under the program evaluation section, field reviews are conducted to help evaluate varying aspects of work zones paying particular attention to the current practices and designs being used in the Connecticut Department of Transportation's (CTDOT) work zones. In-depth field reviews included key personnel from the project, Office of Construction, Division of Traffic, Division of Safety and the Federal Highway Administration (FHWA). Reports were created to document both successes and needed areas of improvement, not only within the project limits but also within Department policies or procedures. The reviews include an overview of traffic control devices, sign installation and removal methods, sign recognition and visibility, and survey of project personnel to determine strengths and weaknesses in work zone procedures. The goal is to take the "Lessons Learned" and improve upon the various disciplines that are involved in work zone design and implementation.

Projects are chosen from each of the four districts in the state: District 1- Central Connecticut; District 2- Eastern Connecticut; District 3- Southwestern Connecticut and District 4- Western Connecticut. There was an attempt to find projects that had some unique features to address in the plans and specifications. Once a project was selected, the review team was notified and a date for the field review was determined. The field review team meets with project personnel at the field office for an initial meeting then follows up with a field review to observe all aspects of the work zone, again with key project personnel. Upon completion of the review a report is generated detailing findings. The report was sent out to the review team and project personnel for comments.

Over the course of four months, ten reviews were conducted. The main focus areas for the reviews were: 1) Night reviews 2) Pedestrian issues 3) Temporary Signalization 4) Stage construction 5) Interstate construction. The following report contains an executive summary, copies of work zone reviews, a table of action items, an additional white paper from one project and an overview of the database created. It should be noted that this is an evolving process. Currently the review form has undergone three revisions or refinements. The database was created so that issues can be better categorized and gleaned from the reports more easily. Another outcome has been the discussion of reviewing work zone operations conducted by different offices. While this has not been implemented it is a topic for future discussion. It is the intent that these reviews will continue every construction season, in order to continually improve work zone safety for construction crews and the traveling public.

WORK ZONE SAFETY REVIEW EXECUTIVE SUMMARY

The Department of Transportation (CTDOT) and the Federal Highway Administration (FHWA) recently completed the 2010 Work Zone Mobility and Safety Self Assessment and one area of the assessment, *Program Evaluation*, states that evaluations are “necessary to identify successes and analyze failures... At the local level, performance monitoring and reporting provides an agency with valuable information on the effectiveness of congestion mitigation strategies, contractor performance, and work zone safety.” Work zone safety reviews or audits are one of the many strategies that have been identified as important tool in better understanding the operational and design characteristics of a work zone. Reviews with the Districts, Traffic and FHWA had been done in the past and were beneficial in developing improvements in the area of design, construction and operations.

Work zone safety reviews were conducted by CTDOT and FHWA towards the end of 2010 and included some in-depth field reviews with the Offices of Construction, Traffic, and Safety. The field reviews included an overview of traffic control devices, sign installation and removal methods, sign recognition and visibility, survey of workers on what is working and not working, as well as use of innovative materials and practices. A work zone review form was developed to capture different aspects of a work zone and includes questions and check off sections pertaining to work zone management, operational characteristics, and equipment and materials being used. Field interviews and project discussions were also conducted when possible.

The intent is to be able to input information into a database that can be used to analyze and identify possible design issues, material defects, specification problems, training needs for inspectors, policy and procedural issues, and best practices. Some of the issues/ideas gleaned from the reviews and action items are as follows:

1. Sign reflectivity issue –illegibility of signs at night and proper use of sheeting -bright fluorescent vs. Type III.
 - a. Review specifications – DOT’s and Manufacturers
 - b. Review material submittals to see if more information required.
 - c. Review sheeting and substrate compatibility.
2. Portable light plants- position of lights causing glare and distraction to the traveling public, inadequate lighting maintained throughout work area
 - a. Review specification requirements
 - b. Add as a review task during work zone project level reviews
3. Pedestrian Access- obstructions, unclear guidance, unsuitable pathways, inaccessibility to crosswalks, pedestrian button devices.
 - a. Review plan details and specifications
 - b. Review guidance documents and standards
 - c. Expand reviews to more projects to see if prevalent issue

4. Movable Barrier application- positive protection for traffic and workers, limited area for use.
 - a. Review different barrier systems
 - b. Review potential constraints
 - c. Cost Benefit Analysis
5. Warning Lights on signs for secondary roadways - Photocell type do not work very well in areas with trees.
6. Traffic control in work zones – experience and understanding of work zone safety training, levels of effectiveness (presence versus enforcement).
 - a. Appropriate Use of law enforcement and flaggers
 - b. Training- local and state level. Addition to curriculum- moving road blocks
 - c. Requirement and Responsibilities in work zone.
 - d. Review policies and procedures- local and state
 - e. Defining an accident in the work zone. Is it considered a workzone accident if it occurs within the queue?
7. Variable Message signs- proper placement (distance from anticipated queue), legibility, ineffective messaging
 - a. Review traffic sign pattern plates for notations
 - b. Research types of portable sign systems and capabilities
 - c. Post mounted versus portable message board- what is best approach
8. Environmental conditions- pavement marking visibility during rain and fog, poor lighting conditions limiting retro-reflectivity, VMS solar backups, sightline restrictions due to trees, construction equipment, work area.
 - a. Work zone checklists for use by projects to identify deficiencies
 - b. Review Pavement markings requirements and specifications. Plastic and paint.
 - c. Review proper sign placement and positioning criteria for visibility and legibility

General Observations/comments

- Reviews need to include more photographs.
- Need to expand number of field visits to get a better understanding of how pervasive an issue may be. Is it a localized concern based on road type, material type, project type?
- Accessibility of tools and checklists such as MUTCD for personnel
- Temporary signalization on secondary roads need to consider emergency services, school busses/stops, mail delivery services, and also farm equipment.
- For night projects include additional separate lighting for use by inspection staff provided by contractor.
- Trooper suggestion to include training on how to perform a moving road block.

2010 WORK ZONE ACTION ITEMS

Issue:	Problem	Actions Taken:	Actions to be Taken:
Construction Sign Retroreflective Issues	Plastic Substrate does not appear to be rigid enough to utilize the reflective properties of the sheeting so that the sign can be read properly by the traveling public during night time hours. Condensation found to reduce retroreflectivity of construction signs.	1) Ongoing discussion with the Office with Traffic Engineering concerning issue. Inquired to other states if they encountered same issue. 2) Email sent to Districts asking for review and be ready for discussion at next managers meeting. 3) Additional in-depth review conducted by project 44-151 personnel regarding condensation.	Based on In-depth review by Districts: A) Send Memo requesting removal of signs using plastic substrate. B) Revise specification to exclude plastic substrates. C) Discuss with other Offices about the use plastic substrates for construction signs. D) Review and, if necessary, revise specification so that condensation is removed from construction signs.
Pedestrian /Bicycle Access issues:	Incomplete Sidewalks, Pedestrian Buttons hard to get to or inaccessible, crosswalk designations at intersections.	1) Notified and discussed with chief inspector the review teams concerns. 2) Reviewed contract documents for specific language, or lack thereof, regarding this type of access. 3) See if utility delays are reason why sidewalks are incomplete.	Include more of these types of reviews to see if these issues are more widespread. Review plans and specifications and revise if necessary. Send out memos reminding districts of specifications. Conduct training if necessary.
Project Lighting for Night Construction:	Glare from portable light plants affecting motorists traveling through the work zone.	None to date.	Send memo requesting inspectors to conduct drive through and report findings on report. Review specification requirements. Possibly create work zone review checklist and include this as an item.
Lighting for night time Inspection:	Inspectors working on night projects do not have sufficient lighting to inspect work. This could be previously completed work or areas requested by contractor prior to placement of material.	Reviewed specification requirements and found that contractor not required to supply any lighting either hand held or portable light plants.	Place request to specification committee to include wording that for any night work, portable and hand held lighting to be supplied by contractor for inspection staff.

2010 WORK ZONE ACTION ITEMS

Issue:	Problem	Actions Taken:	Actions to be Taken:
Barricade warning lights High intensity:	Solar powered warning lights, High intensity, are not effective in rural areas with significant canopy surroundings.	Reviewed specification.	Discuss with the Office of Traffic about this issue for possible change to plans or revision of specification.
Traffic Control in Work Zones:	Experience and understanding of work zone safety training, levels of effectiveness (presence versus enforcement).	Safe and Effective Use of Connecticut Law Enforcement Personnel in Work Zones Training Curriculum Now Available Online. Visit University of Connecticut Technology Transfer (T2) Center at http://www.t2center.uconn.edu/	Continue training at the local and state level. Addition to curriculum – moving road blocks. Review policies and procedures – local and state. Defining an accident in the work zone. Is it considered a work zone accident if it occurs in the queue?
Variable Message Signs:	Defining proper placement (distance from the anticipated queue), proper messaging, ensure message is legible.	Continue to verify proper messaging during reviews	Investigate different types of portable/variable message signs and capabilities to find best approach.
Movable Barrier systems:	Currently only 1 system available for use – proprietary - therefore difficult to use on federal participating projects.	None to date.	Investigate if other systems have been developed. If other systems are in use compare the systems.
Environmental Conditions:	Visibility of Work Zone warning equipment during inclement weather. Rain affecting retroreflective properties of construction signs and pavement markings.	Continued investigation in construction signs and their lack of reflective properties.	Possibly create checklist to be signed off by contractor at beginning of work night. Review proper sign placement and positioning for visibility and legibility.
Safety Review Self Assessment:	Improve and enhance the work zone safety review inspection process.	Improved questionnaire form and created a database to store information.	Include more photographs/video of projects. Expand the number of field visits. Are issues based on road, material, or project type? Inform project staff of internet sites and pamphlets / documents.

NIGHT REVIEWS

50-204, Rt. 15 Fairfield and Trumbull, CT

44-151, I-95 East Lyme and Waterford, CT

83-255, I-95 Milford and Orange, CT

WORK ZONE REVIEW FORM**Project Number:** 50-204/206**District No.** 3**Date & Time:** 8/3/2010 8pm to Midnight**Weather:** 80° Clear**Project Type:** Construction Maintenance Bridge Safety**Road Type:** Limited Access Secondary Local / Town**Inspection Forces:** State Maintenance Consultant**Location (Route & Town):** Route 15 Fairfield/Trumbull**Focus of Review:** Lane Closure: Temporary Permanent; Stage Construction Detour; Pedestrian/ Bike issues; Temporary Signalization; Night Work**Prime Contractor:** O&G Industries**Project Engineer:** Anil Seghal**Chief Inspector:** John O'Dierna (STV)**Project Amount:** 67,186,345**Percent Complete:** 46%**Calendar Days completed:** 242**Calendar Days Allotted:** 772**Review Participants**

Name	Representing
Robert Ramirez	Federal Highway Administration
Robert Turner	Federal Highway Administration
Mary Baier	DOT District 3 Construction
Terri Thompson	DOT Office of Construction
Philip Cohen	DOT Traffic Engineering
Terri Thompson	DOT Office of Construction
Jeff Hunter	DOT Office of Construction
Michael VanNess	DOT Safety
Tim Osika	CT State Police
Sam Scozzari	STV
Frank Morelli	STV
Dan Waida	STV

Q&A:

- 1) Is there clear, positive, understandable guidance through the work zone? Yes however there are some issues with signs. See Notes.
- 2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition). Slight queue and low speeds when entering the work zone around 2100; none by 2300. Have been told it varies depending on night.
- 3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). Project night lighting needs to be reviewed, but no other hazards seen.
- 4) Are there any horizontal/vertical clearance issues? None created by the construction work.

- 5) Are there any permitted load issues? N/A not allowed on highway.
- 6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? See additional comments on attached sheet Substrate is corrugated board.
- 7) Are all cones, drums, barricades, or other channelization devices acceptable? Yes.
- 8) Are warning lights and devices used for Maintenance and Protection of Traffic? Yes.
- 9) Clear Zone issues: (Y/N) Respond to questions below.
- What is the clear zone for this project? 30' or outside of the clear zone of rail.
 - Where are materials stored for the project? In gore areas or behind TPCBC.
 - Where is equipment stored when construction is not in progress? Same as b.
- 10) Have accommodations been made to account for
- Emergency Services – Design did not account for emergency issues within staged work zone.
 - Pedestrian/ Bike/ ADA issues? N/A
- 11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain. Not usually, but the response time could be faster.
- 12) Pavement Markings- Temporary
- Is there an item for removal of pavement markings, if yes, indicate removal method being used? Yes, Grinding.
 - Are there conflicting markings? No.
 - Are the temporary markings legible? If night review, comment on visibility. Yes good visibility.
 - Type of marking material being used. Tape Paint (non-epoxy) Epoxy
- 13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Yes all workers appeared to be.
- 14) Type of Traffic Control Personnel being used on project? Indicate type of training or certification for each and position within the work zone area.
- State Police Also being hired for enforcement.
- Local Police Minimum Hourly Requirement:
- Uniformed Flagger

Comments from Traffic Control Personnel (indicate type of traffic person): not asked.

- 15) Chief Inspector Comments:

16) Project Engineer Comments: See General Comments

Traffic Control Device Inspection- PART II**Table A – Signs**

Requirement	Comment
Type: Construction/Regulatory	
Location	Both sides when able
Mounting Height	Height vs. site line issues.
Clean, Visible, Legible (rate using quality standards guide ATSSA 3 rd edition)	
Reflectorized/Sheeting Type	Bright fluorescent/ Substrate issues.
Project Consistency	
Need to be covered	
Temp./Permanent	

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	42” cones and barrels
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Mostly
Reflectorized	yes
Anchored	
Consistent throughout project	Yes. Exit tapers need more & tighter definition.

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	N/A
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	
Reflectorized	Delineator Integrity questioned
Anchored	
Consistent throughout project	
Crash Trucks (TMA) in use? If yes how many and type	N/A

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	N/A Staff to investigate if warning lights are called for on advanced warning signs.
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	Yes.
Location of portable devices – Indicate if in clear zone and how protected.	Permanent VMS not used for project.
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	

Work Zone Traffic Control Review
Plans and Specifications Section – PART III

Is there a Transportation Management Plan? If yes, explain. No.

What special provisions are there in contract related to work zone (list item no, description and date of provision)? M&P of Traffic and Limitation of Operations.

Is the project being completed in stage construction? If yes, explain. No.

Is there temporary signalization? If yes, explain. No.

Is a detour required or being used? If yes, explain. No.

What guides, tools including manuals, pocket guides, books etc. do you reference?
Not asked.

What work zone traffic plans are included in the project? Stage Construction.

General Discussion Comments:

Speed reduction of legal limit considered during design phase considered but the Design decided against the proposal.

Visual open areas, where traffic cones are still present but no work is active, automobile speeds increase.

More than one “End Road Work” sign located within the sign pattern.

Taper at Exit ramps need to be more defined.

Temporary impact attenuation system damage predominant.

Property damage: How would this be administered if we get the information (GPS Coordinates).

One officer should be located at the start of the traffic queue.

**CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS
DISTRICT 3
REPORT OF MEETING**

Date of Meeting: August 3, 2010

Project: 50-204/206 & 144-178/180, Safety and Bridge Improvements on the Merritt Parkway (CT Route 15) in the Towns of Fairfield and Trumbull

Location of Meeting: CT DOT Field Office, Jefferson Street Park and Ride lot at Exit 46

Subject of Meeting: **Overnight MPT Review, Inspection, and Brainstorming w/CT DOT & FHWA (8:30 p.m.)**

Attendance:

Bob Ramirez	FHWA	860-659-6703 x3004
Robert Turner	FHWA	860-659-6703 x3011
Mary Baier	CT DOT District 3 Construction	203-389-3156
Terri Thompson	CT DOT Pavement Management	860-594-2667
Michael Van Ness	CT DOT Office of Construction	860-594-3118
Philip Cohen	CT DOT Traffic	860-594-2782
Jeff Hunter	CT DOT Safety	860-594-3122
Tim Osika	CT State Police	203-696-2500
Sam Scozzari	STV	646-354-9632
Frank Morelli	STV	203-371-1151
Dan Waida	STV	203-371-1151

Overview:

This meeting was conducted as an effort to brainstorm for areas of improvement regarding MPT through construction zones on limited access highways having high traffic volumes and incident rates. An inspection was conducted prior to the meeting as well as a follow up after the meeting. The following is a summary of ideas discussed and areas of note identified by the FHWA/CT DOT inspection party.

Crash Data:

Crash data for the Project area was discussed with SGT. Osika. He will query the State Police data for information from six months before the Project's commencement date (June 2009) and six months into the Project. SGT. Osika also offered to look into accidents that occurred during off hours. He will report back to Supervising Engineer, Mary Baier.

MPT Devices:

- Terri Thompson questioned if warning lights were specified for permanent mounted advanced warning signs; STV replied that the plans did not indicate warning lights. High intensity lights will be installed.
- Differential sign height of redundant signs on each side of the travelway was noticed during the 7pm inspection and discussed. The concern is that the signs behind barrier are higher than matching signs in the shoulder of the opposite and open lane and not visible when traffic starts to queue. STV responded that the signs could be raised for both sides to match and be better visible through direction to the Contractor. It was cautioned that signs extended in height area subject to wind shear, thus limiting visibility.
- FHWA and CT DOT advised that signs instructing motorist to merge with on-ramp traffic could be beneficial as the patterns are long and there are many entrance ramps on the Project.

Report of August 3, 2010 Meeting:

Overnight MPT Review, Inspection, and Brainstorming with FHWA and CT DOT Headquarters Personnel

- Parties acknowledged and discussed the inconsistency of the retro-reflectivity of the construction signs that are manufactured to the latest CT DOT specification; specifically, a "blotchy" appearance at night, which results in difficulty with read-ability at a distance. Parties brainstormed that it could be resulting from several defects:
 - o Moisture being picked up by the sign materials and being trapped between the sign face and the backing.
 - o Ultra-violet degradation causing a warp of the backing, which separates and allows water to infiltrate.
 - o Some unknown material defect (a hand-held-sized sample of the corrugated sign material was provided to FHWA for further investigation).
- The specification deviation with spacing and color specifications of delineators mounted on Temporary Precast Concrete Barrier Curb (TPCBC) was identified by the FHWA/CT DOT inspection team. STV advised of some problems with longevity of delineators to last through most snow plowing operations (they bend or break off). STV also advised that it is an ongoing issue.

Safety:

- Complacency of the workers is a concern as witnessed during the 7pm inspection, where an employee of the Contractor was observed talking on a cell phone while standing close to the open lane of traffic (standing on the cone line). O&G will be notified.
- Treatment for the area of an existing median berm was discussed with regard to two cross-over accidents wherein vehicles crossed over from one roadway to the other in the past few weeks/months (this occurred in the area between Exit Nos. 42 and 44). SGT. Osika explained that one of the accidents involved a northbound vehicle that left the highway, entered the median, and climbed the existing berm. He explained that the berm acted as a "launch", in which the errant vehicle was airborne and landed in the southbound lanes of live traffic, causing an accident on the southbound side. CT DOT personnel agreed to investigate the treatment and evaluate the need for an immediate temporary treatment until the final treatment is constructed in Spring-Summer 2011, and if the permanent treatment needs to be modified in any way.
- Parties also discussed the pros and cons of median openings as they pertain to emergency responders versus use by unauthorized motorists.
- Parties discussed the value of modifying the specification of sign pattern retrieval (back-to-front picking up devices in reverse versus front-to-back with a forward rolling block and State Police assistance) for special cases such as the Merritt Parkway, which has extensive areas of vertical and horizontal geometry that poses safety challenges for workers and the public.
- CT DOT District 3 advised of the value of State Police for enforcement in addition to visibility at the sign patterns. Parties discussed positioning of State Police vehicles in the pattern versus the danger and safety of the vehicles before the pattern. Parties also discussed the effectiveness of the vehicle before the pattern versus within the pattern, speculating that motorists rationalized that there will be no enforcement if the Trooper is inside the sign pattern. No final recommendation or conclusion was made regarding this matter.
- It was discussed that when an additional trooper is added per DPS requirements, the additional trooper be utilized to frequently drive through the patterns as well as relieve other troopers.

General Comments:

- Within lane closures that extend for some distance where active construction is not visible to a motorist, I suggest the use of an occasional portable barricade mounted orange arrow sign or 3 drums/cones across the closed lane to reinforce the message to through traffic, about which side of the drum/cone line is the closed lane. I call this treatment a "fire stop", just like studs in a wall. This action is intended to address and hopefully eliminate intrusion into the work zone pattern, which was mentioned as an issue on this project.
- Proper permanent "Wrong Way" and "Authorized Vehicles Only" regulatory signing is needed at all median breaks. It was mentioned during the meeting that vehicles have been observed using the median breaks on the Parkway to avoid backups and delays (not always construction related). It is particularly concerning that some median breaks are not even wide enough the harbor a vehicle without intrusion into an adjacent travel lane. Providing signing to preclude a potential wrong way vehicle must be provided and maintained at

Report of August 3, 2010 Meeting:
Overnight MPT Review, Inspection, and Brainstorming with FHWA and CT DOT Headquarters Personnel

all median breaks. This item is relevant especially during construction where signs may be removed temporarily due to work zone conflicts. It was observed that a median break somewhere near the project did not appear to have any Wrong Way signing.

- Although Traffic Engineering is interested in reviewing the median area where the crossover accident occurred, please be specific on which Department Office or Unit is to take the lead in reviewing potential changes to the median treatment as mentioned in the report.
- On all major projects the Transportation Management Plan (TMP) should look closely at access through the work zone by emergency services. The ability to remove disabled Vehicles should also be looked at in the TMP.
- Also on all major projects the item "Work Site Traffic Safety Supervisor" should be utilized.
- It was suggested that when crash barrels are damaged and Police are called to the accident, the same stickers placed on guide rail for maintenance that identify the case number are also placed on the damaged crash barrels.

Subsequent to the meeting, between 22:00 and 23:00, parties again inspected the full project limited access travelways (parkway, only), and the following comments were made:

- Existing merge signs are missing and need to be reinstalled.
- Illumination for some operations is too bright and must be adjusted.
- Added cones to channel traffic at gores should be implemented.

Submitted By: _____
Samuel Scozzari PE, Project Manager

Approved By: _____
Mary Baier PE, Transportation Supervising Engineer

From: Thompson, Terri L
To: [Hunter, Jeffery H](#)
Subject: FW: Photos
Date: Friday, May 06, 2011 1:52:00 PM
Attachments: [Road Work Sign at Night.jpg](#)
[Left Lane at Night.jpg](#)
[Cones staged at X46.jpg](#)
[Mill River Unprotected.jpg](#)

Thanks

Terri 860-594-2667

From: Sehgal, Anil
Sent: Thursday, May 06, 2010 9:59 AM
To: Thompson, Terri L
Cc: Obey, Robert E; Baier, Mary
Subject: FW: Photos

Hi Terri----Attached are some pictures. The problem with these pictures is that when camera flash hits them, they come out decent but when car light hits them shaded areas almost get as dark as the letters and are very hard to read. I think you get the point. We have started to transition into newer signs on our project.



Mill River Unprotected.jpg



Road Work Sign at Night.jpg



Cones staged at X46.jpg



Left Lane at Night.jpg

WORK ZONE REVIEW FORM**Project Number:** 44-151**District No. 2****Date:** 10/06/2010**Weather:** Partly Cloudy 52°**Project Type:** Construction Maintenance Bridge Safety**Road Type:** Limited Access Secondary Local / Town**Inspection Forces:** State Maintenance Consultant**Location (Route & Town):** Interstate 95 Exits 72 to 83 in East Lyme / Waterford**Focus of Review:** Lane Closure: Temporary Permanent; Stage Construction Detour; Pedestrian/ Bike issues; Temporary Signalization; Night Work**Prime Contractor:** Tilcon CT**Project Engineer:** Michael Wilson**Chief Inspector:** James Parsons**Project Amount:** 17,068,239**Percent Complete:** 13%**Calendar Days completed:** 114**Calendar Days Allotted:** 525**Review Participants**

Name	Representing
Robert Rameriz	Federal Highway Administration
Robert Turner	Federal Highway Administration
JoAnn Devine	Assistant District Engineer Dist 2
Terri Thompson	TSE DOT Office of Construction
Michael Wilson	DOT District 2 Construction
Stephen Curley	DOT Office of Traffic Engineering
James Parsons	DOT District 2 Construction
Jeffery Hunter	DOT Office of Construction

Q&A:

- 1) Is there clear, positive, understandable guidance through the work zone? Yes.
- 2) What is the overall condition of traffic flow through the work zone? (Include queue length and speed limit, roadway condition). Minimal queue, 1-2 miles during setup. A more significant queue occurred prior to Labor Day.
- 3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). Grass median area unprotected by barrier and also shoulder – consider safety edge application.
- 4) Are there any horizontal/vertical clearance issues? None noted.
- 5) Are there any permitted load issues? None noted.

- 6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? Yes, however similar issue as noted on previous night reviews concerning use of semi-rigid substrate that causes illegibility of sign message.
- 7) Are all cones, drums, barricades, or other channelization devices acceptable? Yes, also using movable barrier.
- 8) Are warning lights and devices used for Maintenance and Protection of Traffic? Yes.
- 9) Clear Zone issues: (Y/N) Respond to questions below.
- What is the clear zone for this project? 30' or behind the deflection zone of rail system.
 - Where are materials stored for the project? Behind barrier and in gore areas of ramps.
 - Where is equipment stored when construction is not in progress? See b above.
- 10) Have accommodations been made to account for
- Emergency Services – No issues for emergency services to negotiate the work zone.
 - Pedestrian/ Bike/ ADA issues? Since Interstate project does not apply.
- 11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain. No.
- 12) Pavement Markings- Temporary
- Is there an item for removal of pavement markings, If yes, indicate removal method being used? Yes, grinding.
 - Are there conflicting markings? None noted.
 - Are the temporary markings legible? If night review, comment on visibility Yes, visible.
 - Type of marking material being used. Tape Paint (non-epoxy) Epoxy
- 13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Yes.
- 14) Type of Traffic Control Personnel being used on project? Indicate type of training or certification for each and position within the work zone area.
- State Police
- Local Police Minimum Hourly Requirement:
- Uniformed Flagger
- Comments from Traffic Control Personnel (indicate type of traffic person): not asked.
- 15) Chief Inspector Comments: Calling Highway operations prior to pattern set up and at completion. Safety barrier is a good option to provide adequate work area especially with limited shoulder width. State Police positioned at taper transition or work site. It was mentioned that there should be advanced warning areas at back of queue.
- 16) Project Engineer Comments: See Appendix for follow up investigation on reflective sheeting by Project Engineer and Project staff.

Traffic Control Device Inspection- PART II**Table A – Signs**

Requirement	Comment
Type: Construction/Regulatory	
Location	Both sides when able
Mounting Height	OK Height vs Reflectorization
Clean, Visible, Legible (rate using quality standards guide ATSSA 3 rd edition)	Same issues as with previous projects. Visibility.
Reflectorized/Sheeting Type	Yes/Bright Fluorescent
Project Consistency	Yes
Need to be covered	No
Temp./Permanent	Both

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	42" Cones & Drums per plan 80' spacing on cones.
Quantity	Adequate
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Yes
Reflectorized	Yes
Anchored	No
Consistent throughout project	Yes

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	N/A
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	
Reflectorized	
Anchored	
Consistent throughout project	
Crash Trucks (TMA) in use? If yes how many and type	N/A

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	N/A
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	
Location of portable devices – Indicate if in clear zone and how protected.	
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	

Work Zone Traffic Control Review
Plans and Specifications Section – PART III

Is there a Transportation Management Plan? If yes, explain. No

What special provisions are there in contract related to work zone (list item no, description and date of provision)? Not addressed in old form.

Is the project being completed in stage construction? If yes, explain. Not addressed in old form.

Is there temporary signalization? If yes, explain. No.

Is a detour required or being used? If yes, explain. No.

What guides, tools including manuals, pocket guides, books etc. do you reference?
Not addressed in old form.

What work zone traffic plans are included in the project? Not addressed in old form.

Additional Comments from meeting:

No wrecker service, and no work site supervisor required from contractor. Pavement marking eradication is good. Picking up pattern in reverse per DOT requirement, however, cone truck allowed to drive in opposite direction with no lights on for pickup. No issues to date. Experiencing traffic queues. Rocky Neck Connector to the Baldwin Bridge. No work zone accidents that are project related. Not sure about within traffic queue. Discussed with FHWA the use of the safety edge as part of paving for median grass area.

Discussion on incorporating a gate in median upon completion of median barrier for accessibility to opposing direction for incident management. Suggestion was result of an on board meeting with District, Design, and State Police during design phase.

Project personnel suggested that for night work, the illumination requirement should include a statement about supplying inspection staff with sufficient lighting to perform their work. Lighting for project personnel outside of the immediate work area should also be included in the item. It was also stated that contract should have used 5,000 linear feet of movable barrier; however the contract limits length to ½ mile. Contractor needs to better position portable light plants to prevent glare. Noted during SB travel passing work area located NB Exit 73 vicinity. Construction Sign substrate (semi-rigid plastic) causing distortion or illegibility of messages. Possible condensation issue.

WORK ZONE REVIEW FORM**Project Number:** 83-255**District No.** 3**Date & Time:** November 3, 2010**Weather:** Clear, 40 degrees**Project Type:** Construction Maintenance Bridge Safety**Road Type:** Limited Access Secondary Local / Town**Inspection Forces:** State Maintenance Consultant**Location (Route & Town):** Interstate 95 North and Southbound in Milford and Orange**Prime Contractor:** Manafort Brothers**Project Engineer:** Jeff Mordino**Chief Inspector:** Giovanni Castro**Project Amount:** \$30,998,979**Percent Complete:** Work 81%, Time 106%**Calendar Days completed:** 508**Calendar Days Allotted:** 477**Review Participants**

Name	Representing
Jeff Hunter	Office of Construction
Nick Ambrosino	Office of Construction
Dave Harrison	District 3 Construction - Tectonic

Q&A:

- 1) Is there clear, positive, understandable guidance through the work zone? Yes
- 2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition)
There is a queue for about an hour during and after pattern is set up. After about an hour traffic flow is somewhat normal through work zone.
- 3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs) No
- 4) Are there any horizontal/vertical clearance issues?
No
- 5) Are there any permitted load issues? No
- 6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? Yes

- 7) Are all cones, drums, barricades, or other channelization devices acceptable?
The inspector marks all cones/drums that are unacceptable and issues a field memo to the contractor if they are not replaced.
- 8) Are warning lights and devices used for Maintenance and Protection of Traffic?
Yes
- 9) Clear Zone issues: (Y / N) Respond to questions below.
- What is the clear zone for this project?
Usually behind barrier, 30' inside
 - Where are materials stored for the project?
Off ramp near 95
 - Where is equipment stored when construction is not in progress?
Off ramp near 95
- 10) Have accommodations been made to account for
- Emergency Services – One accident so far and there were no issues
 - Pedestrian/ Bike/ ADA issues? N/A
- 11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain
No
- 12) Pavement Markings- Temporary
- Is there an item for removal of pavement markings, If yes, indicate removal method being used? No
 - Are there conflicting permanent markings? No
 - Are the temporary markings legible? If night review, comment on visibility Yes
 - Type of marking material being used. Tape Paint (non-epoxy) Epoxy
- 13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain.
Inspectors were not issued type 3 vests or pants. Contractor does wear proper equipment.
- 14) Type of Traffic Control Personnel being used on project? Indicate type of training or certification for each and position within the work zone area.
- State Police
- Local Police Minimum Hourly Requirement:
- Uniformed Flagger

Comments from Traffic Control Personnel (indicate type of traffic person): None

15) Chief Inspector Comments: None

16) Project Engineer Comments: None

Traffic Control Device Inspection- PART II**Table A – Signs**

Requirement	Comment
Size	Good
Location	Good
Mounting Height	Good
Clean, Visible, Legible (rate using quality standards guide ATSSA 3 rd edition)	Some signs were not as visible as they should be, difficult to read, scratchy look to them
Reflectorized	Some did not have great reflectivity, scratchy look
Project Consistency	Inconsistent
Need to be covered	No
Temp./Permanent	Temp.

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	VMS
Quantity	2
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Very clean and visible
Reflectorized	No
Anchored	No
Consistent throughout project	Yes

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Barrels, Cones and TPCBC
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Barrels were much more vibrant than cones. Some cones were difficult to see
Reflectorized	Yes, some poorly
Anchored	Yes
Consistent throughout project	No
Crash Trucks (TMA) in use? If yes how many and type	4- Type D

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	No
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	Yes
Location of portable devices – Indicate if in clear zone and how protected.	Yes
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	Portable message signs were very readable and the timing between screens was acceptable.

Work Zone Traffic Control Review
Plans and Specifications Section – PART III

Is there a Transportation Management Plan? If yes, explain
No

What special provisions are there in contract related to work zone (list item no, description and date of provision)?
No

Is the project being completed in stage construction? If yes, explain
No

Is there temporary signalization? If yes, explain
No

Is a detour required or being used? If yes, explain
Exit ramp detours when paving exit ramps

What guides, tools including manuals, pocket guides, books etc. do you reference?
Chief inspector uses pocket guide for reflectivity of cones

What work zone traffic plans are included in the project?
Typical Detour, Limitations of Operations

PEDESTRIAN REVIEWS

76-205, Intersection of Routes 6 & 44 in
Manchester, CT

42-297, Intersection of Silver Lane & Forbes St;
East Hartford, CT

WORK ZONE REVIEW FORM

Project Number: 76-205
Date: 08/25/2010 8:30 – 12:30

District No. 1
Weather: Fair 75

Project Type: Construction Maintenance Bridge Safety
Road Type: Limited Access Secondary Local / Town
Inspection Forces: State Maintenance Consultant

Location (Route & Town): Intersection of Routes 6 & 44 in the Town of Manchester

Focus of Review: Lane Closure: Temporary Permanent; Stage Construction
 Detour; Pedestrian/ Bike issues; Temporary Signalization; Night Work

Prime Contractor: Spazzarini Construction Company

Project Engineer: Jaspal Jutla

Chief Inspector: Jeff Benoit

Project Amount: 5,395,377

Percent Complete: 19%

Calendar Days completed: 183

Calendar Days Allotted: 450

Review Participants

Name	Representing
Robert Ramirez	Federal Highway Administration
Barry Shilling	Traffic Engineering
Jeff Hunter	Office of Construction
Steve Sartirana	DOT Safety
Jaspal Jutla	District 1 Construction
Jeff Benoit	District 1 Construction

Q&A:

- 1) Is there clear, positive, understandable guidance through the work zone? Yes, project has sufficient guidance through the work zone.
- 2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition). No queue present.
- 3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). The project has a few drop offs however they are protected properly.
- 4) Are there any horizontal/vertical clearance issues? None created by the construction work.
- 5) Are there any permitted load issues? None created by the construction project.

- 6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? Yes, construction signs appear acceptable.
- 7) Are all cones, drums, barricades, or other channelization devices acceptable? Yes, however the impact attenuation system barrel height obscures the siteline for motorists leaving Cheney Tech high school. The Office of Traffic is reviewing this issue and will resolve it by the time this document is finished.
- 8) Are warning lights and devices used for Maintenance and Protection of Traffic? No.
- 9) Clear Zone issues: (Y / N) Respond to questions below.
- What is the clear zone for this project? 30 feet from roadway.
 - Where are materials stored for the project? On project well outside the clear zone.
 - Where is equipment stored when construction is not in progress? Same as b) above.
- 10) Have accommodations been made to account for
- Emergency Services – Yes.
 - Pedestrian/ Bike/ ADA issues? Yes. Continuing adjustment to crosswalk locations, due to stage construction were discussed between the Office of Traffic and District 1 Construction Personnel.
- 11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain. Not usually on this project.
- 12) Pavement Markings- Temporary
- Is there an item for removal of pavement markings, If yes, indicate removal method being used? Yes, Grinding.
 - Are there conflicting markings? No.
 - Are the temporary markings legible? If night review, comment on visibility Yes
 - Type of marking material being used. Tape Paint (non-epoxy) Epoxy
- 13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Appeared to be.
- 14) Type of Traffic Control Personnel being used on project? Indicate type of training or certification for each and position within the work zone area.
- State Police
- Local Police Minimum Hourly Requirement: 4 hours.
- Uniformed Flagger
- Comments from Traffic Control Personnel (indicate type of traffic person): not asked.
- 15) Chief Inspector Comments: See attached report.
- 16) Project Engineer Comments: See attached report.

Traffic Control Device Inspection- PART II**Table A – Signs**

Requirement	Comment
Size	
Location	
Mounting Height	Break away mount height should be reviewed.
Clean, Visible, Legible (rate using quality standards guide ATSSA 3 rd edition)	Yes.
Reflectorized	Yes.
Project Consistency	
Need to be covered	No.
Temp./Permanent	Reviewed permanent construction signs.

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Inertial barrels used to protect TPCBC
Quantity	2 sets
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Yes however see note about inertial barrels. Delineators used on barrels.
Reflectorized	Delineators are. Type III barricades are as well.
Anchored	No.
Consistent throughout project	Yes

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Type III barricades used.
Quantity	At least 2.
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Yes, however striping is reversed on one of the barricades.
Reflectorized	Yes
Anchored	No
Consistent throughout project	Yes
Crash Trucks (TMA) in use? If yes how many and type	N/A

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	N/A
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	N/A
Location of portable devices – Indicate if in clear zone and how protected.	N/A
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	N/A

Work Zone Traffic Control Review
Plans and Specifications Section – PART III

Is there a Transportation Management Plan? If yes, explain. No.

What special provisions are there in contract related to work zone (list item no, description and date of provision)? Limitation of Operations and M&P of Traffic.

Is the project being completed in stage construction? If yes, explain. Yes all off line work is being done first. Then mainline will be completed.

Is there temporary signalization? If yes, explain. No.

Is a detour required or being used? If yes, explain. No.

What guides, tools including manuals, pocket guides, books etc. do you reference?
Construction Manual.

What work zone traffic plans are included in the project? Staging plans and M&P of Traffic plans.

WORK ZONE REVIEW FORM

Project Number: 42-297
Date: 08/25/2010

District No. 1
Weather: Fair

Project Type: Construction Maintenance Bridge Safety
Road Type: Limited Access Secondary Local / Town
Inspection Forces: State Maintenance Consultant

Location (Route & Town): Intersection of Silver Lane & Forbes St; East Hartford

Focus of Review: Lane Closure: Temporary Permanent; Stage Construction
 Detour; Pedestrian/ Bike issues; Temporary Signalization; Night Work

Prime Contractor: Spazzarini Construction Company

Project Engineer: Jaspal Jutla

Chief Inspector: Richard Balzarini

Project Amount: 1,708,593

Percent Complete: 45%

Calendar Days completed: 133

Calendar Days Allotted: 276

Review Participants

Name	Representing
Robert Ramirez	Federal Highway Administration
Barry Schilling	Traffic Engineering
Yevgeniy Saykin	Traffic Engineering
Jeff Hunter	Office of Construction
Steve Sartirana	Safety
Richard Balzarini	District 1 Construction

Q&A:

- 1) Is there clear, positive, understandable guidance through the work zone? Yes, project has sufficient guidance through the work zone.
- 2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition). No queue present.
- 3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). Utility pole issues caused by utility company.
- 4) Are there any horizontal/vertical clearance issues? None created by the construction work.
- 5) Are there any permitted load issues? No.

- 6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? Yes. Construction Signs appear acceptable.
- 7) Are all cones, drums, barricades, or other channelization devices acceptable? Yes. All devices appear acceptable at this time.
- 8) Are warning lights and devices used for Maintenance and Protection of Traffic? No.
- 9) Clear Zone issues: (Y / N) Respond to questions below.
- What is the clear zone for this project? 30 feet or behind deflection of rail.
 - Where are materials stored for the project? Outside of the clear zone.
 - Where is equipment stored when construction is not in progress? Same as b.
- 10) Have accommodations been made to account for
- Emergency Services – Yes.
 - Pedestrian/ Bike/ ADA issues? Yes, however due to utility delays additional attention may be necessary.
- 11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain. Not usually, but the response time could be faster.
- 12) Pavement Markings- Temporary
- Is there an item for removal of pavement markings, If yes, indicate removal method being used? Yes.
 - Are there conflicting markings? No.
 - Are the temporary markings legible? If night review, comment on visibility
 - Type of marking material being used. Tape Paint (non-epoxy) Epoxy
- 13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Yes at this time.
- 14) Type of Traffic Control Personnel being used on project? Indicate type of training or certification for each and position within the work zone area.
- State Police
- Local Police Minimum Hourly Requirement: **8 hours**
- Uniformed Flagger
- Comments from Traffic Control Personnel (indicate type of traffic person): not asked.
- 15) Chief Inspector Comments: Should look at one lane closures early and then taking a second lane later on for Interstate work. Taking one lane early puts workers more at risk than taking both lanes at once.
- 16) Project Engineer Comments: None.

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction / Regulatory	No issues.
Location	
Mounting Height	
Clean, Visible, Legible (rate using quality standards guide ATSSA 3 rd edition)	
Reflectorized/ Sheeting Type	
Project Consistency	
Need to be covered	
Temp./Permanent	

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	
Reflectorized	
Anchored	
Consistent throughout project	

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	N/A
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	
Reflectorized	
Anchored	
Consistent throughout project	
Crash Trucks (TMA) in use? If yes how many and type	N/A

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	N/A
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	
Location of portable devices – Indicate if in clear zone and how protected.	
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	

Work Zone Traffic Control Review
Plans and Specifications Section – PART III

Is there a Transportation Management Plan? If yes, explain. No.

What special provisions are there in contract related to work zone (list item no, description and date of provision)? Just the normal M&P, nothing special in the contract.

Is the project being completed in stage construction? If yes, explain. No.

Is there temporary signalization? If yes, explain. No.

Is a detour required or being used? If yes, explain. No.

What guides, tools including manuals, pocket guides, books etc. do you reference?
Construction Manual.

What work zone traffic plans are included in the project? None.

**CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS
DISTRICT 1
REPORT OF MEETING**

Date of Meeting: August 25, 2010

Project: 76-205 & 42-297, Intersection Safety Improvements Route 6 & 44 and New State Road, and Route 502 (Silver Lane) and Forbes Street in the Towns of Manchester and East Hartford.

Location of Meeting: CT DOT Field Offices

Subject of Meeting: **Daytime MPT Review, Inspection, and Brainstorming w/CT DOT & FHWA (9:00 a.m.)**

Attendance:

Bob Ramirez	FHWA	860-659-6703 x3004
Jaspal S. Jutla	CT DOT District 1 Construction	860-258-4626
Yevgeniy Saykin	CT DOT Traffic	860-594-2592
Barry Schilling	CT DOT Traffic	860-594-2769
Steven Sartirana	CT DOT Safety	860-594-3118
Jeffrey L. Benoit	CT DOT District 1 Construction	860-533-0321
Richard Balzarini	CT DOT District 1 Construction	860-895-9079
Jeff Hunter	CT DOT OOC	860-594-3122

Overview:

This meeting was conducted as an effort to brainstorm for areas of improvement regarding MPT through construction zones on intersections having high traffic volumes and/or high incidents. A meeting was held as well as a field inspection of both construction sites. The following is a summary of ideas discussed and areas of note identified by the FHWA/CT DOT inspection party.

MPT Devices:

- Robert Ramirez noted that the chevrons on one of the type 3 construction barricades needed to be switched in order to direct traffic towards the travel lane.
- It was noted that the majority of traffic cones and drums are in good shape and have been maintained fairly well.
- Excellent coordination between the District 1 Construction personnel, Office of Traffic, and the Town of Manchester has allowed for changes to be made to construction staging. Reinstalling existing Pedestrian buttons for crosswalks, revising construction sidewalk locations and installation of louvers on signals are needs that have been addressed due to coordination of the above parties.
- Continued discussion of the inconsistency of the retro-reflectivity of the construction signs that are manufactured to the latest CT DOT specification; specifically, a "blotchy" appearance at night, which results in difficulty with read-ability at a distance. Temporary Regulatory signs using the same substraight are on project 76-205. Parties continued discussion that it could be resulting from several defects:
 - o Moisture being picked up by the sign materials and being trapped between the sign face and the backing.
 - o Ultra-violet degradation causing a warp of the backing, which separates and allows water to infiltrate.
 - o Some unknown material defect (a hand-held-sized sample of the corrugated sign material was provided to FHWA for further investigation).
 - o A night review was discussed to see if same issue occurs with the regulatory signs on waffle board.
- Some delineators are mounted on Temporary Precast Concrete Barrier Curb (TPCBC), however, discussion with field personnel indicated that they were not a pay item on the project.

Safety:

- Ability of emergency services to travel through both projects in an efficient manner was discussed. Both Chief Inspectors confirmed that there have been no problems with emergency vehicles traveling through the work zone in an efficient manner.
- Both projects have at least one school located within the project limits. For this reason, it was discussed that crosswalks and sidewalks, even "temporary", should be reviewed on the respective projects for conformance to MP&T specifications. Old Crosswalk markings should be removed and temporary markings installed as necessary.

Project Response to above:

Our thinking is that the Traffic and Design must look at each situation separately and not just incorporate boiler plate specs. In the contract. In case of 42-297 where do you install X-walk when you are constantly digging for drainage/side walk.. We understand the spes. But sometimes it does not work.

- Special considerations were noted regarding project 76-205. On this project, two high schools are located next to each other. Concerns were raised about the amount of new young drivers traveling through a construction zone for the first time. For this reason, excellent coordination between the administration at Cheney Tech and the Construction field office is ongoing. Officials at Cheney Tech are sending out notices to advise families of students regarding the construction. This type of coordination should continue throughout the duration of the project.
- Parties also discussed the problem encountered on project 76-205 with the business located at the corner of New State road and Route 44. The business owner complained that existing traffic uses the parking lot as a cut through to one of the high schools. Currently traffic drums have been installed to prevent this.
- Both projects have two contract items for traffic person; municipal police officer and uniformed flagger; however the municipal police officer contract item is being used almost exclusively on both projects.

Project Response to above:

- *1. Lot of traffic to handle 2. Liability issue 3. City area 4. Price wise flagger is not cheap \$ 46.20/hr to \$55.00/hr. 5. Police \$58/hr 6. School zone 7. Not enough hrs for flaggers (56 days out of 450 days contract time on one job. And 75 days out of 276 days on another) 7. we have used flaggers on rural area project*
- Since Towns are starting to implement an 8 hour daily charge for the use of Municipal Police officers, the use of the contract item traffic person (uniformed flagger) should be given more consideration as a means of traffic control, providing conditions warrant consideration.
- It was observed that AT&T utility poles are still located in the original location on project 42-297. New pavement has already been placed around poles. While no fault by project personnel, this poses a safety hazard for the traveling public in two ways. It is obviously a fixed object in the roadway and the poles provide a false sense of security for bikes and pedestrians who use the area. An open discussion between the necessary offices should continue in order to find ways to avoid this issue.

Project Response to above:

This a big problem on every job. We cannot resolve at the project level. This has to be resolved at upper management level. We can Show you the e-mails/calls made by project personnel to get the utility moving. It appears they want to move at their on pace. If Somebody has a better idea we like to hear. Well, the poles are still there. Any suggestion???

General Comments:

- Break away sign installation should be reviewed.

DETOUR REVIEWS

143-177, Pinewoods Road, Torrington, CT

- 5) Are there any permitted load issues? No
- 6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? Yes
- 7) Are all cones, drums, barricades, or other channelization devices acceptable?
Acceptable, contractor has been good at replacing unacceptable.
- 8) Are warning lights and devices used for Maintenance and Protection of Traffic? Yes
- 9) Clear Zone issues: (Y/N) Respond to questions below.
- What is the clear zone for this project? 30'
 - Where are materials stored for the project? Near work zone (detour)
 - Where is equipment stored when construction is not in progress?
Near work zone (detour)
- 10) Have accommodations been made to account for
- Emergency Services – Yes, they are aware of the detour. No accidents on project.
 - Pedestrian/ Bike/ ADA issues? Bike path, no problems
- 11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain No
- 12) Pavement Markings- Temporary
- Is there an item for removal of pavement markings, If yes, indicate removal method being used? No
 - Are there conflicting permanent markings? No
 - Are the temporary markings legible? If night review, comment on visibility
 - Type of marking material being used. Tape Paint (non-epoxy) Epoxy
- 13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Yes, both contractor and inspectors are using proper safety equipment
- 14) Type of Traffic Control Personnel being used on project? Indicate type of training or certification for each and position within the work zone area.
- State Police
- Local Police (used when paving, get 4 hour min)
- Uniformed Flagger

Comments from Traffic Control Personnel (indicate type of traffic person): None

15) Chief Inspector Comments: None

16) Project Engineer Comments: None

Traffic Control Device Inspection- PART II**Table A – Signs**

Requirement	Comment
Size	Good
Location	Legal and construction ahead were close off ramp, as designed
Mounting Height	Good
Clean, Visible, Legible (rate using quality standards guide ATSSA 3 rd edition)	Good
Reflectorized	N/A (Day review)
Project Consistency	Consistent
Need to be covered	No
Temp./Permanent	Temp.

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	VMS
Quantity	4
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	All were visible except one which was in direct sunlight
Reflectorized	N/A
Anchored	No
Consistent throughout project	Mostly

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Barricade near wok zone
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Visible
Reflectorized	N/A
Anchored	No
Consistent throughout project	Yes
Crash Trucks (TMA) in use? If yes how many and type	No

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	Flashing lights on signs
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	No
Location of portable devices – Indicate if in clear zone and how protected.	Yes, some located on secondary roadways with limited space.
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	Portable message signs were very readable and the timing between screens was acceptable. There were two screens displayed at each VMS.

Work Zone Traffic Control Review
Plans and Specifications Section – PART III

Is there a Transportation Management Plan? If yes, explain
No

What special provisions are there in contract related to work zone (list item no, description and date of provision)?
No

Is the project being completed in stage construction? If yes, explain
2 stages for placing box culverts but no traffic staging

Is there temporary signalization? If yes, explain
No

Is a detour required or being used? If yes, explain
Yes, detour is in place for project duration.

What guides, tools including manuals, pocket guides, books etc. do you reference?
Construction manual and utilities pocket manual

What work zone traffic plans are included in the project?
Detour, Sign for businesses (added through town)

TEMPORARY SIGNALIZATION REVIEWS

142-144, Route 74 west of I-84, Tolland, CT

111-118, Route 97 Pomfret, CT

- 5) Are there any permitted load issues? Unsure – Bridge not posted for weight limit however wide load issues, Permits notified.
- 6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? Yes
- 7) Are all cones, drums, barricades, or other channelization devices acceptable? Yes
- 8) Are warning lights and devices used for Maintenance and Protection of Traffic? Yes
- 9) Clear Zone issues: (Y / N) Respond to questions below.
- What is the clear zone for this project? 0' or 30' from barrier
 - Where are materials stored for the project? Behind barrier
 - Where is equipment stored when construction is not in progress? Near field offices or behind barrier near bridge
- 10) Have accommodations been made to account for
- Emergency Services – Pre-emption for troopers and fire trucks
 - Pedestrian/ Bike/ ADA issues? No
- 11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain KTM – very good w/ changing after power outage
- 12) Pavement Markings- Temporary
- Is there an item for removal of pavement markings, If yes, indicate removal method being used? Yes, grinding
 - Are there conflicting permanent markings?
 - Are the temporary markings legible? If night review, comment on visibility N/A
 - Type of marking material being used. Tape Paint (non-epoxy) Epoxy
- 13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Yes
- 14) Type of Traffic Control Personnel being used on project? Indicate type of training or certification for each and position within the work zone area.
- State Police
- Local Police Minimum Hourly Requirement
- Uniformed Flagger

Comments from Traffic Control Personnel (indicate type of traffic person): No

15) Chief Inspector Comments:

- School bus stops @ house within temp. signalization.
- Why are inspectors responsible for getting police?
- Pre-emption should be in one direction only (from Troopers barracks)
- More thorough investigation of which pre-emption system works best for site.
- More detours should be entertained to reduce time and costs of construction.
- Plowing during winter is difficult with only 10' lanes
- Plastic tape does not last through winter consider use of Epoxy for winter shut downs.
- Utilities – having trouble getting them moved.
- Less signs, more lines.

16) Project Engineer Comments: None**Traffic Control Device Inspection- PART II****Table A – Signs**

Requirement	Comment
Size	Various
Location	Various
Mounting Height	Various
Clean, Visible, Legible (rate using quality standards guide ATSSA 3 rd edition)	All very clean, visible.
Reflectorized	Very good.
Project Consistency	Very good.
Need to be covered	No
Temp./Permanent	Temp.

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Alternating one way Traffic Signals
Quantity	2
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Clean and visible
Reflectorized	N/A
Anchored	Yes
Consistent throughout project	Yes

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Barricade near work zone
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Visible
Reflectorized	Yes
Anchored	Yes
Consistent throughout project	Yes
Crash Trucks (TMA) in use? If yes how many and type	No

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	Yes, alternating One way traffic signals. Lights functioning.
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	No
Location of portable devices – Indicate if in clear zone and how protected.	Yes
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	

Work Zone Traffic Control Review
Plans and Specifications Section – PART III

Is there a Transportation Management Plan? If yes, explain

No

What special provisions are there in contract related to work zone (list item no, description and date of provision)?

No

Is the project being completed in stage construction? If yes, explain
2 stages for construction of bridge.

Is there temporary signalization? If yes, explain

Yes, alternating one way traffic signals

Is a detour required or being used? If yes, explain

No

What guides, tools including manuals, pocket guides, books etc. do you reference?

MUTCD guide is used.

What work zone traffic plans are included in the project?

M&PT plans

- 6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? New
- 7) Are all cones, drums, barricades, or other channelization devices acceptable? New
- 8) Are warning lights and devices used for Maintenance and Protection of Traffic?
Yes, battery operated.
- 9) Clear Zone issues: (Y / N) Respond to questions below.
- a. What is the clear zone for this project? 30 feet
 - b. Where are materials stored for the project? In lot behind deflection zone
 - c. Where is equipment stored when construction is not in progress? Same as above
- 10) Have accommodations been made to account for
- a. Emergency Services – No Pre-emption
 - b. Pedestrian/ Bike/ ADA issues? No room, school buses ok. Rural setting.
- 11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain No, contractor responsive.
- 12) Pavement Markings- Temporary
- a. Is there an item for removal of pavement markings, If yes, indicate removal method being used? Yes, grinding
 - b. Are there conflicting permanent markings? No
 - c. Are the temporary markings legible? If night review, comment on visibility
 - d. Type of marking material being used. Tape Paint (non-epoxy) Epoxy
- 13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Yes
- 14) Type of Traffic Control Personnel being used on project? Indicate type of training or certification for each and position within the work zone area.
- State Police (Not often, alternating one-way. Dangerous curve, before temp signal)
 - Local Police Minimum Hourly Requirement:
 - Uniformed Flagger

Comments from Traffic Control Personnel (indicate type of traffic person): None

15) Chief Inspector Comments: New devices, used 42" cones do not work well. Hard to get contractor to change out 42" cones.

16) Project Engineer Comments: None

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Size	Various
Location	Various
Mounting Height	Various
Clean, Visible, Legible (rate using quality standards guide ATSSA 3 rd edition)	All very clean, visible. New.
Reflectorized	Very good.
Project Consistency	Very good.
Need to be covered	No
Temp./Permanent	Temp.

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Alternating one way Traffic Signals
Quantity	2
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Clean and visible
Reflectorized	N/A
Anchored	Yes
Consistent throughout project	Yes

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Barricade near wok zone
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Visible
Reflectorized	N/A
Anchored	Yes
Consistent throughout project	Yes
Crash Trucks (TMA) in use? If yes how many and type	No

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	Yes, alternating One way traffic signals. Lights functioning.
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	No
Location of portable devices – Indicate if in clear zone and how protected.	Yes
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	Portable message signs were very readable and the timing between screens was acceptable. There were two screens displayed at each VMS.

Work Zone Traffic Control Review
Plans and Specifications Section – PART III

Is there a Transportation Management Plan? If yes, explain
No

What special provisions are there in contract related to work zone (list item no, description and date of provision)?
No

Is the project being completed in stage construction? If yes, explain
2 stages for construction of bridge.

Is there temporary signalization? If yes, explain
Yes, alternating one way traffic signals

Is a detour required or being used? If yes, explain
No

What guides, tools including manuals, pocket guides, books etc. do you reference?
No pocket guide. MUTCD download available online which is used.

What work zone traffic plans are included in the project?
Stage construction plans and temporary pavement plans.

STAGE CONSTRUCTION REVIEWS

15-296/301-0070, Various RR Bridges in the
towns of Fairfield, Bridgeport, Westport CT

140-164, Rehab Br # 00604 Rte 8 NB,
Thomaston, CT

WORK ZONE REVIEW FORM

Project Number: 15 – 296 & 301 – 0070A,B,C **District No.** 1A
Date & Time: 11/02/2010 10:00 AM **Weather:** Clear 62°

Project Type: Construction Maintenance Bridge Safety
Road Type: Limited Access Secondary Local / Town
Inspection Forces: State Maintenance Consultant

Location (Route & Town): Various RR Bridges, Fairfield, Bridgeport, Westport

Focus of Review: Lane Closure: Temporary Permanent; Stage Construction
 Detour; Pedestrian/ Bike issues; Temporary Signalization; Night Work

Prime Contractor: Ducci Electrical Contractors

Project Engineer: Basel Hashem **Chief Inspector:** Robert Mosback

Project Amount: 83,049,904 **Percent Complete:** 55%

Calendar Days completed: 1271 **Calendar Days Allotted:** 1534

Review Participants

Name	Representing
Basel Hashem	CT DOT District 1A
Robert Mosback	HAKS Engnieering
Rich Unkel	CT DOT District 1A
Jeff Hunter	CT DOT
Nick Ambrosino	CT DOT

Q&A:

- 1) Is there clear, positive, understandable guidance through the work zone? Yes
- 2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition) N/A Local roads for RR Bridges and minimal in Bridgeport.
- 3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs) Not at the time of Interview
- 4) Are there any horizontal/vertical clearance issues? Yes, however nothing created due to construction, existing vertical restrictions for RR bridges.
- 5) Are there any permitted load issues? No
- 6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? Yes

- 7) Are all cones, drums, barricades, or other channelization devices acceptable? Good
- 8) Are warning lights and devices used for Maintenance and Protection of Traffic? Yes on Type 3 Barricades.
- 9) Clear Zone issues: (Y / N) Respond to questions below.
- What is the clear zone for this project? Mostly Local Roads, aware of requirements.
 - Where are materials stored for the project? Off road, Amtrak areas.
 - Where is equipment stored when construction is not in progress? Same as above.
- 10) Have accommodations been made to account for
- Emergency Services – Yes. Coordination is ongoing.
 - Pedestrian/ Bike/ ADA issues? Yes, areas have been designated for Pedestrians/ Bike.
- 11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain No, contractor is fairly responsive.
- 12) Pavement Markings- Temporary
- Is there an item for removal of pavement markings, If yes, indicate removal method being used? Yes, grinding.
 - Are there conflicting permanent markings? No.
 - Are the temporary markings legible? If night review, comment on visibility Yes.
 - Type of marking material being used. Tape Paint (non-epoxy) Epoxy
- 13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Yes
- 14) Type of Traffic Control Personnel being used on project? Indicate type of training or certification for each and position within the work zone area.
- State Police
- Local Police Minimum Hourly Requirement: 4 Hours
- Uniformed Flagger
- Comments from Traffic Control Personnel (indicate type of traffic person):
- 15) Chief Inspector Comments: Need to verify that there is 2 feet for the shoulder for TPCBC.
- Insure Table for Inertial Array barriers for various speed limits is incorporated in plans. Should be included in a typical.
- 16) Project Engineer Comments:

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction / Regulatory	
Location	Town roads
Mounting Height	Rural
Clean, Visible, Legible (rate using quality standards guide ATSSA 3 rd edition)	Yes most are new.
Reflectorized/ Type Sheeting	Yes
Project Consistency	Very Good
Need to be covered	No.
Temp./Permanent	Reviewed Permanent Construction Signs

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	
Reflectorized	
Anchored	
Consistent throughout project	

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Type 3 for lane closure
Quantity	2 at reviewed site
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	New
Reflectorized	Yes
Anchored	No, used when construction not in progress
Consistent throughout project	Yes
Crash Trucks (TMA) in use? If yes how many and type	Not at the site reviewed.

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	Yes on signs and on Barricades Yes High
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	N/A
Location of portable devices – Indicate if in clear zone and how protected.	N/A
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	N/A

Work Zone Traffic Control Review
Plans and Specifications Section – PART III

Is there a Transportation Management Plan? If yes, explain

No

What special provisions are there in the contract related to work zone (list item no, description and date of provision)?

Is the project being completed in stage construction? If yes, explain Amtrak RR Bridge and Catenary Wire improvements.

Is there temporary signalization? If yes, explain No

Is a detour required or being used? If yes, explain Not at the time of Review. Some detours may be required when new girders are erected for the bridge improvements.

What guides, tools including manuals, pocket guides, books etc. do you reference?

MUTCD

What work zone traffic plans are included in the project? Just the staging and traffic control plans.

- 6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? Yes
- 7) Are all cones, drums, barricades, or other channelization devices acceptable? Yes.
- 8) Are warning lights and devices used for Maintenance and Protection of Traffic? Yes
- 9) Clear Zone issues: (Y / N) Respond to questions below.
- What is the clear zone for this project? Varies depending on metal beam rail or not.
 - Where are materials stored for the project?
Near work zone: Behind barrier, in gore areas and behind metal beam rail
 - Where is equipment stored when construction is not in progress?
Near work zone see b.
- 10) Have accommodations been made to account for
- Emergency Services – No accidents on project
 - Pedestrian/ Bike/ ADA issues? N/A Limited access highway. Work Under Bridge is all Stop
- 11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain No
- 12) Pavement Markings- Temporary
- Is there an item for removal of pavement markings, If yes, indicate removal method being used? Grinding
 - Are there conflicting permanent markings? No
 - Are the temporary markings legible? If night review, comment on visibility
 - Type of marking material being used. Tape Paint (non-epoxy) Epoxy
- 13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Yes, both contractor and inspectors are using proper safety equipment
- 14) Type of Traffic Control Personnel being used on project? Indicate type of training or certification for each and position within the work zone area.
- State Police (Used for Shifting Traffic for Stage Change)
- Local Police Minimum Hourly Requirement:
- Uniformed Flagger

Comments from Traffic Control Personnel (indicate type of traffic person): None

15) Chief Inspector Comments: Solid Line Versus Skips for On – Ramp during stage Construction.

16) Project Engineer Comments: None

Traffic Control Device Inspection- PART II**Table A – Signs**

Requirement	Comment
Type: Construction / Regulatory	
Location	All Signs appeared to be in good condition
Mounting Height	Good
Clean, Visible, Legible (rate using quality standards guide ATSSA 3 rd edition)	Good
Reflectorized/ Sheeting Type	N/A (Day review)
Project Consistency	Consistent
Need to be covered	No
Temp./Permanent	Temp.

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	VMS
Quantity	2
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Both were functioning with proper messaging
Reflectorized	N/A
Anchored	No
Consistent throughout project	Yes

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Barricade for roadway below bridge.
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3 rd edition)	Visible
Reflectorized	N/A
Anchored	No
Consistent throughout project	Yes
Crash Trucks (TMA) in use? If yes how many and type	Yes, however on a limited basis, stage changes.

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	Flashing lights on signs Yes
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	No
Location of portable devices – Indicate if in clear zone and how protected.	Outside of clear zone therefore no protection necessary.
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	Portable message signs were very readable and the timing between screens was acceptable. There were two screens displayed at each VMS.

Work Zone Traffic Control Review
Plans and Specifications Section – PART III

Is there a Transportation Management Plan? If yes, explain
No

What special provisions are there in contract related to work zone (list item no, description and date of provision)?
Nothing out of the ordinary.

Is the project being completed in stage construction? If yes, explain
2 stages for work on bridge structure.

Is there temporary signalization? If yes, explain
No

Is a detour required or being used? If yes, explain
No.

What guides, tools including manuals, pocket guides, books etc. do you reference?
ATTSA Barrel / Cone and MUTCD, Construction Manual.

What work zone traffic plans are included in the project?
Staging plans for work on, and roadway under, bridge.

2010 workzone safety review participants

District 1

Project 76-205

Robert Ramirez – FHWA, Traffic and Safety Engineer

Jaspal Jutla – Project Engineer

Barry Schilling – Office of Traffic, Design Unit

Steve Sartirana – Office of Safety

Jeff Benoit – Project Manager

Jeff Hunter – Office of Construction

Project 42-297

Robert Ramirez – FHWA, Traffic and Safety Engineer

Steve Sartirana – Office of Safety

Richard Balzarini – Project Manager

Yevgeniy Saykin – Office of Traffic, Design Unit

Jeff Hunter – Office of Construction

Project 142-144

Shawn Mangan – Project Manager

Dave Hoyt – Inspector

Jeff Hunter – Office of Construction

Nick Ambrosino – Office of Construction

District 1A

Project 15-296 & 301-0070A, B, C

Rich Unkel – Supervising Engineer

Basel Hashem – Project Engineer

Robert Mosback – HAKS (Consultant Inspection)

Jeff Hunter – Office of Construction

Nick Ambrosino – Office of Construction

2010 workzone safety review participants

District 2

Project 44-151

Robert Ramirez – FHWA, Traffic and Safety Engineer

Robert Turner – FHWA, Safety Engineer

Jo Ann Devine – Asst. District Engineer

Terri Thompson – Office of Construction

Michael Wilson – Project Engineer

Stephen Curley – Office of Traffic, Design Unit

James Parsons – Project Manager

Jeff Hunter – Office of Construction

Project 111-118

Andrew Millovitsch – Project Manager

Jeff Hunter – Office of Construction

Nick Ambrosino – Office of Construction

District 3

Project 50-204/206 Fairfield -Trumbull

Robert Ramirez – FHWA, Traffic and Safety Engineer

Robert Turner – FHWA, Safety Engineer

Mary Baier – Supervising Engineer

Philip Cohen – Office of Traffic, Design Unit

Terri Thompson – Office of Construction

Mike VanNess – Office of Safety

Jeff Hunter – Office of Construction

Tim Osika – CT State Police

Sam Scozzari – STV (Consultant Inspection)

Frank Morelli – STV (Consultant Inspection)

Dan Waida – STV (Consultant Inspection)

2010 workzone safety review participants

Project 83-255

David Harrison – Tectonics (Consultant Inspection)

Jeff Hunter – Office of Construction

Nick Ambrosino – Office of Construction

District 4

Project 143-177

William Caicedo – Project Manager

Jeff Hunter – Office of Construction

Nick Ambrosino – Office of Construction

Project 140-164

Ryan Wodjenski – Project Manager

Jeff Hunter – Office of Construction

Nick Ambrosino – Office of Construction

2010 workzone safety review participants

Additional Distribution List (outside of participants)

Office of Construction

Lewis Cannon – Const. Administrator

James Connery – Division Chief

Donald Ward – Principal Engineer

Anthony Kwentoh – Supervising Engineer

District 1/1A- Rocky Hill

Dave Lavado – District Engineer, Dist. 1

Ken Fagnoli – Asst. Dist. Engineer, Dist. 1&4

Lynn Cichowski – Asst. Dist. Engineer, Dist. 1A

Michael Mendick – Supervising Engineer

Mark St. Germain – Supervising Engineer

Dilraj Josen – Project Engineer

District 2, Norwich

Carl Nelson – District Engineer, Dist. 2

Eileen Ego – Supervising Engineer

Mike Washington – Supervising Engineer

Mark Elliott – Project Engineer

District 3, New Haven

Mark Rolfe – District Engineer District 3

Robert Obey – Asst. Dist. Engineer, Dist. 3

Steven DiGiovanna – Supervising Engineer

Jeff Mordino – Project Engineer

2010 workzone safety review participants

District 4, Thomaston

Dan Foley – District Engineer, Dist. 4

Cliff Jones – Supervising Engineer

Dean Cerasoli – Supervising Engineer

Dave Ferraro – Project Engineer

Office of Traffic, Design Unit

Charles Harlow – Principal Engineer Office of Traffic

Mike Lalone – Supervising Engineer Traffic

Office of Human Resources, Safety Division

James Ritter – ConnDOT Safety Director

Federal Highway Administration

Amy Jackson-Grove, Division Administrator

Michelle Hilary – Assistant Division Administrator

David Nardone – Project Manager Team Leader

Kurt Salmoiraghi – Pavement and Materials Engineer

Timothy Snyder – Design Engineer

Ted Aldieri – Bridge Engineer

Appendices

Appendix A

Thompson, Terri L

From: Thompson, Terri L
Sent: Wednesday, July 28, 2010 7:16 PM
To: Foley, Daniel P; Lavado, David C; Nelson, Carl E; Rolfe, Mark D
Cc: Devine, Jo Ann; Fagnoli, Kenneth E; Hamilton, James E; Mercure, Brian; Obey, Robert E; Baier, Mary; Cerasoli, Dean; DiGiovanna, Steve; Dunham, John S.; Ego, Eileen; Jones, Clifford G; LaRosa, Domenic; St Germain, Mark; Wagoner, Russell L; Washington, Michael A; Ward, Donald L; Connery, James P; Hunter, Jeffery H; Cannon, Lewis S; Kwentoh, Anthony
Subject: Work Zone Safety Reviews

As you know, work zone safety is an integral part of what we do and there is no greater priority for the Department than the safety of the public that we serve, and the safety of our employees. . The Department and the FHWA recently completed the 2010 Work Zone Mobility and Safety Self Assessment and one area of the assessment, *Program Evaluation*, states that evaluations are "necessary to identify successes and analyze failures... At the local level, performance monitoring and reporting provides an agency with valuable information on the effectiveness of congestion mitigation strategies, contractor performance, and work zone safety." Work zone safety reviews or audits are one of the many strategies that have been identified as important tool in better understanding the operational and design characteristics of a work zone. Reviews with the Districts, Traffic and FHWA had been done in the past and were beneficial in developing improvements in the area of design, construction and operations.

These work zone safety reviews are going to be put into practice again and are being scheduled for projects in your districts. Myself and Jeff Hunter are the leads for these reviews. The reviews will include a overview of traffic control devices, sign installation and removal methods, sign recognition and visibility, survey of workers on what is working and not working. A copy of the draft review forms that have been developed are attached.



Work Zone Review
Form_final_no...

The review team will include at a minimum a person from the offices of Construction, Traffic, Safety, and the FHWA. Additional personnel may participate if space allows.

Prior to any review, the District will be contacted as to what project or projects are being scheduled. The team will report in to the project field office prior to starting the review. Upon completion of the review, the notes and comments will be compiled and a meeting with the project staff will be coordinated through the district to go over the findings.

We plan on conducting these reviews over the next 8 weeks and will select two projects per District; 1 daytime operation and 1 nighttime operation, weather permitting.

The first review location scheduled is a night time review in District 3 and will be done on Tuesday, August 3 between the hours of 7 p.m. and 11 p.m.

The projects will be DOT Project No. 50-204/206, 144-178/180 RESURFACING AND SAFETY IMPROVEMENTS, Route 15 Fairfield/Trumbull. Depending on time the team may also go to Project 83-255 RESURFACING AND SAFETY IMPROVEMENTS on I-95 in Milford/Orange.

Thanks for your support in this effort

Terri Thompson
Transportation Supervising Engineer
Office of Construction
ConnDOT, Newington
860-594-2667, FAX 860-594-2678
www.ct.gov/dot/construction

Appendix B

Here is the question: Currently our State requires construction signs for non access/ limited access highways to be Bright Fluorescent Sheeting which is a fluorescent orange prismatic retro-reflective sheeting meeting ASTM 4956 Type VIII. Most of our contractors are using a corrugated polyethylene substrate such as Coraplast. Is anyone encountering reflectivity or sign legibility issues in nighttime work zone sign patterns?

Appendix C

PROJECT NO: 44-151 DATE: 4-7-11 TIME: 2 AM
 SITE/LOCATION: I-95 East Lyme ⁴⁻⁸⁻¹¹ REVIEWER: Michael Wilson
 WEATHER CONDITIONS: Clear CHIEF INSPECTOR: Jim Parsons
TEMP 35%

SATISF ?	REMARKS	CORRECTIVE ACTION
✓	Signs & MESSAGE BOARDS:	None
✓	PAVEMENT MARKINGS:	None
✓	DRUMS: ALIGNMENT: CLEANLINESS:	None
	GUIDERAIL:	
✓	DELINEATORS:	None
	ILLUMINATION - SIGNALIZATION:	
✓	CONCRETE BARRIER:	None
	ROADWAY SURFACE:	
	OTHER: <u>See Next Page.</u>	

CC: ~~Charles Pantaleakos~~ - JoAnn Devine
 Michael A. Washington

See Attached

Construction Signs for Project No. 44-151.

A thorough review was performed on the Plastic Waffle board Construction Signs being utilized on project no. 44-151. These signs are not new signs for the 2011 construction season. But rather they are used signs from previous projects or last season. The signs which were inspected are placed nightly when the contractor is actively working. The condition of the signs vary from fair to good.

Since these signs are installed on mounting devices nightly, they are showing damage on the edges and show fatigue on the surface.

The signs showed some slight deformation when installed as the slightly warp sometimes. The signs were inspected during the night operations to see if they have the desired reflectivity and I found them to have fair reflectivity. Angle to the roadway, location, roadway curves, condition (as mentioned above), weather and CONDENSATION play roles in reflectivity. The major impact that can be seen on the attached photos is condensation.

Photo 1 is a Waffle board sign within our pattern which was wiped free of condensation. A flash picture was taken and shows the difference between dry and wet conditions.

Photo 2 is a wooden sign approx. 2 years old and the photo was taken with flash. First in its natural condition for the evening, and second after it was wiped with a rag.

In conclusion, I think further review is necessary. I do not know if there is a way to reduce the condensation film from affecting the reflectivity. The signs need to be brighter for worker safety. If you need anymore review, let me know. I hope this helps Terri and Jeff.

Mike

**CONSTRUCTION
AHEAD.**
**ROAD USE RESTRICTED
STATE LIABILITY LIMITED**
GENERAL STATUTES SEC 13a-115, 13a-145
COMMISSIONER OF TRANSPORTATION

**CONSTRUCTION
AHEAD.**
**ROAD USE RESTRICTED
STATE LIABILITY LIMITED**
GENERAL STATUTES SEC 13a-115, 13a-145
COMMISSIONER OF TRANSPORTATION

Appendix D

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- Macros**
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 - Bike Macro
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Welcome

Work Zone Safety Database



Add/Edit Form

Find a Review by Project Number

Find Reviews that Focus on:

<input type="button" value="Stage Construction"/>	<input type="button" value="Permanent Lane Closures"/>
<input type="button" value="Night Work"/>	<input type="button" value="Temporary Lane Closures"/>
<input type="button" value="Detours"/>	<input type="button" value="Temporary Signalization"/>
<input type="button" value="Pedestrian and Bicycle Access"/>	

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View Paste Copy Cut Format Painter Clipboard

Font Rich Text Refresh All Save New Delete More Spelling Filter Selection Advanced Toggle Filter Find Replace Go To Select

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- Macros**

Find a Review

FIND A REVIEW (by project number) [Main Menu](#)

Project Number:

District:

Date:

Time:

Weather:

Location:

Prime Contractor:

Project Engineer:

Chief Inspector:

Project Amount:

Percent Complete:

Calendar Days Completed:

Calendar Days Allotted:

Focus of Review

- Detours
- Stage Construction
- Temporary Signalization
- Night Work
- Pedestrian and Bicycle Access
- Interstate Construction
- Temporary Lane Closure
- Permanent Lane Closure

[View Full Report](#)

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Font

Rich Text

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Sort & Filter Filter Selection Advanced Toggle Filter

Find Replace Go To Select

All Access Objects

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- WZR Welcome

Reports

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- WZR Report

Work Zone Review Form

WORK ZONE REVIEW FORM

[New Review](#) [Delete](#) [Save](#) [Main Menu](#)

Project Number: District:

Date: Time: Weather:

Project Type: Construction Maintenance Bridge Safety

Road type: Limited Access Secondary Local/Town

Inspection Forces: State Maintenance Consultant

Location (Route and Town):

Focus of Review:

Detours Pedestrian and Bicycle Access

Stage Construction Temporary Lane Closure

Temporary Signalization Permanent Lane Closure

Night Work

Prime Contractor:

Project Engineer: Chief Inspector:

Project Amount: Percent Complete:

Calendar Days Completed: Calendar Days Allotted:

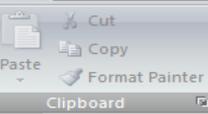
Review Participants

Name	Representing
<input type="text"/>	<input type="text"/>

[Questions](#) [Traffic Control Devices](#) [Plans and Specifications](#)



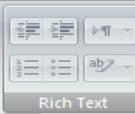
Views



Clipboard



Font



Rich Text



Records



Records



Sort & Filter



Find

All Access Objects

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- File Macro

Work Zone Review Form

WORK ZONE REVIEW FORM

New Review

Delete

Save

Main Menu

Questions Traffic Control Devices Plans and Specifications

1. Is there a clear, positive, understandable guidance through the work zone?

2. What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, conditions

3. Are there any hazards to the traveling public or construction personnel? (Blunt ends, dropoffs etc.)

4. Are there any horizontal/vertical clearance issues?

5. Are there any permitted load issues?

6. Are all signs being used for Maintenance and protection of Traffic acceptable in accordance with applicable requirements?

7. Are all cones, drums, barricades or otehr channelization devices acceptable?

8. Are warning lights and devices used for Maintenance and Protection of Traffic?

9. Are there any Clear Zone issues?

a. What is the clear zone for this project?:

b. Where are materials stored for the project?

c. Where is equipment stores when construction is not in progress?

10. Have accommodations beend made to account for:

a. Emergency Services -

b. Pedestrian/Bike/ADA issues?

11. Do you have a hard time ensuring traffic control devised are in functioning condition and installed according to plan? If yes, explain.

12. Pavement Markings- Temporary

a. Is there an item for removal of pavement markings? if yes, indicate removal method being used

Home Create External Data Database Tools Acrobat

Paste Copy Format Painter Clipboard

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Refresh All New Save Delete Records

Totals Spelling More

Filter Selection Advanced Toggle Filter Sort & Filter

Find Replace Go To Select Find

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Work Zone Review Form

WORK ZONE REVIEW FORM

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Signs

Requirement	Comment
Size:	<input type="text"/>
Location:	<input type="text"/>
Mounting Height:	<input type="text"/>
Clean, Visible, Legible (rate using quality standards guide ATSS:	<input type="text"/>
Reflectorized sign:	<input type="text"/>
Project Consistency:	<input type="text"/>
Need to be Covered:	<input type="text"/>
Temporary/Permanent:	<input type="text"/>

Traffic Control Devices

Requirement	Comment
Type and Placement (<input type="text"/>
Quantity (<input type="text"/>
Clean, Visible, Functioning:	<input type="text"/>
Reflectorized:	<input type="text"/>
Anchored (<input type="text"/>
Consistent throughout project (<input type="text"/>

Barricades and other Channelization Devices

Requirement	Comment
Type and Placement:	<input type="text"/>
Quantity:	<input type="text"/>
Clean, Visible, Functioning:	<input type="text"/>
Reflectorized:	<input type="text"/>
Anchored	<input type="text"/>
Consistent throughout Project:	<input type="text"/>
Crash Trucks (TMA) in use? If yes how many and type:	<input type="text"/>

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- Add/Edite Macro
 - Bike Macro
 - Close

Work Zone Review Form

New Review Delete Save Main Menu

Questions Traffic Control Devices **Plans and Specifications**

Is there a Transportation Management Plan? If yes, explain.

What special provisions are there in contract related to work zone? (list item #, description and date of provision)

Is the project being completed in stage construction? If yes, explain.

Is there temporary signalization? If yes, explain.

Is a detour required or being used? If yes, explain.

What guides, tools (including manuals, pocket guides, books etc) do you reference?

What work zone traffic plans are included in the project?

Record: 1 of 1 No Filter Search

Print Preview Acrobat

Print Size Portrait Landscape Margins Show Margins Print Data Only Page Setup Columns

Page Layout

Zoom One Page Two Pages More Pages

Refresh All Excel SharePoint List PDF or XPS Word Text File More

Data

Close Print Preview Close Preview

All Access Objects

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Projects with Stage Construction Focus WZR Report

WORK ZONE REVIEW

Project Number: 140-164

District: 4 Date: 11/9/2010 Weather: Clear, 50 degrees Time: 10:00 am
 Location (Route and Town): Route 8 NB, Thomaston, Rehab Bridge # 00604

Project Type: <input checked="" type="checkbox"/> Construction <input type="checkbox"/> Maintenance <input type="checkbox"/> Bridge Safety	Road Type: <input checked="" type="checkbox"/> Limited Access <input type="checkbox"/> Secondary <input checked="" type="checkbox"/> Local/Town
Inspection Forces: <input checked="" type="checkbox"/> State <input type="checkbox"/> Maintenance <input type="checkbox"/> Consultant	Focus of Review: <input checked="" type="checkbox"/> Stage Construction <input type="checkbox"/> Night Work <input checked="" type="checkbox"/> Permanent Lane Closure <input type="checkbox"/> Detours <input type="checkbox"/> Pedestrian and Bicycle Access <input type="checkbox"/> Temporary Signalization

Prime Contractor: NIR Construction
Project Engineer: Dave Ferraro
Project Amount: \$1,691,158.00
Calendar Days Completed: 273
Review Participants:

Name	Representing
2	2
11	2
15	6

Chief Inspector: Ryan Wodlenski
Percent Complete: 84%
Calendar Days Allotted: 265

- Is there a clear, positive, understandable guidance through the work zone?
 Yes
- What is the overall condition of traffic flow through the work zone? (Include queue length, speed limit, road conditions)
 Good, indications of possible incidents at night.
- Are there any hazards to the travelling public or construction personnel? (Blunt ends, Drop-Offs)
 No
- Are there any horizontal/vertical clearance issues?
 No
- Are there any permitted load issues?
 No
- Are all signs being used for Maintenance and protection of Traffic acceptable In accordance with applicable requirements?
 Yes
- Are all cones, drums, barricades or other channellization devices acceptable?
 Yes
- Are warning lights and devices used for Maintenance and Protection of Traffic?
 Yes
- Are there Clear Zone issues?
 - What is the clear zone of this project?
 Varies, depending on metal beam rail or not.
 - Where are materials stored for the project?
 Near Work Zone, Behind barrier in gore areas and behind metal beam rail
 - Where is equipment stored when construction is not in progress?
 Near work zone see (b) above
- Have accommodations been made to account for:
 - Emergency Services?
 Yes, notified at beginning of project. No accidents on project.
 - Pedestrian/Bike/ADA issues?
 N/A limited access highway. Work under bridge is all stop.
- Do you have a hard time ensuring traffic control devices are in functioning condition and installed according to plan? If yes, explain.
 No.

APPENDIX 5

2010 Work Zone Action Items (CTDOT)

2010 WORK ZONE ACTION ITEMS

Issue:	Problem	Actions Taken:	Actions to be Taken:
Construction Sign Retroreflective Issues	Plastic Substrate does not appear to be rigid enough to utilize the reflective properties of the sheeting so that the sign can be read properly by the traveling public during night time hours. Condensation found to reduce retroreflectivity of construction signs.	1) Ongoing discussion with the Office with Traffic Engineering concerning issue. Inquired to other states if they encountered same issue. 2) Email sent to Districts asking for review and be ready for discussion at next managers meeting. 3) Additional in-depth review conducted by project 44-151 personnel regarding condensation.	Based on In-depth review by Districts: A) Send Memo requesting removal of signs using plastic substrate. B) Revise specification to exclude plastic substrates. C) Discuss with other Offices about the use plastic substrates for construction signs. D) Review and, if necessary, revise specification so that condensation is removed from construction signs.
Pedestrian /Bicycle Access issues:	Incomplete Sidewalks, Pedestrian Buttons hard to get to or inaccessible, crosswalk designations at intersections.	1) Notified and discussed with chief inspector the review teams concerns. 2) Reviewed contract documents for specific language, or lack thereof, regarding this type of access. 3) See if utility delays are reason why sidewalks are incomplete.	Include more of these types of reviews to see if these issues are more widespread. Review plans and specifications and revise if necessary. Send out memos reminding districts of specifications. Conduct training if necessary.
Project Lighting for Night Construction:	Glare from portable light plants affecting motorists traveling through the work zone.	None to date.	Send memo requesting inspectors to conduct drive through and report findings on report. Review specification requirements. Possibly create work zone review checklist and include this as an item.
Lighting for night time Inspection:	Inspectors working on night projects do not have sufficient lighting to inspect work. This could be previously completed work or areas requested by contractor prior to placement of material.	Reviewed specification requirements and found that contractor not required to supply any lighting either hand held or portable light plants.	Place request to specification committee to include wording that for any night work, portable and hand held lighting to be supplied by contractor for inspection staff.

2010 WORK ZONE ACTION ITEMS

Issue:	Problem	Actions Taken:	Actions to be Taken:
Barricade warning lights High intensity:	Solar powered warning lights, High intensity, are not effective in rural areas with significant canopy surroundings.	Reviewed specification.	Discuss with the Office of Traffic about this issue for possible change to plans or revision of specification.
Traffic Control in Work Zones:	Experience and understanding of work zone safety training, levels of effectiveness (presence versus enforcement).	Safe and Effective Use of Connecticut Law Enforcement Personnel in Work Zones Training Curriculum Now Available Online. Visit University of Connecticut Technology Transfer (T2) Center at http://www.t2center.uconn.edu/	Continue training at the local and state level. Addition to curriculum – moving road blocks. Review policies and procedures – local and state. Defining an accident in the work zone. Is it considered a work zone accident if it occurs in the queue?
Variable Message Signs:	Defining proper placement (distance from the anticipated queue), proper messaging, ensure message is legible.	Continue to verify proper messaging during reviews	Investigate different types of portable/variable message signs and capabilities to find best approach.
Movable Barrier systems:	Currently only 1 system available for use – proprietary - therefore difficult to use on federal participating projects.	None to date.	Investigate if other systems have been developed. If other systems are in use compare the systems.
Environmental Conditions:	Visibility of Work Zone warning equipment during inclement weather. Rain affecting retroreflective properties of construction signs and pavement markings.	Continued investigation in construction signs and their lack of reflective properties.	Possibly create checklist to be signed off by contractor at beginning of work night. Review proper sign placement and positioning for visibility and legibility.
Safety Review Self Assessment:	Improve and enhance the work zone safety review inspection process.	Improved questionnaire form and created a database to store information.	Include more photographs/video of projects. Expand the number of field visits. Are issues based on road, material, or project type? Inform project staff of internet sites and pamphlets / documents.

APPENDIX 6

**2011 Work Zone Safety and Mobility Self Assessment Tool Survey –
Connecticut (5-31-11)**

Work Zone Safety and Mobility Self Assessment Tool



Connecticut

Section 1

Leadership and Policy - 10%

	Rating
<p>4.1.1 Has the agency developed a process to determine whether a project is impact type I, II, III, or IV?</p>	<p>13</p>
<p>4.1.1 Comments: The department does not classify projects using an impact type numeric score. The process is the same for all projects, treating all projects equally, meaning that each operating unit uses an internal checklist to address the process. Considerations to determine the classification include the project size, complexity, construction time, and traffic volume. The process consists of assigning a designation of significant based on criteria being developed at the policy level. The department takes into account road issues, property issues, and the complexity of the projects. The department checks all construction phases and makes a determination of what impacts the project may have on the public. This process is in place and is documented. The department has formalized a policy for identifying significant projects based on FHWA’s final rule for work zones.</p>	
<p>4.1.2 Has the agency established strategic goals specifically to reduce congestion and delays in work zones?</p>	<p>8</p>
<p>4.1.2 Comments: At present, the department has not established a strategic goal for the reduction of congestion and delays in work zones. The State’s 2006 Strategic Highway Safety Plan (SHSP) includes Work Zone Safety as an emphasis area with identified strategies for implementation. A 2010 update of the SHSP is pending review by FHWA and NHTSA. However, it also does not include a strategic goal within the Work Zone area for reducing congestion and delays in work zones. The Department suggests that before establishing a “goal” the first step is to develop performance measures. Performance measures can be monitored and acted upon. The Department is currently in the process of considering and investigating methods for establishing baseline data and developing performance measures relative to congestion and delays in work zones. This would be a first step in the process of developing a strategic goal in this area.</p>	
<p>4.1.3 Has the agency established strategic goals specifically to reduce crashes in work zones?</p>	<p>8</p>
<p>4.1.3 Comments: Connecticut’s Strategic Highway Safety Plan (SHSP), which was approved in September 2006, includes work zone safety as an emphasis area. A 2010 update of the SHSP is pending review by</p>	

FHWA and NHTSA. The State did not establish a strategic goal to specifically reduce crashes in work zones in this plan nor does one exist elsewhere. Furthermore, the utilization and analysis of crash data in work zones to develop project-specific and program-level countermeasures and performance measures to achieve crash reductions in work zones have been considered but are not developed. However, strategies to place emphasis on work zone training, driver behavior and education, and work zone design are continuing.

4.1.4 Has the agency established measures (e.g., vehicle throughput or queue length) to track work zone congestion and delay?

6

4.1.4 Comments: There is a need to investigate what is being done elsewhere as a quantitative measure in terms of time delays. Specific performance measures to track work zone congestion and delay have not been established. However, efforts have begun that involve reviewing the various databases maintained by other units within the Department to see if data being stored can be used as a means to establish performance measures. There has been increased interest from the public in providing delay messages in the field. Department has incorporated a Portable Smart Work Zone System for a recently awarded contract for repairs to the Route 66, Arrigoni Bridge, project. A smart work zone is “a road construction zone in which technology is employed to increase safety and provide information. The portable smart work zone system for the Arrigoni project will use a series of portable sensors and message boards to detect the presence and speed of vehicles and send that information to message boards to provide information on current traffic conditions. The system will have the ability to measure delays, queue times and lengths. This is the first time a system of this type has been tried in Connecticut and an evaluation will be completed for this project to see if the use of this type of system is feasible on other projects.

4.1.5 Has the agency established measures (e.g., crash rates) to track work zone crashes?

5

4.1.5 Comments: Improvements to the State’s system for electronically reporting, storing, tracking, and analyzing work zone crash data in a timely and accurate manner are needed. As of April 2011, there is a 16-month lag from the date of a crash to the coding of the crash data in CTDOT’s crash database. An effort is underway to reduce this coding lag time through the use of additional temporary staff. The current crash database does have a field titled “Construction or Maintenance Related”. This is a yes or no field that the investigating officer fills out, and it is subjective. Queries can be run on this field to determine the incidents that have occurred within work zones. The department is considering other ways to obtain information in order to determine work zone strategies and establish performance measures. Research into what other states are doing from the reporting side and also the use of performance-based strategies is being investigated.

4.1.6 Has the agency established a policy for the development of Transportation Management Plans to reduce work zone congestion and crashes?

13

4.1.6 Comments: CTDOT established a policy and Implementation Plan Guidance in August 2007 for the development of Transportation Management plans (TMPs) to reduce work zone congestion and crashes due to work zones at the project level. Prior to TMP policy development the State had an internalized process to assess safety and mobility. The department’s Design and Traffic Operation offices review project plans to determine what methods and procedures will have the least impact to the public. At the beginning stages of project development, it is determined how the information will be distributed to the public regarding impacts and alternatives prior to release to the field. By doing this, the department believes this will minimize work zone congestion and crashes.

4.1.7 Has the agency established work zone performance guidance

<p>that addresses maximum queue lengths, the number of open lanes, maximum traveler delay, etc.?</p>	<p>13</p>
<p>4.1.7 Comments: The maximum queue length is determined based on volumes for larger projects (type I & II). The number of lanes to remain open and the traveler delay are recommended by the Office of Design. During the design phase, a maximum queue length with a maximum threshold is set. Other performance guidance that addresses queue lengths, number of open lanes, and delay for other projects (types III and IV) is developed specific to the site. For larger projects (types I and II), guidance and adjustments should be made prior to the P.S.&E. approval. If a work zone activity results in a queue length greater than 4 miles, the department’s Highway Operations personnel will notify the specific Department Head to inform them of their observations. A decision to continue, terminate, or have periodic work stoppages to alleviate congestion would be made by the Department.</p>	
<p>4.1.8 Has the agency established criteria to support the use of project execution strategies (e.g., night work and full closure) to reduce public exposure to work zones and reduce the duration of work zones?</p>	<p>14</p>
<p>4.1.8 Comments: The majority of projects that are on the interstate system continue to have most of the work completed during the off-peak hours to minimize congestion and delays. Full closures of the roadway have been used for installing overhead structures such as bridge girders, overhead sign trusses or for expedited completion of work to minimize cost and delays. Traffic volumes (vehicles per hour) are typically used to define hours of construction activity with lane closures. However accessibility to alternate routes, ability to provide advance warning, constructability, contractor accessibility and work duration are also considered when determining project execution. Some strategies are considered during the construction phase as alternative methods to complete work safely, more efficiently and with less overall impact to the traveling public. A recent case in 2010 involved the transporting and setting of main bridge girders that were to be placed on piers over the interstate in a major interchange (I-95 at I-91 in New Haven). Meetings and discussions with various stakeholders that included the project personnel, contractor, law enforcement, oversize/overweight permitting division and the city occurred prior to the event to determine the best strategy for moving the girders down the highway and setting them in place over the roadway considering traffic volumes, safety of workers and motorists and impact to area businesses and connecting roadways. The process was very effective and the work was able to be done during early morning hours and resulted in minimal delays and allowed contractor to work within a safe and secure area.</p>	
<p>4.1.9 Has the agency developed policies to support the use of innovative contracting strategies to reduce contract performance periods?</p>	<p>9</p>
<p>4.1.9 Comments: The Department uses the low bid, incentive/disincentive, and value engineering to reduce contract performance periods. The department has not used innovative contracting strategies such as A + B bidding or lane rental because there are no provisions in the Connecticut General Statutes for design-build bidding except as allowed for the Hartford-New Britain Busway project (ref. C.G.S. §13b-15a). The Department does consider incentive clauses and value engineering to reduce contract time. These are mostly considered on Type I and II projects that would have significant work zone mobility impacts.</p>	
<p>4.1.10 Has the agency established formal agreements, such as Memoranda of Understanding (MOU), with utility suppliers to promote the proactive coordination of long-range transportation plans with long-range utility plans, with the goal of reducing project</p>	<p>10</p>

delays and minimizing the number of work zones on the highway?

4.1.10 Comments: The department does not have a formal MOU with utility providers. To reduce utility delays and reduce work zone durations, the department has implemented three items in conjunction with the local FHWA office. First, the Stewardship Agreement has been revised to provide early detection of utility impacts. Second, the department has created a new policy and procedures manual to provide incentives to utilities to include their work in the State's project contracts. And finally, having utility funding under the ROW phase for certain projects. The Department will continue initiating advanced utility projects as one of the most practical options. However, this option normally takes a longer time to go through the approval process if there is FHWA funding involved with the parent project. The Department has revised a section of the existing General letter 71 (GL71) to allow for the procurement of long lead materials for utilities and railroads. The Department will issue a Purchase Order (PO) without having the executed agreement in place. Using GL71 will reduce the unnecessary utility/railroad delays, as related to procurement of long lead materials. The Utilities Section is currently working with the Office of Construction and other offices within the department in reviewing the utility impacts on the Departments Construction Performance Measures. Also we are reviewing all lesson learned from previous projects; which have experienced utility delays. The Utilities Section's practice is to periodically reexamine all available information and adjust its policy and procedures to ensure the elimination of reoccurring issues; as related to utility delays. We have initiated an open discussion policy with all major utility companies to review our current practice and procedures; we periodically brain storm ideas that will help eliminate or reduce utility delays. The Utilities Section will also continue working with all affected parties to review and explore suggestions that will also help to eliminate or reduce utility delays.

Section 2

Project Planning and Programming - 15%

	Rating
4.2.1 Does the agency's planning process actively use analytical traffic modeling programs to determine the impact of future type I and II road construction and maintenance activities on network performance?	11

4.2.1 Comments: The department uses VSIM, HCS, and other network systems, such as SYNCHRO, on major projects (type I and II). Using a 20-25 year horizon the department develops existing and future volumes, making adjustments to the program to develop year of construction volumes. As the department reaches a certain level of design, the department can utilize the network systems tools to determine potential impacts and assess the viability of various improvement alternatives. The department use network tools on a case-by-case basis. Data, such as tracking existing traffic volumes as well as future volumes, are collected on a site specific basis. The department assesses performance through field verification to compare with results obtained from traffic software. As studies are begun for all major feasibility studies a team from disciplines throughout CTDOT is put together to review and comment on all phases of the study, including the use of these programs. This team is then kept consistent throughout the project's journey from planning to construction to ensure all commitments are kept throughout the process.

4.2.2 Does the agency's planning regular planning process analyze

<p>the network to develop adequate alternate options for routing traffic in anticipation of various needs for future road construction and maintenance?</p>	<p>13</p>
<p>4.2.2 Comments: The Department routinely addresses the transportation networks ability to handle alternate routing of traffic due to construction and maintenance activities associated with large planning studies. For example, studies such as the Route 8 and Interstate 84 Waterbury Interchange Needs Study (WINS) and Buckland Area Transportation Study (BATS) in Manchester looked at the constructability and the affect construction would have on traffic in the region for different alternatives. The Department also produces a congestion management plan that shows congestion on Connecticut’s traffic network that could be used when looking at construction impacts. In addition feedback from construction projects is being used to refine strategies and implementation of alternative network option.</p>	
<p>4.2.3 Does the agency's planning process manage the transportation improvement program to eliminate network congestion caused by poorly prioritized and uncoordinated execution of projects?</p>	<p>13</p>
<p>4.2.3 Comments: The department coordinates projects and programs with various implementing organizations. During the planning process various disciplines are asked to provide input relative to future network performance when developing a project. Multidisciplinary teams are also developed for major planning studies to ensure consistency and coordination objectives are satisfied. When projects move to design, permitting and construction phases, coordination with planning continues to ensure that stated project objectives are consistent with current planning programs. Refinement of ITS strategies during the design phase are implemented and assessed during construction operations. This is done for all major corridor improvement planning. For example all of the items noted in 4.2.3 were completed for the I-95 Q-Bridge, I-84 and Route 8 Interchange, I-95 Bridgeport Planning studies, among others.</p>	
<p>4.2.4 Does the agency's transportation planning process include a planning cost estimate review for project types I, II, and III that accounts for traffic management costs (e.g., incident management, public information campaigns, positive separation elements, uniformed law enforcement, and Intelligent Transportation Systems [ITS])?</p>	<p>13</p>
<p>4.2.4 Comments: The department develops detailed year of construction estimates for projects in the planning stage using current CTDOT Cost Estimating Guidelines. Conceptual cost estimates are developed for each Preliminary Alternative and include approximated unit costs to obtain order of magnitude comparison between alternatives (right of way, environmental, maintenance and operation cost estimates are not included). Later, more detailed construction cost estimates are developed during the Refinement of Improvement Alternatives, and during Development of Final Transportation recommendations (which includes items such as Maintenance and Protection of Traffic). ITS costs are included in the construction cost estimate IF heavy delays are expected during construction (closure of one lane to complete work, etc). Currently, engineering reviews these estimates for consistency. For corridor planning studies the Work Zone Safety and Mobility Implementation Plan guidance is followed per the Department’s “Policy on Systematic Consideration and Management of Work Zone Impacts”, dated August 6, 2007.</p>	
<p>4.2.5 Does the agency's transportation planning process include active involvement of planners during the project design stage to assist in the development of congestion mitigation strategies for type I and II projects?</p>	<p>13</p>

4.2.5 Comments: The Office of Intermodal and Location Planning is copied on the Office of Engineering’s transmittal memos for Preliminary design and Semi-Final Design plans, and are given the opportunity to review plans, comment and attend related meetings. The result of this is that planners are involved in the process through the various design and permitting stages and provide the designers insight on specific mitigation strategies. Planners review access modification request that are developed as part of the design process. Policies and Procedure for New or Revised Access in Connecticut (August 2009) manual explains the FHWA national policy and outlines procedures developed for applying that policy in Connecticut, for new or revised Interstate approval, regardless of the funding source. Planners analyze networks to ensure adequate levels of service can be maintained during construction operations and suggest appropriate mitigation strategies on a project specific basis.

4.2.6 Does the agency's transportation planning process engage planners as part of a multidisciplinary/multiagency team in the development of Transportation Management Plans involving major corridor improvements?

13

4.2.6 Comments: The department establishes multidisciplinary/multi-agency teams which review potential transportation management plans. These teams consist of planners, designers, and other professional who collectively review projects. This review includes all phases of project development through transportation management plan development. This is done to ensure that the plan is comprehensive and addresses all concerns. In Planning, it is added to the Scope of major corridor studies that during the development of final transportation recommendations, the alternatives undergo a qualitative assessment to determine the significance of each. This assessment is conducted in accordance with FHWA regulations and the CTDOT Policy and Implementation Guideline for Work Zone Safety and Mobility. Based on this assessment, appropriate measures are identified (but not developed), i.e. a Transportation Management Plan (TMP), to ensure that safety and mobility are addressed during reconstruction operations.

Section 3

Project Design - 25%

Rating

4.3.1 Does the agency have a process to estimate road user costs and use them to evaluate and select project strategies (full closure, night work, traffic management alternatives, detours, etc.) for type I and II projects?

13

4.3.1 Comments: Yes, user costs are generally identified as delay to the motorist and the department has software to determine the number of drivers exposed to work zones. The department’s Traffic Engineering division uses the Quewz’s guide to determine lane closures and to give the department delay based data to help determine strategies. Quewz’s data is just one component of the decision process. The department uses experience, engineering judgment, and historical knowledge with Quewz’s data in making final decisions on use of detours and night work. The department usually assumes night work is better with volumes above 1600 vehicle per lane per hr. For larger projects (type I, II), work is generally done at night.

<p>4.3.2 Does the agency develop a Transportation Management Plan that addresses all operational impacts focused on project congestion for type I and II projects?</p>	<p>13</p>
<p>4.3.2 Comments: The department is implementing TMPs as prescribed by the work zone final rule. These plans address all operational impacts for significant projects (type I & II). The plan describes the actions to be implemented to reduce work zone congestion and delay during project construction. The department addresses impacts during the project development stage thru the design phase. TMPs have been developed on a number of Type 1/2 projects, and these have been implemented or are being implemented. Examples include the I-95 New Haven Corridor (Q-Bridge) Projects, the Moses Wheeler and Arrigoni Bridge Projects, and I-95 highway improvements in Norwalk and Groton.</p>	
<p>4.3.3 Does the agency use multidisciplinary teams consisting of agency staff to develop Transportation Management Plans for type I and II projects?</p>	<p>13</p>
<p>4.3.3 Comments: On all significant projects, the department will involve players from Design, Planning, Maintenance, Highway Operation, and Construction in development of TMPs. The department's approach is to include stakeholders (local citizens, elected officials, etc) depending on the project's requirements and also to include context sensitive solutions. A number of Type 1/2 projects have TMP's currently under development. TMPs have been developed on a number of Type 1/2 projects, and these have been implemented or are being implemented. Examples include the I-95 New Haven Corridor (Q-Bridge) Projects, the Moses Wheeler and Arrigoni Bridge Projects, and I-95 highway improvements in Norwalk and Groton.</p>	
<p>4.3.4 Does the agency perform constructability reviews that include project strategies to reduce congestion and traveler delays during construction and maintenance for type I and II projects?</p>	<p>13</p>
<p>4.3.4 Comments: Within the Office of Quality Assurance (OQA) the Constructability Review Unit (CRU) will perform constructability reviews in-house on select small to medium projects. CRU coordinates closely with the Department's Traffic Division. Per the Department's Constructability Review process, CTDOT has the ability to utilize and administer consulting engineering services to perform constructability reviews on larger projects and specific issues. OQA will also monitor selected projects during construction. OQA looks for projects that are unique or can potentially add to our Lessons Learned database. A critical component of all reviews is to ensure that the availability of the roadway to travelers, as well as contractors, is optimized. CTDOT makes a concerted effort to minimize delays while maximizing productivity on construction projects.</p>	
<p>4.3.5 Does the agency use independent contractors or contractor associations to provide construction process input to expedite project contract times for type I and II projects?</p>	<p>10</p>
<p>4.3.6 Comments: A process did exist for special projects. This mechanism is done on case-by-case basis to expedite the project. The Department asked contractors to develop recommendations to reduce congestion and delays. However, contractors viewed this as an opportunity to gain advance knowledge before they bid on the project. The appearance of giving contractors advance knowledge is a concern to the State. The department does not currently use this process.</p>	
<p>4.3.6 Does the agency use scheduling techniques that are based on time and performance, such as the critical path method or</p>	

<p>parametric models, to determine contract performance times for type I and II projects?</p>	<p>13</p>
<p>4.3.6 Comments: The Department has implemented a scheduling requirement for all projects regardless of their size. There are varying requirements depending upon the project size and scope. As the value of the project increases so do the requirements of the schedule. For projects valued less than \$5 million dollars a comprehensive bar chart is required. The bar chart schedule is defined by the minimum requirements designated in the specification. Payment of the contract item “Mobilization” is linked to the successful submission of the baseline schedule. For Projects over \$5 million dollars in value, or complex projects valued less than \$5 million, an electronic critical path method (CPM) schedule utilizing Primavera software is required, and the contractor is required to designate a project coordinator to develop and maintain the schedule. As projects increase in size and scope towards a Type 1 project as defined in this self assessment, the requirements of the CPM schedule increase to meet the needs of the project. For projects approaching 100 million dollars in value, specialized CPM specifications are crafted. For larger projects, the Department’s Planning Office develops a basic schedule. The schedule is then refined through the design process. The designer builds upon this and provides a “template” which lists all of the “major elements” of the project and indicates key time frames such as winter shutdowns, and environmental windows. The Contractor then utilizes the template provided by the Department and develops the full CPM schedule. Throughout construction, the contractor updates the schedule and the schedule is reviewed by the Department’s Construction Office. The Department utilizes a Program Manager for multiple projects grouped together such as in the I-95 New Haven Harbor Crossing Corridor Improvement Program. The software utilized for management of multiple projects is Primavera Expedition. The CPM schedules contain detailed information from the planning phase through the construction phase.</p>	
<p>4.3.7 Does the agency have a process to evaluate the appropriate use of ITS technologies to minimize congestion in and around work zones for type I, II, and III projects?</p>	<p>13</p>
<p>4.3.7 Comments: There is utilization of ITS in and around major work zones. Many projects are stand alone projects; others are part of a corridor ITS Management Plan. During the planning phase strategies are identified to minimize congestion caused by work zones on significant projects. During the design phase, these strategies are evaluated and refined to maximize potential effectiveness during the implementation phase. During the operations or construction phase of the project the strategies are employed and assessed for effectiveness. Feedback from the field is used to evaluate the effectiveness of various strategies for future use.</p>	
<p>4.3.8 Does the agency use life-cycle costing when selecting materials that reduce the frequency and duration of work zones for type I, II, and III projects?</p>	<p>13</p>
<p>4.3.8 Comments: Life cycle cost analysis, in a rudimentary form, is utilized extensively in Bridge Design and Pavement Design. In the Department's bridge design process, the initial phase (Structure Type Study or Rehabilitation Study) involves identification of alternatives and a comparison of those alternatives with respect to "serviceability, constructability, and economics." This practice is outlined in the department’s “Bridge Design Manual.” High performance materials often play a significant role in life cycle vs. cost decision making process. Furthermore, if the magnitude of the project transcends the norm, a full life cycle cost analysis as defined in Federal Policy guidelines will be employed. In the Pavement Design arena, a life cycle cost analysis, using Real Cost software, is performed routinely in conjunction with corridor studies where longer sections of the highway system are proposed to be reconstructed and/or widened. To a lesser extent, life cycle analysis is also used on major reconstruction projects, where alternative pavement types/strategies can still be considered.</p>	

<p>4.3.9 Does the agency have a process to assess projects for the use of positive separation devices for type I and II projects?</p>	<p>14</p>
<p>4.3.9 Comments: The department takes into consideration the facility before deployment of any positive separation device. The department's position is to always consider the use of positive barrier systems on Interstates and during major construction projects on high-speed facilities. Although no written procedure exists, the State feels they are doing a great job in practice of putting positive separation devices on type I & II projects. The Department has Chapter 14 in the Highway Design Manual (HDM) that gives guidance to the Designer in developing positive separation for worker safety.</p>	
<p>4.3.10 Does the agency anticipate and design projects to mitigate future congestion impacts of repair and maintenance for type I, II, and III projects?</p>	<p>13</p>
<p>4.3.10 Comments: This practice is well implemented within the Department's culture. It is considered from planning through the design phase. More often wider shoulders are considered on projects, when its use as a pull off area is anticipated. A wider left and/or right shoulder, as far as maintenance is concerned, impacts traffic less and VMS systems and static signs can be maintained better. During design, signs are positioned to lessen future impacts for inspection and maintenance of the sign and structure.</p>	
<p>4.3.11 When developing the Traffic Control Plan for a project, does the agency involve contractors in developing the Traffic Control Plan for type I and II projects?\</p>	<p>9</p>
<p>4.3.11 Comments: The department does not involve the contractor in developing the TCP. However, after award the contractor provides input to modify and improve the TCP. This knowledge is captured in the construction phase and may be used in future designs of TCP's.</p>	
<p>4.3.12 When developing the Traffic Control Plan for a project, does the agency involve contractors on type I and II projects?</p>	<p>8</p>
<p>4.3.12 Comments: For the development of Traffic Control Plans (TCPs), the department continues to use a demand vs. capacity analysis to determine allowable hours for construction. Typical traffic lane capacity volumes used to support lane closures are as follows: 1800 vehicles per hour (vph) for the Route 15 parkway (due to restrictions on commercial vehicle use), 1750 vph for ramps, and 1500 vph for all other roadways. The department hopes that new software will become available to assist them in determining impacts to routes and delay times. The Department will continue its efforts to develop modeling expertise in this area. VISSIM, a program capable of modeling traffic with various traffic control measures in a 3D environment was used for the Arrigoni bridge project. It is able to assist designers in comparing different alternates in designing roundabout, at-grade intersections, and high-type traffic interchanges.</p>	

<p>Section 4</p> <p>Project Construction and Operation - 25%</p>	
	<p>Rating</p>

<p>4.4.1 Is the letting schedule altered or optimized to reflect the available resources and capabilities of the construction industry?</p>	<p>8</p>
<p>4.4.1 Comments: The department tries to spread projects out so a larger number of contractors have a chance to bid on jobs. The department's letting schedule is largely driven by fiscal constraints. For signal projects, it is developed based on the number of contractors that can do the job.</p>	
<p>4.4.2 Is the letting schedule altered or optimized to minimize disruptions to major traffic corridors?</p>	<p>13</p>
<p>4.4.2 Comments: The Department has a process for considering the timing for letting projects to minimize traffic disruption and congestion for larger projects (type I, II). The department reviews and assesses projects at the planning and design phase to determine if there may be any traffic problems. The Arrigoni Bridge project utilized this process to mitigate traffic impacts on alternate routes including delaying paving projects and bridge projects. At present, funding constraints can influence schedules for projects on major traffic corridors. The development and implementation of TMP's has helped this process.</p>	
<p>4.4.3 When bidding type I and II projects, does the agency include road user costs in establishing incentives or disincentives (e.g., I/D, A+B, or lane rental) to minimize road user delay caused by work zones?</p>	<p>11</p>
<p>4.4.3 Comments: For all projects on limited access roadways (type I& II), the Department has a process to evaluate methods for road user costs. The department can use liquidated damages as a disincentive and accelerated work as an incentive. On other projects, the department feels there is no one method of determining road user cost to establish incentive or disincentives. There is some room for improvement in establishing incentive or disincentives. The Department does not use A + B bidding because there are no provisions in the Connecticut General Statutes for design-build bidding except as allowed for the Hartford-New Britain Busway project (ref. C.G.S. §13b-15a). In the past, the Department has implemented methods similar to lane rentals by imposing restrictions on the contractor to limit the length of work zone closures and impacts to traffic during peak travel hours.</p>	
<p>4.4.4 When bidding type I, II, and III projects, does the agency use performance-based criteria to eliminate contractors who consistently demonstrate their inability to complete a quality job within the contract time?</p>	<p>8</p>
<p>4.4.4 Comments: The department has in the past eliminated contractors who have consistently demonstrated their inability to complete a quality job within the contracted time. Although a rating system is used to evaluate the contractor's performance annually and at the end of a project, the rating has no role in awarding projects to contractors. The rating is not used to disqualify the contractors from the bidding process, regardless of past performance of the contractors.</p>	
<p>4.4.5 When bidding type I and II project contracts, does the agency use incident management services (e.g., wrecker, push vehicles, and service patrols)?</p>	<p>14</p>
<p>4.4.5 Comments: Service Patrol vehicles are provided by CTDOT to help assist and clear incidents within work zones. The Department's practice is to utilize Highway Advisory Radio (HAR), Changeable message Signs (CMS), CCTV cameras, the Interactive Travel Information Map on the department's website, e-</p>	

alert messages, and service patrols (CHAMPS) as incident management resources both internally and externally. Push-bumpers are available on State police vehicles and many maintenance trucks for use in incident clearance whenever possible. All of the resources with the exception of service patrols are operational 24/7 and managed from the two highway operation centers located in Newington and Bridgeport. The service patrols currently operate 5:30am - 7:00pm along the state's interstate corridors and major routes crossing these interstates. Projects in major corridors may also include a wrecker service provision to assist in moving vehicles off road, thus minimizing congestion within the work zone and potential incidents.

4.4.6 When bidding contracts, does the agency use flexible starting provisions after the Notice to Proceed is issued?

10

4.4.6 Comments: All types of projects have some flexibility between award and notice to proceed. The Notice to Proceed (NTP) normally occurs within 45 days of the award. An exception would be in instances that a winter shutdown date occurs during or immediately after the 45-day window. In that case the NTP may be delayed to have the Contractor begin work after the winter shutdown period (Dec 1 to March 31). Two-part NTP's may also be included in the contract. They usually are to allow for procurement of materials prior to actual construction, such as for traffic signal projects or for critical time frame work.

4.4.7 During type I, II, and III projects, does the agency use uniformed law enforcement?

14

4.4.7 Comments: Currently law enforcement personnel are used for traffic control on most projects. State troopers are used exclusively on expressway (limited access roadways). Projects on other roads that are under a contractor's control require certified flag persons or uniformed law enforcement. Typically, a town or city will require at least one officer at a site to assist with traffic control. Operations that are completed by DOT maintenance operations do not require the use of uniformed law enforcement, and the department's own certified flaggers will handle traffic control. Operations on expressways conducted by department maintenance personnel have a limited use of State troopers under a program entitled Operation Big Orange, which is a random patrol and speed enforcement operation funded by the department. Along with Operation Big Orange, DOT maintenance has fostered cooperation with state and local police with random enforcement in temporary work zones. Presence roles at the work zone ranges from a trooper/officer pulling into a work zone to complete police reports (high visibility police presence) to trooper/officers conducting routine traffic enforcement in the work zone or area of the work zone. Normally uniformed law enforcement assigned to a project only performs traffic control. However, the department has been pursuing an initiative to do speed enforcement in work zones and is gathering data on speeds and types of infractions issued. The enforcement activity uses on-site troopers that are assigned to the project as traffic control to complete the task. Further work is in progress to develop a department policy to better define the types of traffic control personnel that are used on projects, also set guidelines as to when the use of law enforcement and flaggers are used within work zone areas, and what role they will have in work zone safety management.

4.4.8 Does the agency provide/require training of contractor staff on the proper layout and use of traffic control devices?

14

4.4.8 Comments: The Department requires uniformed flaggers to be persons who have successfully completed flagger training by the American Traffic Safety Services Association (ATSSA), National Safety Council (NSC) or other programs approved by the Engineer. A copy of the Flagger's training certificate shall be provided to the Engineer before the flagger performs any work on the project. Contractors have the option to become certified trainers and train their personnel or to use other contractors for this service or use uniformed officers. Several larger or some high profile projects include

a separate pay item for a Worksite Traffic Supervisor (WTS). This individual(s) must be certified through the American Traffic Safety Services Association (ATSSA) as a Traffic Control Supervisor or a similar training course acceptable to ConnDOT. The WTS is required to be on the project site for each workday that the traffic control devices are being used. Some of the responsibilities of the WTS is to monitor workzone signing and safety practices, recommend and implement enhancements to the Traffic Control Plan to meet site conditions as well as inspect and notify the Engineer of any deficiencies to traffic related mechanical devices located on the project and the corrective actions to be taken.

<p>4.4.9 Does the agency provide training to uniformed law enforcement personnel on work zone devices and layouts or ensure law enforcement personnel receive proper training elsewhere?</p>	<p>9</p>
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4.4.9 Comments: Public Act 08-114 and Section 4-1a of the Connecticut General Statutes established a Highway Work Zone Safety Advisory Council to address issues related to work zone safety, including worker training, driver education, new technology implementation, review of current design and safety protocols, and enforcement strategies. Current activity of the Council includes the review and recommendation of a work zone safety training program curriculum for law enforcement. The curriculum is based on a course developed by the Federal Highway Administration (FHWA), entitled “Safe and Effective Use of Law Enforcement Personnel in Work Zones”, National Highway Traffic Safety Administration (NHTSA), International Association of Chiefs of Police (IACP) and the National Sheriffs Association (NSA). The course was adapted for Connecticut as a result of two pilot courses and also work performed by the University of Connecticut’s Transportation Technology Transfer Center (T2). The T2 center is now offering a course as part of a series of Connecticut Legal Traffic Authority program workshops. The State Police are looking to add additional instruction on work zone traffic control as part of their academy training.

Section 5

Communications and Education - 15%

	<p>Rating</p>
<p>4.5.1 Does the agency maintain and update a work zone website providing timely and relevant traveler impact information for type I, II, and III projects to allow travelers to make effective travel plans?</p>	<p>14</p>

4.5.1 Comments: The department currently has a website for traveler information that includes a Google-based interactive map populated with notices of incidents, traffic cameras, road construction information, variable message sign locations and messages, as well as travel resources, such as ferries, park and ride facilities, airports, and train stations. An e-alert system is in place to notify subscribers of incidents, delays and construction news which are also available through Twitter. Certain high-profile projects also have a separate web page to provide updates to project status and construction activities. This is a precursor to a fully activated 511 system. The interactive map is currently being populated with construction projects (includes project location and description) on state roads. Incident reporting has expanded to include road work advisory and is triggered upon start of lane closure patterns reported to the two operation centers. The department also coordinates with regional traffic services from area states and commuter service companies to share information related to work zones and highway incidents that may result in traveler delays and congestion.

<p>4.5.2 Does the agency sponsor National Work Zone Awareness Week?</p>	<p>15</p>
<p>4.5.2 Comments: Since 2000, the department has had a dedicated working group, referred to as the Work Zone Safety Awareness Group, that has focused on not only work zone safety but also on the driver awareness risks associated with work zones. Each year the presiding Governor has proclaimed at least one week in April as Connecticut Work Zone Safety Week in support of the state and national efforts. The working group focuses on driver behavior measures that will produce a change in how drivers perceive a work zone and the need to slow down and pay attention. More emphasis is being focused on better work zone consistency in signing, configuration, and use of portable devices to monitor and alert motorists of the need to pay attention to speeds and hazards and the need to slow down in work zones.</p>	
<p>4.5.3 Does the agency assume a proactive role in work zone educational efforts?</p>	<p>14</p>
<p>4.5.3 Comments: The department has taken a proactive approach in educating drivers, workers, and the public in general about safe practices in and around work zones and the hazards associated with them. Recent legislation has resulted in new law passed on charges for assaulting or endangering a highway worker. The legislation also resulted in the formation of a Highway Work Zone Safety Advisory Council which is responsible for reviewing current policy and practices related to Work Zone Safety. Most recently, the State Department of Motor Vehicles has included additional information and guidance to drivers about work zone safety, including a section in the driver's manual. The department maintains a Work Zone Safety Awareness web page that includes links to the work zone safety clearinghouse and other resources for contractors, workers, and drivers. Each year the department's Work Zone Safety Awareness Working Group holds a press conference to highlight the local and national awareness campaigns. Stakeholders and partners from safety organizations and contractors attend the event. At the event, information is made available to participants on various strategies to increase not only awareness but also to promote the use of innovative and effective work zone management.</p>	
<p>4.5.4 During type I, II, and III project construction, does the agency use a public information plan that provides specific and timely project information to the traveling public through a variety of outreach techniques (e.g., agency website, newsletters, public meetings, radio, and other media outlets)?</p>	<p>14</p>
<p>4.5.4 Comments: The department provides major project updates on its website and also publishes project information and travel impact information via the DOT's website (see comment 4.5.1). Highway advisory radio, cameras images, media releases, interactive maps and a cooperative effort by various commuter and travel services helps to inform the public on construction and maintenance activities. The cameras provide real-time images on interstate and limited access highways. Information sharing is definitely part of CTDOT's culture. The department has implemented an e-traffic alert advisory system to alert subscribers at no cost of highway and rail incident and notifications as well as ferry status information. Additional cameras and variable message signs were recently added to the Waterbury, Danbury and the southeast corridor. A tie into State Police Computer Aided Dispatch (CAD) has enhanced the ability to receive notification about more incidents statewide in a real time environment. Expansion of camera technology to other locations is also under design and construction. The department has a policy and procedure which requires that a public information component is included as part of the Transportation Management Plan at the project and corridor level. This public information component is a requirement for identifying strategies that seek to inform road users, the general public, area residences and businesses about the project, the expected work zone impacts, and the changing conditions on the project.</p>	

<p>4.5.5 During type I, II, and III projects, does the agency use ITS technologies to collect and disseminate information to motorists and agency personnel on work zone conditions?</p>	<p>14</p>
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4.5.5 Comments: Yes. Please see comment 4.5.4. Systems are in place to address work zone and congestion issues. VMS, E-alert, cameras and Highway Advisory Radio (HAR) devices are deployed to inform the public. The department manages the data internally before the data is disseminated to the public. When the Department receives calls where cameras do not exist, it verifies this information through the state police, DOT field personnel and Connecticut Highway Assistance Motorist Patrol (CHAMP). Connecticut State Police has provided Computer Aided Dispatch workstations to the Highway Operations centers, which provide for quicker activation of ITS response times. ITS technology is used to monitor traffic conditions at various work sites within its range to check whether significant delays are occurring. Project personnel also communicate directly with the staff at the operation centers that manage the ITS devices so that messages and alerts can be broadcast through the system when work is actually ongoing within the travel lanes that may result in motorist delay. During a recent project on a major interstate corridor, ITS information was used as a tool to warn motorists of significant delays that would be occurring as a result of the work zone. These alerts were also broadcast in adjacent states to provide adequate warning to motorists to seek alternate routing. The strategy was effective in reducing traffic volumes in work zone area and thus reducing congestion and delays.

Section 6

Program Evaluation - 10%

	<p>Rating</p>
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<p>4.6.1 Does the agency collect data to track work zone congestion and delay performance in accordance with agency-established measures? (See Section 1, item 4)</p>	<p>4</p>
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4.6.1 Comments: The Department is currently looking at equipment that will assist in tracking work zone information such as speed, volume, and delay (length of queues) in order to establish some performance parameters that can be used in the design of work zones. Incident related delays are collected currently but no delay information due to work zones that are long term or short term. Highway Operations personnel is currently in the planning stage of considering involving its consultant (IBI) to produce monthly reports from the Crescent program to be shared with other agencies within the DOT. The use of collected data has not progressed.

<p>4.6.2 Does the agency collect data to track work zone safety performance in accordance with agency-established measures? (See Section 1, item 5)</p>	<p>4</p>
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4.6.2 Comments: The Department collects the fatalities data, but the data is not broken down in something useful for work zone performance measures. Fatality data is collected but the Department questions the accuracy of that data. A big question is whether an accident outside and downstream of the construction zone is related to the construction zone itself. The department realizes the need for improvements with data collection. However, to date, there is no measure to assess work zones performance. The Department

realizes that the police need to provide more detailed information on the accident report (PR-1 form), so that the department can determine a statistical baseline to help the designer develop a more comprehensive and safe design with regard to the management and handling of traffic during construction. The department developed policy regarding work zone safety and mobility final rule. The use of collected data has not progressed and will require considerable resources and manpower, which is currently not available.

4.6.3 Does the agency conduct customer surveys to evaluate work zone traffic management practices and policies on a statewide/area-wide basis?

3

4.6.3 Comments: The Department has not conducted a specific survey related to work zone traffic management but has not ruled out a survey as an option to assess programs and strategies. The criteria and strategies for using surveys as means to improve performance needs further study. The Department has conducted public information meetings during design and also during construction to allow the public to bring their concerns, needs or ideas to the department. This has been a success on some of the higher profile projects where there is much public interest in the project. The Department also has an e-mail address for feedback on its website.

4.6.4 Does the agency develop strategies to improve work zone performance on the basis of work zone performance data and customer surveys?

4

4.6.4 Comments: The department is working on several strategies in hopes to develop some performance based measures. Public relations efforts include the establishment of an e-mail address and redesign of the department's work zone safety website. The website directs visitors to other work zone web pages for information on worker and contractor safety topics, education and training, FAQ's surveys and Connecticut guidelines, policies and regulations. Additional on-site efforts include deployment of portable speed monitoring devices for data collection and as a motorist advisory tool. The Department is also reviewing current guidance and practices for traffic control specific to workers, contractors, and law enforcement. Development of criteria to define the limits of work zones and related queues is also being studied, and it can be used to establish best practices on how to manage queue lengths. Work zone safety reviews for night and day operations will be more frequent and will include the review of traffic control devices, sign installation and removal methods, sign recognition and visibility, and a survey of workers on what is working and not working. Through these reviews, changes and improvements can be made to assist motorists and workers. Additional research into performance measurements for work zone strategies is ongoing in various states and by safety organizations. Specific types of data collection that will have relevance and assist in strategies to establish performance metrics continues to be researched.

Supplemental Questions

Work Zone Process Reviews

1a. Has the agency performed a comprehensive work zone process review in the last two years in accordance with 23 CFR 630 Subpart J?

No

1b. Please provide the date when your last process review was completed.

Month: June Year: 2011

1c. Comments (optional): 1st Work Zone Process Review report for Connecticut is targeted for completion by end of June 2011. Work Zone field reviews were conducted by joint FHWA-CTDOT team last summer/fall, and a final report for this effort, including action items, was completed by CTDOT in May 2011. The Process Review report will encompass this field review and annual self assessment as appendices.

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