U.S. Department of Transportation

Federal Highway Administration

Process Review

FHWA Connecticut Division Office

Connecticut Department of Transportation

WORK ZONE SAFETY and MOBILITY

June 2014

FINAL REPORT

U.S. Department of Transportation
Federal Highway Administration

WORK ZONE SAFETY and MOBILITY
PROCESS REVIEW FINAL REPORT

June 2014

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
BUREAU of ENGINEERING and CONSTRUCTION

By: _____ Date: June 5, 2014
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FEDERAL HIGHWAY ADMINISTRATION

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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 to comply with the requirements of 23 CFR Part 630 *Preconstruction Procedures, Subpart J – Work Zone Safety and Mobility*. It is the second such process review conducted for this program area since this regulation became effective on October 12, 2007. The first such process review was completed in June 2011.

To satisfy the biennial process review requirement, this review comprised a review of the following documents:

1. Work Zone Safety and Accessibility, CTDOT Policy No. E&C-40
2. Systematic Consideration and Management of Work Zone Impacts, CTDOT Policy No. E&C-46
3. 2011-2012 Work Zone Annual Field Reviews of Active Projects
4. 2012 Work Zone Mobility and Safety Self-Assessment
5. Connecticut Work Zone Improvement Plan (WZIP)

Copies of CTDOT's two (2) work zone policies are included as Appendix 1 and Appendix 2 and a reference is included for recent Connecticut legislation concerning the safety of workers in roadway work zones. Related CTDOT memoranda concerning the *Systematic Consideration and Management of Work Zone Impacts* policy were also reviewed (see Appendix 9 and Appendix 10).

Work Zone field reviews of active construction projects have been conducted annually by CTDOT since the 2010 Work Zone Self-Assessment. A copy of a report documenting the field reviews conducted in calendar years 2011 and 2012 is included as Appendix 3. Observations and recommendations resulting from these field reviews were provided by the CTDOT Office of Construction directly to the appropriate construction project personnel for action soon after each site visit.

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 (see Appendix 4 and Appendix 5). The results of the most recent (2012) Work Zone Self-Assessment (see Appendix 6) were compiled and published in a standardized report prepared by FHWA using the scoring and comments provided by CTDOT. **NOTE:** FHWA suspended the annual self-assessment for 2013 and has subsequently terminated it (see FHWA memorandum dated 5-1-14 in Appendix 7).

The Connecticut Work Zone Improvement Plan (WZIP) was developed by CTDOT and accepted by FHWA in May 2013 (see Appendix 8) and is the formal action plan

developed to address the recommendations in the previous (2011) Process Review. It establishes two (2) working groups to progress the action items outlined in the plan. Chairpersons and members of both working groups have been identified. CTDOT has been addressing many of these action items over the past two (2) years, and recently held a combined kickoff meeting of the two working groups on September 19, 2013 to institutionalize this continuing effort. Joint meetings of both working groups were also held on October 18 and November 19, 2013, and monthly meetings are scheduled beginning in January 2014.

The official release of the WZIP recognizes past and continuing efforts, and provides the commitment of resources necessary to enable further progress in work zone safety and mobility in Connecticut. Eight (8) critical issue action areas are detailed in Table 3 of the WZIP. In addition, twelve (12) initial action item issues are identified for the Work Zone Operations (WZO) Working Group, and five (5) initial action items issues are identified for the Work Zone Performance Measures (WZPM) Working Group.

Several successful practices for Connecticut's implementation of the Work Zone Safety and Mobility program were found to be noteworthy, including the following:

- Transportation Management Plans (TMPs) to address the operational impacts of significant projects.

- CTDOT work zone web site to provide traveler information that includes a Google-based interactive map.

Seven (7) observations were documented with corresponding recommendations for improvements (see Observations and Recommendations). The key areas which need attention are re-summarized as follows:

- **Annual Field Reviews** – CTDOT needs to publish a more timely annual report in order to address systemic issues sooner.
- **Leadership Support** – CTDOT needs continued leadership support of the WZIP in order to identify, prioritize and implement changes with the resources necessary to continually promote and improve Work Zone Safety and Mobility.
- **Performance Measures** – CTDOT needs to establish and/or implement performance measures to track work zone congestion, delay and crashes.
- **Policies** – CTDOT needs to proactively update its policy statements concerning Work Zone Safety and Mobility, and include references to current regulations.

The next required Work Zone Process Review must be completed by December 31, 2015.

BACKGROUND

Regulations

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*.

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 February 6, 2012 (see Appendix 4).

Moving Ahead for Progress in the 21st Century Act (MAP-21)[1]

MAP-21 became effective on October 1, 2012. Section 1405 *Highway Worker Safety* requires the Secretary of Transportation to modify 23 CFR Part 630.1108, paragraph (a) *Work zone safety management measures and strategies,* concerning the use of positive protective measures to separate workers on highway construction projects from motorized traffic. As of the date of this Process Review report, the necessary rulemaking to revise these regulations is still pending.

[1] Public Law No. 112-141

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

Scope of Review

This Process Review was conducted jointly by CTDOT and the FHWA Connecticut Division Office. The scope of this Process Review included four (4) separate tasks to provide a statewide and programmatic perspective regarding the current status of work zone safety and mobility in Connecticut. The scope of each task is discussed below. Typically a process review includes the development of a team charter and a 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 completed.

CTDOT Work Zone Policies

CTDOT's two (2) existing work zone policies (see Appendix 1 and Appendix 2) were identified and reviewed. In addition, a 2007 CTDOT internal memorandum (see Appendix 9) and a 2007 CTDOT Consulting Engineers General Memorandum (see Appendix 10) were also reviewed.

2011-2012 Work Zone Safety Field Reviews

This 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.

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.

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.

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. These reports were circulated to the review team and project personnel for comments before being finalized.

The 2011-2012 Work Zone Safety and Mobility field reviews were conducted using the same Work Zone Review Form and Checklist developed in 2010 for these reviews. Projects were selected with the objective of conducting reviews of projects in construction during daylight hours as well projects in construction at night. Four (4) types of construction work were selected for the 2011-2012 field reviews. For the two (2) construction seasons covered, a total of fifteen (15) in-depth field reviews were conducted. The primary focus areas for the reviews were:

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

Table 1 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.

Table 1 – Work Zone Field Reviews Summary

Review Type	District 1	District 2	District 3	District 4	TOTAL
Detour	1		1		**2**
Night	2		3	1	**6**
Stage Construction	1	2	1		**4**
Temporary Signalization			2	1	**3**
Total Projects	**4**	**2**	**7**	**2**	**15**

The 2011-2012 Work Zone Safety Field Review Final Report contains an executive summary, copies of the work zone reviews and a table of action items (see Appendix 3). The ACCESS® database created in 2010 was expanded to include the 2011-2012 projects. As was previously done in 2010, issues were categorized to facilitate queries to produce reports. CTDOT has continued to conduct annual work zone field reviews every construction season since 2010 in order to continually improve work zone safety for construction crews and the traveling public.

2012 Work Zone Mobility and Safety Self-Assessment

The 2012 Work Zone Mobility and Safety Self-Assessment (see Appendix 6) was conducted in accordance with the methodology, scoring method, guidance, and documentation contained in FHWA's 2012 User's Guide (see Appendix 5) for conducting these assessments.

The 2012 Self-Assessment was conducted as a review and update of the 2011 Work Zone Mobility and Safety Self-Assessment via e-mail with multi-disciplinary representatives of various offices at CTDOT, including Planning, Design, Construction, Maintenance, and Operations. Scoring for each question was determined by a consensus of the participants and remained unchanged from 2011; however, supporting justification for each question was revised and updated as appropriate in the 2012 Self-Assessment.

Connecticut Work Zone Improvement Plan (WZIP)

The Connecticut Work Zone Improvement Plan (WZIP) document was finalized by CTDOT in May 2013 and accepted by FHWA on May 29, 2013. Although this document only recently became official, during the past two (2) years CTDOT has been addressing many of the action items contained therein that were identified during the 2011 Work Zone Process Review. The scope of this 2013 Process Review focused on the status of these action items as documented in Tables 3, 4 and 5 of the WZIP.

NOTE: The WZIP establishes two (2) working groups to progress the action items outlined in the plan. Chairpersons and members of both working groups have been identified and a combined kickoff meeting was held on September 19, 2013. Joint meetings of both working groups were also held on October 18 and November 19, 2013, and monthly meetings are scheduled beginning in January 2014.

PROCESS REVIEW TEAM MEMBERS

The members of the Process Review team that coordinated and conducted the 2011-2012 construction project work zone field reviews were:

Philip J. Cohen, *Transportation Supervising Engineer* (**CTDOT Traffic**)
Jeffery H. Hunter, *Transportation Engineer 2* (**CTDOT Construction**)
Anthony Kwentoh, *Transportation Supervising Engineer* (**CTDOT Construction**)
Robert Ramirez, *ITS, Traffic & Safety Engineer* (**FHWA**)
Terri L. Thompson, *Transportation Supervising Engineer* (**CTDOT Construction**)
Robert W. Turner, *Safety / Area Engineer* (**FHWA**)
Bonney Whitaker, *Transportation Engineer 3* (**CTDOT Construction**)

The members of the Process Review team that participated in the 2012 work zone self-assessment were:

Lewis S. Cannon, *Acting District IV Engineer* (**CTDOT Construction**)
James P. Connery, *Chief of Construction* (**CTDOT Construction**)
Harold J. Decker, *Highway Operations Director* (**CTDOT Highway Operations**)
Charles A. Drda, *Transportation Maintenance Director* (**CTDOT Maintenance**)
Edward F. Girolamo, *Trans. Maintenance Planner 2* (**CTDOT Maintenance**)
Charles S. Harlow, *Transportation Principal Engineer* (**CTDOT Traffic**)
David M. Head, *Transportation Supervising Planner* (**CTDOT Planning**)
Jeffery H. Hunter, *Transportation Engineer II* (**CTDOT Construction**)
Morgan K. Kennerson, *Trans. Maint. Training Coordinator* (**CTDOT Maint.**)
John F. Korte, *Trans. 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**)
Robert W. Turner, *Safety / Area Engineer* (**FHWA**)

The members of the Process Review team that contributed to the preparation of the 2013 Connecticut Work Zone Improvement Plan were:

Thomas A. Harley, *Chief Engineer* (**CTDOT Engineering & Construction**)
Terri L. Thompson, *Transportation Supervising Engineer* (**CTDOT Construction**)
Robert W. Turner, *Safety / Area Engineer* (**FHWA**)

OBSERVATIONS and RECOMMENDATIONS

General Observations and Recommendations

- Observation No. 1-1:

  Although the individual work zone field review inspection reports for each project visited were completed and provided to project personnel in a timely fashion, there was a significant delay in publication of the formal 2011-2012 work zone safety reviews report which contributed to the delay of this Process Review. The principal reason for the delay in finalizing the work zone safety reviews report and this Process Review was the limited amount of staff time available to prepare, review and edit these reports.

  Recommendation:

  Publication of the annual work zone field review inspections report by CTDOT needs to be more timely (within six (6) months of the end of each calendar year).

  Compliance Issue[2]:

  Delays in publication of the annual work zone safety review reports could delay necessary programmatic improvements in work zone safety practices, as well as opportunities to discuss current issues at the annual winter training sessions. The timely completion of future required work zone process review reports every two years could also be jeopardized by delay of the annual work zone safety review reports.

  Resolution:

  The recent convening of a regular schedule of monthly Work Zone Operations Working Group meetings should institutionalize a formal ongoing collaborative dialogue on work zone issues, which in turn should ensure timely reports.

[2] See 23 CFR Part 630.1008, paragraph (e), *State-level processes and procedures*.

CTDOT Work Zone Policies

- Observation No. 2-1:

  CTDOT's two (2) work zone policies (see Appendix 1 and Appendix 2) do not reference the applicable federal regulations. The policy on *Work Zone Safety and Accessibility* does reference the Manual of Uniform Traffic Control Devices (MUTCD) but does not cite 23 CFR 655 *Traffic Operations*. The policy on *Systematic Consideration and Management of Work Zone Impacts* defines what constitutes a significant project, but does not cite either 23 CFR 630.1010 *Significant Projects* or 23 CFR 630.1012 *Project-level procedures* (which includes requirements for Transportation Management Plans).

  The 2007 CTDOT internal memorandum (see Appendix 9) which transmitted the initial version of the *Systematic Consideration and Management of Work Zone Impacts* policy did reference the applicable federal regulations, and included a separate *Work Zone Safety and Mobility Implementation Plan Guidance* with further details for implementation of the policy. The subsequent 2007 CTDOT Consulting Engineers General Memorandum (see Appendix 10) appears to be still in effect, and provides general guidance regarding when Transportation Management Plans (TMP) are required.

  Recommendation:

  Future policy statements should include references to the applicable portions of 23 CFR 630: Subpart J - Work Zone Safety and Mobility and Subpart K - Temporary Traffic Control Devices, and 23 CFR 655 *Traffic Operations*. CTDOT's *Work Zone Safety and Mobility Implementation Plan Guidance* should be reviewed and/or updated every two (2) years.

  It would be desirable to post CTDOT Policy Statements on its public web site.

  Compliance Issue[3]: None

  Resolution: Future consideration when policies are updated.

[3] See 23 CFR 630.1014 *Implementation* and 23 CFR 630.1016 *Compliance date*.

- Observation No. 2-2:

  On May 30, 2013, the Connecticut legislature passed Public Act No. 13-92 *An Act Concerning The Safety Of Workers In Roadway Work Zones* that includes a provision[4] for CTDOT to study the implementation of a pilot program concerning the use of alternative colored lights in highway work zones with a report to the legislature's Transportation Committee due by February 1, 2014.

  Recommendation:
  FHWA can assist with providing information from other states.

  Compliance Issue: None

  Resolution: Not applicable

2011-2012 Work Zone Safety Field Reviews

- Observation No. 3-1:

  Issues were identified in six (6) categories: Pavement Markings, Signing, Maintenance and Protection of Traffic, Traffic Control Devices, Construction Staging and Transportation Management Plans (TMPs). These issues were considered for incorporation into the Work Zone Improvement Plan (WZIP); new action items for two of these categories (Pavement Markings and Signing) were added as Item Nos. 13 and 14 to Table 4 (Work Zone Operations Working Group Action Items) of the WZIP. Issues for three categories (i.e., Maintenance and Protection of Traffic, Traffic Control Devices and Construction Staging) are already covered under existing action items.

  Recommendation:

  An action item for issues identified under the category of Transportation Management Plans (TMPs) should also be added to Table 4 of the WZIP.

  Compliance Issue[5]:

  Some of the issues identified during the field reviews concern compliance with the Manual of Uniform Traffic Control Devices (MUTCD); others concern compliance with FHWA regulations (see footnote 5).

[4] See Section 7 of Public Act No. 13-92
[5] See 23 CFR 655 *Traffic Operations*, 23 CFR 630.1010 *Significant Projects* and 23 CFR 630.1012 *Project-level procedures* (requirements for Transportation Management Plans).

Resolution:

Construction project inspection personnel were immediately notified verbally by the CTDOT Office of Construction of non-compliant issues requiring corrective action that were identified during these field reviews and instructed to correct these issues. CTDOT will include a follow-up procedure after future reviews to verify that corrective actions were taken. Some issues will be addressed programmatically via the annual construction inspection training sessions, and others will be addressed by the Work Zone Operations Working Group. Additional emphasis has been given for staff to use work zone checklists/pocket guides routinely to ensure the correct application and use of traffic control devices, pavement markings and signing.

The non-compliance issues that were identified for pavement markings and signing during the field reviews arose for two main reasons: a lack of inspection and/or an insufficient level of awareness or knowledge of standard specifications by project inspection personnel. Previous issues, such as traffic control device quality and maintenance and protection of traffic, were also the result of a lack of awareness and inconsistent practices. Construction staging issues occurred due to a lack of the best design for the field conditions.

2012 Work Zone Mobility and Safety Self-Assessment

The final scores and comments are included as Appendix 6 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.

- Observation No. 4-1:

  Four (4) of the six (6) categories evaluated in the assessment maintained scores at an acceptable to excellent level:

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

Recommendation:

Continue execution of current policies and procedures with future improvements as needed which should be coordinated under the WZIP.

Compliance Issue: None

Resolution: Not applicable

- Observation No. 4-2:

  Two (2) of the six (6) categories evaluated in the assessment continue to be in need of attention:

  - **Leadership and Policy**
  - **Program Evaluation**

  Recommendation:

  Leadership and Policy – As previously identified in the 2011 Process Review, CTDOT could strengthen its work zone program by establishing and/or implementing strategic goals to:

  - Reduce congestion and delays in work zones; and
  - Reduce crashes in work zones

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

  - Track work zone congestion and delay; and
  - Track work zone crashes

  Program Evaluation – As previously identified in the 2011 Process Review, in order to accurately assess impacts from work zone operations, CTDOT needs to collect, track, and evaluate the following types of work zone data:

  - Work zone congestion and delay performance data and measures; and
  - Work zone safety performance data and measures

  The WZIP addresses the above with the inclusion of conducting customer surveys to evaluate work zone traffic management practices and policies on a statewide/area-wide basis.

NOTE: CTDOT has taken an important step towards improvement in the above two (2) categories with the finalization of the WZIP in 2013. Efforts to improve in these categories should be closely monitored to ensure substantial progress before the next process review in 2015. The establishment of two (2) Working Groups and a Champion under the WZIP will help facilitate these improvements.

Compliance Issue[6]: None

Resolution: Not applicable.

Connecticut Work Zone Improvement Plan (WZIP)

- Observation No. 5-1:

  The WZIP is a very ambitious and comprehensive plan intended by design to be implemented incrementally over a number of years into the future. It encompasses both activities that are required by regulation (e.g., annual self-assessments) as well as other activities. CTDOT has done an excellent job preparing this Plan which provides the necessary foundation of an operational framework and a detailed list of actions for execution by the two identified (2) working groups whose membership has been determined in advance.

  Recommendation:

  A regular schedule of joint meetings has recently been instituted for both Working Groups to provide the necessary starting momentum to begin implementation of this Plan. Each meeting is being organized with an advance agenda and followed up with official minutes prepared and distributed to the membership / attendees. Continued CTDOT leadership support of the WZIP will be essential to identify, prioritize and implement changes with the resources necessary to continually promote and improve Work Zone Safety and Mobility.

  Compliance Issue: None

  Resolution: Not applicable

[6] See footnote 3

SUCCESSFUL PRACTICES

FHWA and CTDOT identified the following noteworthy practices during the 2011-2012 Work Zone Field Reviews:

- Use of overhead wires signs to alert construction vehicles of hazards
- Use of dedicated and trained traffic control crews for maintenance and protection of traffic
- Use of portable smart work zone technology to assist motorists and the project with the monitoring of traffic queues, delays, speeds and volumes in the project area

FHWA and CTDOT identified the following noteworthy practices during the 2012 Work Zone Self-Assessment:

- The CTDOT Design Manual was previously updated to provide for the consideration of positive separation devices for Type I and II projects.[7]
- Transportation Management Plans (TMPs) are consistently developed to address the operational impacts of significant projects.
- CTDOT maintains a work zone web site to provide traveler information for Type I, II and III projects (http://www.dotdata.ct.gov/iti/master_iti.html) that includes a Google-based interactive map populated with notices of incidents, traffic cameras, road construction information, variable message sign locations and messages.
- Intelligent Transportation System (ITS) technologies are frequently used to collect and disseminate information to motorists and agency personnel on work zone conditions.
- Incident Management services are utilized on Type I and II projects.

[7] 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 FHWA *Work Zone Mobility and Safety Self-Assessment User Guide* (2012).

- **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.

- CTDOT uses uniformed law enforcement personnel in work zones.[8]
- CTDOT does an excellent job of sponsoring and promoting National Work Zone Awareness week annually and throughout each construction season.

[8] 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 6).

CONCLUSIONS

Some of the issues identified during the field reviews concern compliance with the Manual of Uniform Traffic Control Devices (MUTCD); others concern compliance with FHWA regulations. As previously noted, construction project inspection personnel have been notified by the CTDOT Office of Construction of non-compliant issues. Some issues will be addressed programmatically via the Winter 2014 construction inspection training sessions, and others will be addressed by the Work Zone Operations Working Group. The timeliness of future annual field reviews reports is critical for compliance of future work zone process reviews on the required two-year cycle.

The many successful practices that were identified during past Self-Assessments and Field Reviews continue to be employed by CTDOT in construction projects; these, as well as a few new ones are noted in the previous section.

Further planned improvements in Work Zone Safety and Mobility have officially been endorsed by CTDOT and FHWA with the recent release of the Connecticut Work Zone Improvement Plan (see Appendix 8) that was developed to address recommendations from the previous (2011) Process Review.

The next section highlights the action items in the WZIP that are, or will be, underway for the Work Zone Safety and Mobility program in Connecticut. As evidenced by the status of the sub-level tasks in each of Tables 3, 4 and 5 of the WZIP, CTDOT continues to make progress with improving its Work Zone Safety and Mobility program.

ACTION ITEMS

Each of the following eight (8) critical issue action areas previously recommended for improvement based on the 2011 Process Review is covered in detail in Table 3 of the Connecticut Work Zone Improvement Plan (WZIP):

- Establish strategic goals specifically to reduce congestion and delays in work zones[9]
- Implement strategic goals specifically to reduce crashes in work zones[10]
- 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 crashes[11]
- Collect data to track, analyze and evaluate work zone congestion and delay performance[12]
- Collect data to track, analyze and evaluate work zone safety performance[13]
- 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

Table 3 in the WZIP includes the following information for each critical issue area:

- Recommendations for Improvement
- Actions and/or Products, including Major Steps, if any, and Resources Needed
- Responsible Office/Position/Person
- Status
- Target Completion Date

[9] Reducing congestion and delays in work zones is one of the items identified in the Work Zone Safety emphasis area included in CTDOT's 2013 Strategic Highway Safety Plan (SHSP).

[10] Work zone crash reduction goals have been established by CTDOT and are detailed in the Bureau of Planning, Transportation Safety Section's 2013 Highway Safety Plan (HSP).

[11] 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.

[12] See 23 CFR §630.1008(c) *Work Zone Data*

[13] See footnote 12

A Work Zone Operations (WZO) Working Group has been established to address the following twelve (12) action item issues, including ten (10) previously identified in the 2011 Process Review. These are included in Table 4 of the Connecticut Work Zone Improvement Plan (WZIP):

- Construction Sign Retro-reflective 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
- Work Zone Safety Review
- Project-Level Work Zone Reviews
- Traffic Control Device Quality

Finally, a Work Zone Performance Measures (WZPM) Working Group has been established to address the following five (5) action item issues included in Table 5 of the Connecticut Work Zone Improvement Plan (WZIP):

- Mobility in Work Zones
- Reliable Crash Data in Work Zones
- Work Zone Safety Performance
- Traveler Feedback
- Develop Strategies from Performance Data and Traveler Surveys

Tables 4 and 5 in the WZIP include the following information for each action item issue:

- Problem
- Expected Outcomes
- Actions Taken
- Actions to be Taken
- Current Status
- Time Frame
- Responsible Parties

As is evident in each of the above tables, many sub-level tasks have already been completed, and many others are already in progress.

U.S. Department
of Transportation
Federal Highway Administration

APPENDIX 1

Work Zone Safety and Accessibility

CTDOT Policy No. E&C-40

(April 8, 2011)

CONNECTICUT DEPARTMENT OF TRANSPORTATION

POLICY STATEMENT

POLICY NO. E&C - 40
April 8, 2011

SUBJECT: Work Zone Safety and Accessibility

The Department is committed to ensure a safe and accessible highway environment for all users of the roadway (motorist, pedestrian, and bicyclist) traveling through a work zone and to establish a safe and secure area for those who must construct and maintain the highway system.

In order to achieve a safe and accessible highway environment during construction and maintenance periods, a uniform set of vehicular traffic control plans have been developed to establish a consistent application of traffic control patterns. These plans were developed using the principles set forth in the Manual of Uniform Traffic Control Devices (MUTCD), published by the Federal Highway Administration in cooperation with the American Association of State Highway and Transportation Officials. When applicable, these plans shall be utilized by all Department units, contractors, and permittees working within the highway right-of-way.

It is recognized that the development of detailed standards that would be adequate to cover all construction and maintenance applications is not practical. There will be occasions when the typical set of signs or other traffic control devices will not adequately address the field conditions impacting vehicles, pedestrians, or bicyclists for a given project. Such conditions should be anticipated and special traffic control plans, specifications, and/or transportation management plans reflecting the principles set forth in the MUTCD should be developed for the particular project or activity to address the identified concerns. All mobility modes should be considered in the development of project-specific plans. In particular, the level of accessibility for disabled individuals that was experienced prior to the project should be provided during construction and maintenance operations.

(This Policy Statement abolishes Policy Statement No. E&H.O -46 dated February 19, 2009)

James P. Redeker
Acting Commissioner

U.S. Department of Transportation
Federal Highway Administration

rev. 6/3/14

APPENDIX 2

Systematic Consideration and Management of Work Zone Impacts

CTDOT Policy No. E&C-46

(April 8, 2011)

CONNECTICUT DEPARTMENT OF TRANSPORTATION

POLICY STATEMENT

POLICY NO. E&C - 46
April 8, 2011

SUBJECT: Systematic Consideration and Management of Work Zone Impacts

It is the policy of the Department to systematically consider and manage work zone impacts of significant projects.

In establishing this Work Zone policy, the Department's objectives are to:

1. Provide a high level of safety for both workers and the public.

2. Minimize congestion and community impacts.

3. Provide both maintenance forces and contractors adequate access to the highway to efficiently conduct their work.

In order to meet these objectives, appropriate planning, design, construction, maintenance, and public awareness strategies shall be employed on all significant projects. For the purposes of this policy, a significant project is defined as:

> A stationary highway construction or maintenance activity which causes sustained mobility impacts on I-84, I-91, I-95, I-291, I-384, or I-691 for more than three (3) days with either intermittent or continuous lane closures. In addition, any highway construction or maintenance activity that alone or in combination with other concurrent activities nearby, which is expected based on engineering judgment, to cause sustained mobility impacts that are considered greater than what is considered tolerable relative to typical traffic operations experienced in the area of the work zone, may be declared a significant project.

It is recognized that the Department's emergency operations may not always allow a systematic consideration of work zone impacts. In such situations, the objectives of this policy will be honored as much as practicable.

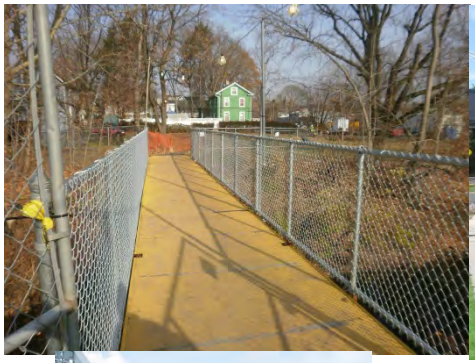
(This Policy Statement abolishes Policy Statement No. E&H.O -57 dated August 10, 2007)

James P. Redeker
Acting Commissioner

U.S. Department of Transportation
Federal Highway Administration

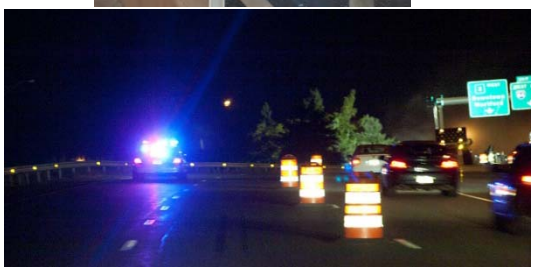
APPENDIX 3

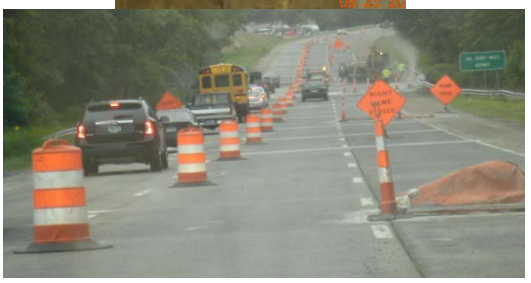
2011-2012 Work Zone Safety Field Review Report



BUILDING

SAFER





WORK ZONES

State of Connecticut

2011 & 2012

Work Zone Safety Reviews

Prepared By:

Connecticut Department of Transportation

Office of Construction

Terri Thompson, Jeff Hunter,
Bonney Whitaker

2800 Berlin Turnpike

Newington CT, 06131

CONNECTICUT
2011-2012 WORK ZONE SAFETY REVIEW REPORT

The report was prepared by the Connecticut Department of Transportation and the reviews have been completed to conform to the requirements of the Department's Work Zone Safety Improvement Plan, specifically Table 3, Work Zone Self-Assessment Element No. 8, Program Evaluation.

The Plan was developed in response to the recommendations in the 2011 Connecticut Work Zone Safety and Mobility Process Review Report and is evidence of Connecticut's compliance with 23 CFR 630.1008.

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Submitted By: _____

Terri Thompson
Transportation Supervising Engineer
Bureau of Engineering and Highway Operations

Approved By: _____

Lewis S. Cannon
Construction Administrator
Bureau of Engineering and Highway Operations

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INTRODUCTION

The FHWA's 2011 & 2012 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. The reviews began in 2010 as a means to better understand and evaluate different characteristics of a work zone and the strategies and procedures that could be improved upon or used as a "best practices" example. 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 included 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 engineering, design and implementation. The issues that arise as a result of these reviews are considered for incorporation into the Work Zone Improvement Plan and added to working group action item issues. Refer to Table 3, 4, 4a and 5 in Appendix A of this report.

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 identify 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 that include comments from project personnel.

Over the course of two construction seasons, fifteen reviews were conducted with five of the reviews being In-depth. The main focus areas for the reviews were: 1) Night reviews 2) Detour reviews 3) Temporary Signalization and 4) Stage construction on both interstate and secondary roadways. Five (5) issue areas were identified: markings, signing, maintenance and protection of traffic, traffic control devices and staging. The report contains an executive summary, copies of work zone reviews, project action items generated from reviews, and updated tables that are also included in the Work Zone Improvement Plan. It should be noted that this is an evolving evaluation process. 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 Connecticut Department of Transportation (CTDOT) with the assistance of the Federal Highway Administration (FHWA) conducts work zone field reviews (audits) as a means to assess current field practices relative to applying work zone safety and mobility processes and procedures on these projects. These field reviews are an important tool to promote better understanding of the operational and design characteristics of a work zone. They help CTDOT develop improvements in the area of design, construction and operations.

The projects were selected with the objective of conducting reviews with various types of activities, challenges and also look at projects during daytime and nighttime hours since operations do differ based on light conditions. The field reviews are scheduled to include various types of projects in construction and maintenance. The Reviews can range from a full audit of all work zone aspects to a selected audit of particular work zone elements such as pedestrian accessibility, pattern deployment, quality of traffic control devices and innovative techniques.

The 2011-2012 Work Zone Safety and Mobility field reviews were conducted using the same Work Zone Review Form and Checklist developed in 2010. The information is then entered into an Access 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.

The primary user group for the information will be the Work Zone Operations Working Group under the Work Zone Improvement Plan recently signed by the FHWA and CTDOT. The Plan was developed in response to the Work Zone Safety and Mobility Process Review (Process Review) completed during the 2010 calendar year to comply with the requirements of 23 CFR Part 630, Preconstruction Procedures, Subpart J—Work Zone Safety and Mobility.

The Working Group will focus on elements related to work zone traffic management practices and policies on a statewide/area-wide basis. Many of the tasks for the working group are derived from information obtained during the work zone reviews. This group will evaluate and make recommendations for changes or improvements to the various elements that are a part of work zone traffic management practices and policies. This may include: improvements to traffic control devices; creating, updating, and revising specifications; development of guidance documents; and the use of innovative practices for the safety of the highway workers and the traveling public.

Some of the issues and good practices from the 2011-2012 reviews are as follows:

1. Markings
   - Existing/conflicting pavement markings not eradicated or covered.
   - Temporary markings missing or worn.
   - Black out tape not adequately covering the permanent lines completely.

2. Signing

- Detour signs not covered when detour not in effect nor being removed when the detour is no longer required.
- Construction signs not mounted on breakaway posts.
- Improper sign height on post mounted and portable stands. Many Exit signs not meeting height requirement of 7' above pavement.
- High intensity barricade warning lights on signs other than those posts mounted.
- Use of Overhead Wires signs to alert construction vehicles of hazards as a good practice.

3. Maintenance and Protection of Traffic
   - Ramp closures need to be considered during design phase to develop detours and closures for operations where the ramps are too narrow to safely accommodate a work area and traffic.
   - Inadequate notice of ramp closures and no detour posted for closure.
   - Inadequate use of temporary work zone lighting.
   - Improper positioning of light plants resulting in blinding oncoming traffic.
   - Use of dedicated and trained traffic control crews for maintenance and protection of traffic as a good practice.
   - Standard traffic plans for sign patterns are not always applicable to certain stages of construction, roadway geometry especially at complex interchanges, HOV lanes.

4. Traffic Control Devices
   - Marginal or unacceptable quality of drums, cones and barricades that should be replaced or do not meet standard.
   - Incorrect use and quality of Type III barricades. Stripes sloping in wrong direction and loss of reflectivity and obvious color fading.
   - The DE-7C delineators located on the TPCBC missing and wrong color used based on side of road on. (i.e. yellow delineators on barrier located on right side of traffic).
   - Arrow board on trucks not using correct display when parked in closed lane or on shoulder.
   - Use of portable smart work zone technology to assist motorists and project in monitoring of traffic queues, delays, speeds and volumes in project area as good practice.

5. Staging
   - Alternative temporary barrier designs and impact attenuation systems required for access to workspace during stage construction.
   - Lack of accommodations for pedestrians and bicyclists.
   - Staging plans need to be reviewed in detail to account for emergency service access, space for outriggers on cranes and taper lengths

6. Transportation Management Plans (TMPs)
   - Project personnel are not aware of a plan being part of contract
   - Lack of updating of plan to reflect changes in maintenance and protection, staging, or other construction related activities.
   - Better system of reporting and archiving incidents in work zones
   - Lacking ability to acquire crash data during construction activity to perform analytics on types and frequency.

Project Action Items

2011 & 2012 Work Zone Review Issues

2011 Work Zone Review Issues

Proj.ID	Comments
59-155	1. Conflicting pavement markings require correction.
67-115	1. Chevrons on Type III barricade are pointing the wrong direction 2. Blunt end on TPCBC exposed. 3. Vegetative growth obscuring DE-9 delineator and impact attenuation. 4. Existing pavement markings not eradicated or covered.
84-102	1. There are missing or worn pavement markings that need to be addressed. 2. Temporary line striping needs to be refreshed prior to winter shutdown. 3. Some materials are too close to roadway. 4. Numerous cones were not up to Conn DOT Standards. 5. While the detour is not in effect, change the temporary signal at Green Street to flash red all-way to avoid unnecessary back-ups on Green Street. If the detour is no longer required, please remove the temporary traffic signal. 6. While the detour is not in effect, cover the detour signs. Remove the detour signs when the detour is no longer required. 7. Many of the traffic drums and cones are visibly worn and should be replaced. 8. There were many traffic cones noted on the jobsite that do not conform to current DOT standards. 9. Replace temporary pavement markings throughout the project limits including stop bars at the intersections. 10. There were multiple roadside hazards during the safety inspection (concrete blocks, material piles, construction equipment, etc.) All fixed objects must be protected, removed, or located outside of the clear zone. 11. All construction signs must be mounted on breakaway posts. Breakaway post height needs to be reviewed and corrected if not in conformance with the plans. It appeared that the spacer bars were not installed; if this is a new design then supporting documentation should be provided by the contractor.
92-531 92-619	1. It is unclear that ramp is closed until you come upon ramp. 2. Queue's for pattern set up 95 SB & 95 NB extending beyond advance warning during set up. 3. Arrow board on trucks show incorrect display during set up of I-91 SB pattern. 4. Should be flashing arrow during the lane closure process. 5. Work force wearing Hi-O's Class 3 PPE. 6. Due to the amount of dust delineators were not reflecting properly. Should be cleaned. 7. One arrow board was on flashing arrow instead of bar or corners. 8. Contractors expressed concerns about motorists continually speeding through the work zones. 9. Inadequate notice of ramp closures Rt. 34 Eastbound to I-91 Northbound and no detour was posted for this closure.

126-167	1. One sign obstructed by traffic drum. 2. Problem with horizontal clearance for oversize trucks due to lane closures. 3. Some of the contractor's personnel need to wear Class 3 reflective. 4. Barricade warning lights High Intensity should be removed from non–permanent construction signs. 5. Discussion about Temporary night time work zone illumination. The light plant should not face into oncoming traffic. Review of opposing traffic should be inspected to ensure there are no issues as well. 6. Consideration should be given to using 42" traffic cones in the on-ramp / operational lane gore area. 7. Consideration should be given to locating the State trooper out of the left lane closure to back of queue. Current location is not well protected. 8. 4" Black out tape did not cover some of the permanent lines completely. 9. Contractor extended lane closure to accommodate traffic from on ramp. This was done to prevent existing traffic from jumping lane.
173-414	1. Two pre warning signs installed were not Bright Fluorescent sheeting. 2. Some of the workers for the contractor were not wearing the proper reflective apparel for limited access highways. 3. VMS was outside of the clear zone but hard to see within reasonable time frame.

2012 Work Zone Review Issues

Proj.No.	Comments
82-299	1. Staging plans should be looked at in more detail. Access for emergency services, space for outriggers on cranes, taper lengths and signage are some issues. 2. Portable impact attenuation system barrels to be used on bridge during stage construction were found to be too wide therefore used different system which was considerably more expensive. 3. Standard glare screens are not as effective at lower speeds.
42-312	1. There is no project specific control on the plans. Plans are similar to a Maintenance vendor-in-place contract and plans were a part of actual contract with minimal detail available. Traffic control plans should have been more detailed especially for area at a difficult work zone. 2. State trooper should be doing speed enforcement during shift. 3. No HOV Lane Closed Ahead signs were shown on the plans. A regulatory type sign was used instead of construction sign and was made by project. Not MUTCD compliant. 4. Both sides of the highway were not signed. Wide roadway with more than two lanes across. This was especially an issue when no signs were used next to the lane closure. (High speed lane closed and no signs in high speed shoulder). 5. Lane Closed Ahead sign too close to arrow board and lane closure. Difficult to read and not time to react. Not MUTCD compliant. 6. Tri-axle trucks used on the jobsite should be equipped with amber lights and or warning signs saying Construction Vehicle attached to the back of the tailgate.
79-215	1. There were four Type III construction barricades that were faded, not providing appropriate reflectivity. The project added high intensity barricade warning lights to the Type III barricades. 2. The stripes of four Type III barricades were sloping in the wrong direction. Stripes should slope downward in the direction traffic is to pass. 3. On the detour signs, the “1” in Route 71 appeared to be grey and not matching the black color as the rest of the letters on the signs.
96-199	1. Shoulder is not delineated with temporary tape 2. Some of the drums and cones appear to be marginal, needing to be replaced 3. Speeding trucks at night are an issue. 4. Paving the ramps is problematic. The ramps are too narrow to safely accommodate for a work area and traffic. The contractor would like to be able to close the ramps in order to perform milling and paving. 5. A “Motorcycles Use Caution” sign was placed on the left side of the road. The same sign needs to be placed on the right side of the road. 6. One of the flashing arrows on the shoulder should have been flashing a straight bar or four corner dots.

98-100	1. One of the solar powered high intensity lights is not as bright due to being located in the shade. 2. Type III barricade has stripe pattern sloped in the wrong direction. 3. The existing 45 MPH sign and Do Not Pass signs that are in conflict with temporary signs need to be covered. 4. A Type III barricade located on the north side of the structure needs to be reversed so the stripe pattern slopes downward in the direction traffic is to pass. 5. The DE-7C delineators located on the TPCBC need to be turned for yellow side to be on the left side of traffic. 6. The yellow skip lines in the south bound approach to the alt. one-way traffic need to be covered with black tape. 7. The breakaway posts on the construction signs need to be adjusted to the appropriate height.
103-256	1. The DE-7C delineators shall be turned with the yellow side on the left side of traffic.
137-143	2. The high intensity warning lights are solar powered, can be dim on grey days 3. Regular traffic cones were replaced with 42” traffic cones due to better visibility & stability. 4. Have to remove the T.P.C.B.C. to gain access to work site. This resulted in adding an item to relocate the Temp. Impact Attenuation System.
144-179	1. It would be beneficial to the project if someone from the inspection staff as well as lower level contractor staffing (foremen) had training in work zone safety. 2. Standard templates don’t address sharp curves. On ramps could be difficult for long wheeled bases such as tractor trailers.
171-351	1. There were few signs that were scratched, scuffed, and dirty, which reduced their visibility. 2. The vests worn by the contractor's employees are old and non-reflective. Pants are not typically used.

NIGHT REVIEWS

- 42-312, I-84, East Hartford and Manchester
- 92-531/619, I-95/I-91, New Haven
- 96-199, I-84, Newtown, Southbury and Middlebury, CT
- 144-179, Route 25, Trumbull, CT
- 171-351, Bridges in Southington, Hartford, East Hartford and Manchester, CT
- 173-414, Route 15, Hamden, CT

WORK ZONE REVIEW FORM

Project Number: 0042-0312 **District No. 1**
Date: 08/23/2012 **Weather: clear 68° F**

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

Location (Route & Town): I-84 East Hartford, Manchester

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

Prime Contractor: Tilcon Connecticut, Inc

Project Engineer: Paul Carl **Chief Inspector:** Alan Lobaugh

Project Amount: $9,177,264.72 **Percent Complete:** 80%

Calendar Days completed: 74 **Calendar Days Allotted:** 119

Review Participants

Name	Representing
Alan Lobaugh	DOT D1/ Milone & MacBroom
Terri Thompson	CT DOT Office of Construction
Jeff Hunter	CT DOT Office of Construction
Chris	Tilcon CT foreman

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). No queue length at the time of inspection. Inspector says queue dissipates within an hour after lane closures.

3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). None noted at the time of inspection.

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? One "HOV lane closed" sign was a regulatory type sign.

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? No

9) Clear Zone issues: (Y / N) Respond to questions below.

   a. What is the clear zone for this project? 30' or behind deflection of rail system.

   b. Where are materials stored for the project? At the field office or in the gore area of ramps

   c. Where is equipment stored when construction is not in progress? gore areas.

10) Have accommodations been made to account for
   a. Emergency Services – Notified of project.
   b. Pedestrian/ Bike/ ADA issues? N/A Limited access highway

11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain. No, Tilcon has a dedicated work zone crew.

12) Pavement Markings- Temporary
   a. Is there an item for removal of pavement markings, If yes, indicate removal method being used? No, however milling operation is removing markings
   b. Are there conflicting markings? None noted at time of inspection.
   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

   ☒ Local Police Minimum Hourly Requirement: 4 hrs

   ☐ Uniformed Flagger

   Comments from Traffic Control Personnel (indicate type of traffic person): Trooper on jobsite mentioned the need to have training on using moving roadblocks and installing and removing patterns. Visual aids would be helpful.

15) Chief Inspector Comments: Post construction reviews should be conducted between design, consultant and construction more often. No safe place to park vehicles. Foreman in charge of work zone safety for contractor was very good in difficult situations.

16) Project Engineer Comments: Did not attend the review.

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	Throughout the project
Mounting Height	Not measured
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	Yes
Reflectorized/Sheeting Type	Yes (bright fluorescent sheeting)
Project Consistency	Yes however 1 sign used was a regulatory sign.
Need to be covered	No
Temp./Permanent	Temporary

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Cones lane closure length and Drums for taper
Quantity	Did not count
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes, the majority of cones and drums were in good condition.
Reflectorized	Yes
Anchored	No
Consistent throughout project	Spacing too far apart in some instances allow for errant vehicle to enter closed lane

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Not inspected this review
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	
Reflectorized	
Anchored	
Consistent throughout project	
Crash Trucks (TMA) in use? If yes how many and type	

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	Not reviewed
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	Portable and truck mounted flashing hours used. Lights functioning and in correct mode
Location of portable devices – Indicate if in clear zone and how protected.	At the beginning of the taper to the lane closures and on the impact attenuation systems
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	Permanent message signs used. Message was understandable, 2 frames displayed. Time between screens was acceptable.

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

Is there a Transportation Management Plan? If yes, explain. Chief Inspector was not aware of one.

What special provisions are there in contract related to work zone (list item no, description and date of provision)? Limitation of operations, Prosecution and Progress and M&PT.

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 guide books etc. do you reference?
MUTCD and ATTSA guidelines

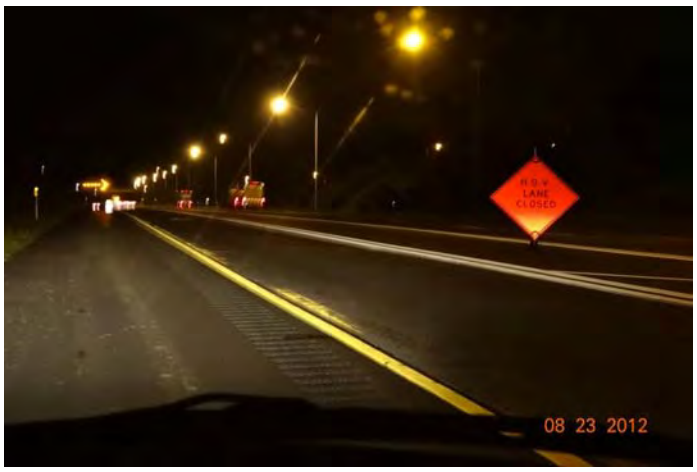
What work zone traffic plans are included in the project?
Just the standard plan sheets.

Has the project had any incident reports filed? Not asked.

Additional Comments:

- Contractor installing alert signs for construction vehicles regarding overhead wires.
- There is no control on the plans. One set of plans actually says 1,000' from start of Gore.
- No issues with state police except one of the troopers should be doing speed enforcement.
- Plans are similar to a Maintenance vendor-in-place contract and plans were part of actual contract with minimal details available.
- Traffic control details should have been more detailed especially for area where merging of Route 15 North with I-384 and I-84 very difficult work zone and should be reviewed.
- A regulatory type sign was used instead of construction sign in one instance and was made by project. Not MUTCD compliant.
- Very difficult to find place to park inspector vehicles during operations.
- Safety meetings should be conducted with subcontractors and also trucking companies, State Police and DOT personnel.
- Portable radios should be utilized by key M&PT personnel.
- Tri-axle trucks used on the jobsite should be equipped with amber lights and or warning signs saying "Construction Vehicle" attached to the back of the tailgate.
- No "HOV lane closed ahead" signs were shown on the plans. One was created by project. These signs should have been incorporated into the project plans and also quantities included for pay item.
- I-84 East direction- Both sides of the highway were not signed. Wide roadway with more than two lanes across. This was especially an issue when no signs were used next to the lane closure. (High speed lane closed no signs in high speed shoulder)
- I-84 East direction "Lane Closed Ahead" sign too close to arrow board and lane closure. Difficult to read and not time to react. Not MUTCD compliant.

- Not enough traffic cones assigned to project item quantity and spacing between cones was too far apart.
- Without some form of stationing or place to put construction stakes or marks it was difficult to track activities and placement quantities for contract pay items or start and end points for work day.



HOV lane sign created by project

Sign too close to lane closure.

Improper sign type- Using regulatory colors (black and white) versus Construction Sign colors (black and orange). Not included in contract

Appears to be waffle board substrate. Poor Retroreflectivity.

Sign with Plywood substrate

Median barrier clamping system for signs and safety sign used by contractor for trucks delivering materials. Good Practice

WORK ZONE REVIEW FORM

Project Number: 0092-0531/0619 **District No. 3A**
Date: 10/25/2011 **Weather: Clear 48° F**

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

Location (Route & Town): I-95 & I-91 Route 34 Interchange (Q Corridor) New Haven

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

Prime Contractor: 92-531 E O&G/Tutor Perini / 92-619 E2 Walsh
Project Engineers: **Chief Inspectors:**
92-531 Dan Stafko **Charlie Johnson (92-531 CE Resident)**
92-619 Bob Savage **Paul Van Olden (92-619 CE Resident)**

Project Amount: $357,104,784.92 **Percent Complete: 8%**

Calendar Days completed: 248 **Calendar Days Allotted: 2135**

Review Participants

Name	Representing
See Attached attendant sheet	

Q&A:

1) Is there clear, positive, understandable guidance through the work zone? Area on Chapel St VMS view obscured. Ramp from 34E to 95 NB unclear that ramp closed until come upon ramp.
2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition). Queue's for pattern set up 95 SB & 95 NB extending beyond advance warning during set up.
3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). Construction personnel only protected by traffic drums/cones on limited access highway. Positive protection at drop off of rail not present.
4) Are there any horizontal/vertical clearance issues? None noted.
5) Are there any permitted load issues? No. Oversize/overweight allowed on I-91/95.
6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? No, Variable Message Sign on 95 SB proximity of State St/ Willow St. (Exit 4 area), portable message sign too close to permanent overhead. Additional comments on attachment.

7) Are all cones, drums, barricades, or other channelization devices acceptable? Not reviewed close up. General scan appears that acceptable sheeting and integrity is there.

8) Are warning lights and devices used for Maintenance and Protection of Traffic? Arrow board on trucks show incorrect display during set up of I-91 SB pattern. Should be flashing arrow during the lane closure process. Once the lane closure is established, the board should then be moved to a four corners or flashing bar.

9) Clear Zone issues: (Y / N) Respond to questions below.

   a. What is the clear zone for this project? 30' from edge of travelway or min. of 3' behind maximum deflection of rail system.
   b. Where are materials stored for the project? Off site in staging areas throughout interchange area.
   c. Where is equipment stored when construction is not in progress? Behind barrier or off road.

10) Have accommodations been made to account for
   a. Emergency Services – have been notified and are aware of the project
   b. Pedestrian/ Bike/ ADA issues? The detour in place does not look like very pedestrian friendly. It should be stressed that local roads and sidewalks either remain accessible or detour, with the proper signage, pedestrians and bicyclists as well.

11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain. Worksite supervisors stated they do not, however supervisors work for the contractors.

12) Pavement Markings- Temporary
   a. Is there an item for removal of pavement markings, If yes, indicate removal method being used? Not reviewed at this time.
   b. Are there conflicting markings? None noted.
   c. Are the temporary markings legible? If night review, comment on visibility
   d. Type of marking material being used. ☒ Tape ☒Paint (non-epoxy) ☒ Epoxy
   Experimental blackout paint on 34 WB flyover ramp from I-95 NB.

13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Hi-O's Class 3

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 hour minimum.

   ☐Uniformed Flagger

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

15) Chief Inspector Comments:

16) Project Engineer Comments: Job briefings are held every night before work begins.

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	Throughout project
Mounting Height	Various depending on permanent or portable using both.
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	Most of the signs are clean and visible however should be reviewed by project.
Reflectorized/Sheeting Type	Both bright fluorescent and type III reflective sheeting
Project Consistency	Fairly consistent however missing signs on detour route.
Need to be covered	No.
Temp./Permanent	Both temporary and permanent construction signs.

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Traffic cones and drums. Cursory review.
Quantity	Numerous, not counted
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	For the most part, yes. Since did not review up close it appeared that most were acceptable.
Reflectorized	Yes.
Anchored	No
Consistent throughout project	For the most part. Did see any that stood out as unacceptable

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Temporary Precast Concrete Barrier Curb
Quantity	Did not count
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Due to the amount of dust delineators were not reflecting properly. Should be cleaned.
Reflectorized	Yes but delineators need to be cleaned.
Anchored	To each other but not to the ground.
Consistent throughout project	Yes.
Crash Trucks (TMA) in use? If yes how many and type	Yes. Two used for moving road block.

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 some permanent mounted construction signs. Did not inventory. The ones that were noted were working High.
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	Both portable and truck mounted in use. No. One was on flashing arrow instead of bar or corners.
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?	Both permanent and portable, however too close together at one location. Did not count number of frames displayed. Timing between screens appeared acceptable.

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

Is there a Transportation Management Plan? If yes, explain.
Yes. An update is due because of completion of projects. Revision (6/2010). Mobility and Identification of responsible parties.

What special provisions are there in contract related to work zone (list item no, description and date of provision)? MP&T, Worksite supervisor, Truck mounted attenuation systems, cones, drums.

Is the project being completed in stage construction? If yes, explain. Multiple stages see plan sheets.

Is there temporary signalization? If yes, explain. None noted at this time.

Is a detour required or being used? If yes, explain. Various detours in place during ramp closures @ I-91/95 interchange and at local roads. Detour for Wooster St closure @ Chapel.

What guides, tools including manuals, pocket guides,books etc. do you reference?
Not covered during this interview.

What work zone traffic plans are included in the project?
Stage construction plans, M&P lane plans, local road plans. Worksite supervisors for contractors develop traffic plan details. Contractors will use plans and TMP for lane closures, pattern development and also use google maps as a tool in developing changes in staging, and sequence of construction. Need to look at ways to do some work during daytime hours by widening road, traffic shifts and or detours to accommodate construction activities. Example is work of excavator next to residential area using bright lights and issues with noise levels. Contractors expressed concerns about motorists continually speeding through the workzones. Inadequate notice of ramp closures 34 East bound to I-91 Northbound and no detour was posted for this closure.

WORK ZONE REVIEW FORM

Project Number: 96-199 **District No.** 4
Date: August 29, 2012 **Weather:** Clear

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

Location (Route & Town): Route I-84, Newtown, Southbury, and Middlebury

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

Prime Contractor: Tilcon Connecticut, Inc.

Project Engineer: Dave Neelands **Chief Inspector:** Mohammed Khadeer

Project Amount: $8,282,141.00 **Percent Complete:** 57%

Calendar Days completed: 67 Days **Calendar Days Allotted:** 117 Days

Review Participants

Name	Representing
Mohammed Khadeer	DOT – Dist. 4
Ryan Wodjenski	DOT – Dist. 4
Terri Thompson	DOT - OOC
Jeff Hunter	DOT - OOC
Bonney Whitaker	DOT - OOC
Scott Wassmann	DOT - Traffic
Robert Turner	FHWA
Steve Tuxbury	Tilcon Connecticut
Jamie Sirica	Tilcon Connecticut

Q&A:

1) Is there clear, positive, understandable guidance through the work zone? Yes, except shoulder is not delineated with temporary tape. Additional signs were added to the contract. (See comments on page 4).

2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition). Lane closure resulted in a queue of about 1.5 miles with a 20 minute traffic delay.

3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). None noticed.

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. There is a dedicated person to check signs throughout the night.

7) Are all cones, drums, barricades, or other channelization devices acceptable? Some of the drums and cones appear to be marginal.

8) Are warning lights and devices used for Maintenance and Protection of Traffic? Remote controlled changeable message signs.

9) Clear Zone issues: (Y / N) Respond to questions below.

   a. What is the clear zone for this project? Form 816, Section 1.07.07, 30' from edge of traveled way applies to this project.
   b. Where are materials stored for the project? Off Exit 15, out of the clear zone.
   c. Where is equipment stored when construction is not in progress? Crash trucks - same as "b" above. Pavers & rollers - stored at closest exit ramp from end of paving area.

10) Have accommodations been made to account for
   a. Emergency Services – No
   b. 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
   a. Is there an item for removal of pavement markings? If yes, indicate removal method being used? No. Pavement marking removed during milling operations.
   b. Are there conflicting markings? No
   c. Are the temporary markings legible? If a night review, comment on visibility. Acceptable
   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

   ☒ Local Police Minimum Hourly Requirement: 4 hours minimum

   ☐ Uniformed Flagger

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

15) Chief Inspector Comments: It is time consuming for inspector to order State Police. Also, speeding trucks at night are an issue.

16) Project Engineer Comments: Not available for review.

[Traffic Control Device Inspection- PART II

Table A – Signs

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

Table B – Traffic control Devices

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

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Traffic drums & 42" traffic cones
Quantity	Not counted. Additional drums & cones added to contract.
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Some drum and cones were noted to be marginal and needing to be replaced.
Reflectorized	Yes
Anchored	N/A
Consistent throughout project	Yes
Crash Trucks (TMA) in use? If yes how many and type	Yes

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	High intensity warning lights. All functioning.
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	Truck mounted flashing arrows. One of the flashing arrows on the shoulder should have been flashing a straight bar or four corner dots.
Location of portable devices – Indicate if in clear zone and how protected.	I-84 W: Beyond edge of pavement. I-84E: In gore area at Exit 13.
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	Using both permanent and portable message signs.

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

Is there a Transportation Management Plan? If yes, explain. Yes, a TMP was put in place due to the high traffic volumes on Interstate 84 within the project limits. However, the project personnel were not aware that a TMP had been prepared for this project.

What special provisions are there in contract related to work zone (list item no, description and date of provision)?
Item #0970006A – Trafficperson (Municipal Police Officer), Rev. 1/2008
Item #0970007A – Trafficperson (Uniformed Flagger), Rev. 1/2008
Item #0971001A – Maintenance & Protection of Traffic, Rev. 12/15/11
Item #1131002A – Remote Controlled Changeable Message Sign, Rev. 12/02/02
Item #1220013A – Construction Signs – Bright Fluorescent Sheeting, Rev. 10/7/11

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. The contractor would prefer a detour be put in place so ramps could be closed for construction activity.

What guides, tools including manuals, pocket guides, books etc. do you reference?
MUTCD and ATSSA Guide to Temporary Traffic Control in Working Zones

What work zone traffic plans are included in the project? Traffic Sheet Nos. TR_1220_01 & TR_1220_02.

Has the project had any incident reports filed? Yes How many? 3

Contractor comments:
- Paving the ramps is problematic. The ramps are too narrow to safely accommodate for a work area and traffic. The contractor would like to be able to close the ramps in order to perform milling and paving.
- The quantity of cones provided in the contract is insufficient.
- Placing traffic drums for short duration is difficult, but safer.

General comments:
- Good job on placement of extra traffic cones in ramp area.
- Highway Operations stated project is consistent with calling in for message boards.
- Shoulder area was not delineated with temporary tape as specified in the contract. (See question 1).
- A “Motorcycles Use Caution” sign was placed on the left side of the road. The same sign needs to be placed on the right side of the road.
- “Motorcycles Use Caution”, “Bump Ahead” and “Milled Pavement Ahead” signs had to be added to the contract for better public guidance.

WORK ZONE REVIEW FORM

Project Number: 0144-0179 **District No.** 3
Date: 06/12/2012 **Weather:** Cloudy & Rain

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

Location (Route & Town): Route 25, Trumbull

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

Prime Contractor: Manafort Brothers, Inc.

Project Engineer: Steven Hebert **Chief Inspector:** Dave Speerli

Project Amount: $17,496,965.65 **Percent Complete:** 23%

Calendar Days completed: 124 **Calendar Days Allotted:** 519

Review Participants

Name	Representing
Bonney Whitaker	DOT O.Q.A.
Steven Hebert	DOT District No. 3
Nick Ozkan	DOT O.Q.A.
Dave Speerli	Amman Whitney
Edwin Brown	DOT Traffic
Jeff Hunter	DOT O.O.C.

Q&A:

1) Is there clear, positive, understandable guidance through the work zone? Yes, Contractor and Inspection team have done a good job with the signing pattern.
2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition). Traffic flow very smooth, no queue length, speed through the work zones was less that posted speed.
3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). None noted.

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 all signs reviewed were acceptable.

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? No.

9) Clear Zone issues: (Y / N) Respond to questions below.

   a. What is the clear zone for this project? 30' from edge of travel way.

   b. Where are materials stored for the project? In the median and also along roadway outside of clear zone in both instances.
   c. Where is equipment stored when construction is not in progress? Same as b. above.

10) Have accommodations been made to account for
   a. Emergency Services – Notified at beginning of project.
   b. Pedestrian/ Bike/ ADA issues? Limited access highway therefore no issues.

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 very good, but inspector noted that this was important from the onset and contractor has been good at keeping up.
12) Pavement Markings - Temporary
   a. Is there an item for removal of pavement markings, If yes, indicate removal method being used? Yes and the method is grinding.
   b. Are there conflicting markings? None noted.
   c. Are the temporary markings legible? If night review, comment on visibility
   d. Type of marking material being used. ☐ Tape ☒ Paint (non-epoxy) ☐ Epoxy

   Note: Existing plastic pavement markings are an issue with diamond grinding.
13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Not reviewed on this inspection.

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: Standard Templates don't address Tangents especially on ramps could be difficult if tractor trailers were present. Project specific lane closures should be submitted for the 90% plan review. On numerous projects have encountered crash truck hours to be insufficient. Traffic cones for lane closures on limited access highways have insufficient weight to keep them from blowing over, constantly required to pick up cones.

16) Project Engineer Comments:

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	Throughout project
Mounting Height	Acceptable
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	Yes all signs were clean and legible. No night review performed so reflectivity not reviewed.
Reflectorized/Sheeting Type	Bright Fluorescent sheeting
Project Consistency	Very good
Need to be covered	No
Temp./Permanent	Temporary

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Traffic Drums for temporary lane closures.
Quantity	Did not count.
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes the majority were clean and visible.
Reflectorized	Yes
Anchored	No
Consistent throughout project	Yes

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Temporary Precast Concrete Barrier Curb
Quantity	Around 300' reviewed
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes.
Reflectorized	Delineators attached to barrier are.
Anchored	To each other.
Consistent throughout project	Yes
Crash Trucks (TMA) in use? If yes how many and type	Approximately 5 portable impact attenuation trucks.

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	Not reviewed.
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	Some portable and some truck mounted all but one unit had all lights functioning. The other one had one bulb out. All were in correct mode.
Location of portable devices – Indicate if in clear zone and how protected.	Portable flashing arrows were located with the signing pattern at the proper locations.
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	Changeable message signs were used, they were portable with 2 frames displayed and the timing between frames was good.

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)? Construction Signs, MP&T, and Traffic persons

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

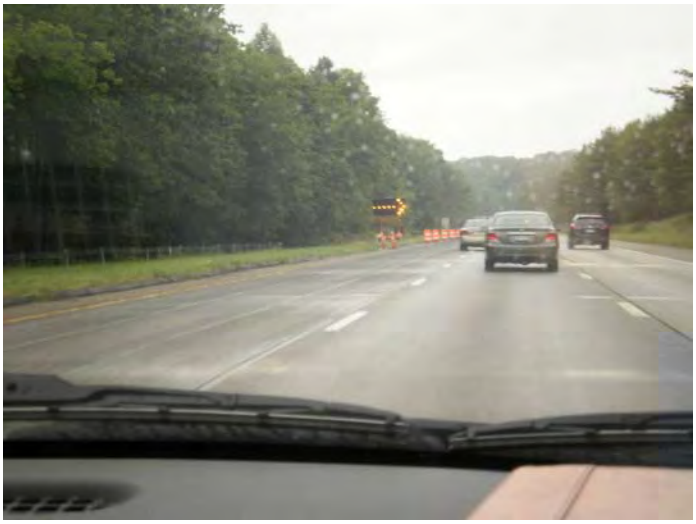
Is there temporary signalization? If yes, explain.
No.

Is a detour required or being used? If yes, explain.
Yes, detours will be utilized on the interchange ramps with Route 15 as outlined in the MP&T specifications.

What guides, tools including manuals, pocket guides,books etc. do you reference?
ATTSA guidelines for Work Zone Safety Devices, 2011 MUTCD
What work zone traffic plans are included in the project?
No special plans other than the detours mentioned above for the interchange ramps.

General Comments.

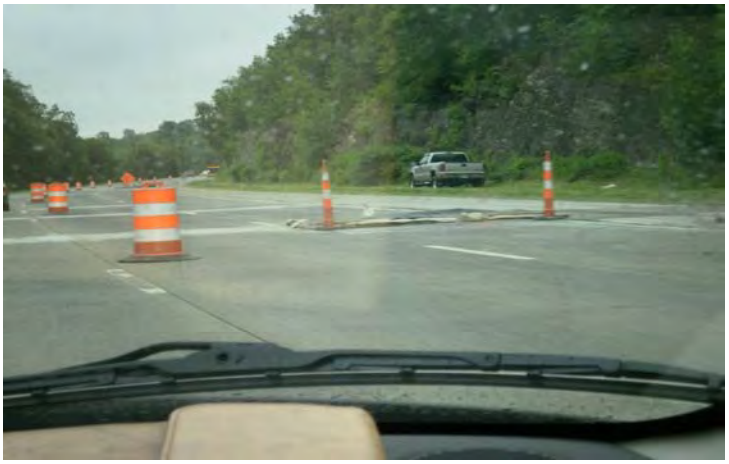
1) At times the traffic becomes so light that workers can become complacent when a vehicle does enter the work zone.
2) Overhead costs for local police are getting to be very costly and should be reviewed.
3) There should be discussions to transferring state trooper ordering back to the contractors.
4) Traffic pattern templates for shoulder closures should be reviewed and updated.
5) It would be beneficial to the project if someone from the inspection staff as well as lower level contractor staffing (foremen) had training in work zone safety.



Beginning of Signing Pattern Route 25 Northbound

Signs used throughout sign pattern to reinforce lane closure

Proper space provided for exit ramp



Sign in the distance and impact attenuation vehicle in the background with proper signal

WORK ZONE REVIEW FORM

Project Number: *171-351* **District No.** *1*
Date of field review: *9/11/12* **Weather:** *Clear ~60F, Nighttime*

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

Location (Route & Town): *Various*

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

Prime Contractor: *Arborio Corp.*

Project Engineer: *Joe Sullivan* **Chief Inspector:** *Rich Balzarini*

Project Amount: *$1,529,995.00* **Percent Complete:** *70%*

Calendar Days completed: *171* **Calendar Days Allotted:** *152*

Review Participants:

Name	Representing
Rich Balzarini	*OOC - District 1, Project Inspector*
Bonney Whitaker	*OOC - OQA*
Jeff Hunter	*OOC*
Nick Mandler	*OE - Traffic*
Doug Harz	*OOC - OQA*
Nick Ozkan	*OOC - OQA*

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)**. *To date, work has been done primarily on the off ramps. Generally, light traffic conditions. Initially, when signs go up, some queue would occur. Thereafter, smooth flowing.*

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?** *Yes*

8) **Are warning lights and devices used for Maintenance and Protection of Traffic?**
Didn't use lights – only diamond warning signs have been used for shoulder work

9) **Clear Zone issues: (Y / N) Respond to questions below.**

   a. **What is the clear zone for this project?** *Per Form 816, the clear zone for equipment storage is 30' from travel way.*

   b. **Where are materials stored for the project?** *Commuter Parking Lot.*

   c. **Where is equipment stored when construction is not in progress?** *Commuter Parking Lot.*

10) **Have accommodations been made to account for**
   a. **Emergency Services –** *When Br. #1469A on I-91 NB had to be closed for a weekend, notifications were sent out via e-mail to contact people and press releases were made for the weekend detour. This was only a one time occurrence for the project.*

   b. **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**
   a. **Is there an item for removal of pavement markings, If yes, indicate removal method being used?** *No.*
   b. **Are there conflicting markings?** *No*
   c. **Are the temporary markings legible? If night review, comment on visibility** *N/A*
   d. **Type of marking material being used. ☐ Tape ☐ Paint (non-epoxy) ☐ Epoxy** *N/A*

13) **Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain.** *No. Hard hats are used, however, the vests worn by the employees are old and reflective, and pants are not typically used.*

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:** *Hartford Police ($488/8 hrs. for Police Officer and $ 672/8 hrs. for a Sgt., when more than 3 officers are on duty.) There are no additional charges for administration.*

   ☐**Uniformed Flagger** - *this item is not used.*

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

15) **Chief Inspector Comments:** *No primary issues. The inspector noted that he did not feel the "ITEM #0973723A – WORKSITE TRAFFIC SUPERVISOR" item was warranted for this project.*

During times, when one of the two Crash Trucks did not have a driver, the contractor was paid partially for the truck without the driver by the inspector.

16) **Project Engineer Comments:** *Was not in attendance.*

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	*Construction*
Location	*Throughout project*
Mounting Height	*Acceptable*
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	*Signs were clean and visible*
Reflectorized/Sheeting Type	*Type III reflective sheeting*
Project Consistency	*Very Good*
Need to be covered	*No*
Temp./Permanent	*Temporary*

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	*Traffic Drums for Temporary Lane Closures*
Quantity	*Not counted*
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	*Majority were clean and visible*
Reflectorized	*Yes*
Anchored	*No*
Consistent throughout project	*Yes*

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	*TPCBC/Barricades were not used on this project*
Quantity	_
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	_
Reflectorized	_
Anchored	_
Consistent throughout project	_
Crash Trucks (TMA) in use? If yes how many and type	*2 trucks, typically, one manned.*

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	*None were used* *The project provided for High Intensity Warning Lights*
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	*Yes* *Truck mounted* *Yes*
Location of portable devices – Indicate if in clear zone and how protected.	*Off travel way, in delineated areas*
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	*Since the State's Permanent Changeable Message were utilized, the project's temporary signs were not used, as the field personnel felt that the Portable Message signs would be superfluous*

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)?
#0970006A - Traffic person (Municipal Police Officer) (1/2008)
#0970007A – Traffic person (Uniformed Flagger) (1/2008)
#0979003A – Construction Barricade Type III (1/17/01)
#1131002A – Remote Control Changeable Message Sign (12/02/02)
#1220013A – Construction Signs- Bright Fluorescent Sheeting (1/17/01)
#0971001A – MP&T (4/13/2011)
#0973723A – Worksite Traffic Supervisor (no date)

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

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

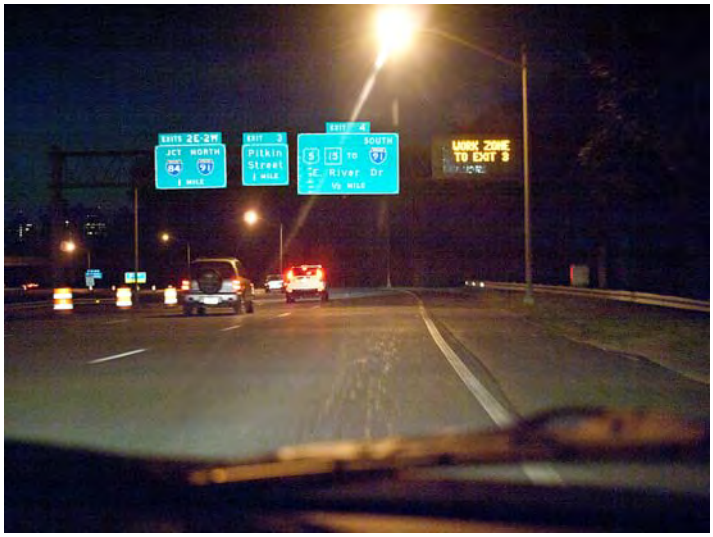
Is a detour required or being used? If yes, explain. Yes, a weekend closure, which entailed a detour, was required to replace the joints. *See #10 above.*

What guides, tools including manuals, pocket guides, books etc. do you reference? *The project plans were primarily used.*

What work zone traffic plans are included in the project? T*ypical Traffic Control Plans.*

Has project had any incident reports filed? *No.*

How many? *NA*


EXIT 2
Pilkin
Street
1 MILE
EXIT 4
SOUTH
River
Dr
WORK ZONE
TO EXIT 5


ROAD
WORK
AHEAD


ROAD
WORK
AHEAD

WORK ZONE REVIEW FORM

Project Number: 0173-0414 **District No. 3**
Date: 09/12/2011 **Weather: Clear 70° F**

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

Location (Route & Town): Route 15 Southbound, Hamden

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

Prime Contractor: New England Road Inc.

Project Engineer: Jeffrey Knapp **Chief Inspector:** Chukwuekezie Ezigbo

Project Amount: $1,811,110.00 **Percent Complete: 17%**

Calendar Days completed: 58 **Calendar Days Allotted: 261**

Review Participants

Name	Representing
Jeffrey Knapp	District 3 Construction
Chukwuekezie Ezigbo	District 3 Construction
Matthew Bishop	District 3 Construction
Greg Shaffer	DOT Office of Construction
Jeffery Hunter	DOT Office Of Construction

Q&A:

1) Is there clear, positive, understandable guidance through the work zone? Yes, however two pre warning signs installed were not Bright Fluorescent sheeting.
2) What is the overall condition of traffic flow through the work zone? (Include queue length and speed limit, roadway condition). Very good. Initial queue time (to get through work zone) was around 10 minutes. Traffic had dissipated within 1.5 hours.
3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). As per office of Traffic, since only traffic drums separate construction personnel from the traveling motorists this constitutes a hazard.
4) Are there any horizontal/vertical clearance issues? No.

5) Are there any permitted load issues? No. Trucks are not allowed on this limited access road.

6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? Yes, except two, which were changed over before the end of the night.

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? No

9) Clear Zone issues: (Y / N) Respond to questions below.

   a. What is the clear zone for this project? Workers on limited access highway protected by crash truck and traffic drums. Therefore the clear zone is about 1 foot.
   b. Where are materials stored for the project? Offsite

   c. Where is equipment stored when construction is not in progress? Offsite

10) Have accommodations been made to account for
   a. Emergency Services – Aware of the project
   b. Pedestrian/ Bike/ ADA issues? N/A Limited Access highway.

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
   a. Is there an item for removal of pavement markings, If yes, indicate removal method being used? No
   b. Are there conflicting markings? No
   c. Are the temporary markings legible? If night review, comment on visibility N/A
   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. Some of the workers for the contractor were not wearing the proper reflective apparel for limited access highways

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: None at this time

16) Project Engineer Comments: Did not Interview

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	Route 15 SB Right Lane & Shoulder, Hamden
Mounting Height	Not measured but appeared correct for Temporary signs.
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	
Reflectorized/Sheeting Type	Yes, Bright Fluorescent (Except two)
Project Consistency	Except Two which were changed promptly.
Need to be covered	No
Temp./Permanent	Temporary

Table B – Traffic control Devices: Cones and Drums

Requirement	Comment
Type & Placement	Traffic Drums
Quantity	Over 50
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes only two traffic drums were borderline.
Reflectorized	Yes
Anchored	No
Consistent throughout project	Yes

Table C - Barricades and other channelization devices

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

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 warning lights on signs
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	Portable, notified inspector that one bulb was out. Flashing arrow was operating in correct mode.
Location of portable devices – Indicate if in clear zone and how protected.	VMS was outside of the clear zone but hard to see within reasonable time frame. Tried to move to better location.
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	Portable. Due to work site hard to find acceptable location for the VMS. However Contractor is making attempt to locate a better area for placement.

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)? Standard Items.

Is the project being completed in stage construction? If yes, explain.
Yes. Replace half of the bridge joint in the travel lane and shoulder one night and then replace the high speed lane and shoulder at a later date.

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? Contract.

What work zone traffic plans are included in the project? MP&T plans.

Notes: Reviewed issues with the Project Engineer and agreed to show field review with inspector Matthew Bishop. During field review noticed that construction signs for the on ramp were not installed. Matt discussed issues with contractor and they were taken care of in a timely manner that evening.

Type III Reflective sheeting (left) Versus Bright Fluorescent Sheeting

Again Mixed Sheeting types Bright Fluorescent (background) versus Type III first sign.

Ramp signs not installed; Again notice Type III versus Bright Fluorescent Sheeting.

Initial Queue of traffic just after signing pattern was set up.

DETOUR REVIEWS

- 79-215, Route 71, Meriden, CT
- 84-102, Route 25, Monroe, CT

WORK ZONE REVIEW FORM

Project Number: 79-215 **District No.** 4
Date: 11/30/12 **Weather:** Clear, 41°

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

Location (Route & Town): Route 71 (Cook Ave.) over Harbor Brook, Meriden

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

Prime Contractor: Dayton Construction Co., Inc.

Project Engineer: Ali Farzan **Chief Inspector:** Rich Rudaitis

Project Amount: $2,396,603.47 **Percent Complete:** 93%

Calendar Days completed: 214 **Calendar Days Allotted:** 230

Review Participants

Name	Representing
Rich Rudaitis	District 4
Kevin LaRosa	District 4
Brien Smith	Office of Traffic
Bonney Whitaker	Office of Construction

Q&A:

1) Is there clear, positive, understandable guidance through the work zone? Yes, with detour around work zone in place.

2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition). Traffic is detoured around the work zone onto Route 70. There are no traffic issues at the work site or on Route 70 with the detour.

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? Yes

8) Are warning lights and devices used for Maintenance and Protection of Traffic? Yes. Additional high intensity warning lights were added to Type III barricades at both ends of the bridge.

9) Clear Zone issues: (Y / N) Respond to questions below.
   a. What is the clear zone for this project? Work area at bridge is closed to traffic and protected by temporary precast barrier curb.
   b. Where are materials stored for the project? At trailer site
   c. Where is equipment stored when construction is not in progress? Behind barrier at the work site

10) Have accommodations been made to account for
   a. Emergency Services – Police, fire department and schools were involved in meetings. The town also notified those concerned by email.
   b. Pedestrian/ Bike/ ADA issues? A temporary sidewalk and temporary pedestrian bridge around the work zone was installed.

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
   a. Is there an item for removal of pavement markings? If yes, indicate removal method being used. N/A
   b. Are there conflicting markings? N/A
   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

☒ Local Police Minimum Hourly Requirement: 4 hour minimum
Administrative expense: 10%

☐ Uniformed Flagger

Comments from Traffic Control Personnel (indicate type of traffic person): Not being used at this time.

15) Chief Inspector Comments: None

16) Project Engineer Comments: Not present

Traffic Control Device Inspection- PART II

Table A – Signs

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

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Not reviewed during this inspection
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	
Reflectorized	
Anchored	
Consistent throughout project	

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Type III barricades at North & South ends of bridge
Quantity	12 each
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	There is noticeable loss of reflectivity and obvious color fading on 4 barricades.
Reflectorized	High intensity warning lights added to barricades.
Anchored	Yes
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?	Barricade warning lights used on construction detour signs. Project added additional warning lights to Type III barricades used to close the bridge. High intensity.
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)?

0970006A Trafficperson (Municipal Police Officer), Rev. 1/2008
0970007A Trafficperson (Uniformed Flagger), Rev. 1/2008
0979003A Construction Barricade Type III, Rev 1/17/01
1220011A Construction Signs - Type III Reflective Sheeting, Rev. 1/17/01

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. Yes, a detour is required to allow for the reconstruction of the bridge.

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

What work zone traffic plans are included in the project? Detour Plan – 1 and Detour Plan – 2.

Has the project had any incident reports filed? No

Comments:

1. There were four Type III construction barricades that were faded and not providing appropriate reflectivity. The project added high intensity barricade warning lights to the Type III barricades.
2. The stripes of four Type III barricades were sloping in the wrong direction. Stripes should slope downward in the direction traffic is to pass.
3. On the detour signs, the "1" in Route 71 appeared to be grey and not matching the black color as the rest of the letters on the signs.

Type III barricades and signs placed at south end of bridge. Barricade stripes should all be sloping downward in the direction traffic is to pass (in this case to the left) and be retroreflective.

Temporary pedestrian bridge installed around the work zone.

Sign pattern for the road closure at north end of bridge Barricades were moved to allow for construction equipment access. Barricade stripes should all be sloping downward to the left.

Sign No. 80-9929 to inform the public of the bridge closure. In accordance with Note 9 on the plans, this sign should have been removed once the detour was in effect.

WORK ZONE REVIEW FORM

Project Number: 0084-0102 **District No. 4**
Date: 11/08/2011 **Weather: Sunny/65° F**

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

Location (Route & Town): Route 25 Monroe, CT

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

Prime Contractor: Dayton Construction Company Inc.

Project Engineer: Charles Murad **Chief Inspector: Kenneth Rekrut**

Project Amount: $4,200,274.63 **Percent Complete: 39%**

Calendar Days completed: 213 **Calendar Days Allotted: 457**

Review Participants

Name	Representing
Robert Rameriz	Federal Highway Administration
Robert Turner	Federal Highway Administration
Anthony Kwentoh	CT DOT Office of Construction
Philip Cohen	CT DOT Office of Traffic
Kenneth Rekrut	DeCarlo & Doll
Oddler Fils	CT DOT Office of Traffic
Jeff Hunter	CT DOT Office of Construction
Scott Smigel	DeCarlo & Doll

Q&A:

1) Is there clear, positive, understandable guidance through the work zone? No, there are missing or worn pavement markings that need to be addressed. Temporary line striping needs to be refreshed prior to winter shutdown. Local police do not take the place of proper work zone signing patterns. Please see contract MP&T provisions for proper guidance.
2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition). There is a lunchtime queue, length was not measured. Queue cleared up within 45 minutes. See Photo page 10.
3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). Yes, on a town road that is being utilized for a detour there is a drop-off due to incomplete drainage work. Utility poles also need removal.

4) Are there any horizontal/vertical clearance issues? Since detour was on local roads horizontal clearance issues needed to be managed. One vertical issue due to utility pole leaning into town road. See photo on page 9.

5) Are there any permitted load issues? Yes, since detour is on town roads, however to date no permits have been requested.

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? Some cones on site do not meet specification requirements. See photos pages 7 & 8.

8) Are warning lights and devices used for Maintenance and Protection of Traffic? Yes, warning lights are located on detour signs.

9) Clear Zone issues: (Y / N) Respond to questions below.

   a. What is the clear zone for this project? 30' or behind deflection of Metal Beam Rail.

   b. Where are materials stored for the project? In a laydown area near the work area, however some materials are too close to roadway see photo on page 8.
   c. Where is equipment stored when construction is not in progress? See b above.

10) Have accommodations been made to account for
   a. Emergency Services – Fire and Rescue are aware of detour on project and are notified of any changes.
   b. Pedestrian/ Bike/ ADA issues? There are pedestrian/bike issues that were not addressed during design, however not really very many bicyclists or pedestrians utilize the road.

11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain. Most of the time the contractor takes care of issues requested, however not always in a timely manner.

12) Pavement Markings- Temporary
   a. Is there an item for removal of pavement markings, If yes, indicate removal method being used? Eradication done by grinding
   b. Are there conflicting markings? None noted.
   c. Are the temporary markings legible? If night review, comment on visibility. Temporary pavement markings need to be reapplied before winter shutdown.
   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

☒Local Police Minimum Hourly Requirement: 4 hours for either service

☒Uniformed Flagger

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

15) Chief Inspector Comments: Old utility poles have not been removed yet see photos pages 9 & 10. Recent weather conditions have delayed this work. Eight foot cut has caused some challenges in maintaining commercial business access. Also some challenges with maintaining access to medical offices due to design/staging of project.

16) Project Engineer Comments:

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	Throughout project
Mounting Height	Okay
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	Yes
Reflectorized/Sheeting Type	Both Bright wide angle & Type III construction
Project Consistency	Acceptable
Need to be covered	If detour not in use or signs left in place over winter, yes.
Temp./Permanent	Both temporary and permanent

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Traffic Cones
Quantity	Over 25
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	No, numerous cones were not up to Conn DOT Standards. See photos pages 7 & 8
Reflectorized	Around Half. See photos page 7 & 8
Anchored	No
Consistent throughout project	No

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Not reviewed during this inspection
Quantity	
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	
Reflectorized	
Anchored	
Consistent throughout project	
Crash Trucks (TMA) in use? If yes how many and type	

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 construction detour signs. Not a focus of this field review.
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	Not an item on this project.
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?	Not used at time of inspection. 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)? Temporary signalization items.

Is the project being completed in stage construction? If yes, explain.
Yes, traffic detoured to complete ledge blasting and eight foot cut in roadway.

Is there temporary signalization? If yes, explain.
Yes, detour in effect for portion of route 25 closed during blasting of ledge and cut in roadway. Temporary Signalization needed for Route 25 traffic routed onto town road which needed to make a left turn movement in the detour route.

Is a detour required or being used? If yes, explain.
Yes, detour required for cut in roadway and ledge removal.

What guides, tools including manuals, pocket guides, books etc. do you reference?
Contract plans.
What work zone traffic plans are included in the project?
Maintenance and Protection of Traffic Plans and the Detour Plans.

See Attached Winter shutdown punch list of work zone safety issues and Photos

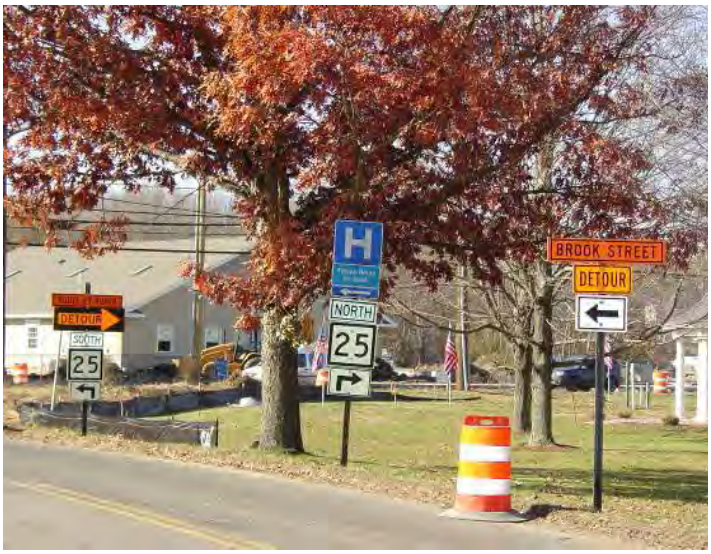
Project No. 84 – 102
Intersection Improvements Along Route 25
Monroe, CT
Work Zone Safety Review
Weather: dry & sunny, ± 60º F

On Tuesday November 8, 2011, the Offices of Traffic Engineering, Construction, FHWA, and the project chief inspector performed a safety review of the project. The following punch list items should be addressed prior to winter shutdown.

1. While the detour is not in effect, change the temporary signal at Green Street to flash red all-way to avoid unnecessary back-ups on Green Street. If the detour is no longer required, please remove the temporary traffic signal.
2. While the detour is not in effect, cover the detour signs. Remove the detour signs when the detour is no longer required.
3. Please clear all overgrown brush from interfering with sight of construction signs.
4. Many of the traffic drums and cones are visibly worn and should be replaced.
5. There were many traffic cones noted on the jobsite that do not conform to current DOT standards. Please remove and replace with proper traffic cones as needed.
6. Replace temporary pavement markings throughout the project limits including stop bars at the intersections.
7. It is recommended that epoxy be used as temporary pavement markings during the winter shut-down.
8. There were multiple roadside hazards during the safety inspection (concrete blocks, material piles, construction equipment, etc.) All fixed objects must be protected, removed, or located outside of the clear zone.
9. The drop off by the newly installed culvert end on the town road needs to be addressed.
10. While it is understood that utility companies have been busy on storm clean-up phone calls should be made to continue emphasis on removal of utility poles that need to be removed.
11. The utility pole located on the town road by the cemetery is leaning significantly into the roadway. It appears that it has already been hit once. Some sort of warning should be placed to alert commercial trucks of this hazard. The utility company in charge of this pole should be notified of this issue.
12. All construction signs must be mounted on breakaway posts. Breakaway post height needs to be reviewed and corrected if not in conformance with the plans. It appeared that the spacer bars were not installed; if this is a new design then supporting documentation should be provided by the contractor.
13. Refer to the Traffic Control Plans included in the Maintenance and Protection of Traffic special provision for typical traffic control applications showing proper signing pattern.
14. At sawcut locations (driveway aprons and side streets), create smooth transitions to negate bumps. This is a particular concern for winter conditions.
15. All raised manholes and catch basins should be leveled (flushed) with the roadway. This is also a concern for winter conditions. If leveling cannot be obtained then contractor needs to make roadway safe for plowing purposes.

Oddler Fils - Office of Traffic Engineering
Jeff Hunter - Office of Construction

Improper breakaway post height.



Abundant Signs

Overgrown brush blocking view of sign.

Missing or faded Stop Bar

Material too close to Roadway

Utility Pole leaning; town road used for detour.

Numerous Issues.

Impact Attenuation System protecting utility poles.

Lunchtime Traffic Queue. Utility pole requiring removal

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TEMPORARY SIGNALIZATION REVIEWS

- 59-155, Route 77, Guilford, CT
- 67-115, Route 341, Kent, CT
- 98-100, Route 17, North Branford, CT

WORK ZONE REVIEW FORM

Project Number: 59-155 **District No. 2**
Date: 07/21/11 **Weather: Hot & Humid 92° F**

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

Location (Route & Town): Route 77 (Durham Road) Guilford, CT

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

Prime Contractor: Brunalli Construction Co

Project Engineer: Paul Andruskiewicz **Chief Inspector: John DiBiagio**

Project Amount: $1,087,746.00 **Percent Work Complete: 48%**

Calendar Days completed: 144 **Calendar Days Allotted: 300**

Review Participants

Name	Representing
John DiBiagio	CT DOT Construction D2
Jeff Hunter	CT DOT OOC
Mike Chachakis	CT DOT Traffic
Kiah Patten	CT DOT OOC

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). No Queue length, traffic flow smooth, road conditions good.
3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). No. All Temporary precast barrier curb protected by impact attenuation systems.

4) Are there any horizontal/vertical clearance issues? 14 foot width with shoulders.
No vertical clearance issues.
5) Are there any permitted load issues? No weighted load restrictions

6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? Yes all signs are acceptable.

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, on all permanent construction signs except legal signs.
9) Clear Zone issues: (Y / N) Respond to questions below.

   a. What is the clear zone for this project? 30' or behind temporary barrier

   b. Where are materials stored for the project? Behind TPCBC or in the parking lot of the field office.
   c. Where is equipment stored when construction is not in progress?
   Behind TPCBC or in the field office parking lot.
10) Have accommodations been made to account for
   a. Emergency Services – Emergency Services were notified at the beginning of the project.
   b. Pedestrian/ Bike/ ADA issues? No special accommodations were made however, the lane width is 14' which provides enough room. Usually stage construction calls for 11' lane width.
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 very good and responsive.

12) Pavement Markings- Temporary
   a. Is there an item for removal of pavement markings, if yes, indicate removal method being used? Yes, grinding and black tape are used.
   b. Are there conflicting markings? Yes, stage change occurred day before, work remains.
   c. Are the temporary markings legible? If night review, comment on visibility N/A
   d. Type of marking material being used. ☒ Tape ☒Paint (non-epoxy) ☐ Epoxy
   Epoxy will be used if project extends through winter.
13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Yes, wearing proper reflective 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: 4 hr & After 4 hrs Next is 8 hrs

   ☒Uniformed Flagger Minimum hourly requirement is 4 hrs.

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

15) Chief Inspector Comments: Design did not take into consideration boat launch area. During the stage where traffic is located next to boat launch area, it is very difficult, if not impossible, for vehicles with boat trailer to make a right turn.
16) Project Engineer Comments: Not present.

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	Pre warning
Mounting Height	Rural setting, no sidewalks
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	Yes all signs are in very good condition.
Reflectorized/Sheeting Type	Yes/ Type III Bright Wide Angle
Project Consistency	Very good
Need to be covered	No. See comment below
Temp./Permanent	Construction Signs are permanent

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Type III Barricades Open end of Barrier
Quantity	1
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes
Reflectorized	Yes
Anchored	No
Consistent throughout project	Yes

Table C - Barricades and other channelization devices

Requirement	**Comment:** Temporary Precast Concrete Barrier Curb
Type & Placement	See above/ on bridge for stage construction
Quantity	320 +/- Linear feet
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes
Reflectorized	DE 7 Delineators
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. Warning lights on temporary signalization signs (permanent mounted) Yes High
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	Not used on project.
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?	Not used at the time of review.

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)? MP&T plans and stage construction plans.

Is the project being completed in stage construction? If yes, explain. Yes, one side of bridge is replaced and then switch over and complete the other side.

Is there temporary signalization? If yes, explain. Yes. Bridge is being constructed in two phases, with one way alternating traffic controlled by temporary signals.

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

What guides, tools including manuals, pocket guides, books etc. do you reference?
Plans and the contract documents.

What work zone traffic plans are included in the project? MP&T plans and stage construction plans.

Stage construction with temporary precast concrete barrier curb with delineators.

Boat launch in close proximity to stage construction.

Temporary signalization construction sign high intensity warning light.

Conflicting pavement markings original was eventually covered with tape.

WORK ZONE REVIEW FORM

Project Number: 0067-0115 **District No. 4**
Date: 06/29/2011 **Weather: Clear / 84**

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

Location (Route & Town): Route 341 - Kent

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

Prime Contractor: Dayton

Project Engineer: Matthew Cleary **Chief Inspector:** Daniel Paton

Project Amount: 1,761,540.00 **Percent Work Complete:** 60%

Calendar Days completed: 167 **Calendar Days Allotted:** 222

Review Participants

Name	Representing
Daniel Paton	CT DOT District 4
Brett Stoeffler	CT DOT Traffic
Jeff Hunter	CT DOT OOC
Kiah Patten	CT DOT OOC

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). No Traffic Issues

3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). One TPCBC that needs to be addressed.

4) Are there any horizontal/vertical clearance issues? 11' Lanes due to stage construction. No Vertical issues
5) Are there any permitted load issues? Yes, wide load issues until stage construction complete.

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.

   a. What is the clear zone for this project? 30' or behind protective system

   b. Where are materials stored for the project? At the project field office.

   c. Where is equipment stored when construction is not in progress? Behind TPCBC or at the field office.

10) Have accommodations been made to account for
   a. Emergency Services – Local Services were notified at beginning of project.
   b. Pedestrian/ Bike/ ADA issues? ADA N/A since rural setting however Designer did not take into account hikers from the Appalachian Trail. See Photo

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 very responsive.

12) Pavement Markings- Temporary
   a. Is there an item for removal of pavement markings, if yes indicate removal method being used? Yes, grinding is the removal method.
   b. Are there conflicting markings? None noted.
   c. Are the temporary markings legible? If night review, comment on visibility Yes, temporary pavement markings are legible.
   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, everyone on jobsite wearing proper reflective 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 4 hour minimum

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

15) Chief Inspector Comments: None

16) Project Engineer Comments: Not present during complete interview.

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	Throughout
Mounting Height	Not measured but appeared correct
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	Yes
Reflectorized/Sheeting Type	Yes, Type III sheeting
Project Consistency	Very good
Need to be covered	No
Temp./Permanent	Post mounted (permanent)

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Barricades Type III
Quantity	5
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes all are visible and reflective
Reflectorized	Yes
Anchored	No
Consistent throughout project	No. Chevrons in wrong direction.

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Temporary Precast Concrete Barrier Curb
Quantity	160 linear feet, 80 linear feet each bridge
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	N/A Delineators are clean functioning and attached to the barrier
Reflectorized	DE7 Delineators are
Anchored	Yes anchored to each other.
Consistent throughout project	Yes
Crash Trucks (TMA) in use? If yes how many and type	No TMA's used.

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, Barricade Warning Lights on Construction Signs. Yes High Intensity per contract.
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	Not assigned to this contract.
Location of portable devices – Indicate if in clear zone and how protected.	No portable devices in use at the time of inspection.
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	No changeable message signs in use at the time of inspection.

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)? Staging plans and Maintenance and Protection of Traffic plans for Temporary signalization during bridge construction.

Is the project being completed in stage construction? If yes, explain. Yes. Alternating one way traffic on both bridges controlled by Temporary Signalization. Both bridges are complete rehabilitations.

Is there temporary signalization? If yes, explain. Yes, Temporary Signalization in use for installation of new bridges structures. Microwave Detection is use, No preemption installed.

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

What guides, tools including manuals, pocket guides,books etc. do you reference? Only the plans and contract documents.

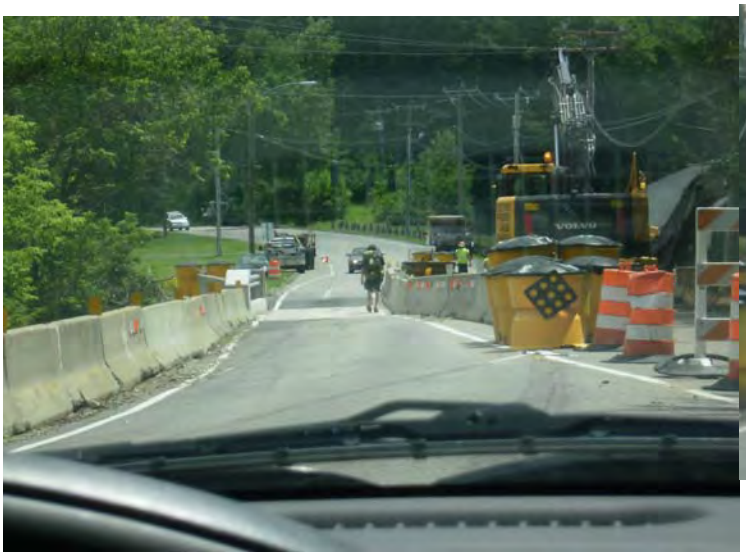
What work zone traffic plans are included in the project? Staging Plans and Maintenance and Protection of Traffic Plans.

Additional Comments:

1) Some Oak Branches should be trimmed however, excellent signing and no skid marks noted.
2) Blunt end on Temporary precast concrete barrier curb needs to be protected currently tied to wire rope of three cable guide rail.
3) Better coordination with Highway Design and Traffic to ensure Pedestrian issues are addressed. While this is a very rural area, there is a break in the Appalachian Trail where hikers come down and stop in the town of Kent.
4) Traffic barrels should not impede site of DE-9 delineators. The delineators are associated with Impact attenuation systems. See Photo.
5) The Type III barricades all appeared to be in very good condition, however chevrons were pointing in the wrong direction.
6) The temporary pavement markings were acceptable however permanent markings not eradicated need to be covered.

Notice Blunt end on Temporary Precast Concrete Barrier Curb.

Type III Barricade with chevrons in wrong direction. Traffic Drum blocking DE-9.



Hiker Access to Kent from the Appalachian Trail, Design did not consider this.

Vegetative Growth obscuring impact attenuation and DE-9 delineator view.

WORK ZONE REVIEW FORM

Project Number: 98-100 **District No.** 3
Date: 7/26/12 **Weather:** Pt. Cloudy

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

Location (Route & Town): Route 17, North Branford

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

Prime Contractor: D & V Morin Construction Co., Inc.

Project Engineer: Roger Thomas **Chief Inspector:** Matthew Bishop

Project Amount: $443,801.00 **Percent Complete:** 27%

Calendar Days completed: 89 **Calendar Days Allotted:** 236

Review Participants

Name	Representing
Matthew Bishop	DOT Construction
Oddler Fils	DOT Traffic
Jeff Hunter	DOT OOC
Nick Ozkan	DOT OOC-OQA
Bonney Whitaker	DOT OOC-OQA

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). Very good. Traffic clears in one signal cycle.

3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). No. Temporary impact attenuation systems and barriers are in place.

4) Are there any horizontal/vertical clearance issues? Utilities will be moved to accommodate a crane for Stage 2 construction. The travel lane is 11' due to stage construction. A hay wagon clipped a sign and broke a warning light which has been replaced.

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. The inspector is pleased with the Contractors provisions of signs and devices.

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. However, one of the solar powered high intensity lights is not as bright due to being located in the shade.

9) Clear Zone issues: (Y / N) Respond to questions below.
   a. What is the clear zone for this project? 30' or behind protective system.

   b. Where are materials stored for the project? On the property adjacent to the bridge in accordance with a signed agreement between the Contractor and property owner. The materials are set back over 75 feet from the road.

   c. Where is equipment stored when construction is not in progress? Same as "b" above.

10) Have accommodations been made to account for
   a. Emergency Services – Yes. The Town Engineer notified appropriate services. There is no preemption on the temporary signalization.
   b. Pedestrian/ Bike/ ADA issues? The narrow shoulder does not allow for bikes to safely transverse with the vehicle traffic. The inspector stated that the vehicles allow the bikes to proceed first.

11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain. No. The Contractor is very responsive.

12) Pavement Markings- Temporary
   a. Is there an item for removal of pavement markings? If yes, indicate removal method being used? Previous markings covered with black tape.
   b. Are there conflicting 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. Not reviewed on this inspection.

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 hour minimum with an 8 hour minimum if working over 4 hours.
   The administrative mark-up is 40.38%.

   ☐ Uniformed Flagger

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

15) Chief Inspector Comments: The temporary marking tape has held up well. The warning lights grab peoples' attention. Plans did not show painted shoulder line.
16) Project Engineer Comments: Not present at review.

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	Throughout project
Mounting Height	Acceptable
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	Yes, all clean and visible.
Reflectorized/Sheeting Type	Type III reflective sheeting
Project Consistency	Very good
Need to be covered	No
Temp./Permanent	Permanent

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Type III barricade
Quantity	4 each. Stage construction plan detail shows 2 each.
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes
Reflectorized	Yes
Anchored	No
Consistent throughout project	One has stripe pattern sloped in the wrong direction.

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Temporary Precast Concrete Barrier Curb
Quantity	140 LF
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	N/A
Reflectorized	DE-7C delineators
Anchored	Pinned to each other
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?	Barricade warning lights used on advanced warning signs. All lights functioning. High intensity.
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)?
Item #0822005A Temporary Precast Concrete Barrier Curb (Structure)
Item #0917010A Repair Guiderail, 7/17/08
Item #0970006A Trafficperson (Municipal Police Officer), 1-08
Item #0970007A Trafficperson (Uniformed Flagger), 1-08
Item #0971001A Maintenance and Protection of Traffic, 5/6/02
Item #0979003A Construction Barricade Type III, 1/17/01
Item #1020030A Temporary Illumination Unit
Item #1111404A Microwave Vehicle Detector, 11-07
Item #1118101A Temporary Signalization
Item #1220011A Construction Signs – Type III Reflective Sheeting, 1/17/01

Is the project being completed in stage construction? If yes, explain. Yes. Stage 1 Construction will remove the east portion of existing structure and construct the east side of the proposed culvert and Stage 2 Construction will do the same for the west side of the project.

Is there temporary signalization? If yes, explain. Yes. Temporary traffic signals installed to facilitate alternating one-way traffic during stage construction. Also, temporary traffic signals installed at adjacent driveways on the north and south ends of the bridge.

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

What guides, tools including manuals, pocket guides, books etc. do you reference?
The MUTCD and the pocket guide for traffic control devices.

What work zone traffic plans are included in the project? Maintenance and Protection of Traffic plans for Stage 1 and Stage 2 Construction and Stage Construction Details.

Have there been any incident reports on the project? No

Recommendations:

- The existing 45 MPH sign and Do Not Pass signs that are in conflict with temporary signs need to be covered.
- A Type III barricade located on the north side of the structure needs to be reversed so the stripe pattern slopes downward in the direction traffic is to pass.
- The DE-7C delineators located on the TPCBC need to be turned for yellow side to be on the left side of traffic.
- The yellow skip lines in the south bound approach to the alt. one-way traffic need to be covered with black tape.
- The End Road Work construction sign missing for southbound traffic needs to be installed.
- The breakaway posts on the construction signs need to be adjusted to the appropriate height.

Signs informing drivers of upcoming travel conditions.

Height of breakaway posts is not according to plans.

DE-9 delineator is temporarily blocked by the barrel. Type III barricade on the right has striped pattern sloping in the opposite direction.

Plan details note the height of temporary earth retaining system shall not extend above the height of the TPCBC.

STAGE CONSTRUCTION REVIEWS

- 82-299, Route 66 (Arrigoni Bridge), Cromwell and Middletown, CT
- 103-256, Route 97, Norwich, CT
- 126-167, Route 8, Shelton, CT
- 137-143, Route 1, Stonington, CT

WORK ZONE REVIEW FORM

Project Number: 0082-0299 **District No. 1**
Date: 08/08/2012 **Weather: Sunny (Temp not recorded)**

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

Location (Route & Town): Arrigoni Bridge Cromwell, Middletown

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

Prime Contractor: The Middlesex Corp.

Project Engineer: James J. Ruitto **Chief Inspector: Craig Albert**

Project Amount: $19,367,550 **Percent Complete: 96%**

Calendar Days completed: 388 **Calendar Days Allotted: 358**

Review Participants

Name	Representing
See Attached Attendance Sheet	

Q&A:

1) Is there clear, positive, understandable guidance through the work zone? Yes, however overhead lane markers not aligned with stage construction in one direction.
2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition). No queue length at time of review, traffic flowing smoothly. Review was not conducted during heavy traffic volumes.
3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). None noted.
4) Are there any horizontal/vertical clearance issues? No.

5) Are there any permitted load issues? Permitted loads not allowed on the bridge.

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.

   a. What is the clear zone for this project? Behind barrier.

   b. Where are materials stored for the project? Under the bridge.

   c. Where is equipment stored when construction is not in progress? Under the bridge or behind barrier.

10) Have accommodations been made to account for
   a. Emergency Services – Yes Police officer on bridge at all times in case of accident.
   b. Pedestrian/ Bike/ ADA issues? Kept one sidewalk open at all times. ADA entrances to sidewalks installed on previous project. Bicyclists shared sidewalk during construction.

11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain. No. Item in contract for worksite supervisor to be on site and maintain work zone and devices during work hours.

12) Pavement Markings- Temporary
   a. Is there an item for removal of pavement markings, If yes, indicate removal method being used? Truck and Hand grinders.
   b. Are there conflicting markings? None noted at time of inspection.
   c. Are the temporary markings legible? If night review, comment on visibility
   d. Type of marking material being used. ☒ Tape ☒Paint (non-epoxy) ☒ Epoxy
      Also refreshed paint in median islands to make them more visible.

13) Personnel Protective Equipment- Are all members of the work force wearing the proper reflective equipment? If no, explain. Yes. Good Safety Program Contractor performs safety talk and stretch every morning. Foreman would also have talk with his crew.

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 hrs min.

   ☐Uniformed Flagger
   (No hourly surcharge – Admin. Fee)

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

15) Chief Inspector Comments: Staging plans should be looked at in more detail. Access for emergency services, space for outriggers on cranes, taper lengths and signage are some issues.

16) Project Engineer Comments: Limitations of operations were difficult. Communication early on with Middletown, Cromwell and numerous public outreach meetings made motorists more willing to find alternate routes and accept the delays. Detours should be utilized more on projects to expedite project completion.

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	Approaches to construction site
Mounting Height	Urban setting
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	Yes
Reflectorized/Sheeting Type	Type III
Project Consistency	Very good
Need to be covered	No
Temp./Permanent	Permanent & Portable construction signs

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	Cones and Drums
Quantity	Did not count quantity
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes
Reflectorized	Yes
Anchored	No
Consistent throughout project	Yes

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Temp Precast Conc Barrier Curb W/ glarescreen
Quantity	Did not count
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes
Reflectorized	No
Anchored	Yes
Consistent throughout project	Yes
Crash Trucks (TMA) in use? If yes how many and type	Not at time of inspection

Table D- Warning lights and devices

Requirement	Comment
Warning lights being used? Indicate type and location. Are all lights functioning? High or low intensity?	Did not review
Advance Flashing Warning arrows Portable or Truck-mounted Lights functioning and in correct mode?	Did not review
Location of portable devices – Indicate if in clear zone and how protected.	In the median areas. If the devices were in the clear zone they were protected by barriers
Changeable Message Signs – indicate if	Portable message signs used on Route 9 & I-91 as part of

Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	an intelligent transportation system to alert motorists if traffic volumes/delays were detected near the construction zone.

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

Is there a Transportation Management Plan? If yes, explain. Yes.
It was recommended that a meeting at the end of the project be conducted to review the TMP. It was discussed that TMP's should be considered living documents and should be updated at the end of the project.

What special provisions are there in contract related to work zone (list item no, description and date of provision)
ITEM 1131007A –PORTABLE WORK ZONE MANAGEMENT SYSTEM DEPLOYMENT
ITEM 1131008A – PORTABLE WORK ZONE MANAGEMENT SYSTEM OPERATIONS
ITEM 1131009A – PORTABLE WORK ZONE MANAGEMENT SYSTEM QUEUE TRAILER/SENSOR (PQT)
ITEM 1131010A – PORTABLE WORK ZONE MANAGEMENT SYSTEM CHANGEABLE MESSAGE SIGN (PCMS)
ITEM 1131011A – PORTABLE WORK ZONE MANAGEMENT SYSTEM MOBILE VIDEO TRAILER WITH PAN TILT ZOOM (PTZ)

The use of portable smart work zone technology at a project level is a first for the Department of Transportation and may be considered on future projects if its application is successful on this project. The subcontractor for the system, PDP Associates Inc., has been working with the Department's Traffic, Highway Operations and Project personnel to optimize the capability and use of the portable work zone system. The technology was considered for the project due to the projected traffic impacts for business and residents in the area. The Portable work Zone Management System (PWZMS) was used for notification of incidents, delays and speeds through work zone and roads leading into bridge and included portable camera systems and website for viewing by public. All in all the system was fairly effective on Route 9 but had issues with data collection on secondary Route 66. Use of speed detection and queue sensors was problematic on secondary road application due to traffic signalization, considerable amount of stop and go though business district with pedestrian cross walks, lower speeds which made it difficult to account for delay times. However, cameras were useful to monitor traffic conditions. Some of the detectors and message boards were relocated or removed from system because either found not to be needed in area or wanted to broaden notification and monitoring more effectively based on impacts occurring.

Rev. Date 2/7/11

ITEM #0973723A – WORKSITE TRAFFIC SUPERVISOR

Portable impact attenuation system barrels to be used on bridge during stage construction were found to be too wide therefore used different system which was considerably more expensive. Glare screens were not as effective at speed that motorists traveled through work zone. Worksite supervisor provision should be a living document too with feedback from contractor and project staff after contract complete.

Is the project being completed in stage construction? If yes, explain. Yes, three stages center of bridge, left and right.

Is there temporary signalization? If yes, explain. No however timings on existing signals on either side of bridge were adjusted accommodate peak hour volumes during construction.

Is a detour required or being used? If yes, explain. No, however there were strong suggestions of alternate routes.

What guides, tools including manuals, pocket guides, books etc. do you reference?
ATTSA Pocket Guide, MUTCD

What work zone traffic plans are included in the project?
Staging plans and other miscellaneous plans indicating where intelligent transportation system should be located.

Has the project had any incident reports filed? Yes, the incidents are completed at project level and sent in electronically or via fax. A better system of archiving incidents and reporting out on them is needed.

How many?

Comments:

- Temporary glare screens; spacing meant for highway speeds maybe look into lower speed spacing.
- Utilized traffic officers at intersections during peak am & pm peak traffic hours to control flow.
- Town aided in traffic flow by converting a local road to one way during the construction project.
- Work with the local governments was very important for public outreach and support for this type of project.
- At beginning of project another street scape project was on going the cause traffic queues.
- Worksite supervisor should be a living document in which construction; contractor and designer sit down and have a meeting after the project to discuss what worked and what could use improvement.
- Added "Do Not Block pavement markings in front of Middletown Fire Department and at intersections based on observations of vehicles blocking intersection and causing additional delays and congestion.
- Separate email address specific to project was created along with an official project website used to keep key stakeholders including the traveling public up to date with project progress, traffic updates and link to interactive map and portable work zone website for travel info.
- Monthly meetings held with EMS for area and also Middlesex Chamber of Commerce that was open to the public to discuss concerns, project status and respond to public's questions.

Sign Height for Urban Installation

Anchored Barrier Curb with Glare screen

Lane Designator Alignment

Portable WZMS camera sensor

Bicyclist utilizing sidewalk during construction

Work Zone Safety Meeting

Date: August 8, 2012
Place: Construction Field Office

Attendance Roster

NAME (PLEASE PRINT)	REPRESENTING
Mary Baier	Office of Construction OQA
Mohammed Bishtawi	DOT District 1
Terri Thompson	Office of Construction
Robert Turner	FHWA
Jim Ruitto	DOT District 1
Craig Albert	DOT District 1
Jeff Hunter	Office of Construction
Nick Mandler	DOT Division of Traffic
John Johnson	The Middlesex Corp.
Bonney Whitaker	Office of Construction
Nick Ozkan	Office of Construction

WORK ZONE REVIEW FORM

Project Number: 0103-0256 **District No.** 2
Date: 06/19/12 **Weather:** Cloudy

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

Location (Route & Town): Route 97, Norwich

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

Prime Contractor: Pondview Construction, Inc.

Project Engineer: Patrick Warzecha **Chief Inspector:** Harold Wong

Project Amount: $1,228,930.50 **Percent Complete:** 57%

Calendar Days completed: 131 **Calendar Days Allotted:** 300

Review Participants

Name	Representing
Harold Wong	DOT District No. 2
Jeff Hunter	DOT OOC
Nick Ozkan	DOT OOC-QA
Bonney Whitaker	DOT OOC-QA

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). Limited sightline heading southbound. Slight queue during school bus running time – morning, noon and afternoon. Traffic clears after a few signal cycles.

3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). None noted.

4) Are there any horizontal/vertical clearance issues? Telephone lines were too low and eventually moved. Worked with Occum Maintenance Garage to test plowing & lane width.

5) Are there any permitted load issues? No. Informed bridge maintenance of stage construction.

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.

   a. What is the clear zone for this project? 30' from edge of travel way.

   b. Where are materials stored for the project? At field office site & work site.

   c. Where is equipment stored when construction is not in progress? Behind the concrete barrier.

10) Have accommodations been made to account for
   a. Emergency Services – Notified at beginning of project. No preemption on temporary signalization.
   b. Pedestrian/ Bike/ ADA issues? Missed in the design phase. There is not enough clearance for pedestrian traffic with an 11.00' travel lane.

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
   a. Is there an item for removal of pavement markings? If yes, indicate removal method being used. Yes. Removal is by grinding
   b. Are there conflicting 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. Not reviewed on this inspection.

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: 5 hours
   No administrative fee for Norwich police.

   ☐ Uniformed Flagger

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

15) Chief Inspector Comments: Additional signs on secondary roads for extended lane closures are useful to slow traffic. Drivers get complacent after a while.

16) Project Engineer Comments:

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	Throughout project
Mounting Height	Acceptable
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	Yes
Reflectorized/Sheeting Type	Type III reflective sheeting
Project Consistency	Very good
Need to be covered	No
Temp./Permanent	Permanent

Table B – Traffic control Devices: Not reviewed

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

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Temporary Precast Concrete Barrier Curb
Quantity	Under 300’
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	N/A
Reflectorized	DE-7 delineator
Anchored	To each other
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?	Barricade warning lights used on advanced warning signs. All lights functioning. High intensity.
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)?
Item 0822001A Temporary Precast Concrete Barrier Curb
Item 0922005A Temporary Precast Concrete Barrier Curb (Structure)
Item 0822010A Removal of Temporary Precast Concrete Barrier Curb
Item 0970006A Trafficperson (Municipal Police Officer)
Item 0970007A Trafficperson (Uniformed Flagger)
Item 0971001A Maintenance & Protection of Traffic
Item 0979003A Construction Barricade Type III
Item 1118101A Temporary Signalization
Item 1220011A Construction Signs – Type III Reflective Sheeting

Is the project being completed in stage construction? If yes, explain.
Yes. Stage construction is being utilized to allow for the removal and reconstruction of half the bridge per stage.

Is there temporary signalization? If yes, explain.
Yes. Temporary traffic signals installed to facilitate alternating one way traffic on bridge. Also, temporary traffic signals installed at adjacent driveways on northwest end of bridge.

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

What guides, tools including manuals, pocket guides, books etc. do you reference?
The MUTCD and ATSSA cone guide.

What work zone traffic plans are included in the project?
Guidance provided for layout of the signs and signalization.

Comment: The inspector and contractor did an excellent job of setting the height for the breakaway posts on the construction signs.

Sign to inform motorists of upcoming temporary signalization at bridge

Temporary signalization for driveways

Proper placement of Type A impact attenuation system

Proper placement of sign and pavement markings for temporary signalization at bridge
Notified inspector about traffic barrel blocking view of Delineator

WORK ZONE REVIEW FORM

Project Number: 0126-0167 **District No. 3**
Date: 06/25/2011 **Weather: Partly Sunny/Humid**

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

Location (Route & Town): Route 8 - Shelton

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

Prime Contractor: Rotha Contracting Co.

Project Engineer: Joseph Sorcinelli **Chief Inspector: John Antonucci**

Project Amount: $2,810,140.00 **Percent Work Complete: 47%**

Calendar Days completed: 202 **Calendar Days Allotted: 250**

Review Participants

Name	Representing
Mary K. Baier	CT DOT – D3
Robert Turner	FHWA
Terri Thompson	CT DOT OOC
Phil Cohen	CT DOT Traffic
John Antonucci	CT DOT – D3
Steven J. Sartirana	CT DOT Safety
Michael Chachakis	CT DOT Traffic
Jeff Hunter	CT DOT OOC

Q&A:

1) Is there clear, positive, understandable guidance through the work zone? Yes, however one sign obstructed by traffic drum.
2) What is the overall condition of traffic flow through the work zone? (include queue length and speed limit, roadway condition). Minimal backup. Queue to Seymour Avenue. Roadway condition is dry and good visibility. Posted construction speed limit was 45 mph.
3) Are there any hazards to the traveling public or construction personnel? (Blunt ends, Drop-offs). Yes. Current DOT policy will not allow concrete barrier to be used on limited access highways for extended periods of time. Proprietary solutions (movable barrier) are not widely accepted for use on Federal Projects. Until such time that there is a change in policy or additional movable barrier types are designed, this type of hazard will continue to exist.
4) Are there any horizontal/vertical clearance issues? Horizontal clearance for oversize trucks due to lane closures.

5) Are there any permitted load issues? OS/OW vehicles.

6) Are all signs being used for Maintenance and Protection of Traffic acceptable in accordance with applicable requirements? Yes except question concerning warning lights high intensity on portable construction signs.

7) Are all cones, drums, barricades, or other channelization devices acceptable? Yes appear to be.

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

9) Clear Zone issues: (Y / N) Respond to questions below.
   a. What is the clear zone for this project? 30' or behind deflection of rail system. During construction traffic is maintained directly adjacent to the work zone, therefore the clear zone while work is ongoing is 0-5 feet.
   b. Where are materials stored for the project? In the staging area when working.
   c. Where is equipment stored when construction is not in progress? In a parking lot off of the roadway outside of the project limits.

10) Have accommodations been made to account for
   a. Emergency Services – road open no special consideration necessary.
   b. Pedestrian/ Bike/ ADA issues? Southbound Side - restricted access notification for separate walkway during joint work. No long term closure was in place.

11) Do you have a hard time ensuring Traffic Control Devices are in functioning condition and installed according to plan? If yes, explain. No. Reviewing workzone every couple of hours. Contractor very proactive.

12) Pavement Markings - Temporary
   a. Is there an item for removal of pavement markings; if yes, indicate removal method being used? Black out Tape.
   b. Are there conflicting markings? Yes, the plan sheets indicated that a white edge line was to be placed and construction personnel followed the plans accordingly, however a yellow edge line should have been placed. Construction personnel were notified and asked to correct the error. See figure 6.
   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. No. Some of the contractor's personnel need to wear Class 3 reflective.

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: 5.0 hrs (During Detour)

   ☐Uniformed Flagger

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

15) Chief Inspector Comments:

16) Transportation supervising Engineer Comments: Good planning by contractor. Developed contingency plans. First weekend used to gauge how much work could be done in a weekend. Did not start too much work. Provided temporary guide rail system to bridge the gap in the concrete barrier curb caused by expansion joint work.

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	
Mounting Height	Correct
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	Yes, all clean and visible.
Reflectorized/Sheeting Type	Bright Fluorescent
Project Consistency	Yes
Need to be covered	No
Temp./Permanent	Both

Table B – Traffic control Devices: 42" Cones

Requirement	Comment
Type & Placement	42" Cones
Quantity	Over 25
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes
Reflectorized	Yes
Anchored	No
Consistent throughout project	Yes

Table C - Barricades and other channelization devices: Drums/TPCBC/Type III

Requirement	Comment
Type & Placement	Drums
Quantity	Over 50
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Yes (Daytime Review)
Reflectorized	Yes
Anchored	No
Consistent throughout project	Yes
Crash Trucks (TMA) in use? If yes how many and type	Yes, (5) Type D Portable Impact.

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. Used on advanced warning signs. Also using flashing arrow. Yes Appear to be High Intensity.
Advance Flashing Warning arrows Portable or Truck-mounted	Portable, two truck mounted

Lights functioning and in correct mode?	All lights functioning in correct mode.
Location of portable devices – Indicate if in clear zone and how protected.	In the lane closure; protected by Traffic Drums.
Changeable Message Signs – indicate if Permanent or Portable, Message understandable, Number of frames displayed, Timing between screens acceptable?	Not used for this stage.

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

Is there a Transportation Management Plan? Yes.

What special provisions are there in the contract related to work zone (list item no, description and date of provision)? Limitation of Operations, Prosecution and Progress, Contract Time and Liquidated Damages, and Notice to Contractor – Detour.

Is the project being completed in stage construction? If yes, explain. Yes – New Expansion Joints installed on bridge. Passing lane and shoulder on one weekend; travel lane and shoulder the next weekend. At the time of inspection the project was working on Stage 5.
Is there temporary signalization? If yes, explain. No.

Is a detour required or being used? If yes, explain. A detour was required to close a ramp however not during the stage that was reviewed.

What guides, tools including manuals, pocket guides, books etc. do you reference?
Construction Manual, Plans
What work zone traffic plans are included in the project? Stage construction plans with signing patterns.

COMMENTS:

1) Innovative ideas by field personnel and the contractor to place construction signs on wide barrier sections and also using metal beam rail to protect gap in barrier during joint replacement. See Figures 1 and 2.
2) Work area cluttered. Materials on both sides of work area could be obstacle/ hazardous if quick action/exit needed. See Figure 7.
3) Question concerning distance from work area to front of crash truck. This information should be provided by manufacturer. Discussion about wheel chocks. See Figure 7.
4) Barricade warning lights High Intensity should be removed from Non – permanent construction signs. See Figures 2 and 5.
5) Discussion concerning loose material on back of Crash Trucks.
6) Discussion about Temporary night time work zone illumination. The light plant should not face into oncoming traffic. Review of opposing traffic should be inspected to ensure there are no issues as well. See Figure 7.
7) Consideration should be given to using 42” traffic cones in the on-ramp/operational lane gore area.

8) Consideration should be given to locating the State trooper out of the left lane closure to back of queue. Current location is not well protected.
9) 4" Black out tape did not cover some of the permanent lines completely. See Figure 4.
10) If the pavement is wet cannot place the Temporary plastic pavement markings for stage construction.
11) Contractor extended lane closure to accommodate traffic from on ramp. This was done to prevent existing traffic from jumping lane.
12) Temporary pavement markings are being utilized to direct motorists through weekend work zones. Inspection staff have commented that the tape is working very well. It has stayed in place, been reflective and effective. See Figure 4

Photos of Project:

Figure 1: Innovative Design

Figure 3: Work Area Protection

Figure 2: Innovative Design 2

Figure 4: Temporary Tape

Figure 5: Merging Traffic & Barrier Sign Clamp

Figure 6: Improper Tape Color

Figure 7: Cluttered Work Area

Figure 8: Temporary Tape

Figure 9: Minimal Protection from live traffic cluttered work area.

WORK ZONE REVIEW FORM

Project Number: 137-143 & 137-144 **District No.** 2
Date: 10/16/12 **Weather:** Clear, 68°

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

Location (Route & Town): Route 1 over Stony Brook & over Quanaduck Cove, Stonington

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

Prime Contractor: Hemlock Construction Co., Inc.

Project Engineer: Keith Schoppe **Chief Inspector:** Robert Beauchesne

Project Amount: $3,287,727.80 **Percent Complete:** 67%

Calendar Days completed: 396 **Calendar Days Allotted:** 662

Review Participants

Name	Representing
Bob Beauchesne	District 2
Mike LaLone	Traffic
Jeff Hunter	OOC
Bonney Whitaker	OOC

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). The alternating one way traffic allows 3 vehicles to proceed at a time and is working well. A slight back-up occurs when school lets out, but clears up quickly.

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. Signs were new when installed.

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. The high intensity warning lights are solar powered and working well. However, they can be dim on grey days. The batteries were recently replaced.

9) Clear Zone issues: (Y / N) Respond to questions below.

   a. What is the clear zone for this project? Per the Form 816, the clear zone is 30' from the travelway.
   b. Where are materials stored for the project? On state property, north of the project.
   c. Where is equipment stored when construction is not in progress? Behind barrier or next to staging area, (b) above.

10) Have accommodations been made to account for
   a. Emergency Services – The Town, the police and the school bus director were notified.
   b. Pedestrian/ Bike/ ADA issues? The inspector stated that there is quite a bit of bike traffic. The bicyclists tend to proceed with the vehicular traffic.

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
   a. Is there an item for removal of pavement markings? If yes, indicate removal method being used. Yes. Grinding was used to remove white lines. Yellow skips were painted over with solid yellow lines.
   b. Are there conflicting 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. Not reviewed

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 hour minimum with an 8 hour minimum if working over 4 hours.
   Administrative mark-up is 5%.

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

15) Chief Inspector Comments: Would have preferred to have access to Bridge No. 01900 without having to remove the T.P.C.B.C. To gain access, time is spent moving 2 to 4 barriers. This resulted in adding an item to relocate the Temp. Impact Atten. System. Also, regular traffic cones were replaced with 42" traffic cones due to better visibility & stability.
16) Project Engineer Comments: Not present at review.

Traffic Control Device Inspection- PART II

Table A – Signs

Requirement	Comment
Type: Construction/Regulatory	Construction
Location	Throughout project
Mounting Height	Acceptable
Clean, Visible, Legible (rate using quality standards guide ATSSA 3rd edition)	Signs were clean & visible.
Reflectorized/Sheeting Type	Type III reflective sheeting
Project Consistency	Very good
Need to be covered	No
Temp./Permanent	Permanent

Table B – Traffic control Devices

Requirement	Comment
Type & Placement	42" traffic cones
Quantity	Not counted
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	Acceptable
Reflectorized	Yes
Anchored	N/A
Consistent throughout project	Yes

Table C - Barricades and other channelization devices

Requirement	Comment
Type & Placement	Temporary Precast Concrete Barrier Curb
Quantity	Not counted
Clean, Visible, Functioning (rate using quality standards guide ATSSA 3rd edition)	N/A
Reflectorized	DE-7 C delineator
Anchored	Pinned to each other
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?	Barricade warning lights used on advanced warning signs. All lights functioning. One light needs adjusting back to original position. High intensity, solar powered.
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)?
Item 0822005A Temporary Precast Concrete Barrier Curb (Structure)
Item 0970006A Trafficperson (Municipal Police Officer), Rev. 1/2008
Item 0970007A Trafficperson (Uniformed Flagger), Rev. 1/2008
Item 0971101A Maintenance & Protection of Traffic (Site No. 1), Addendum No. 1
Item 0971102A Maintenance & Protection of Traffic (Site No. 2), Addendum No. 1
Item 0979003A Construction Barricade Type III, Rev. 1/17/01
Item 1220011A Construction Signs – Type III Reflective Sheeting, Rev. 1/17/01

Is the project being completed in stage construction? If yes, explain. Yes stage construction is being utilized to remove existing culverts while maintaining alternate one way traffic over each bridge.

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?
The MUTCD and the pocket guide for traffic control devices.

What work zone traffic plans are included in the project? Maintenance & Protection of Traffic – Stage 1 and Maintenance & Protection of Traffic – Stage 2 for Bridge No. 01898 and Bridge No. 01900.

Has the project had any incident reports filed? No How many? N/A

Comments:

- The inspector stated that the Town pushed for temporary traffic signals, but the three- car stop sign control has been adhered to and is working well. He feels that traffic signals would cause vehicles to speed up to get through the yellow light. He also stated that the town police were particularly vigilant when the alternating one way traffic control began and would pull over motorists who were ignoring the three-car system.
- The project worked closely with DOT traffic for the implementation of the three-car system and the placement of signs.
- Two changeable message signs were added by CO in order to alert the public of the up-coming change to alternating one-way traffic.
- The inspector was informed that some stockpiled material was too close to the road. (See photograph, Page 7.)

A rarely used three-car traffic control system, designed for this location, is working efficiently and without complaints.

Good removal of existing line and placement of new edge line.

Construction Barricade Type III and Temporary Impact Attenuation System (Type A) protecting blunt end of T.P.C.B.C.

Existing sign appropriately covered.

The inspector was informed that the stockpiled materials were too close to the travelway. In accordance with the Form 816, Section 1.07.07, all equipment, materials, equipment or material storage areas, and work areas must be placed, located, and used in ways that do not create a hazard to people or property, especially in areas open to public pedestrian or vehicular traffic. All equipment and materials shall be placed or stored in such a way and in such locations as will not create a hazard to the traveling public. In an area unprotected by barriers or other

means, equipment and materials must not be stored within 30 feet (9.15 meters) of any traveled way.
The Contractor must always erect barriers and warning signs between any of its work or storage areas and any area open to public, pedestrian, or vehicular traffic. Such barriers and signs must comply with all laws and regulations, including any applicable codes.

2011 Work Zone Safety Review Participants

District 2	District 3
Project 59-155 John DiBiagio – Project Manager Mike Chachakis – Office of Traffic Jeff Hunter – Office of Construction Kiah Patten – Office of Construction	Project 126-167 Robert Turner – FHWA, Safety Engineer Mary Baier – Supervising Engineer Terri Thompson – Office of Construction Phil Cohn – Office of Traffic Michael Chachakis – Office of Traffic Steven Sartirana – Office of Safety John Antonucci – Project Manager Jeff Hunter – Office of Construction Project 173-414 Jeffery Knapp – Project Engineer Chukwuekezie Ezigbo – Project Manager Matthew Bishop – Inspector Gregg Shaffer – Office of Construction Jeffery Hunter – Office of Construction
District 3A	**District 4**
Project 92-531/619 Robert Ramirez – FHWA, Traffic and Safety Engineer Robert Turner – FHWA, Safety Engineer Anthony Kwentoh – Office of Construction Terri Thompson – Office of Construction Philip Cohen – Office of Traffic Michael Chachakis – Office of Traffic Daniel Stafko – Project Engineer Bob Savage – Project Engineer Vlad Kaminsky – Project Engineer Jim Perkins –Berger Lehman (Consultant) Marilee Beebe – Parsons Brinckerhoff (Consultant) Fred Howe – O&G Industries/Tutor Perini Corp JV (Contractor) Caswell Seinell – O&G Industries/Tutor Perini Corp JV (Contractor) Rich Smith – Walsh (Consultant) Gary Splain – Gannett Fleming (Consultant)	Project 67-115 Daniel Paton – Project Manager Brett Stoeffler – Office of Traffic Jeff Hunter – Office of Construction Kiah Patten – Office of Construction Project 84-102 Robert Rameriz – FHWA, Traffic and Safety Engineer Robert Turner – FHWA, Safety Engineer Anthony Kwentoh – Office of Construction Jeff Hunter – Office of Construction Philip Cohen – Office of Traffic Oddler Fils – Office of Traffic Kenneth Rekrut – DeCarlo & Doll (Consultant Inspection) Scott Smigel – DeCarlo & Doll (Consultant Inspection)

2012 Work Zone Safety Review Participants

District 1

Project 42-312
Alan Lobaugh – Milone & MacBroom (Consultant)
Terri Thompson – Office of Construction
Jeff Hunter – Office of Construction
Chris – Tilcon CT (Contractor)

Project 82-299
Robert Turner – FHWA Safety Engineer
Mohammed Bishtawi – Supervising Engineer
Jim Ruitto – Project Engineer
Craig Albert – Project Manager
Terri Thompson – Office of Construction
Mary Baier- Office of Construction – Quality Assurance
Jeff Hunter – Office of Construction
Bonney Whitaker – Office of Construction
Nick Ozkan – Office of Construction
Nick Mandler – Office of Traffic
John Johnson – The Middlesex Corp. (Contractor)

Project 171-351
Rich Balzarini – Project Manager
Jeff Hunter – Office of Construction
Nick Ozkan – Office of Construction
Bonney Whitaker – Office of Construction
Doug Harz – Office of Construction
Nick Mandler – Office of Traffic

District 2

Project 103-256
Harold Wong – Project Manager
Jeff Hunter – Office of Construction
Bonney Whitaker – Office of Construction
Nick Ozkan – Office of Construction

Project 137-143/144
Bob Beauchesne – Project Manager
Jeff Hunter – Office of Construction
Bonney Whitaker – Office of Construction
Mike LaLone – Office of Traffic

District 3

Project 144-179
Steven Hebert – Project Engineer
Jeff Hunter – Office of Construction
Nick Ozkan – Office of Construction
Bonney Whitaker – Office of Construction
Edwin Brown – Office of Traffic
Dave Speerli – Amman Whitney (Consultant)

Project 98-100
Matthew Bishop – Project Manager
Jeff Hunter – Office of Construction
Nick Ozkan – Office of Construction
Bonney Whitaker – Office of Construction
Oddler Fils – Office of Traffic

District 4

Project 96-199
Robert Turner – FHWA, Safety Engineer
Terri Thompson – Office of Construction
Jeff Hunter – Office of Construction
Bonney Whitaker – Office of Construction
Scott Wassmann – Office of Traffic
Mohammed Khadeer – Project Manager
Ryan Wodjenski – Inspector
Steve Tuxbury – Tilcon CT (Contractor)
Jamie Sirica – Tilcon CT (Contractor)

District 4

Project 79-215
Bonney Whitaker – Office of Construction
Brien Smith – Office of Traffic
Rich Rudaitis – Project Manager
Kevin LaRosa - Inspector

Appendix A

TABLE 3 – Connecticut Work Zone Improvement Plan (WZIP) Action Areas

Updated 11/1/13

	Critical Issue Area	Recommendations for Improvement	Actions and/or Products, including Major Steps, if any, and Resources Needed	Responsible Office/ Position/ Person	Status	Target Completion Date
	Work Zone Self-Assessment Elements					
1	**Leadership and Policy**	A) Establish strategic goals specifically to reduce congestion and delays in work zones. B) Reduce crashes in work zones. (Added October 18, 2013 WZIP Meeting)	1. Form working groups comprised of various stakeholders that can assist in improvement. a) Establish Work Zone Operations (WZO) Working Group and Work Zone Performance Measures (WZPM) Working Group. b) Schedule meeting for both groups to go over action plan and issues list from work zone reviews 2. Define other safety plans and programs that include Work Zone Safety elements 3. Develop strategic goals for work zone safety (CTDOT and stakeholders) to provide safe and efficient roadway systems. 4. Prepare recommendation(s) for implementation of strategic goals for review and comment by the SHSP Champion. 5. Act on recommendations to implement or return for further action 6. Approve strategic goals and incorporate into SHSP	1a. T. Thompson 1b. Chairpersons - currently T. Thompson and C. Kissane 2. WZO and WZPM Chairpersons 3. WZO and WZPM Chairpersons 4. WZO and WZPM Chairpersons and SHSP Champion 5. SHSP Champion 6. SHSP Champion and SHSP steering committee	1a. Completed 1b. Pending Approval of WZIP 2. Ongoing 3. Ongoing 4. Pending 5. Pending 6. Pending	1a. Completed 1b. Completed 2. Completed 3.To Be Determined 4.To Be Determined 5.To Be Determined 6.To Be Determined
2	**Leadership and Policy**	Implement strategic goals specifically to reduce crashes in work zones.	1. Establish a Work Zone Safety Advocate/Liaison that reports to upper management and coordinates with various offices, agencies and organizations to brainstorm and identify reasonable strategic goals to improve mobility in work zones and handle delays more effectively.	Office of Commissioner	Pending	To Be Determined

TABLE 3 – Connecticut Work Zone Improvement Plan (WZIP) Action Areas Updated 11/1/13						
	Critical Issue Area	**Recommendations for Improvement**	**Actions and/or Products, including Major Steps, if any, and Resources Needed**	**Responsible Office/ Position/ Person**	**Status**	**Target Completion Date**
	Work Zone Self-Assessment Elements					
3	**Leadership and Policy**	Establish performance measures (e.g. vehicle throughput or queue length) to track work zone congestion and delay	1. Define metrics for performance measures considering - Queue lengths - Speed - Volume - Delay time 2. Development of criteria to define the limits of work zones and related queues 3. Establish means to capture real time traffic data.- Low vehicle throughput and long queue lengths causing congestion and delays in work zones a) Systems Engineering Analysis - Needs Assessment and Functional Requirements b) Develop RPM Technical Design document for RFP c) RFP Document to be sent to Purchasing / Specification Committee d) RFP Document to be sent to DAS e) RFP Advertising to Award f) Begin Travel Time messaging.	1-2. WZPM 3. Highway Operations 3a-b) Consultant with input from stakeholders including WZO and WZPM 3c) Highway Operations 3d) Highway Operations 3e) DAS/Purchasing 3f) Highway Operations	1-2 Pending. Refer to Table 5 3. Ongoing 3a-b) Completed 3c-f) As of November 19, 2013 RFP is not being approved.	1-2. To Be Determined 3a) Completed 3b) April 30, 2013 3c) May 1, 2013 3d) May 30, 2013 3e) June 15 - Sept. 30, 2013 3f) Sept. 30, 2014

TABLE 3 – Connecticut Work Zone Improvement Plan (WZIP) Action Areas

Updated 11/1/13

	Critical Issue Area	Recommendations for Improvement	Actions and/or Products, including Major Steps, if any, and Resources Needed	Responsible Office/ Position/ Person	Status	Target Completion Date
	Work Zone Self-Assessment Elements					
4	**Leadership and Policy**	Implement performance measures (e.g., crash rates) to track work zone crashes	1. Define metrics to be used for performance measure - Type - Frequency - Location 2. Develop baseline to determine threshold values to be used a basis of measuring crashes 3. Approval of metrics and baseline	1. WZPM 2. WZO / WZPM SHSP Champion 3. SHSP Champion and SHSP steering committee	1. Pending. Refer to Table 5 2. Pending. Refer to Table 5 3. Committee meetings to decide	1. To Be Determined 2. Coincides with data collection effort 3. Pending
5	**Program Evaluation**	Collect data to track, analyze and evaluate work zone congestion and delay performance.	1. Research equipment to track 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. a) Develop specification and add to project as pilot b) Obtain and evaluate data collected c) Revise specification and add to additional projects d) Establish some performance parameters that can be used in the design of work zones 2. Develop reporting system to output incident related delays utilizing current in place system to obtain data a) Develop database to log incident reports and structure queries b) produce monthly reports for analysis c) Evaluate and develop delay performance measure.	1. Highway Operations 1a) Terri Thompson and John Korte 1b) PDP Associates – company furnishing system 1c) Terri Thompson and John Korte 1d) Bureau of Engineering & Construction- Offices of Traffic Engineering Design Services, Construction 2. WZO with OIS	1. Ongoing 1a) Implemented on Project No. 0082-0299, Arrigoni Bridge Middletown 1b) Received data – Pending review 1c) Project No. 0060-0152/0153 1d) Pending 2. Pending	1a) 2011 1b) January 2014 1c) March 2014 1d) To Be Determined 2. Pending

TABLE 3 – Connecticut Work Zone Improvement Plan (WZIP) Action Areas Updated 11/1/13

	Critical Issue Area	Recommendations for Improvement	Actions and/or Products, including Major Steps, if any, and Resources Needed	Responsible Office/ Position/ Person	Status	Target Completion Date
	Work Zone Self-Assessment Elements					
6	**Program Evaluation**	1. Collect data to track, analyze and evaluate work zone safety performance	1. Obtain reliable Crash Data in Work Zones a) Accurate representation on accident reports and include work zone as primary element on crash report b) Decrease time to get crash data c) Categorize crash types d) Incorporate crash frequency in the design of future projects in the area.	1a-b) Bureau of Policy & Planning 1c) Bureau of Policy and Planning 1d) Bureau of Engineering and Construction Engineering –Design and Traffic	1. Dependent on CTDOT Vehicle Crash Reporting System	1) Adopt new motor vehicle crash reporting January 2015
7	**Program Evaluation**	Conduct customer surveys to evaluate work zone traffic management practices and policies on a statewide/area-wide basis	1. Customer Surveys a) Develop questionnaire for survey for web based application b) Info System setup for webpage c) Conduct Survey d) Compile information and develop needs list based on customer feedback e) Recommend new practices and polices based on needs list f) Submit for approval and implementation g) Approve recommendations and incorporate into specifications, and practices for Department 2. Maximize the best visibility and reading capability for the traveling public a) Research different types of portable/variable message signs and capabilities to find best approach. b) Recommend changes to specifications, policies and practices based on research (i.e. distance from the anticipated queue), proper messaging,	1. WZO 1a) Work Zone Safety Awareness Working Group 1b) OIS 1c) WZO / WZPM 1d) Chairpersons WZO / WZPM 1e-g) SHSP Champion and Bureau Chief 2a) WZO Highway Operations 2b) SHSP Champion 2c) Bureau Chiefs for Highway Operations	1. Pending 2. Pending	1a) January 2014 1b) January 2014 1c) March 2014 1d) June 2014 1e) TBD – Present at WZIP Annual Meeting 1f-g) To Be Determined 2. To Be Determined

TABLE 3 – Connecticut Work Zone Improvement Plan (WZIP) Action Areas Updated 11/1/13						
	Critical Issue Area	**Recommendations for Improvement**	**Actions and/or Products, including Major Steps, if any, and Resources Needed**	**Responsible Office/ Position/ Person**	**Status**	**Target Completion Date**
	Work Zone Self-Assessment Elements					
			and message legibility. c) Approve recommendations and incorporate into specifications, policies and practices for Department	and Engineering & Construction		
8	**Program Evaluation**	1. Develop strategies to improve work zone performance based on work zone performance data and customer surveys.	1. Work Zone Traffic Control Reviews a) Develop review form and database to document evaluations. Review sections include - Q&A - Traffic Control Devices - Plans and specifications b) Perform Field Reviews c) Prepare Annual Report 2. Maintain Action List for Working Groups (WZO/WZPM) a) Define issue and problem statement, with expected outcome b) Review issues and develop or revise as needed - Actions Required, Status, Time Frame and Responsible parties c) Update action list and report out on activities to SHSP Champion.	1. Bureau of Engineering & Construction- Office of Construction 1a) Jeff Hunter 1b) Work Zone Review Group – includes personnel from FHWA, Office of Construction, Traffic, Safety, and Highway Operations 1c) Office of Construction 2. Work Zone Review Group	1. Ongoing 1a) Completed 1b) 2010 through 2012 completed 2013 in progress 1c) 2011 and 2012 Draft report completed 2. Revisions for Tables 3, 4 and 5 under review Refer to Table 4 and Table 5	1. Ongoing 1a) Completed 1b) Min. 10 per year 1c) 2011 and 2012 combined in one report November 1, 2013 2. N/A 2c) Present revisions as part of WZIP Annual Meeting

TABLE 4- Work Zone Operations (WZO) Working Group Action Item Issues

* Refer to Table 4a for completed actions

Updated 11/1/13

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
1	**Construction Sign Retro-Reflective 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 retro-reflectivity of construction signs.	Improved visibility of signs by the traveling public.	A)* B)*	C) Monitor use of new sign provision on new projects. D) Propose research studies - Testing different types of sheeting and substrates to find qualities that provide optimum visibility and durability. E) Additional in-depth reviews regarding condensation conducted by Project 0044-0151 personnel. Review and, if necessary, revise specification so that condensation is removed from construction signs.	A)* B)* C) Ongoing D) Pending E) Pending further review	A) * B)*	Office of Construction Traffic Engineering
2	**Pedestrian /Bicycle Access Issues**	Incomplete sidewalks, pedestrian buttons inaccessible or inoperable, lack of crosswalks at intersections, and lack of handicap ramps.	Improved pedestrian and bicycle awareness and accessibility through design and construction	A) Notified and discussed the review teams' concerns with chief inspectors. B) Reviewed contract documents for specific language, or lack thereof, regarding this type of access. C) Investigate if utility delays are the reason why sidewalks are incomplete. D) *	E) Conduct more of these types of reviews to see if these pedestrian/bicycle issues are more widespread. F) Review plans and specifications and revise if necessary.	C) Ongoing D) * E,F) Continue reviewing plans and monitoring projects for conformance	D)* E,F) Ongoing	Traffic Engineering Highway Design Office of Construction Office of Maintenance Mon-motorized Transportation Coordinator

TABLE 4- Work Zone Operations (WZO) Working Group Action Item Issues

* Refer to Table 4a for completed actions

Updated 11/1/13

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
3	**Project Lighting for Night Inspection**	Refer to Table 4a Completed Issues						
4	**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.	Increase visibility for inspecting night time and improve overall visibility of work area.	A) Reviewed specification requirements and found that contractor not required to supply any lighting either hand held or portable light plants.	B) Place request to specification committee to include wording that for any night work, portable and hand held lighting is to be supplied by contractor for inspection staff.	B) In the process of reviewing current M&PT and work zone requirements included in special provisions and standard specifications.	Ongoing	Office of Construction Traffic Engineering Office of Maintenance Safety Division
5	**Barricade Warning Lights - High intensity**	High-intensity, solar powered warning lights are not effective in rural areas with significant canopy surroundings.	Ensure that lights are operational under all conditions.	Reviewed specification.	Revise current provision to state exclusion of solar powered warning lights in rural areas. Projects should require and monitor battery-operated lights in areas where this may be an issue. Add as an item on the Daily Site Review checklist referenced is Issue No. 3.	Discussing with the Office of Traffic about possibly changing the plans or revising the specification to allow either solar or battery-operated.	Ongoing	Office of Construction Traffic Engineering Safety Division

TABLE 4- Work Zone Operations (WZO) Working Group Action Item Issues

* Refer to Table 4a for completed actions

Updated 11/1/13

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
6	**Traffic Control in Work Zones**	Experience with and understanding of work zone safety. Establishing levels of effectiveness (i.e. presence versus enforcement).	Consistent practices and implementation of use of traffic persons. Better educated traffic control persons who will provide effective direction in work zones.	"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/	A) Continue training at the local and state level. Look at grant resources to provide monies for training. B) Executive Policy Statement for "Policy on Effective Use of Traffic Persons in Work Zones". C) * D) Review policies and procedures and guidance documents and revise to meet current MUTCD, new policy and other standards in place at state and federal level E) Add new section in Division I of Form 816 – Best practices for work zone safety operations	A) T2 continues to provide training but funding is an issue since many local towns and municipalities, as well as, Police Standards Training Academy do not have funds available to pay for this course. Limited to a Train-the-Trainer scenario so they can teach their own. B) Final Draft completed C) * D) Ongoing E) Pending	A) Ongoing B) Pending Awaiting Commissioner signature C)* D) TBD E) TBD	Office of Construction Traffic Engineering Office of Maintenance State Police Safety Division
7	**Variable Message Signs**	Defining proper placement (i.e. distance from the anticipated queue), proper messaging, and message legibility.	Maximize the best visibility and reading capability for the traveling public.	Continue to verify proper messaging during reviews.	A) Research different types of portable/variable message signs and capabilities to find best approach.	A) Pending	TBD	Office of Construction Traffic Engineering Office of Maintenance Highway Design

TABLE 4- Work Zone Operations (WZO) Working Group Action Item Issues

* Refer to Table 4a for completed actions

Updated 11/1/13

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
8	**Movable Barrier Systems**	Currently only one system available for use – proprietary – therefore difficult to use on federal participating projects.	Having barrier systems that can be utilized on more than one project.	None to date.	A) Need to work with Design to develop a specification and design guidance on positive separation equipment and materials for work zones that are not proprietary and has potential for use on other projects. B) Investigate if other systems have been developed. If so, compare the systems.	A) Positive feedback from Project 0044-0151, I95 Old Lyme that is completed. Project 53-175 Putnam Bridge scheduled to start April 1, 2013. Use is limited to certain project types. Need to look at other alternatives.	Ongoing	Office of Construction Traffic Engineering FHWA Highway Design
9	**Environmental Conditions**	Visibility of work zone warning equipment during inclement weather. Rain affecting retro-reflective properties of construction signs and pavement markings.	Improved visibility of signs and markings even during inclement weather.	Continued investigation in construction signs and their lack of reflective properties.	Use the Daily Site Review checklist referenced in Issue No. 3.	1. Reviewing new MUTCD requirements and incorporating changes into contracts. 2. Add recessed pavement marking detail and items into contracts to enhance retro-reflective qualities	Ongoing	Traffic Engineering FHWA Office of Construction Office of Maintenance
10	**Work Zone Safety Review**	Improve and enhance the work zone safety review inspection process.	Improve awareness and documentation of work zone reviews.	Improved questionnaire form and created a database to store information.	A) Include more photographs/videos of projects. Expand the number of field visits. Inform project staff of internet sites and pamphlets/documents. Are issues based on road, material, or project type?	A) Review 8-10 projects per year 2010-Ten projects reviewed 2011-Six projects reviewed 2012-Nine projects reviewed	Ongoing	Traffic Engineering FHWA Office of Construction Office of Maintenance

TABLE 4- Work Zone Operations (WZO) Working Group Action Item Issues

* Refer to Table 4a for completed actions

Updated 11/1/13

Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
11 Project-Level Work Zone Reviews	Inconsistent applications of work zone principles at the project level.	Consistent practices of work zone reviews for each project.	Included this item in the Winter training session for supervisors and inspectors occurs in February and March 2012.	A) Continue reviewing plans and monitor projects for conformance. B) Use the Daily Site Review checklist referenced in Issue 3. C) Include this item in upcoming winter training session to include Work Zone Policy & Procedure presentation.	A) Ongoing process B) Ongoing Process C) Ongoing Completed for 2011 & 2012.	Implemented Topic of discussion since 2011 training classes.	Office of Construction Office of Maintenance Safety Division
12 Traffic Control Device Quality	Inconsistency in accepting devices of similar quality.	Understanding acceptable qualities for traffic control devices and maintaining consistency in which devices are accepted.	Obtained quality standard field guides.	A) Distribute guides on accepting traffic control devices to field staff to use in daily reviews.	A) Ongoing process	A) Complete by end of 2013	Office of Construction Office of Maintenance Safety Division
13 Signing	Breakaway post height does not conform to plans.	Conformity to requirements posted in the project plans.	Reviewed sign mounting detail with project inspector.	Continue monitoring projects during work zone reviews for compliance.	Ongoing with work zone reviews. New issue in 2011 and 2012 reviews.	Ongoing	Office of Construction
14 Pavement Markings*	Existing pavement markings not eradicated or covered. Missing or worn pavement markings need to be addressed.	Provide a clearly defined path for the traveling public through the work area.	Notified project staff of deficiencies.	Use winter training session to remind projects of the importance of maintaining consistent pavement markings.	Pending New issue in 2011 and 2012 reviews.	Winter Training 2014	Office of Construction Traffic Engineering

Table 4a- Work Zone Operations (WZO) Working Group Action Item Issues Completed Updated 11/1/13							
	Issue	**Problem**	**Expected Outcomes**	**Actions Taken**	**Actions to be Taken**	**Current Status**	**Time Frame**	**Responsible Parties**
1	**Construction Sign Retro-Reflective 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 retro-reflectivity of construction signs.	Improved visibility of signs by the traveling public.	A) Send Memo requesting removal of signs using plastic substrate. B) Revise specification to exclude plastic substrates.		Sent out October 15, 2011 Memo from Construction to Division of Traffic recommending two changes A) Discontinued the use of Type III sheeting and require bright fluorescent sheeting for all construction signs. B) Revised specification Item No. 1220013A Construction Signs - Bright Fluorescent Sheeting to not allow use of corrugated or waffle board types of plastic substrate, foam core, and composite aluminum sign substrates.	A) Completed 5/30/12 B) Completed revision date 1/5/12	Office of Construction Traffic Engineering
2	**Pedestrian /Bicycle Access Issues**	Incomplete sidewalks, pedestrian buttons inaccessible or inoperable, lack of crosswalks at intersections, and lack of handicap ramps.	Improved pedestrian and bicycle awareness and accessibility through design and construction	D) Conduct training if necessary.		D) Included in winter training session- Work Zone Policy & Procedure presentation. Training session for supervisors and inspectors occurs in February and March.	D) Completed as of April 2012	Traffic Engineering Highway Design Office of Construction Office of Maintenance Mon-motorized Transportation Coordinator

Table 4a- Work Zone Operations (WZO) Working Group Action Item Issues Completed Updated 11/1/13							
	Issue	**Problem**	**Expected Outcomes**	**Actions Taken**	**Actions to be Taken**	**Current Status**	**Time Frame**	**Responsible Parties**
3	**Project Lighting for Night Construction**	Glare from portable light plants affecting motorists traveling through the work zone.	Reduce glare for motorists in work zone areas.	A) Develop a Daily Site Review checklist to be used by project field personnel.	B) Develop and distribute work zone safety reminders (i.e. issues memo) for field personnel. C) Review specification requirements.	A) Completed B) Completed C) Completed- no change	A) Implemented Aug. 15, 2012	Office of Construction Traffic Engineering Safety Division
6	**Traffic Control in Work Zones**	Experience with and understanding of work zone safety. Establishing levels of effectiveness (i.e. presence versus enforcement).	Consistent practices and implementation of use of traffic persons. Better educated traffic control persons who will provide effective direction in work zones.	"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/	C) Work with Bureau of Policy and Planning to include work zones as a required field in accident report.	C) Completed – Model Minimum Uniform Crash Criteria Fourth Edition (2012) Data Element C18	C) Completed through PR-1 crash report.	Bureau of Policy and Planning

TABLE 5- Work Zone Performance Measures (WZPM) Working Group Action Item Issues

Updated 11/1/13

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
1	**Mobility in Work Zones**	Low vehicle throughput and long queue lengths causing congestion and delays in work zones.	Improve mobility in work zones or handle delays more effectively.	Systems Engineering Analysis Review initiated by Highway Operations	A) Establish means to capture real time traffic data.	A) Ongoing- See Table 3, Item 3	3 years	Bureau of Policy and Planning, Office of Coordination, Modeling and Crash Data and TRCC August 30, 2014 data available
2	**Reliable Crash data in Work Zones**	Crash data for work zones must be accurately represented on accident reports	Gaining more data in a timely manner to incorporate crash frequency in the design of future projects in the area.	Members of WZO and WZPM became stakeholders in the Traffic Records Coordinating Committee (TRCC)	A) Working with Bureau of Policy & Planning to get more motor vehicle crash reports.	A) Ongoing- See Table 3 Items 4 & 6	Dependent on CTDOT Vehicle Crash Reporting System 100% electronic January 2015	A) Bureau of Policy and Planning, Office of Coordination, Modeling and Crash Data and TRCC
3	**Work Zone Safety Performance**	Safety concerns for highway workers and the traveling public in work zones	Improved safety in work zones.		A) Collect data to track, analyze and evaluate work zone safety performance. B) Establish work zone safety practices and monitoring that they are applied consistently throughout the duration of the project.	A) Ongoing- See Table 3 Items 6 & 8. Current backlog is 7 months B) See Table 3 Item 8 See WZO Action List Items 10-12	A) Dependent on CT Vehicle Crash Reporting. New Crash report (PR-1) Jan. 2015 Backlog schedule: 6 mo. - Dec 2013 3 mo. - Aug 2014. B) Implemented	A) Bureau of Policy and Planning, Office of Coordination, Modeling and Crash Data and TRCC B) Offices of Safety, Construction and Maintenance
4	**Traveler Feedback**	Not knowing if the performance measures taken are most useful for the traveling public	Implement practices that are more conscientious of the public and assure them that they're contributing to the process		A) Conduct traveler surveys to evaluate work zone traffic management practices and policies on a state-wide and area region-wide basis	A) Ongoing- See Table 3 Item 7	2013	Office of Construction Office of Maintenance
5	**Develop Strategies from Performance Data and Traveler Surveys**	Not utilizing information obtained to continuously improve practices	Establishing effective performance measures		A) Evaluate data and surveys to determine where improvements can be made	A) Ongoing- Table 3 Items 1 & 7	Ongoing	Offices of Strategic Planning & Projects, Construction and Maintenance

U.S. Department of Transportation
Federal Highway Administration

APPENDIX 4

FHWA Memorandum

Traffic Incident Management and Work Zone Self Assessments

(February 6, 2012)

U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: **ACTION:** Traffic Incident Management and Work Zone Self Assessments

Date: FEB 6 2012

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 2011 Traffic Incident Management and Work Zone Self Assessments and announce the Self Assessment cycle for fiscal year (FY) 2012. These assessments are valuable in supporting Agency efforts to achieve our System Performance, National Leadership, and Program Delivery goals. 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 annual performance goals for the Agency.

Similarly, 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. Several States have selected areas for focused efforts based on their assessment results. The Work Zone Self Assessment (WZSA) can support the process reviews required every other year by the Work Zone Safety and Mobility Rule. A Division might find it helpful to work with the State and other stakeholders to conduct the WZSA as part of the State's process review.

Similar to past years, the FY 2012 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 range 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, 2012. In the next few weeks, your Division Office contact persons for these assessments will be sent specific guidance for each assessment.

Please find attached the FY 2011 National Summary Reports for each of the two Self Assessment areas. The 2012 TIM Self Assessment Annual Analysis Report is provided this year in a new Executive Summary format for easier review. The full report is available upon request. 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

U.S. Department
of Transportation
Federal Highway
Administration

APPENDIX 5

Work Zone Mobility and Safety Self-Assessment User Guide (2012)

Work Zone Mobility and Safety Self Assessment

User Guide

Federal Highway Administration

2012

Table of Contents

1 Introduction and Background

In 2007, there were 41,059 traffic fatalities in the United States, with 835 identified as work zone crashes[1]. 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.

The WZ SA can provide helpful information for the process reviews required every other year by the Work Zone Safety and Mobility Rule. To support efforts to meet the ongoing process review requirement, the prior supplemental questions in the WZ SA have been replaced with a two-part question on the process review. This question is intended to gauge progress by agencies in performing work zone process reviews in accordance with 23 CFR 630 Subpart J. A Division might find it helpful to work with the State and other stakeholders to conduct the WZ SA as part of the agency's process review.

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 be 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	• 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	• 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	• 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	• 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	• 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).

Tip: **Be as specific as possible when including comments.** Adding comments after each question can greatly assist in the overall national-level analysis, and can help the participants remember the basis for their score. Comments should provide specific, detailed information that helps identify trends such as why a score changed, specific examples of practices that support the score, or other specific information that can be used to understand an agency's position on a question or the interpretation of the intent of a question.

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	• 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	• 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	• 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.	• 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	• 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.	• 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	• Affects the traveling public to a small degree. • Low public interest. • Duration is short to moderate. • Work zones are usually mobile and typically recurring.	• 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.

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), 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 formal agreements, such as 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

It may be desirable to overlap or, in some cases, avoid overlapping, utility and transportation projects. To avoid prolonged project delays that may increase work zone impacts, agencies should develop **formal** agreements with utility providers to coordinate construction schedules and to define how coordination occurs. These may be MOUs or other formal agreements that ensure the coordination happens on a consistent and proactive basis.

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 regular planning process analyze the network to develop adequate alternate options for routing traffic in anticipation of various needs for future road construction and maintenance?*

Relevant Sections of the WZ Rule:

630.1012b2 - Transportations Operations Component

This question refers to the agency's regular planning process, rather than the planning done for a specific road project. 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 will 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. Planners should anticipate the need to reconstruct and maintain principal arterials and other roads and consider how those construction and maintenance activities will affect traffic on the surrounding network. To help maintain traffic during future road work, planners may identify the need for network improvements such as frontage roads, increased capacity on parallel facilities, and strategically placed lateral connectors.

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 contact, 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 Criteria

Question: *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?*

Quality design and construction results in a product expected to perform well over a given period. The use of performance-based criteria, such as during a contractor pre-qualification process, can enable the agency to consider past performance and eliminate contractors from the bidding process who have consistently demonstrated poor performance. 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 contact 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 polices 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 Question – Work Zone Process Reviews

Select only ONE response to the first part of the question, and provide a date for the second part of the question.

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

- □ Yes
- □ No

b. Please provide the date (mm/yyyy) when your last review was completed.

_____

c. Comments: (optional):

_____

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.

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

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

(Average raw score x Weight (Col B)) = Weighted Score

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

U.S. Department of Transportation
Federal Highway Administration

rev. 6/3/14

APPENDIX 6

2012 Work Zone Mobility and Safety Self-Assessment

Connecticut Summary Report

(January 2013)

2012 Work Zone Mobility and Safety Self Assessment

CONNECTICUT

Summary Report

Federal Highway Administration
Office of Operations

January 2013

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 2012 WZ SA was to evaluate the progress made since the last WZ SA in 2011 and to reassess program initiatives both at the local and national levels. In 2012, each FHWA Division Office was asked to re-examine and update their scores from 2011 to reflect any changes in their practices related to the 46 WZ SA questions. This report presents the WZ SA results for Connecticut in 2012, with data from 2011 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.

To support efforts to meet the ongoing process review requirement, the WZ SA includes a two-part question on process reviews. This question was not used in calculating an agency's WZ SA score. This question is intended to gauge progress by agencies in performing work zone process reviews in accordance with 23 CFR 630 Subpart J.

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 2012 WZ SA results for Connecticut. The 2011 results for Connecticut, as well as the national results for both years, are included for reference. Section 2.2 displays the 2012 results for Connecticut on both a section-by-section and question-by-question basis, with 2011 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 2012. The national average score for 2012 is 10.6.

Table 1. Overall Self Assessment Score (0 to 15 scale)

	2011 Weighted Score	2012 Weighted Score	Percent Change from 2011 to 2012
Connecticut	11.2	11.2	0.0%
National Average	10.3	10.6	2.9%

Unweighted scores are also provided, in Table 2, since these values indicate the average score for each section on the 0 to15 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	2011 Connecticut Unweighted Score	2012 Connecticut Unweighted Score	Percent Change from 2011 to 2012	2012 National Unweighted Average
Section 1 – Leadership and Policy	9.9	9.9	0.0%	10.3
Section 2 – Project Planning and Programming	12.7	12.7	0.0%	9.3
Section 3 – Project Design	12.1	12.1	0.0%	10.9
Section 4 – Project Construction and Operation	11.2	11.2	0.0%	11.1
Section 5 – Communications and Education	14.2	14.2	0.0%	12.8
Section 6 – Program Evaluation	3.8	3.8	0.0%	7.7

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	2011 Connecticut Score	2012 Connecticut Score	2012 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	11.1
4.1.2	Has the agency established strategic goals specifically to reduce congestion and delays in work zones?	8	8	9.5
4.1.3	Has the agency established strategic goals specifically to reduce crashes in work zones?	8	8	10.0
4.1.4	Has the agency established measures (e.g., vehicle throughput or queue length) to track work zone congestion and delay?	6	6	8.4
4.1.5	Has the agency established measures (e.g., crash rates) to track work zone crashes?	5	5	10.5
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	11.5
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	10.6
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	12.2
4.1.9	Has the agency developed policies to support the use of innovative contracting strategies to reduce contract performance periods?	9	9	12.0
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 delays and minimizing the number of work zones on the highway?	10	10	6.9

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	2011 Connecticut Score	2012 Connecticut Score	2012 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?	11	11	9.1
4.2.2	Does the agency's regular planning process analyze the network to develop adequate alternate options for routing traffic in anticipation of various needs for future road construction and maintenance?	13	13	8.9
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?	13	13	9.2
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])?	13	13	9.7
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?	13	13	9.4
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	9.4

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	2011 Connect-icut Score	2012 Connect-icut Score	2012 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	11.1
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	11.8
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	12.0
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	12.4
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	9.7
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	11.3
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	9.7
4.3.8	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?	13	13	10.9
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	12.7
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	10.5
4.3.11	When developing the Traffic Control Plan for a project, does the agency involve contractors on type I and II projects?	9	9	8.4
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	9.9

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	2011 Connecticut Score	2012 Connecticut Score	2012 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	10.5
4.4.2	Is the letting schedule altered or optimized to minimize disruptions to major traffic corridors?	13	13	11.3
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	12.1
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?	8	8	8.3
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	11.3
4.4.6	When bidding contracts, does the agency use flexible starting provisions after the Notice to Proceed is issued?	10	10	11.3
4.4.7	During type I, II, and III projects, does the agency use uniformed law enforcement?	14	14	13.3
4.4.8	Does the agency provide/require training of contractor staff on the proper layout and use of traffic control devices?	14	14	12.8
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?	9	9	8.8

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	2011 Connecticut Score	2012 Connecticut Score	2012 National Average
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?	14	14	13.1
4.5.2	Does the agency sponsor National Work Zone Awareness week?	15	15	12.6
4.5.3	Does the agency assume a proactive role in work zone educational efforts?	14	14	12.9
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	13.8
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	11.6

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	2011 Connecticut Score	2012 Connecticut Score	2012 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	6.9
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	9.2
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	3	6.9
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	7.8

2.2.7 Work Zone Process Reviews

23 CFR 630 Subpart J requires that an agency perform a comprehensive work zone process review at least every 2 years. In order to gauge progress by agencies in performing work zone process reviews in accordance with 23 CFR 630 Subpart J, agencies were asked to respond to the following two-part supplemental question. The 2012 Connecticut responses to the supplemental question are shown below.

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

1b. Please provide the date when your last process review was <u>completed</u>.

Month: July
Year: 2011

1c. Comments (optional): An executive level de-briefing meeting was held on August 10, 2011 with FHWA Division Office and CTDOT management which resulted in a commitment by CTDOT to develop an Action Plan to address the recommendations contained in the Process Review report. A final action plan is forthcoming in 2012.

Appendix A

2012 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

2012 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 2010 Strategic Highway Safety Plan (SHSP) includes Work Zone Safety as an emphasis area and adopts the 2010 Highway Safety Plan goal to reduce crashes by 48 percent from 1348 in 1995 to 700 by the year 2011. However, it does not include a strategic goal within the Work Zone area for reducing congestion and delays in work zones. The Department has been researching and evaluating various methodologies and data information resources to establish baseline data and develop 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 and updated in 2010, 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.

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 has incorporated a Portable Smart Work Zone System for a high interest project that involves repairs to the Route 66 Arrigoni Bridge. The system will be evaluated at project completion scheduled for November 2012. The evaluation will include an analysis of collected data, survey of users on the effectiveness of the system, and recommendations for future system applications.

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. A project is underway to develop a Connecticut Crash Data Repository (CTCDR), designed at the University of Connecticut. The repository compiles data from agencies in Connecticut that captures PR-1 accident data and provides users access to these data. The overall project goal is to provide members of the traffic-safety community with timely, accurate, complete and uniform crash data. .As of May 2012, here is a 14-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, and a concurrent pilot project is underway at the University of Connecticut to utilize scanning and optical character recognition to supplement the data entry process. 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. The monitoring, collection and reporting of project level crash data needs to be developed in order to assess the TMP's effectiveness.

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 PS&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.

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.

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.

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 recurring 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.

Project Planning and Programming

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 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.

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 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 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, 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.

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.

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.

4.3.4 Comments: The Bureau of Engineering and Construction, Office of Construction, Quality Assurance unit (QA) performs constructability reviews on selected projects during the design and construction phases. The unit works closely with the various support offices that contribute to a project's concept and design. Per the Department's Constructability Review process, CTDOT has the ability to use consulting engineering services to perform constructability reviews on larger projects and areas of specific interest. QA is also responsible for monitoring selected projects during construction and includes evaluation of work zone safety practices, guidance and specifications. 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 $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.

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, 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.

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.

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 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.

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. 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.

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. Recent legislation has been passed that allows the Department to designate that highway construction and maintenance projects be built using either a (1) "construction-

manager-at-risk" contract with a guaranteed maximum price or (2) design-build contract, as alternatives to the Department's traditional "design-bid-build" process. 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.

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.

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 (http://www.dotdata.ct.gov/iti/master_iti.html) on the Department's web site, 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 5:30 am - 7:00 pm 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 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 (December 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 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 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. An evaluation of the bid item for Worksite supervisor that is in several projects needs to be completed to see if the item provides a benefit and is an effective tool in reducing work zone congestion, delays and promoting safety.

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.

Communications and Education

4.5.1 Comments: The Department currently has a web site for traveler information (http://www.dotdata.ct.gov/iti/master_iti.html) 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 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 (see http://www.ct.gov/dot/cwp/view.asp?a=1410&q=475476). 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. In 2012, a new work zone safety media and public relations campaign was launched which includes the use of social media sources such as Facebook, You Tube and Twitter to reach out to public and industry partners.

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 (See 4.5.2 Comments).

4.5.4 Comments: The Department provides major project updates, project information and travel impact information via the Department's web site (see 4.5.1 Comments). 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. Significant projects that include the rehabilitation and construction of some of the major bridges and interchanges in the state have developed individual webpages where information on travel impacts, project progress, delays, detours and general project information is provided. The New Britain-Hartford Busway Construction Program is also developing a web site that will provide transit information and construction updates ((http://www.ctrapidtransit.com/).

4.5.5 Comments: Yes (see 4.5.4 comments). 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.

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. 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 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 to receive feedback from the public via an online message form on its web site (http://www.dotdata.ct.gov/contacts/contact.aspx).

4.6.4 Comments: The Department is working on several strategies in hopes of developing some performance based measures. Public relations efforts include the establishment of an e-mail address specific to work zone safety questions and comments, the continued participation in marketing and campaigning initiatives, and an enhanced work zone safety web site that directs visitors to information on worker and contractor safety topics, education and training, FAQ's, surveys and Connecticut guidelines, policies and regulations (http://www.ct.gov/dot/cwp/view.asp?a=1410&q=475476). Additional project specific efforts include the incorporation of portable speed monitoring devices and equipment systems to capture traffic queue and delay information for selected projects. The Department is in the process of updating plans, guidance and practices for traffic control specific to workers, contractors, and law enforcement using guidelines and manuals available through the National Work Zone Safety Clearinghouse. 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 are conducted annually and 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. The Department is in the process of completing an action plan based on the Work Zone Process Review that was conducted in 2011. Additional action items and timeframes still need to be developed and included before the action plan is complete. 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.

U.S. Department of Transportation
Federal Highway Administration

APPENDIX 7

FHWA Memorandum
Work Zone Self-Assessments
(May 1, 2014)

U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: **INFORMATION:** Work Zone Self-Assessments

Date: MAY 1 - 2014

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 an update on our efforts to continue improving transportation system performance related to work zones, especially regarding the Work Zone Self-Assessment (WZSA).

The WZSA has been invaluable to the Agency, supporting our efforts to achieve System Performance, National Leadership, and Program Delivery goals. It has also been helpful for setting Agency annual performance goals over the 11 years that it was conducted. The WZSA has also provided critical input to the Office of Operations, enabling us to assess the success of our programs, to better define our priorities, and to identify and share best practices nationwide. The Self-Assessment has also proven to be valuable to our State and local partners with respect to evaluating the effectiveness of their work zone management activities and charting paths for improvement in these areas.

In an effort to meet our goals of both measuring performance and promoting efficient and effective work zone management practices, the Office of Operations initiated a project in 2013 to evaluate the WZSA and to determine if changes are needed. It was time to conduct such an evaluation given the considerable improvement and changes in work zone safety and mobility practices, policies, and tools/technologies that we documented over the years, as reflected in the high WZSA scores. It was also important to consider the WZSA within the context of related efforts, especially the Work Zone Process Reviews required by 23 CFR 630 Subpart J and the Work Zone Management Capability Maturity Framework that is currently being developed by the Office of Operations. Under this evaluation project, we conducted two stakeholder meetings with representatives from State departments of transportation and Federal Highway Administration Division Offices to get their input on possible changes in the WZSA, its effectiveness, and its relationship to the Process Reviews. After evaluating the input from our stakeholders and assessing other key factors, we have concluded that significant changes are warranted, including the termination of the self-assessment.

We believe that focusing our attention on the Process Reviews and related tools will better meet our needs, resulting in efficiencies for both the Agency and our State partners.

To help with the transition from the WZSA to this new approach, we will be taking the following actions over the next few months:

- We will update our guidance on Work Zone Process Reviews.
    - This guidance will better define:
        - Who within the State departments of transportation should be involved in the Process Review;
        - The major areas that should be considered as part of the Process Review; and
        - Appropriate performance measures that can be used and included in the reviews to gauge the effectiveness of current agency processes, and help measure improvements in those processes over time.
    - This guidance will include information on best aspects of self-assessment to be considered during the Process Reviews
    - This guidance will also include discussion on the use of other assessment tools such as the Operations Efficiency Index and the Work Zone Management Capability Maturity Framework that is currently under development.
- Once this guidance is available, we will conduct webinars to explain the new approach.
- To complement the guidance and webinar, we will develop outreach materials such as factsheets and brochures to increase awareness of new approach / guidance.

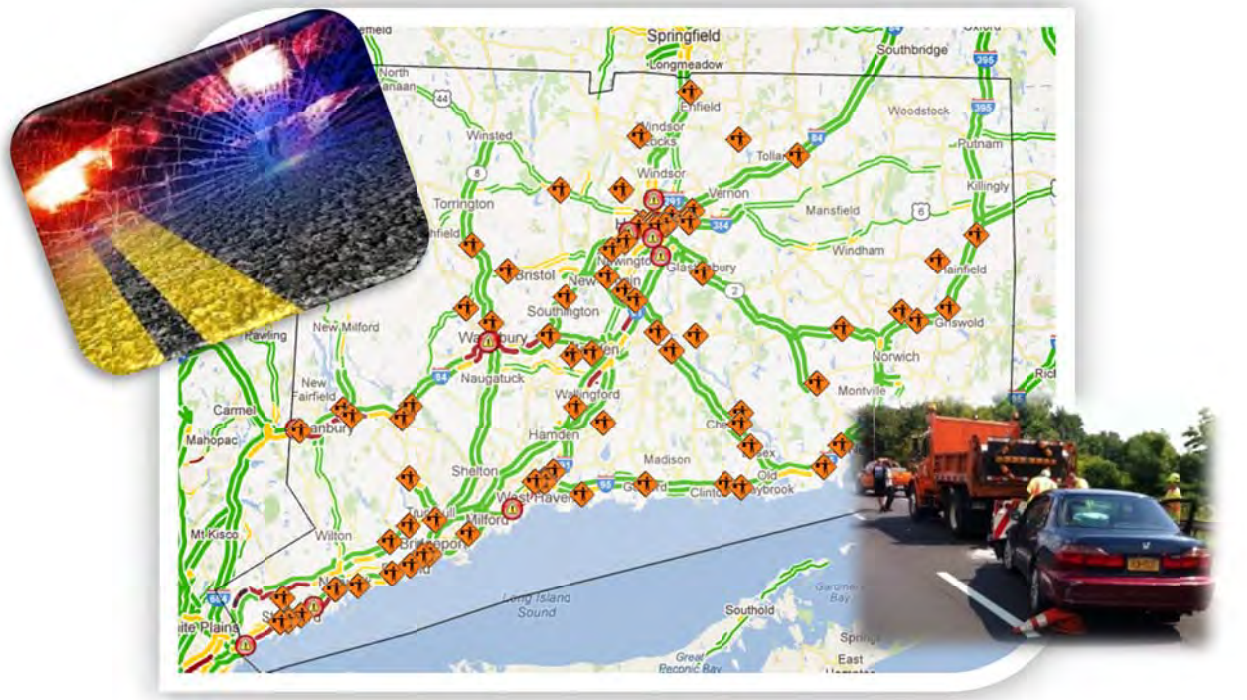
Finally, we want to emphasize that work zone safety and mobility remains one of our top priorities. We believe that increased focus on the Process Reviews will help us achieve work zone management goals, advance best practices and the implementation of new innovative strategies/tools, and assess current state-of-the-practice. Look for more information and details on the above actions soon.

U.S. Department of Transportation
Federal Highway Administration

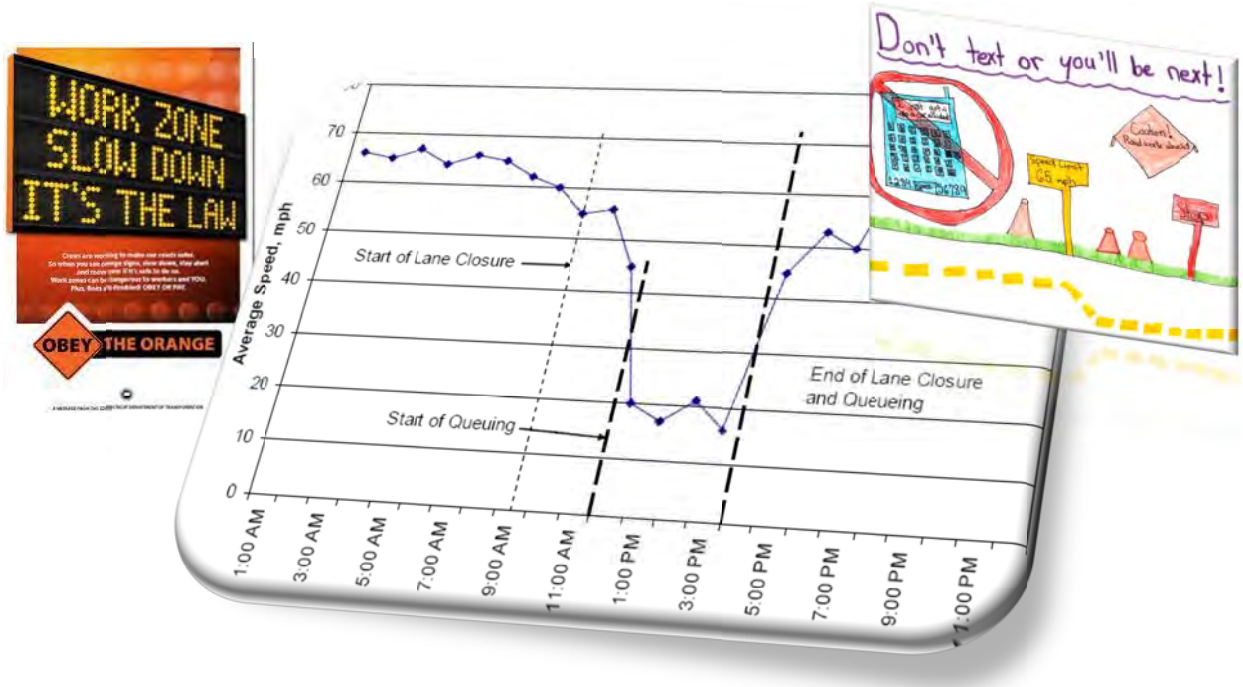
APPENDIX 8

Connecticut Work Zone Improvement Plan (WZIP)

(May 29, 2013)



Connecticut Work Zone Improvement Plan



CONNECTICUT
WORK ZONE IMPROVEMENT PLAN

This Work Zone Improvement Plan was prepared by the Connecticut Department of Transportation in response the recommendations in the 2011 Connecticut Work Zone Safety and Mobility Process Review Report and is evidence of Connecticut's compliance with 23 CFR 630.1008.

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

By: _____ Date: 5/22/13
James P. Redeker
Commissioner

FEDERAL HIGHWAY ADMINISTRATION

By: _____ Date: 5/29/13
Amy Jackson-Grove
Division Administrator

Executive Summary

A Work Zone Safety and Mobility Process Review (Process Review) was completed during the 2010 calendar year by the Connecticut Department of Transportation (CTDOT) and the Federal Highway Administration Connecticut Division (FHWA) to comply with the requirements of 23 CFR Part 630, Preconstruction Procedures, Subpart J—Work Zone Safety and Mobility.

The Process Review was the first such review conducted for the Work Zone Safety Program since this regulation became effective in 2007. The report is entitled *2011 Work Zone Safety and Mobility Process Review* and was signed by CTDOT and the FHWA on July 11, 2011. The report includes several recommendations for improvement and also a commitment by CTDOT to develop a formal action plan to pursue opportunities for additional improvement.

The 2010 and 2011 Work Zone Mobility and Safety Self-Assessments (Self-Assessment) and the 2010 Work Zone Field Reviews (Field Reviews) were the primary means by which the Process Review was developed.

The Self-Assessment is conducted annually by the FHWA Connecticut Division and CTDOT. It is used to evaluate the effectiveness of work zone management activities in Connecticut and to identify areas needing improvement.

The Field Reviews are scheduled to include various types of projects in construction and maintenance. The Reviews can range from a full audit of all work zone aspects to a selected audit of particular work zone elements such as pedestrian accessibility, pattern deployment, quality of traffic control devices and innovative techniques. These Field Reviews are an important tool to promote better understanding of the operational and design characteristics of a work zone. They help the DOT to develop improvements in the area of design, construction and operations.

This Work Zone Improvement Plan (WZIP) is the formal action plan to address the recommendations in the recent Process Review. The primary objective of the Plan is to minimize work zone congestion and delays, and enhance the safety of workers and motorists. This will be done through the establishment of policies, strategies, processes and tools to manage work zone mobility and safety impacts during project planning, design, and construction and maintenance activities.

A number of intermediate goals and actions are included in the WZIP to work towards the use of safety performance measures. Typical safety performance measures relate to the number and rate of fatalities and/or crashes and incidents, emergency response times, public perceptions of safety, etc., for the relevant transportation modes. Safety performance measures should be relevant to the safety issues and policy/strategy initiatives in a jurisdiction[1].

The most critical safety benefit is a decrease in the number of fatal and injury crashes that occur each year on streets and highways. Motor vehicle crashes are the sixth leading cause of death and the leading cause of injuries in the United States.

The Process Review identified several successful practices that are part of CTDOT's culture and continue to be refined and improved upon. They include:

- CTDOT Design Manual has been updated to provide for the consideration of positive separation devices for certain high speed/high volume facilities. 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 its 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 zones.
- CTDOT does an excellent job of sponsoring and promoting National Work Zone Awareness Week annually and of promoting awareness throughout each construction season.
- Incident Management services are utilized on Type I and II projects.

FHWA and CTDOT also identified the following noteworthy practices as a result of the 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.

The two areas identified in the Process Review that need improvement based on the Self-Assessments are:

Leadership and Policy- The report suggests 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

[1] Cited from Cambridge Systematics, Inc. 2009, *A Primer on Safety Performance Measures for the Transportation Planning Process,* Report No. FHWA-HEP-09-043 http://safety.fhwa.dot.gov/hsip/tsp/fhwahep09043/fhwahep09043.pdf

Further, the report 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.

This WZIP establishes two working groups to progress the action items outlined in this plan. The first is the Work Zone *Performance Measures* Working Group under the Bureau of Policy and Planning and the second is the Work Zone *Operations* Working Group under the Bureau of Engineering and Construction. The Work Zone *Performance Measures* Working Group is responsible for developing strategic goals, performance measures, and the means to collect and analyze work zone congestion, delay, and safety performance. The Work Zone *Operations* Working Group is responsible for developing standards, practices, and policies that are consistent with national programs and meet Federal and State requirements. A Chairperson presides over each working group and decisions within the group are made by general consensus. These Working Groups will exist as an implementation tool for the Strategic Highway Safety Plan (SHSP) objectives and each Chairperson is responsible to the SHSP *Work Zones* safety emphasis area leader being referred to as the "Champion" in this WZIP.

The reader is reminded that CTDOT oversees the SHSP which is a broader, federally mandated plan covering a wide spectrum of physical and behavioral safety initiatives. The purpose of the SHSP is to clearly identify the State's critical safety needs and direct allocated resources to achieve significant reductions in fatalities and serious injuries on highways and all other public roads. The SHSP is a data-driven, multiyear comprehensive safety plan which integrates the 4E's – engineering, education, enforcement, and emergency medical services (EMS). To achieve the goal of the SHSP, the following safety emphasis areas have been identified:

- Traffic Records and Information Systems
- Roadway Departure and continued Spot and Systematic Safety Improvement
- Pedestrians and Bicycles
- Work Zones
- Driver Behavior (Occupant Protection, Child Passenger Safety, Speed Enforcement and Distracted Driving)
- Commercial Vehicles
- Incident Management

The SHSP *Work Zones* Champion is not only an active participant in the WZIP but is also a member of the SHSP Steering Committee. The Champion will steer the WZIP Chairpersons in a direction consistent with the policy objectives of the broader SHSP. The Champion provides the conduit for feedback for future SHSP updates, and manages changes to the emphasis area. The Champion and the Chairpersons will ensure that the recommendations of the WZIP are brought to the appropriate agency management levels for implementation.

Introduction

Since the Federal Highway Administration (FHWA) issued the 2004 Final Rule on Work Zone Safety and Mobility, several changes to the Code of Federal Regulations (CFR) have been adopted. Key elements of the Work Zone Safety and Mobility regulations require State Highway Agencies to implement the following:

- Policy – implement a policy to manage work zone impacts. The policy may be in the form of plans, processes, and procedures that will be developed in cooperation with FHWA.

- Assessment – develop and implement systematic procedures to assess work zone impacts, the scope of the assessment shall be based on project characteristics.

- Significant projects – identify significant projects based on agency policy and engineering judgment.

- Transportation Management Plan (TMP) – develop a TMP that consists of temporary traffic control plans; for significant projects, TMPs shall address the traffic control plans, operational strategies, and public information and outreach.

- Work Zone Data – use work zone crash data to improve work zone safety and mobility during project implementation and to improve agency procedures for future work zones.

- Training – train personnel involved in work zone design, implementation, operation, and inspection.

- Process Review – perform a work zone safety and mobility process review every 2 years with the FHWA.

- Pay Items – include appropriate pay items for implementing the TMP either through method or performance based specifications.

- Responsible persons – provide a qualified person responsible for work zone safety and mobility at the State and Contractor level.

- Implementation – work in partnership with the FHWA in the implementation of its policies and procedures to improve work zone safety and mobility. The FHWA will review the State's conformance with this regulation at appropriate intervals.

Requirements that were added to the CFR include revisions to standards, guidance, options, and supporting information relating to the traffic control devices, impacting virtually every section of

the Manual of Uniform Traffic Control Devices (MUTCD). These requirements resulted in the adoption of the 2009 Edition of the MUTCD as the national standard for all traffic control devices installed on any street, highway, or bicycle trail open to public travel. Some other final rules that have been incorporated into Title 23 CFR are:

- Final rule to supplement existing regulations to include conditions for the appropriate use of, and expenditure of funds for; uniformed law enforcement officers; positive protective measures between workers and motorized traffic; and installation and maintenance of temporary traffic control devices during construction, utility, and maintenance operations (Reference 23 CFR Part 630 Subpart K revised December 5, 2007).

- Final rule on maintaining traffic sign retro-reflectivity (Reference 23 CFR Part 655 Subpart F revised May 14, 2012).

- Final rule on high-visibility safety apparel in response to Section 1402 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act commonly referred to as SAFETEA-LU, which requires all workers to wear high-visibility safety apparel (Reference 23 CFR Part 655 Subpart F revised April 1, 2009).

A Work Zone Safety and Mobility Process Review was completed during the 2010 calendar year by the Connecticut Department of Transportation (CTDOT) and the Federal Highway Administration Connecticut Division (FHWA) to comply with the requirements of 23 CFR Part 630, Preconstruction Procedures, Subpart J—Work Zone Safety and Mobility.

The Process Review was the first such review conducted for the Work Zone Safety Program since this regulation became effective in 2007. The report is entitled *2011 Work Zone Safety and Mobility Process Review* and was signed by CTDOT and the FHWA on July 11, 2011. The report includes several recommendations for improvement and also a commitment by CTDOT to develop a formal action plan to pursue opportunities for additional improvement. The next work zone process review must be completed in 2013.

This Work Zone Improvement Plan (WZIP) is the formal action plan to address the recommendations in the recent Process Review. The primary objective as it relates the management of work zone safety and mobility for CTDOT is to minimize work zone congestion and delays, and enhance the safety of workers and motorists. This will be done through the establishment of policies, strategies, processes and tools to manage work zone mobility and safety impacts during project planning, design, and construction and maintenance activities.

Overview

Plan: a system for achieving objective

WZIP will evolve through updates, be expanded as needed, and address future changes in rules and regulations related to work zone safety initiatives:

1) National Highway Work Zone Safety Program
2) Final Rule on Work Zone Safety and Mobility
3) Public Law 112-141 Moving Ahead for Progress in the 21st Century Act (MAP-21).

WZIP will also integrate CTDOT's work zone policies, goals and objectives included in the SHSP, and results of the annual Self-Assessments and Field Reviews being performed annually by CTDOT in cooperation with the FHWA. Agency guidelines, policies, and practices will be reviewed and updated to meet the new laws and regulations that are enacted at the state and Federal levels and be documented in WZIP.

Administration

This WZIP establishes two working groups to progress the action items outlined in this plan. The first is the Work Zone *Performance Measures* Working Group under the Bureau of Policy and Planning and the second is the Work Zone *Operations* Working Group under the Bureau of Engineering and Construction. The Work Zone *Performance Measures* Working Group is responsible for developing strategic goals, performance measures, and the means to collect and analyze work zone congestion, delay, and safety performance. The Work Zone *Operations* Working Group is responsible for developing standards, practices, and policies that are consistent with national programs and meet Federal and State requirements. A Chairperson presides over each working group and decisions within the group are made by general consensus. These Working Groups will exist as an implementation tool for the Strategic Highway Safety Plan (SHSP) objectives and each Chairperson is responsible to the SHSP *Work Zones* safety emphasis area leader being referred to as the "Champion" in this WZIP. Refer to Figure 1 Organization Chart for additional information on participants and relationships between SHSP, WZIP and others.

The reader is reminded that CTDOT oversees the SHSP which is a broader, federally mandated plan covering a wide spectrum of physical and behavioral safety initiatives. The purpose of the SHSP is to clearly identify the State's critical safety needs and direct allocated resources to achieve significant reductions in fatalities and serious injuries on highways and all other public roads. The SHSP is a data-driven, multiyear comprehensive safety plan which integrates the 4E's – engineering, education, enforcement, and emergency medical services (EMS). To achieve the goal of the SHSP, the following safety emphasis areas have been identified:

- Traffic Records and Information Systems
- Roadway Departure and continued Spot and Systematic Safety Improvement
- Pedestrians and Bicycles
- Work Zones
- Driver Behavior (Occupant Protection, Child Passenger Safety, Speed Enforcement and Distracted Driving)
- Commercial Vehicles
- Incident Management

The SHSP *Work Zones* Champion is not only an active participant in the WZIP but is also a member of the SHSP Steering Committee. The Champion will guide the WZIP Chairpersons in a direction consistent with the policy objectives of the broader SHSP. The Champion provides the conduit for feedback for future SHSP updates, and manages changes to the emphasis area. The Champion and the Chairpersons will ensure that the recommendations of the WZIP are brought to the appropriate agency management levels for implementation.

The action item areas recommended for improvement based on the Self-Assessments are in the category for Leadership and Policy and the category for Program Evaluation and are listed in Table 3. The action item issues recommended and based upon the Field Reviews have been included in Table 4 and Table 5. The groups will work collaboratively with the Commissioner's Highway Work Zone Safety Advisory Council, the Work Zone Safety Awareness Working Group, the Highway Safety Office (HSO), and be responsible for integrating their efforts into Connecticut's Strategic Highway Safety Plan.

The Highway Work Zone Safety Advisory Council was established under Public Act 08-114 (Connecticut General Statute Section 14-212e).Its purpose is to make recommendations to improve safety for workers, public safety officers, and motor vehicle operators in a "highway work zone", as defined in Connecticut General Statute Section 14-212d.

The ongoing areas of study and review by the Council include: (1) Evaluation of current work design and safety protocols; (2) survey of effective highway work zone design and safety protocols in other states; (3) implementation of technology to improve highway work zone safety; (4) use of public safety officers to improve highway work zone safety; (5) availability of federal funding for highway work zone training and enforcement; and (6) other issues the Council deems appropriate for improving highway work zone safety.

The Work Zone Safety Awareness Working Group was formed in 2000, following the inception of the National Work Zone Awareness Campaign in 1999. The Working Group's primary objective is to increase public awareness of work zone safety and facilitate intradepartmental and interagency communication and support related to work zone safety awareness.

The HSO's primary objectives are to plan, coordinate, and implement effective highway safety programs and to provide technical leadership, support and policy direction to highway safety partners. The HSO focuses on NHTSA (National Highway Traffic Safety Administration) program areas under the Federal 402 program. These include Impaired Driving, Occupant Protection, Child Passenger Safety, Police Traffic Services, Motorcycle Safety, Traffic Records, Driver Groups, Bicycle and Pedestrian Safety and Work Zone Safety. The HSO is also publishes the Annual Highway Safety Plan and the Annual Highway Safety Report, which ensures compliance with CTDOT policies, National Highway Traffic Safety Administration guidelines, and relevant federal laws and regulations; establishes problem identification, and formulates goals and objectives for transportation safety.

The Strategic Highway Safety Plan clearly identifies the State's critical safety needs and directs allocated resources to achieve significant reductions in fatalities and serious injuries on highways and all other public roads. The SHSP is prepared in cooperation and collaboration with the Highway Safety Improvement Program. It is the mechanism for all highway safety programs in the State to work together in a coordinated effort to maximize its resources and positions the State and all its safety partners to address the State's traffic safety challenges. The Plan includes Work Zones as an emphasis area. The Champion is responsible for the oversight of the WZIP, and execution of any recommendations that originate from the WZIP that have been approved by the Department of Transportation or SHSP steering committee.

Work Zone Operations Working Group (WZO)

Terri L. Thompson - Chair
Transportation Supervising Engineer
Bureau of Engineering and Construction
Office of Construction
Telephone: (860) 594-2667
Email: Terri.Thompson@ct.gov

The Work Zone *Operations* Working Group is responsible for developing standards, practices, and policies that are consistent with national programs and meet Federal and State requirements. A Chairperson presides over each working group and decisions within the group are made by general consensus.

TABLE 1- WORK ZONE OPERATIONS WORKING GROUP

MEMBER	REPRESENTING
Terri Thompson	Office of Construction, Central Administration – Chairperson
Jeffrey Hunter	Office of Construction, Central Administration
Bonney Whitaker	Office of Construction, Central Administration
Kiah Patten	Office of Construction, Central Administration
Travis Woodward	Office of Construction, District
David Ferraro	Office of Construction, District
Charles Harlow	Office of Traffic Engineering
Michael Calabrese	Office of Highway Design
Steve Keedy	Office of Bridge Safety
Frederick DiNardi	Office of Maintenance, Central Administration
John Korte	Office of Highway Operations
David Shute	Office of Human Resources- Safety Division
Robert Turner	Federal Highway Administration
Robert Ramirez	Federal Highway Administration
Vacant	Department of Emergency Services & Public Protection State Police
Vacant	Connecticut Police Chiefs Association

The Working Group will focus on elements in Table 3 and Table 4 related to work zone traffic management practices and policies on a statewide/area-wide basis. The tasks will include development and execution of customer surveys to gauge the effectiveness of public outreach strategies, work zone design and management, and the level of recognition of the work zone traffic control devices and their functions. This group will also evaluate and make recommendations for changes or improvements to the various elements that are a part of work zone traffic management practices and policies. This will include: improvements to traffic control devices; creating, updating, and revising specifications; development of guidance documents; and the use of innovative practices for the safety of the highway workers and the traveling public.

Work Zone Performance Measures Working Group (WZPM)

Colleen A. Kissane - Chair
Transportation Assistant Planning Director
Bureau of Policy and Planning
Office of Strategic Planning and Projects
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The Work Zone *Performance Measures* Working Group is responsible for developing strategic goals, performance measures, and the means to collect and analyze work zone congestion, delay, and safety performance.

TABLE 2- WORK ZONE PERFORMANCE MEASURES WORKING GROUP

MEMBER	REPRESENTING
Colleen Kissane	Office of Strategic Planning and Projects - Chairperson
Craig Babowicz	Office of Strategic Planning and Projects- Policy & Performance Measures Unit
Michael Connors	Office of Roadway Information Systems
Maribeth Wojenski	Office of Coordination, Modeling and Crash Data
Harold Decker	Office of Highway Operations
Charles Harlow	Office of Traffic Engineering
Terri Thompson	Office of Construction, Central Administration
Jeffrey Hunter	Office of Construction, Central Administration
Bonney Whitaker	Office of Construction, Central Administration
John DeCastro	Office of Maintenance, Central Administration
Robert Turner	Federal Highway Administration
Robert Ramirez	Federal Highway Administration
Vacant	Department of Emergency Services & Public Protection State Police
Vacant	Connecticut Police Chiefs Association

The Working Group will focus on elements in Table 3 and Table 5 that are related to goals and performance measures in an attempt to reduce crashes and delays. This will include monitoring congestion impacts and identifying problems in real time that result in work zone delays and crashes.

Implementation

Action Items

The Process Review identified the following action item areas needing improvement based on the scores for the Self-Assessments. These areas are part of WZIP Action Areas (see Table 3).

1) Establish strategic goals specifically to reduce congestion and delays in work zones.

2) Implement strategic goals specifically to reduce crashes in work zones.
3) Establish performance measures (e.g., vehicle throughput or queue length) to track work zone congestion and delay.

4) Implement performance measures (e.g., crash rates) to track work zone crashes.

5) Collect data to track, analyze and evaluate work zone congestion and delay performance.

6) Collect data to track, analyze and evaluate work zone safety performance.

7) Conduct customer surveys to evaluate work zone traffic management practices and policies on a statewide/area-wide basis.

8) Develop strategies to improve work zone performance based on work zone performance data and customer surveys.

Performance Measures

Performance measures have been a topic of discussion at the Council, which has a responsibility to make recommendations to improve safety for workers, public safety officers, and motor vehicle operators in a "highway work zone," as defined in Connecticut General Statute Section 14-212d. The areas of study and review by the Council include: (1) evaluation of current work design and safety protocols; (2) survey of effective highway work zone design and safety protocols in other states; (3) implementation of technology to improve highway work zone safety; (4) use of public safety officers to improve highway work zone safety; (5) availability of federal funding for highway work zone training and enforcement; and (6) other issues the Council deems appropriate for improving highway work zone safety.

Ms. Colleen Kissane and Mr. Joseph Cristalli, who is the Transportation Principal Safety Program Coordinator in the Office of Highway Safety, provided an overview to the Council of their experience with implementing performance measures and provided a copy of the National Cooperative Highway Research Program (NCHRP) Domestic Scan 08-04 entitled "Best Practices in Work Zone Assessment, Data Collection, And Performance Measurement", which is available at the following website:
http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-68A_08-04.pdf

Areas that have been identified by CTDOT and the FHWA as opportunities for best practices are:
Tracking Long-Term Progress

- Monitoring progress system-wide over many years to determine trends
- Not assessing any individual project, but CTDOT as a whole
- Key interest items:
    - Traffic safety during construction
        - Be able to identify accident rates before, during, and after construction
        - Is construction activity increasing accidents?
        - Are accident rates better or worse after construction than before?
    - Congestion impacts of construction
        - How much delay is construction causing motorists?
        - How can delays be evaluated?
        - Should existing speed-flow monitors on I-91 be used?

- Need to capture data from existing and convenient sources, if possible.

- Scope may require narrowing the types of projects or roads to be included in data collection.
  - ✓ Example: Data on freeway system (freeway construction projects) may be readily available.
  - ✓ Single data source: State Police
  - ✓ Electronic data source: State Police System

Identifying Problems in Real Time on Individual Projects

- If problems occur during construction projects, are they being recognized and corrected appropriately?
- The FHWA cited tractor trailer rollovers during a past I-95 construction project in Bridgeport. The monitoring of traffic cameras in the area revealed that trucks were having trouble negotiating lane changing in the project limits. The contractor identified improper super elevation, repaved the area of concern, and corrected the problem.
- Tracking crashes in a work zone
  - ✓ The crash data element for work zones must be accurately represented on accident reports in order to obtain reliable crash data. Emphasis and understanding of the work zone element as defined in the Model Minimum Uniform Crash Criteria (MMUCC) and ANSI D16.1-2007 Manual on Classification of Motor Vehicle is critical in order for the performance measures to move forward.

  - ✓ The Traffic Records Coordinating Committee is a committee whose mission is to provide a timely, complete, uniform, accurate, accessible, and integrated motor vehicle crash reporting system for Connecticut. TRCC will provide major assistance to the WZIP Working Group in developing performance measures related to vehicle crash data.

Specific Items Requiring Further Discussion by WZIP Working Groups

1) Best Available Data – Look at internal, interagency and external sources for information.

2) Delay Measures – Innovative practices and devices to assist in getting data.

3) Public Information – Use of surveys, campaigns, website, and social media to get public feedback.

4) Determine what is considered construction-related effects on congestion and delay – Approaching work zones (i.e. queue areas).

5) Law Enforcement Training – Require all law enforcement personnel to complete a course in work zone traffic control, such as “Safe and Effective Use of Connecticut Law Enforcement Personnel in Work Zones,” that is available through the University of Connecticut Technology Transfer Center.

6) Incident Reporting – Develop project-based incident reporting database.

7) Establishment of work zone clear zone - The AASHTO Roadside Design Guide defines a clear zone as the total roadside border area, starting at the edge of the traveled way, available for safe use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or a clear run-out area. The clear zone needs to be established for each project to ensure the contractor's operations provide an appropriate clear area for items such as storage of equipment, vehicles, and stockpiling of project materials. The use of appropriate NCHRP 350 devices that provide positive protection must also be required.

Planned Measures and Strategies

WZIP will be the mechanism for:

- Documenting issues, defining problems, and establishing realistic outcomes, as a result of discussions with various work zone stakeholders that include local, state and private agencies and organizations, the traveling public, and contracting industry.

- Establishing tasks and timelines to implement goals and measures for reducing congestion and delays, and reduce crashes in work zones.

- Guiding the Working Groups in producing solutions in the areas of Engineering, Enforcement, Education and Outreach, Traffic Incident Management, and Programming and Planning.

WZIP has three task-based lists that will address the following:

1) Action Areas, Table 3.

2) The Work Zone Operations Working Group Action Item Issues, Table 4.

3) The Work Zone Performance Measures Working Group Action Item Issues, Table 5.

This WZIP includes recommendations and solutions that are achievable, valuable, manageable, constructive, and realistic. There are other activities that are not specifically addressed in the tables and are as follows:

1) Annual Meeting to report out on progress by Work Zone Operations and Work Zone Performance Measures Working Groups.

2) Member participation or affiliation with other committees, groups, and organizations that have work zone safety focus or emphasis areas that may have related work zone safety areas (i.e. Strategic Highway Safety Plan Committee, Traffic Records Coordinating

Committee, Connecticut Transportation Institute Technology Transfer Center, Office of Highway Safety, Commissioner's Highway Work Zone Safety Advisory Council, and the Work Zone Safety Awareness Working Group).

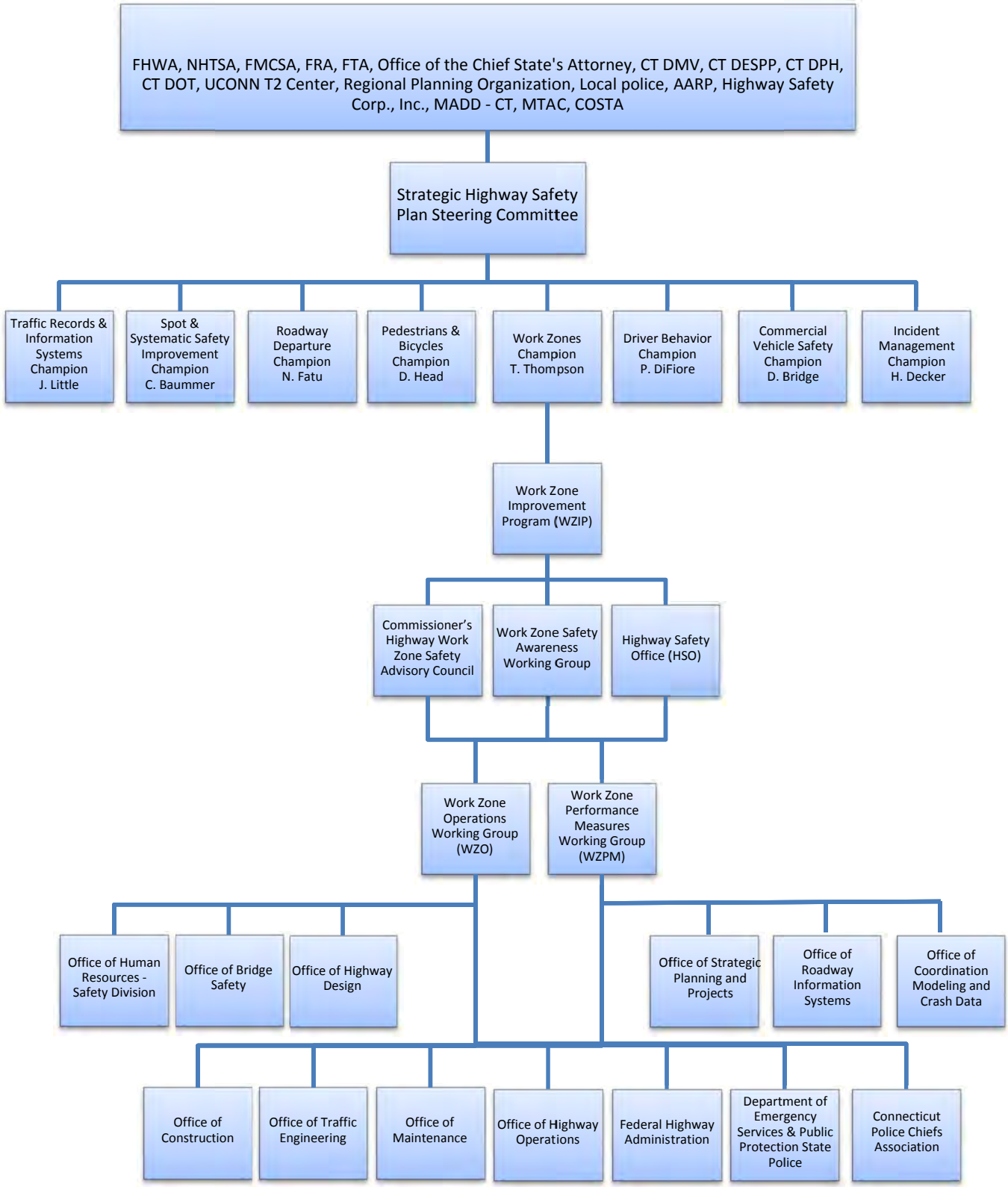
3) Joint meetings held quarterly with the Executive Steering Committee WZIP Working Groups to discuss progress and update the tables.

4) Annual Work Zone Mobility and Safety Self-Assessments.

5) Work Zone Safety Awareness Campaign initiatives, including the annual work zone safety press event and public outreach activities in support of the National Work Zone Awareness Campaign.

6) Work zone safety audits for night and day operations are conducted throughout the construction season and include the review of traffic control devices, sign installation and removal methods, and sign recognition and visibility. A survey of workers is also conducted to better understand what is working and what is not working. Through these audits, changes and improvements can be made to assist motorists and workers. Specific action items to be addressed by the Working Groups are included in the Work Zone Improvement Plan Table 4 and Table 5.

FIGURE 1- ORGANIZATIONAL CHART



CONNECTICUT
WORK ZONE IMPROVEMENT PLAN

This Work Zone Improvement Plan was prepared by the Connecticut Department of Transportation in response the recommendations in the 2011 Connecticut Work Zone Safety and Mobility Process Review Report and is evidence of Connecticut's compliance with 23 CFR 630.1008.

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

By: _____ Date: _____
James P. Redeker
Commissioner

FEDERAL HIGHWAY ADMINISTRATION

By: _____ Date: _____
Amy Jackson-Grove
Division Administrator

TABLE 3 – Connecticut Work Zone Improvement Plan (WZIP) Action Areas

Improvement Area: Work Zone Safety and Mobility
State: Connecticut
Process Review Report Date: July 11, 2011

	Critical Issue Area	Recommendations for Improvement	Actions and/or Products, including Major Steps, if any, and Resources Needed	Responsible Office/ Position/ Person	Status	Target Completion Date
	Work Zone Self-Assessment Elements					
1	**Leadership and Policy**	Establish strategic goals specifically to reduce congestion and delays in work zones.	1. Form working groups comprised of various stakeholders that can assist in improvement. a) Establish Work Zone Operations (WZO) Working Group and Work Zone Performance Measures (WZPM) Working Group. b) Schedule meeting for both groups to go over action plan and issues list from work zone reviews 2. Define other safety plans and programs that include Work Zone Safety elements 3. Develop strategic goals for work zone safety (CTDOT and stakeholders) to provide safe and efficient roadway systems. 4. Prepare recommendation(s) for implementation of strategic goals for review and comment by the SHSP Champion. 5. Act on recommendations to implement or return for further action 6. Approve strategic goals and incorporate into SHSP	1a. T. Thompson 1b. Chairpersons - currently T. Thompson and C. Kissane 2. WZO and WZPM Chairpersons 3. WZO and WZPM Chairpersons 4. WZO and WZPM Chairpersons and SHSP Champion 5. SHSP Champion 6. SHSP Champion and SHSP steering committee	1a. Completed 1b. Pending Approval of WZIP 2. Ongoing 3. Ongoing Refer to Table 4 & Table 5 4. Pending 5. Pending 6. Pending	1a. Completed 1b. May 2013 2. Ongoing 3. October 2013 4.To Be Determined 5.To Be Determined 6.To Be Determined

	Critical Issue Area	Recommendations for Improvement	Actions and/or Products, including Major Steps, if any, and Resources Needed	Responsible Office/ Position/ Person	Status	Target Completion Date
	Work Zone Self-Assessment Elements					
2	**Leadership and Policy**	Implement strategic goals specifically to reduce crashes in work zones.	1. Establish a Work Zone Safety Advocate/Liaison that reports to upper management and coordinates with various offices, agencies and organizations to brainstorm and identify reasonable strategic goals to improve mobility in work zones and handle delays more effectively.	Office of Commissioner	Pending	To Be Determined
3	**Leadership and Policy**	Establish performance measures (e.g. vehicle throughput or queue length) to track work zone congestion and delay	1. Define metrics for performance measures considering - Queue lengths - Speed - Volume - Delay time 2. Development of criteria to define the limits of work zones and related queues 3. Establish means to capture real time traffic data.- Low vehicle throughput and long queue lengths causing congestion and delays in work zones a) Systems Engineering Analysis - Needs Assessment and Functional Requirements b) Develop RPM Technical Design document for RFP c) RFP Document to be sent to Purchasing / Specification Committee d) RFP Document to be sent to DAS e) RFP Advertising to Award f) Begin Travel Time messaging.	1-2. WZPM 3. Highway Operations 3a-b) Consultant with input from stakeholders including WZO and WZPM 3c) Highway Operations 3d) Highway Operations 3e) DAS/Purchasing 3f) Highway Operations	1-2 Pending. Refer to Table 5 3. Ongoing 3a) Completed 3b-f) Pending	1-2. To Be Determined 3a) Completed 3b) April 30, 2013 3c) May 1, 2013 3d) May 30, 2013 3e) June 15 - Sept. 30, 2013 3f) Sept. 30, 2014

	Critical Issue Area	Recommendations for Improvement	Actions and/or Products, including Major Steps, if any, and Resources Needed	Responsible Office/ Position/ Person	Status	Target Completion Date
	Work Zone Self-Assessment Elements					
4	**Leadership and Policy**	Implement performance measures (e.g., crash rates) to track work zone crashes	1. Define metrics to be used for performance measure - Type - Frequency - Location 2. Develop baseline to determine threshold values to be used a basis of measuring crashes 3. Approval of metrics and baseline	1. WZPM 2. WZO / WZPM SHSP Champion 3. SHSP Champion and SHSP steering committee	1. Pending. Refer to Table 5 2. Pending. Refer to Table 5 3. Pending	1. To Be Determined 2. Coincides with data collection effort 3. Pending
5	**Program Evaluation**	Collect data to track, analyze and evaluate work zone congestion and delay performance	1. Research equipment to track 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. a) Develop specification and add to project as pilot b) Obtain and evaluate data collected c) Revise specification and add to additional projects d) Establish some performance parameters that can be used in the design of work zones 2. Develop reporting system to output incident related delays utilizing current in place system to obtain data a) Develop database to log incident reports and structure queries b) produce monthly reports for analysis c) Evaluate and develop delay performance measure.	1. Highway Operations 1a) Terri Thompson and John Korte 1b) PDP Associates – company furnishing system 1c) Terri Thompson and John Korte 1d) Bureau of Engineering & Construction- Offices of Traffic Engineering Design Services, Construction 2. WZO with OIS	1. Ongoing 1a) Implemented on Project No. 0082-0299, Arrigoni Bridge Middletown 1b) Awaiting data 1c) Pending 1d) Pending 2. Pending	1a) 2011 1b) September 2013 1c) March 2014 1d) Undetermined 2. Pending

	Critical Issue Area	Recommendations for Improvement	Actions and/or Products, including Major Steps, if any, and Resources Needed	Responsible Office/ Position/ Person	Status	Target Completion Date
	Work Zone Self-Assessment Elements					
6	**Program Evaluation**	1. Collect data to track, analyze and evaluate work zone safety performance	1. Obtain reliable Crash Data in Work Zones a) Accurate representation on accident reports and include work zone as primary element on crash report b) Decrease time to get crash data c) Incorporate crash frequency in the design of future projects in the area. d) Categorize crash types	1. TRCC / Bureau of Policy & Planning 1a) Traffic Records TRCC 1b) UConn Repository 1c) Bureau of Engineering and Construction Engineering- Design and Traffic 1d) Bureau of Policy and Planning	1. Dependent on TRCC Vehicle Crash Reporting System	1) Adopt new motor vehicle crash reporting January 2015

	Critical Issue Area	Recommendations for Improvement	Actions and/or Products, including Major Steps, if any, and Resources Needed	Responsible Office/ Position/ Person	Status	Target Completion Date
	Work Zone Self-Assessment Elements					
7	**Program Evaluation**	Conduct customer surveys to evaluate work zone traffic management practices and policies on a statewide/area-wide basis	1. Customer Surveys a) Develop questionnaire for survey for web based application b) Info System setup for webpage c) Conduct Survey d) Compile information and develop needs list based on customer feedback e) Recommend new practices and polices based on needs list f) Submit for approval and implementation g) Approve recommendations and incorporate into specifications, and practices for Department 2. Maximize the best visibility and reading capability for the traveling public a) Research different types of portable/variable message signs and capabilities to find best approach. b) Recommend changes to specifications, policies and practices based on research (i.e. distance from the anticipated queue), proper messaging, and message legibility. c) Approve recommendations and incorporate into specifications, policies and practices for Department	1. WZO 1a) Work Zone Safety Awareness Working Group 1b) OIS 1c) WZO / WZPM 1d) Chairpersons WZO / WZPM 1e-g) SHSP Champion and Bureau Chief 2a) WZO Highway Operations 2b) SHSP Champion 2c) Bureau Chiefs for Highway Operations and Engineering & Construction	1. Pending	September 2013

	Critical Issue Area	Recommendations for Improvement	Actions and/or Products, including Major Steps, if any, and Resources Needed	Responsible Office/ Position/ Person	Status	Target Completion Date
	Work Zone Self-Assessment Elements					
8	**Program Evaluation**	1. Develop strategies to improve work zone performance based on work zone performance data and customer surveys.	1. Work Zone Traffic Control Reviews a) Develop review form and database to document evaluations. Review sections include - Q&A - Traffic Control Devices - Plans and specifications b) Perform Field Reviews c) Prepare Annual Report 2. Develop Action List for Working Groups (WZO/WZPM) a) Define issue and problem statement, with expected outcome b) Review issues and develop - Actions Required, Status, Time Frame and Responsible parties c) Update action list and report out on activities to SHSP Champion.	1. Bureau of Engineering & Construction- Office of Construction 1a) Jeff Hunter 1b) Work Zone Review Group – includes personnel from FHWA, Office of Construction, Traffic, Safety, and Highway Operations 1c) Office of Construction 2. Work Zone Review Group	1. Ongoing 1a) Completed 1b) 2010 and 2011 completed 2012 in progress 1c) 2011 and 2012 Pending 2. Ongoing Refer to Table 4 and Table 5	1. Ongoing 1a) Completed 1b) Min. 10 per year 1c) 2011 and 2012 to be combined in one report May 2013 2. N/A 2c) Present Progress as part of WZIP Annual Meeting – December of each year.

Table 4 and Table 5 include items from the 2010 Work Zone Action Items included in 2011 Process Review and have been updated for this report.

TABLE 4- Work Zone Operations (WZO) Working Group Action Item Issues

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
1	**Construction Sign Retro-Reflective 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 retro-reflectivity of construction signs.	Improved visibility of signs by the traveling public.	Ongoing discussion with the Office with Traffic Engineering concerning the issue. Inquired to other states if they encountered same issue. Email sent to Districts asking for review and to be ready for discussion at next managers meeting. Additional in-depth reviews regarding condensation conducted by Project 0044-0151 personnel. A) Send Memo requesting removal of signs using plastic substrate. B) Revise specification to exclude plastic substrates.	C) Monitor use of new sign provision on new projects. D) Propose research studies - Testing different types of sheeting and substrates to find qualities that provide optimum visibility and durability. E) Review and, if necessary, revise specification so that condensation is removed from construction signs.	Sent out October 15, 2011 Memo from Construction to Division of Traffic recommending two changes A) Discontinued the use of Type III sheeting and require bright fluorescent sheeting for all construction signs. B) Revised specification Item No. 1220013A Construction Signs - Bright Fluorescent Sheeting to not allow use of corrugated or waffle board types of plastic substrate, foam core, and composite aluminum sign substrates. C) Ongoing D) Pending E) Pending further review	A) Completed 5/30/12 B) Completed revision date 1/5/12	Office of Construction Traffic Engineering

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
2	**Pedestrian /Bicycle Access Issues**	Incomplete sidewalks, pedestrian buttons inaccessible or inoperable, lack of crosswalks at intersections, and lack of handicap ramps.	Improved pedestrian and bicycle awareness and accessibility through design and construction	A) Notified and discussed the review teams' concerns with chief inspectors. B) Reviewed contract documents for specific language, or lack thereof, regarding this type of access. C) Investigate if utility delays are the reason why sidewalks are incomplete. D) Conduct training if necessary.	E) Conduct more of these types of reviews to see if these pedestrian/bicycle issues are more widespread. F) Review plans and specifications and revise if necessary.	D) Included in winter training session- Work Zone Policy & Procedure presentation. Training session for supervisors and inspectors occurs in February and March. E, F) Continue reviewing plans and monitoring projects for conformance	D) Completed as of April 2012 E,F) Ongoing	Traffic Engineering Highway Design Office of Construction Office of Maintenance Mon-motorized Transportation Coordinator
3	**Project Lighting for Night Construction**	Glare from portable light plants affecting motorists traveling through the work zone.	Reduce glare for motorists in work zone areas.	A) Develop a Daily Site Review checklist to be used by project field personnel.	B) Develop and distribute work zone safety reminders (i.e. issues memo) for field personnel. C) Review specification requirements.	A) Completed B) Completed C) Completed- no change	A) Implemented Aug. 15, 2012	Office of Construction Traffic Engineering Safety Division
4	**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.	Increase visibility for inspecting night time and improve overall visibility of work area.	A) Reviewed specification requirements and found that contractor not required to supply any lighting either hand held or portable light plants.	B) Place request to specification committee to include wording that for any night work, portable and hand held lighting is to be supplied by contractor for inspection staff.	B) In the process of reviewing current M&PT and work zone requirements included in special provisions and standard specifications.	Ongoing	Office of Construction Traffic Engineering Office of Maintenance Safety Division

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
5	**Barricade Warning Lights - High intensity**	High-intensity, solar powered warning lights are not effective in rural areas with significant canopy surroundings.	Ensure that lights are operational under all conditions.	Reviewed specification.	Revise current provision to state exclusion of solar powered warning lights in rural areas. Projects should require and monitor battery-operated lights in areas where this may be an issue. Add as an item on the Daily Site Review checklist referenced is Issue No. 3.	Discussing with the Office of Traffic about possibly changing the plans or revising the specification to allow either solar or battery-operated.		Office of Construction Traffic Engineering Safety Division
6	**Traffic Control in Work Zones**	Experience with and understanding of work zone safety. Establishing levels of effectiveness (i.e. presence versus enforcement).	Consistent practices and implementation of use of traffic persons. Better educated traffic control persons who will provide effective direction in work zones.	"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/	A) Continue training at the local and state level. Look at grant resources to provide monies for training. B) Executive Policy Statement for "Policy on Effective Use of Traffic Persons in Work Zones". C) Work with Traffic Records Coordinating Committee (TRCC) to include work zones as a required field in accident report. D) Review policies and procedures and guidance documents and revise to meet current MUTCD, new policy and other standards in place at state and federal level E) Add new section in Division I of Form 816 – Best practices for work zone safety operations	A) T2 continues to provide training but funding is an issue since many local towns and municipalities, as well as, Police Standards Training Academy do not have funds available to pay for this course. Limited to a Train-the-Trainer scenario so they can teach their own. B) Final Draft completed C) Completed – Model Minimum Uniform Crash Criteria Fourth Edition (2012) Data Element C18 D) Ongoing E) Pending	A) Ongoing B) Completed 11/16/2012-awaiting Commissioner signature C) Completed D) TBD E) TBD	Office of Construction Traffic Engineering Office of Maintenance State Police Safety Division

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
7	**Variable Message Signs**	Defining proper placement (i.e. distance from the anticipated queue), proper messaging, and message legibility.	Maximize the best visibility and reading capability for the traveling public.	Continue to verify proper messaging during reviews.	A) Research different types of portable/variable message signs and capabilities to find best approach.	A) Pending	TBD	Office of Construction Traffic Engineering Office of Maintenance Highway Design
8	**Movable Barrier Systems**	Currently only one system available for use – proprietary – therefore difficult to use on federal participating projects.	Having barrier systems that can be utilized on more than one project.	None to date.	A) Need to work with Design to develop a specification and design guidance on positive separation equipment and materials for work zones that are not proprietary and has potential for use on other projects. B) Investigate if other systems have been developed. If so, compare the systems.	A) Positive feedback from Project 0044-0151, I95 Old Lyme that is completed. Project 53-175 Putnam Bridge scheduled to start April 1, 2013. Use is limited to certain project types. Need to look at other alternatives.	Ongoing	Office of Construction Traffic Engineering FHWA Highway Design
9	**Environmental Conditions**	Visibility of work zone warning equipment during inclement weather. Rain affecting retro-reflective properties of construction signs and pavement markings.	Improved visibility of signs and markings even during inclement weather.	Continued investigation in construction signs and their lack of reflective properties.	Use the Daily Site Review checklist referenced in Issue No. 3.	1. Reviewing new MUTCD requirements and incorporating changes into contracts. 2. Add recessed pavement marking detail and items into contracts to enhance retro-reflective qualities	Ongoing	Traffic Engineering FHWA Office of Construction Office of Maintenance

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
10	**Work Zone Safety Review**	Improve and enhance the work zone safety review inspection process.	Improve awareness and documentation of work zone reviews.	Improved questionnaire form and created a database to store information.	A) Include more photographs/videos of projects. Expand the number of field visits. Inform project staff of internet sites and pamphlets/documents. Are issues based on road, material, or project type?	A) Review 8-10 projects per year	Implemented	Traffic Engineering FHWA Office of Construction Office of Maintenance
11	**Project-Level Work Zone Reviews**	Inconsistent applications of work zone principles at the project level.	Consistent practices of work zone reviews for each project.	Included this item in the Winter training session for supervisors and inspectors occurs in February and March 2012.	A) Continue reviewing plans and monitor projects for conformance. B) Use the Daily Site Review checklist referenced in Issue 3. C) Include this item in upcoming winter training session to include Work Zone Policy & Procedure presentation.	A) Ongoing process B) Ongoing Process C) Ongoing	Implemented Topic of discussion since 2011 training classes.	Office of Construction Office of Maintenance Safety Division
12	**Traffic Control Device Quality**	Inconsistency in accepting devices of similar quality.	Understanding acceptable qualities for traffic control devices and maintaining consistency in which devices are accepted.	Obtained quality standard field guides.	A) Distribute guides on accepting traffic control devices to field staff to use in daily reviews.	A) Ongoing process	A) Complete by end of 2013	Office of Construction Office of Maintenance Safety Division

TABLE 5- Work Zone Performance Measures (WZPM) Working Group Action Item Issues

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
1	**Mobility in Work Zones**	Low vehicle throughput and long queue lengths causing congestion and delays in work zones.	Improve mobility in work zones or handle delays more effectively.	Systems Engineering Analysis Review initiated by Highway Operations	A) Establish means to capture real time traffic data.	A) Ongoing- See Table 3, Item 3	3 years	Bureau of Policy and Planning, Office of Coordination, Modeling and Crash Data and TRCC August 30, 2014 data available
2	**Reliable Crash data in Work Zones**	Crash data for work zones must be accurately represented on accident reports	Gaining more data in a timely manner to incorporate crash frequency in the design of future projects in the area.	Members of WZO and WZPM became stakeholders in the Traffic Records Coordinating Committee (TRCC)	A) Working with TRCC to get more motor vehicle crash reports.	A) Ongoing- See Table 3 Items 4 & 6	Dependent on TRCC Vehicle Crash Reporting System 100% electronic January 2015	A) Bureau of Policy and Planning, Office of Coordination, Modeling and Crash Data and TRCC
3	**Work Zone Safety Performance**	Safety concerns for highway workers and the traveling public in work zones	Improved safety in work zones.		A) Collect data to track, analyze and evaluate work zone safety performance. B) Establish work zone safety practices and monitoring that they are applied consistently throughout the duration of the project.	A) Ongoing- See Table 3 Items 6 & 8 B) See Table 3 Item 8 See WZO Action List Items 10-12	A) Dependent on TRCC Vehicle Crash Reporting August 30, 2014 data available and crash record January 2015 B) Implemented	A) Bureau of Policy and Planning, Office of Coordination, Modeling and Crash Data and TRCC B) Offices of Safety, Construction and Maintenance

	Issue	Problem	Expected Outcomes	Actions Taken	Actions to be Taken	Current Status	Time Frame	Responsible Parties
4	**Traveler Feedback**	Not knowing if the performance measures taken are most useful for the traveling public	Implement practices that are more conscientious of the public and assure them that they're contributing to the process		A) Conduct traveler surveys to evaluate work zone traffic management practices and policies on a state-wide and area region-wide basis	A) Ongoing- See Table 3 Item 7	2013	Office of Construction Office of Maintenance
5	**Develop Strategies from Performance Data and Traveler Surveys**	Not utilizing information obtained to continuously improve practices	Establishing effective performance measures		A) Evaluate data and surveys to determine where improvements can be made	A) Ongoing- Table 3 Items 1 & 7	Ongoing	Offices of Strategic Planning & Projects, Construction and Maintenance

U.S. Department
of Transportation

Federal Highway Administration

rev. 6/6/13

Report prepared by:

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U.S. Department of Transportation
Federal Highway Administration

APPENDIX 9

CTDOT Work Zone Safety and Mobility Policy and Implementation Plan

Memorandum & Guidance

(August 6, 2007)

Draft

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

memorandum

subject Work Zone Safety and Mobility Policy and Implementation Plan

date: August 6, 2007

To Mr. Charles Barone
Mr. James H. Norman
Mr. Robert P. Mongillo
Mr. Lewis Cannon

from Michael W. Lonergan
Acting Bureau Chief
Bureau of Engineering
and Highway Operations

In September 2004, the Federal Highway Administration (FHWA) published updates to the Work Zone regulations contained in 23 CFR 630 Subpart J. The updated rule is referred to as the Work Zone Safety and Mobility Rule (Rule) and applies to all State and local governments that received Federal-aid highway funding. Transportation agencies are required to comply with the provisions of the Rule by October 12, 2007.

The Rule requires agencies to develop and implement an agency-level Work Zone Safety and Mobility policy to support systematic consideration and management of work zone impacts across all stages of project development. In order to develop this required policy, as well as prepare an associated implementation plan, a Rule Steering Committee was established by the Department. Members of this multi-disciplinary committee included representatives from the FHWA and Offices of Construction, Maintenance, Engineering, and Intermodal Planning.

The attached draft Department policy entitled "Policy on Systematic Consideration and Management of Work Zone Impacts" is in conformance with the Rule and by copy of this memorandum is being forwarded to Commissioner Carpenter's Office for approval. The policy defines which Department projects are subject to the Rule and allows an exception for unplanned emergency operations.

The attached implementation plan has been developed to provide guidance to your offices in complying with the Rule. The plan identifies several assignments and ongoing responsibilities for the units under your supervision which will be necessary for compliance. It should be noted that your Offices will need to develop more specific project and program level procedures to institutionalize the letter and spirit of the Rule. Your representatives to the Rule Steering Committee should be utilized as resources in this effort.

It has been determined that in Connecticut all "significant" projects, as defined by the policy, that begin their planning, preliminary engineering or preliminary design phase on or after October 1, 2007, or whose design completion date (DCD) is on or after October 1, 2008, shall be in accordance with the Rule. For those "significant" projects with a DCD during Federal Fiscal Year 2008 (October 1, 2007 to September 30, 2008), the FHWA, in coordination with the Department, will approve PS&E following confirmation that the appropriate TMP components have been incorporated in compliance with the Rule. Please take the steps necessary to ensure the Department's compliance with the Rule by these dates.

Attachment(s)
cc: Bradley Keazer (FHWA)
Robert Ramirez (FHWA)

TAH
JRC
JJO
TMW
CC

FROM THE DESK OF
TIMOTHY M. WILSON

AUG 0 8 2007

	F.Y.I.	PLS. DO	PLS.
W. BRITNELL			
T. GAFFEY			
H. HAYWARD			
R. ZBROZEK			

John F. Carey:jyk

cc: Comr. Carpenter – Dep. Comr. Boice – Dep. Comr. Curtis – Dep. Comr. Martin
David Crowther – Please process the attached Policy for Commissioner Carpenter's approval.
Arthur W. Gruhn – Michael W. Lonergan - Richard T. Jankovich
James H. Norman, Acting Engineering Administrator
Timothy Wilson
Carmine Trotta
Robert P. Mongillo-Charles A. Drda-Ronald Cormier-David A. Sawicki-John Carey (Maintenance)
Mark Rolfe
John F. Carey

CONNECTICUT DEPARTMENT OF TRANSPORTATION

POLICY STATEMENT

POLICY NO. E&HO
August 6, 2007

SUBJECT: Policy on Systematic Consideration and Management of Work Zone Impacts

It is the policy of the Department to systematically consider and manage work zone impacts of significant projects.

In establishing this Work Zone policy, the Department's objectives are:

1. Provide a high level of safety for both workers and the public.
2. Minimize congestion and community impacts.
3. To provide both maintenance forces and contractors adequate access to the highway to efficiently conduct their work.

In order to meet these objectives, appropriate planning, design, construction, maintenance and public awareness strategies shall be employed on all significant projects. For the purposes of this policy, a significant project is defined as:

> A stationary highway construction or maintenance activity which causes sustained mobility impacts on I-84, I-91, I-95, I-691, I-291 or I-384 for more than 3 days with either intermittent or continuous lane closures. In addition, any highway construction or maintenance activity that alone or in combination with other concurrent activities nearby, which is expected based on engineering judgment, to cause sustained mobility impacts that are considered greater than what is considered tolerable relative to typical traffic operations experienced in the area of the work zone, may be declared a significant project.

It is recognized that the Department's emergency operations may not always allow a systematic consideration of work zone impacts. In such situations, the objectives of this policy will be honored as much as practicable.

WORK ZONE SAFETY AND MOBILITY IMPLEMENTATION PLAN GUIDANCE

The Connecticut Department of Transportation (Department) shall establish and implement a program to improve safety and mobility within work zones for certain interstate and state roadway construction projects, in accordance with the Federal Highway Administration Work Zone Safety and Mobility Final Rule.

COMPLIANCE

The Department, in compliance with the Federal Highway Administration Final Rule, has developed a Policy regarding Work Zone Safety and Mobility (WZS&M). Implementation of this policy is effective October 1, 2007. All State transportation planning documents (e.g. planning studies, Master Plans, Long Range Plans, Strategic Highway Safety Plans) that include certain interstate or state roads and are initiated on or following October 1, 2007, shall address WZS&M in accordance with the Final Rule and Department policy. In addition, WZS&M compliance shall be implemented for those interstate or state roadway transportation projects that have been designated as "significant" in accordance with this Policy and Implementation Plan, which have been in development prior to October 1, 2007, and that begin the preliminary engineering or preliminary design phase of development on or after October 1, 2007, or whose design completion date (DCD) is on or after October 1, 2008.

For those "significant" projects with a DCD during Federal Fiscal Year 2008 (October 1, 2007 to September 30, 2008), the FHWA, in coordination with the Department, will approve PS&E following confirmation that the appropriate TMP components have been incorporated in compliance with the WZS&M Final Rule.

The Department WZS&M Policy and Implementation Plan (and associated procedures) shall be reviewed every two years (or as needed) to determine the effectiveness of its application and consistency with FHWA direction.

INTRODUCTION

On September 9, 2004, the Federal Highway Administration (FHWA) issued a final rule on Work Zone Safety and Mobility. This rule addresses the changing times of more traffic, more congestion, greater safety issues, and more work zones. The FHWA revised the regulation to facilitate comprehensive consideration of the broader safety and mobility impacts of work zones across all stages of project development, and the adoption of additional strategies that help manage these impacts during project implementation. The new FHWA provisions are intended to help State Departments of Transportation (DOTs) meet current and future work zone safety and mobility challenges, and serve the needs of the American people. DOTs must be in compliance with the final Rule by October 12, 2007. The key features of the Final Rule are as follows:

- A policy driven focus that will institutionalize work zone processes and procedures at the agency level, with specific language for application at the project level.
- A systems engineering approach that includes provisions to work zone considerations starting early in planning, and progressing through project design, implementation, and performance assessment.
- Emphasis on addressing the broader impacts of work zones to develop transportation management strategies that address traffic safety and control through the work zone, transportation operations, and public information and outreach.
- Emphasis on a partner driven approach, whereby transportation agencies and the FHWA will work together towards improving work zone safety and mobility.
- Overall flexibility, scalability, and adaptability of the provisions, so as to customize the application of the regulations according to the needs of individual agencies, and to meet the needs of the various types of highway projects.

Section 135 of Title 23 and Section 5304 of Title 49 of the United States Code (USC), as amended by the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU) requires each State to carry out a transportation planning process that provides for consideration of projects and strategies that will increase the safety of the transportation system for motorized and non-motorized users. With respect to Work Zone Safety, SAFETEA-LU contains several provisions that address safety in highway construction work zones. They are as follows:

Work Zone Safety Grants – Under the Work Zone Safety Grants program, the U.S. Department of Transportation (USDOT) will make grants to nonprofit and not-for-profit organizations to provide training to prevent and reduce work zone injuries and fatalities. Such grants may be used for:

- construction worker training to prevent injuries and fatalities
- development of guidelines to prevent work zone injuries and fatalities
- training for State and local governments, transportation agencies, and other groups implementing these guidelines

Temporary Traffic Control Devices (TTC) - Projects may not be approved on Federal-aid highways or under the Federal Lands Highway program unless proper temporary traffic control devices to improve safety in work zones will be installed and maintained during construction, utility, and maintenance operations on the portion of the highway to be improved by such projects. Installation and maintenance of the devices must be in accordance with the Manual on Uniform Traffic Control Devices.

The Secretary of Transportation, after consultation with appropriate Federal and State officials, is to issue regulations establishing the conditions for the appropriate use of, and expenditure of funds for, uniformed law enforcement officer, positive protective measures between workers and motorized traffic, and installation and maintenance of temporary traffic control devices during construction, utility, and maintenance operations.

Worker Injury Prevention and Free Flow of Vehicular Traffic – By August 10, 2006, the Secretary of U.S. DOT must establish regulations requiring highway workers to wear high visibility garments.

National Work Zone Safety Information Clearinghouse - Under this program, the U.S. DOT will make grants to a national nonprofit foundation for the operation of the National Work Zone Information Clearinghouse to be used for assembling and disseminating, electronically or otherwise, information relating to the improvement of work zone safety.

Implementation of the Department policy on WZS&M involves a number of actions to address:

- Data collection and Reporting during project construction.
- Data retention.
- Data analysis.
- Early evaluation and documentation in the identification of "significant" proposed projects.
- Establishment of specific project scope and limits.
- Reassessment of "significant" project determinations at each phase of project development.
- Development of a TTC plan, Transportation Operations (TO) plan and Public Outreach (PO)/Public Information (PI) program components, as warranted.
- Application during project construction.
- Monitoring during project construction.
- Post-construction analysis of significant projects.

BACKGROUND

WZS&M focuses on those projects that are determined to be "significant" as defined by Department policy (and consistent with FHWA guidelines). The scope and limits of all projects that are advanced to construction by the Department evolves as information becomes available and analysis is refined. In addressing WZS&M, it is essential that an initial determination regarding the project "significance" is made as early as possible and that there is an opportunity to reassess that determination at the various phases of project development and definition (i.e. planning, preliminary engineering, preliminary design, and final design).

The initial stage in the overall development and determination of a "significant project" as defined by the Department policy on WZS&M, is the conduct of a planning analysis to identify the transportation needs and deficiencies to be addressed for both the existing and future (20-year horizon) "No Build" conditions. Once such needs are identified, options are considered towards the development of a recommended action to modify the transportation system to address those needs. An implementation plan which may consist of both near-term (if any) and long-term recommendations is recommended. This is typically accomplished by a State/Federal (Federal Highway Administration) study team representing planning, maintenance, and engineering design disciplines, often in coordination with a stakeholder committee.

Recommendations documented at the planning phase are considered conceptual, possibly consisting of various transportation modes, and must be refined and more precisely defined as the recommended action(s) is further developed through the National Environmental Policy Act / Connecticut Environmental Policy Act (NEPA/CEPA) documentation, preliminary engineering, preliminary design and final design processes. A determination of a "significant project" must be reassessed for every project at each of these stages of project development.

IMPLEMENTATION

Training:

The Final Rule specifies that agencies require appropriate training and periodic updates, for personnel involved in the development, design, implementation operations, inspection and enforcement of work zone related transportation management and traffic control. These include transportation planners, design engineers, traffic and safety engineers, temporary traffic control designers and program managers, regional construction managers, construction project staff, maintenance staff, and contractor and utility staff. This may include executive level decision-makers, policy makers, senior managers, information officers, and law enforcement and incident responders.

The Department and Industry Organizations will provide the opportunity for training through a number of initiatives. The Department, through the Training Coordinator and in coordination with the FHWA, will seek to sponsor available related courses for Department personnel. In addition, annual training provided for Department Construction Inspectors will include a discussion addressing WZS&M.

Data Collection / Reporting Procedures:

The Department's Offices of Traffic Engineering, Maintenance, Construction and Inventory and Forecasting will establish procedures for the collection, reporting and retention of WZS&M data, for "significant" projects. Such information may include but may not be limited to:

- Incident type and duration.
- Residual traffic queue and duration.
- Police reporting records.

Data shall be collected and retained for all projects determined to be "significant", within the work zone limits, defined as the display point of the approach "Series 16" limited liability sign, through to the exiting "End Construction" sign.

Data Retention / Analysis:

The Final Rule requires States to use field observations, available Work Zone Crash data, and operational information to manage Work Zone impacts for specific significant projects during construction. In addition, States are required to continually pursue improvement of Work Zone Safety and mobility by analyzing Work Zone Crash and operational data from multiple significant projects to improve State processes and procedures.

The satisfaction of these two requirements will require updates to the Department's computerized data retention system that are in progress but not yet

available. While the Department's roadway characteristics file has been revised to a relational data base, the Department's accident record, traffic volume, and pre-design project status/location files currently reside on a legacy main frame computer system and are not readily linked. Such linkage is necessary to identify construction project limits and reflect accident, traffic volume, and roadway inventory records. The Department is presently pursuing improvements to these mainframe files which will move these records to relational databases similar to the roadway characteristics file. Improvements to the electronic entry of accident records into the DOT system are also planned. Such improvements will allow efficient and timely reviews.

For the interim, the Department will rely on the Offices of Maintenance and Construction field personnel to monitor their work zones and make appropriate adjustments based on their observations of accidents and traffic operations. Multiple reviews will be limited in scope until the planned improvements to the data system become available. All data collected will be retained by the Offices of Maintenance and Construction, with a copy to the Traffic Division and the Bureau of Policy and Planning's office of Inventory and Forecasting.

Planning:

As required by Section 135 of Title 23 USC, the Department identifies in its Long-Range Transportation Plan (LRP), safety and security issues, including work zone safety, and actions being taken to address them. Also, the State 2007 Master Transportation Plan (MTP) identifies safety and mobility needs among the primary principles the Department has committed to strive towards. Work Zone Safety and Mobility is presented as one component of 'Transportation Safety and Security Programs and Plans". Updates of these plans will address work zone safety and mobility as a component of "Transportation Safety Programs and Plans".

The State LRP and MTP will identify and discuss actions that the Department has taken or plans to take to comply with the FHWA September 9, 2004 Final Rule on WZS&M. The Department's actions and plans to comply with work zone safety-related regulations required by SAFETEA-LU will be discussed in these plans, as will work zone safety programs undertaken with any funding received from U.S. Department of Transportation Work Zone Safety Grants program.

A preliminary determination of "significance" as it relates to WZS&M will be made for each roadway component of the study corridor near-term and long-term roadway project recommendations. Based upon the following definition of a ***"significant project"*** as established by the Department WZS&M policy in accordance with the FHWA Final Rule:

> *A stationary highway construction or maintenance activity which causes sustained mobility impacts on I-84, I-91, I-95, I-691, I-291, or I-384 for more than 3 days with either intermittent or continuous lane closures. In*

addition, any highway construction or maintenance activity that alone or in combination with other concurrent activities nearby, which is expected based on engineering judgment, to cause sustained mobility impacts that are considered greater than what is considered tolerable relative to typical traffic operations experienced in the area of the work zone, may be declared a significant project.

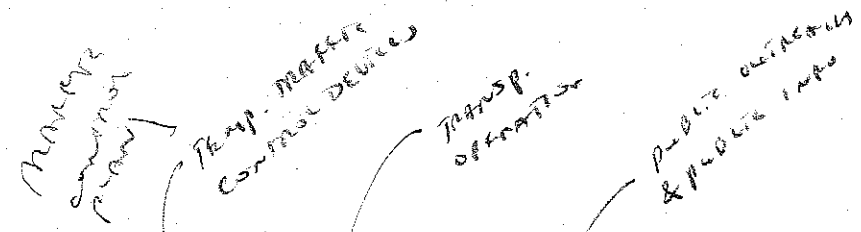
WZS&M will be addressed in initial planning studies and in the NEPA/CEPA documentation processes as part of an assessment regarding project Constructability, and Maintenance and Protection of Traffic, for each roadway component (near-term and long-term) of the recommended action(s). In determining the significance of a recommended roadway action(s) at the planning phase of project development, consideration will be given to:

- recommended project(s) definition and scope, for each near-term and long-term component;
- whether the recommended action(s) meets the definition of significance in accordance with the Department WZS&M policy;
- whether the recommended action(s) is on existing or new alignment;
- the primary type of travel being served (e.g. commuter / recreational / affected stakeholders);
- the existing and predicted future No-Build hourly traffic volumes and vehicle types, and roadway capacity along the study corridor major routes (including the primary corridor, parallel corridors, alternate routes);
- the availability of other than roadway modes for travel; and
- possible other planned/scheduled projects in the study area.

- A qualitative assessment will be made regarding the "significance" of each component (near-term and long-term) of the recommended action. A determination will be made regarding the anticipated need (or not) for a specific WZS&M Transportation Management Plan (TMP) as it relates to each component of the recommended action (near-term and long-term). Possible elements of a TMP will be presented for consideration during further development of the project(s) through preliminary engineering, preliminary design and final design processes.

Preliminary Engineering/Preliminary Design

The determination of "significance" for recommended transportation improvement modifications previously made during the planning stage will be reviewed for reconfirmation or modification during the preliminary engineering/preliminary design phases as the scope and limits of the project are more clearly defined. For those projects that did not involve a planning stage, an initial determination of significance will need to be made and documented in the Recommended Project Memorandum.



During the preliminary engineering/preliminary design phases, development of the Transportation Management Plan (TMP), including the appropriate preliminary TTC Plan, TO Plan, and PO/PI Program are initiated. Available data collected from similar projects will be reviewed and used in developing this information. Alternative roadway routes, as well as alternative modes of transportation (e.g., rail, bus, and ferry) will be identified as a component of the TMP. Bicycle and pedestrian access will also be addressed.

Confirmation of the determination of significance and the development of the TMP will be documented at the initial project scoping and at the preliminary design/design approval stages. Any change from the initial determination of significance will be approved by the Engineering Administrator.

Final Design

Once again during the final design, the determination of "significance" for recommended transportation improvement modifications made during the preliminary engineering/preliminary design phases will be reviewed for reconfirmation or modification. During this phase, the TMP will be finalized, including the appropriate final TTC Plan(s), TO Plan, and PO/PI Program. The specific work zone limits shall be defined for each construction project.

Appropriate documentation confirming the determination of significance and relating to the development of the TMP will be included in the final design report and in the Stewardship Agreement Checklist. Any change in the determination of significance will be approved by the Engineering Administrator.

Regarding the development of the TMP, it is recognized that each improvement project may present unique considerations; as such, developing the TMP is an iterative process that evolves as the design progresses. However, for purposes of uniformity, standardization of TMPs for projects with similar scopes should be considered.

Construction:

As a significant project progresses into the construction phase, special consideration will be given in terms of design and constructability review, inspection staffing, monitoring and reporting procedures for field activity and general oversight and administration.

Within the design review process, construction staff will ensure that Plans, Specifications and Estimates (PS&E's) include appropriate pay items to implement the Transportation Management Plan (TMP). On active projects, Construction and the Contractor will each designate a trained person (Responsible Person) to properly implement the TMP. In addition to the

inspection of Temporary Traffic Control (TTC) and Transportation Operation (TO) components of the TMP, Construction will take the lead in the coordination and implementation of Public Awareness (PI) strategies. Construction will monitor and collect data on work zone incidents for the purpose of identifying problematic trends and implementing appropriate adjustments.

All data collected will be retained by the Office of Construction, with a copy to the Traffic Division and the Bureau of Policy and Planning's office of Inventory and Forecasting

Maintenance:

A review of all maintenance and utility activities will be conducted. During the earliest possible stages of the review, it will be determined if the scope of work to be performed is within the Department's definition of "significant project" as it applies to the final rule. Final approval of the determination will be made by the District Maintenance Director.

The TMP for significant maintenance or utility projects will consist of a TTC plan with a PI / PO component. This plan will also apply to permit activities.

Maintenance will monitor and collect data on work zone incidents for the purpose of identifying problematic trends and implementing appropriate adjustments.
All data collected will be retained by the Office of Maintenance with a copy to the Traffic Division and the Bureau of Policy and Planning's office of Inventory and Forecasting

Exceptions:

The FHWA Final Rule provides for an exception process for those Interstate system projects, or classes of projects, that are deemed to be significant according to the Rule or Department Policy, but in reality, may not have a high level of sustained work zone impacts. For such projects that are classified as "significant" as applied to work zone safety and mobility, through the application of this provision, but in the judgment of the Department they do not cause sustained work zone impacts, the Department may request an exception, from the FHWA Division Office, to the requirements triggered by the classification. Exceptions to these provisions may be granted by the FHWA Division Office based upon the Department's ability to demonstrate that the specific Interstate system project or categories of interstate system projects do not have sustained work zone impacts. The Department can submit to the FHWA Division Office, qualitative and/or quantitative criteria documentation to demonstrate that the specific project or categories of projects will not have sustained work zone impacts.

Appendix A: Implementation – Office Assignments

Appendix B: Training Needs

Appendix C: Acronyms

APPENDIX A

IMPLEMENTATION – ASSIGNMENTS

This information is intended to provide general guidance regarding the responsibilities of the various ConnDOT stakeholders involved in the implementation of the WZS&M Final Rule. The specific mechanism(s) for implementation must be developed by the individual offices.

WORK ZONE SAFETY AND MOBILITY

IMPLEMENTATION PLAN – DIVISION ASSIGNMENTS)

CONNDOT DIVISION	*FUNCTIONS*	*WZS & M RESPONSIBILITIES / ASSIGNMENTS*
PLANNING		
SYSTEMS INFORMATION	▪ Systems Inventory. ▪ Accident records. ▪ Traffic Data Collection ▪ Traffic Data Monitoring. ▪ Census/Modeling. ▪ Trip Analysis. ▪ GIS/Computer Systems.	▪ Training ▪ Data Collection and Retention. ▪ Assist in Developing Electronic Documentation and Queries. ▪ Project WZ Limits – Electronic (GIS) mapping and database.
POLICY	▪ STIP. ▪ Long Range / Master Plans ▪ Legislative Analysis. ▪ State / Federal Funding Programs. ▪ Field Coordination (RPOs). ▪ Safety Program.	▪ Training ▪ Address WZS&M in Long Range and Master Plans. ▪ Include in Strategic Highway Safety Plan (SHSP) and in the 2008 Highway Safety Plan (HSP)*. * Note: Work Zone Safety Grants are available to qualifying municipalities on a one-time basis.
INTERMODAL (PROJECT) PLANNING	▪ Aviation / Ports. ▪ Transit. / Bike & Pedestrian. ▪ Location (Highway). ▪ Security / Evacuation Planning.	
ENVIRONMENTAL PLANNING	▪ Environmental / Historic Documents. ▪ Water Resources. ▪ Water Compliance. ▪ Air and Noise Analysis	▪ Training ▪ Studies Documentation – - Provide Preliminary determination of "Significant Project". - Constructability Review. ▪ Studies Documentation – - Provide Preliminary determination of "Significant Project". - Constructability Review.
ASSET MANAGEMENT	▪ Document and Maintain Department Assets Inventory and Determine Financial Investment Needs (5).	▪ Training ▪ To Be Determined.

WORK ZONE SAFETY AND MOBILITY

IMPLEMENTATION PLAN – DIVISION ASSIGNMENTS (Continued)

CONNDOT DIVISION	*FUNCTIONS*	*WZS & M RESPONSIBILITIES / ASSIGNMENTS*
ENGINEERING	▪ Define Project Scope and Limits. ▪ Funding. ▪ Preliminary Engineering. ▪ Traffic Analysis. ▪ Preliminary Design. ▪ Final Design.	▪ Training. ▪ Determination/Verification of project "significance". ▪ Stewardship Agreement. ▪ Work Zone mapping. ▪ Operational analysis of collected data. ▪ Develop TMP, including TTC, TO and PI. ▪ Public Outreach.
CONSTRUCTION	▪ Project Administration.	▪ Training. ▪ Implement TMP. ▪ Public Outreach. ▪ Data Collection and dissemination.
MAINTENANCE	▪ Daily facility maintenance and repairs. ▪ Project Administration.	▪ Training. ▪ Determination/Verification of project "significance". ▪ Stewardship Agreement? ▪ Work Zone mapping. ▪ Operational analysis of collected data. ▪ Develop TMP, including TTC, TO and PI. ▪ Public Outreach.

APPENDIX B

TRAINING NEEDS

This information is intended to provide general overview of the extent of initial and subsequent training needs to of the various ConnDOT stakeholders involved in the implementation of the WZS&M Final Rule. The specific mechanism(s) for implementation must be developed by the individual offices.

Work Zone Safety and Mobility

ANTICIPATED TRAINING NEEDS

Bureau of Policy and Planning

ConnDOT Division	*FUNCTIONS (Estimated Number of Positions)*	*TRAINING NEEDS*
4202/57522 (Systems Information)	▪ Systems Inventory (10) ▪ Accident records (12) ▪ Traffic Monitoring (16)	▪ Data Collection needs ▪ Electronic Documentation and Queries
4203/57523 (Systems Information)	▪ GIS/Computer Systems (5)	▪ WZ Mapping Database – establishment and maintenance
4503/57533 (Policy)	▪ Long Range Plan / Legislative Analysis (4) ▪ State/Federal Programs (1) ▪ Field Coordination (4) ▪ Safety (11)	▪ LRP/MTP Policy Statement ▪ Funding Opportunities ▪ Regional Coordination ▪ Training Course / Annual Reporting?
4502/57532 (Intermodal Planning)	▪ Location (Highway) (4)	▪ Studies Documentation ("Significant Project")
4503/57542 (Environmental Planning)	▪ Environmental Documents/ Historic Documents (5)	▪ Studies Documentation ("Significant Project")
4601/57551 (Asset Management)	▪ Document and Maintain Department Assets Inventory and Determine Financial Investment Needs (5).	▪ Initial Awareness Training. ▪ Potential Future Training as Required.

Work Zone Safety and Mobility

ANTICIPATED TRAINING NEEDS (Continued)

Bureau of Engineering and Highway Operations

ConnDOT Division	*FUNCTION (Number of Positions)*	*TRAINING NEEDS*
ENGINEERING Unit 1400 Traffic Engineering Unit 1300 Consultant Design Unit 1305 State Design	TE2 (20) TE3 (15) Supervising Engineer (8) TE3 (35) Supervising Engineer (10) TE2 (30) TE3 (30) Supervising Engineer (12)	1 – Design & Operation of Work Zone Traffic Control 2 – Construction Staging
CONSTRUCTION ▪ 501 Headquarters ▪ 601 District 1 ▪ 701 District 2 ▪ 801 District 3 ▪ 901 District 4	▪ Administrators/Managers (2) ▪ District Management (9) ▪ HQ Supervisors (7) ▪ District Supervisors (16) ▪ HQ Engineers -TE3 (5) ▪ District Project Engineers (44) --- ▪ District Inspectors - TE2 (95) ▪ District Inspectors - TE1 (79) ▪ District Inspectors – Intern (9) ▪ HQ Engineers – TE2,TE1 (8)	▪ FHWA-NHI-380003 Design and Operation of Work Zone Traffic Control ▪ Annual presentation updating WZ policy and practice through winter "Supervisor School". --- ▪ FHWA-NHI-380063 Construction Zone Safety Inspection ▪ Annual refresher on Work Zone Traffic Control Best Practices through winter "Inspector School".
MAINTENANCE 1510 1530 1610 1710 1810 1910 The training numbers reflect all sub-units within Maintenance.	▪ Administrators/Managers (27) --- ▪ Gen. Supv (62) ▪ Crew Leader (128) ▪ Maint's (990) --- ▪ Planning (14) ▪ Dist Serv Agent (18) --- ▪ District Traffic Engineer (4) ▪ Highway Operations (3) ▪ Dist Bridge Eng + Newington Staff (7)	▪ Roadway Safety Awareness --- ▪ Work Zone Safety for Roadway Maintenance Operations --- ▪ Roadway Safety Awareness Inspection --- ▪ Design /Operation

List of Acronyms

AASHTO	-	American Association of State Highway and Transportation officials
ADT	-	Average Daily Traffic
CEPA	-	Connecticut Environmental Policy Act
Department	-	Connecticut Department of Transportation
FHWA	-	Federal Highway Administration
Final Rule	-	Federal Highway Administration Work Zone Safety and Mobility Final Rule
GIS	-	Geographic Information Systems
HSP	-	Highway Safety Plan
LRP	-	Long Range Transportation Plan
MTP	-	Master Transportation Plan
NEPA	-	National Environmental Policy Act
No-Build	-	The analysis condition of imposing future (20 year horizon) traffic on the existing transportation system.
PI	-	Public Information
PO	-	Public Outreach
PS&E	-	Plans, Specifications and Estimates
SAFETA-LU	-	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SHSP	-	Strategic Highway Safety Plan
Significant	-	Significant project as defined by Department Policy on Work Zone Safety and Mobility
TMP	-	Transportation Management Plan
TO	-	Transportation Operations
TTC	-	Temporary Traffic Control Device
USDOT	-	United States Department of Transportation
WZ	-	Work Zone
WZS&M	-	Work Zone Safety and Mobility

U.S. Department of Transportation
Federal Highway Administration

APPENDIX 10

CTDOT Work Zone Safety and Mobility Policy and Implementation Plan

Consulting Engineers General Memorandum 07-09

(September 18, 2007)

CONSULTING ENGINEERS
GENERAL MEMORANDUM 07-09

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING AHIGHWAY OPERATIONS
OFFICE OF ENGINEERING

Work Zone Safety and Mobility Policy and
Implementation Plan

September 18, 2007

To: CONSULTING ENGINEERS

Enclosed is guidance concerning the Department of Transportation's (Department) Work Zone Safety and Mobility (WZS&M) Implementation Plan in keeping with SAFETEA-LU legislation. In particular, your attention is directed to the implementation date of the WZS&M Plan requirements.

A primary goal of adopting this Plan is to ensure a broad assessment of work zone safety and mobility issues on a statewide or regional level, in addition to the project specific contract controls historically included in project design. Responsibility for documenting that assessment on a project-by-project basis will fall to the Designer with substantial input from the Department.

Much of the specifics for implementing this WZS&M Plan are going to evolve over a period of time, but the initial framework is summarized below.

A determination of "significance" will be made for each project and that determination will be revisited periodically during the life of the project. A project determined to be "significant" for work zone concerns will need a Transportation Management Plan (TMP) consisting of Temporary Traffic Control (TTC) Plan(s), a Transportation Operations (TO) Plan, and a Public Involvement/Outreach (PI or PO) Plan. Documentation of the overall TMP will take place in the Design Report which is required with the standard milestone submission (Preliminary, Semi Final, Final Plans for Review, and Final Plans).

Some elements of the TMP will be presented in the contracts plans (such as the TTC Plan(s)) and specifications (Prosecution and Progress, Maintenance and Protection of Traffic). Other elements of the TMP might involve procedures and functions the Department will provide such as outreach efforts, diversionary route signing and other regional traffic control initiatives outside the realm of the Construction Contract.

One particular element of the legislation that you should be aware of is the mandated training (and potential certification). This issue has not been fully resolved; but at a minimum, designers with responsibility for the TMPs will need to be appropriately trained.

Department staff will discuss implementation of this directive with each consulting firm on a project-by-project basis.

Very truly yours,

Thomas A. Harley, P.E.
Manager of Consultant Design
Bureau of Engineering and Highway Operations

Enclosure

U.S. Department
of Transportation
Federal Highway Administration

rev. 6/3/14

Report prepared by:

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