

# **WORK ZONE MOBILITY AND SAFETY SELF ASSESSMENT**

## **2012 NATIONAL REPORT**



**FEDERAL HIGHWAY ADMINISTRATION**

**OFFICE OF OPERATIONS**

**JANUARY 2013**

## TABLE OF CONTENTS

1. Introduction .....	1
2. Overview of Results .....	1
3. Background and Purpose.....	6
4. Detailed Results .....	8
Leadership and Policy .....	8
Project Planning and Programming .....	13
Project Design .....	16
Project Construction and Operation.....	21
Communications and Education .....	26
Program Evaluation .....	28
5. Supplemental Question: Work Zone Process Reviews .....	31
6. Conclusion .....	32
Appendix A: WZ SA Scoring and Project Types.....	33

## LIST OF FIGURES

Figure 1. National Average Section Ratings by Year: 2003 to 2012 .....	3
Figure 2. Results for Leadership and Policy Section.....	9
Figure 3. Results for Project Planning and Programming Section.....	14
Figure 4. Results for Project Design Section.....	17
Figure 5. Results for Project Construction and Operation Section .....	22
Figure 6. Results for Communications and Education Section.....	26
Figure 7. Results for Program Evaluation Section.....	29
Figure 8. Agencies Performing Process Reviews in the Last 2 Years.....	31

## LIST OF TABLES

Table 1. National Average Ratings.....	2
Table 2. Percent Change in Weighted Score by Agency.....	6
Table 3. Ratings for Leadership and Policy Section.....	9
Table 4. Ratings for Project Planning and Programming Section.....	14
Table 5. Ratings for Project Design Section.....	17
Table 6. Ratings for Project Construction and Operation Section .....	22
Table 7. Ratings for Communications and Education Section.....	26
Table 8. Ratings for Program Evaluation Section.....	29

# 1. INTRODUCTION

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 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* (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; and
- Gain information for use as inputs to process reviews that are required by the Work Zone Safety and Mobility Rule ([http://www.ops.fhwa.dot.gov/wz/resources/final\\_rule.htm](http://www.ops.fhwa.dot.gov/wz/resources/final_rule.htm)).

At the 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;
- 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; and
- 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, scanning tours, workshops, or as peers in the Work Zone Peer-to-Peer Program (<http://www.ops.fhwa.dot.gov/wz/p2p/index.htm>).

# 2. OVERVIEW OF RESULTS

This section presents an overview of the combined results for the 52 Divisions/States that provided responses to the 2012 WZ SA. Results from the 2011 WZ SA are also included for comparison. Table 1 shows the 2012 overall average rating and average ratings for each of the six sections in the WZ SA in comparison to the 2011 results.

**Table 1. National Average Ratings**

<b>Section</b>	<b># of Questions</b>	<b>2011</b>	<b>2012</b>	<b>Change<sup>1</sup></b>	<b>Percent Change</b>
1. Leadership and Policy	10	10.0	10.3	0.2	2%
2. Project Planning and Programming	6	8.9	9.3	0.4	4%
3. Project Design	12	10.5	10.9	0.4	4%
4. Project Construction and Operation	9	10.8	11.1	0.3	2%
5. Communications and Education	5	12.6	12.8	0.2	2%
6. Program Evaluation	4	7.5	7.7	0.2	3%
<b>Overall</b>	<b>46</b>	<b>10.3</b>	<b>10.6</b>	<b>0.3</b>	<b>3%</b>

### **Noteworthy Findings by Section**

The highest average ratings were for Section 5 (Communications and Education), followed by Section 4 (Project Construction and Operation) and Section 3 (Project Design). The lowest average rating was assigned to Section 6 (Program Evaluation). This is consistent with the results from previous years.

Each section experienced a slight increase in average rating from 2011 to 2012. Section 2 (Project Planning and Programming) and Section 3 (Project Design) had the highest average rating increase (4 percent for each section). The section that has the greatest increase generally changes from year to year.

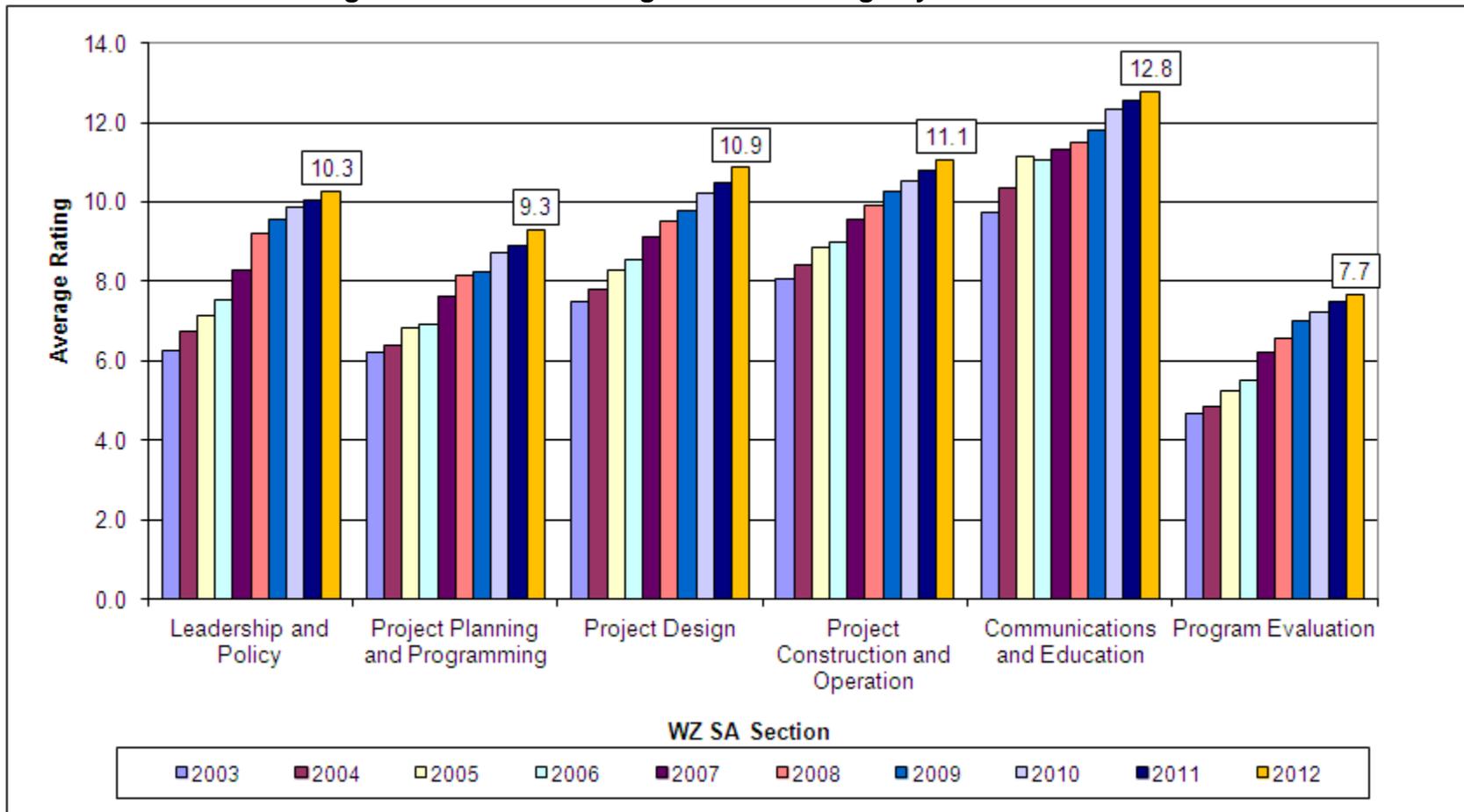
The National average ratings for all six sections have consistently increased since the inception of the WZ SA, with the level of increase varying from section to section as shown in Figure 1. Since 2009, the average rating for every section has been at or above the implementation threshold of seven - meaning that on average across the country, agencies are implementing the practices in all six sections of the assessment. Four of the six sections now have average ratings that show agencies are assessing their performance (rating of 10-12),<sup>2</sup> with Section 2 (Project Planning and Programming) approaching this range as well. As agencies have continued to enhance their work zone policies and practices, the average ratings have reached a level to where increases are more gradual.

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<sup>1</sup> Numbers in this table and other tables in this report may not calculate exactly due to rounding. Non-rounded values were used in these and other calculations throughout this report.

<sup>2</sup> See Appendix A for a description of the scoring for the WZ SA.

Figure 1. National Average Section Ratings by Year: 2003 to 2012



## **Noteworthy Findings by Question**

Key findings by question:

- **Highest Rated Question: 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 Web site, newsletters, public meetings, radio, and other media outlets)?**
  - The average rating for this question was 13.8, and increase from 13.6 in 2011.
  - This question has consistently had one of the highest ratings of any question in the WZ SA.
  - All 52 agencies use public information plans that provide specific and timely project information to the traveling public. The use of public information plans is a well-established and assessed practice in many agencies.

The questions with the largest percent increases in rating between 2011 and 2012 are:

- **8% Increase: 4.2.4 Does the agency's transportation planning process include a planning cost estimate review for project types I, II, and III that accounts for traffic management costs (e.g., incident management, public information campaigns, positive separation elements, uniformed law enforcement, and intelligent transportation systems [ITS])?**
  - The 8 percent rating increase (from 9.0 to 9.7) was due to increases by 20 agencies.
  - Ratings for 3 agencies increased above 7, meaning they are now implementing this practice.
  - The Temporary Traffic Control Devices Rule (Subpart K) established additional requirements for consideration of some of the example practices listed in this question and may help explain the large increase in average rating.
- **7% Increase: 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?**
  - The 7 percent rating increase (from 9.1 to 9.7) resulted from increases by 14 agencies.
  - 45 agencies (87 percent) have a process to consider ITS use in work zones.
  - The range of agency use varies greatly. Several agencies noted use of ITS, especially on significant projects, in metropolitan areas and on interstates.
- **7% Increase: 4.3.11 When developing the Traffic Control Plan for a project, does the agency involve contractors on type I and II projects?**
  - The 7 percent rating increase (from 7.8 to 8.4) was due to increases by 15 agencies.
  - Ratings for 2 agencies increased to 7, meaning they are now implementing this practice. The increases for both agencies were large (from 0 to 7, from 1 to 7).
  - Overall, 34 agencies (65 percent) are involving contractors on type I and II projects when developing the Traffic Control Plan.

Three questions had the lowest average rating (6.9):

- **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?**
  - While this question has consistently been rated low, the average rating increased from 6.7 in 2011 to 6.9 in 2012.
  - Slightly more than half (27) of agencies indicate that they are implementing this practice, an increase of one agency from 2011.
  - Coordination with utility suppliers tends to be an informal process as opposed to the formal agreement such as an MOU.
  - FHWA has made this an area of focus. TMP resources and training promote project coordination, a webinar was held in 2012, and a state-or-the-practice review is planned for 2013 to promote greater coordination to reduce project delays and impacts to traffic.
  
- **4.6.1 Does the agency collect data to track work zone congestion and delay performance in accordance with agency-established measures?**
  - While the average rating increased from 6.6 in 2011 to 6.9 in 2012, this question has consistently been at or near the lowest rated of all questions.
  - More than half (28) of all agencies indicate they are implementing this practice (an increase of two agencies from 2011).
  - Both knowledge and resources have constrained implementation of work zone congestion and delay data collection. In 2011, FHWA published a primer and a research report and held a webinar on work zone performance monitoring to help advance knowledge on establishing measures and collecting data to assess the measures. FHWA follow-on efforts are underway, including an online training module that outlines how to develop and use work zone performance measures.
  
- **4.6.3 Does the agency conduct customer surveys to evaluate work zone traffic management practices and policies on a statewide/area-wide basis?**
  - The average rating for this question increased from 6.6 in 2011 to 6.9 in 2012.
  - Slightly more than half (27) of agencies indicated they are implementing customer surveys to evaluate work zone traffic management practices and policies on a statewide/area-wide basis (an increase of one agency from 2011).

The average rating for four questions remained the same from 2011 to 2012 (4.1.5, 4.1.6, 4.4.7, and 4.5.3). The question about the use of a work zone Web site to provide traveler information (4.5.1) showed a slight decrease (from 13.2 to 13.1), and is the only question that decreased.

The changes in ratings for any WZ SA question may be due to a combination of reasons. Factors that may contribute to changes in rating include enhancements to

State practices, changes in the process for completing the WZ SA (enhanced stakeholder input, greater attention to agency process change relative to WZ SA topics, changes in personnel), FHWA technical support to agencies, further implementation of the Work Zone Rule or other recommended practices, or re-baselining of practices. Question-specific factors for rating changes are provided in Section 4.

### **Noteworthy Findings by Agency**

Most agencies increased their overall WZ SA rating between 2011 and 2012. Table 2 shows the changes in average agency ratings. The rating increased for 43 agencies (83 percent), decreased for 6 agencies (12 percent), and remained the same for 3 agencies (6 percent). These percentages are similar to the changes from 2010 to 2011.

**Table 2. Percent Change in Weighted Score by Agency**

<b>Score Change</b>	<b>Agencies</b>	<b>Percent of Agencies</b>
Increased by more than 10%	3	6%
Increased 6% to 10%	7	13%
Increased 1% to 5%	33	63%
No Change	3	6%
Decreased up to 5%	5	10%
Decreased by 5% or more	1	2%
<b>Total</b>	<b>52</b>	<b>100%</b>

The largest percentage increase in average weighted score for an agency was 37 percent (followed by 16 percent and 11 percent), while the largest percentage decrease in average weighted score was 8 percent.

**Work Zone Process Reviews:** Responses to the supplemental question show that the majority of agencies (43) have conducted a comprehensive work zone process review in the last two years in accordance with 23 CFR 630 Subpart J, with many completed in 2012. Of the nine agencies not completing reviews during this time, five completed reviews during the few years prior. FHWA is following up with those agencies that have not completed reviews in a timely manner.

## **3. BACKGROUND AND PURPOSE**

FHWA began the WZ SA in 2003 and conducts the assessment annually. In 2012, each FHWA Division Office was asked to re-examine and update the results of its 2011 WZ SA, working with transportation agency staff from its State partner. Each Division Office had the option of performing a simple update or a more in-depth reassessment. A simple update would focus on revising past ratings to reflect current practices based on observations and an ongoing knowledge of work zone practices. For a more in-depth reassessment, the WZ SA is conducted as a group exercise and involves a structured discussion among stakeholders to develop consensus ratings for each of the questions. Agencies may choose to alternate between the two approaches from year to year.

While the WZ SA rating provides a metric for measurement, the most important information is derived from the discussions conducted among the participants. The

interchange among stakeholders provides an opportunity for an agency to identify specific areas for improvement and provides the basis for structuring approaches to improve work zone policies, programs, and practices.

The WZ SA is intended to help agencies identify areas of strength and areas for improvement and to then use that information to identify needs and gaps in practices that could benefit from additional focus. While a goal of the WZ SA is to identify opportunities for improvement, the “next step” is to identify techniques and actions that can fill those gaps to improve upon current work zone operations.

The WZ SA consists of six primary assessment areas and one supplemental question.

The six primary areas are:

- Section 1: Leadership and Policy
- Section 2: Project Planning and Programming
- Section 3: Project Design
- Section 4: Project Construction and Operation
- Section 5: Communications and Education
- Section 6: Program Evaluation.

Each assessment area contains questions about a particular work zone-related policy, strategy, process, or tool. For each question, respondents were asked to evaluate the extent to which a particular practice has been incorporated into an agency’s way of doing business. The questions were rated according to the level of adoption phase, using a scale of 0 to 15 that is broken into a set of five progressive levels based on the quality improvement process model used by industry. A rating of 7 or more signifies that a State is implementing/executing the item in that question. Several questions in the WZ SA are based on the magnitude of impact that a project may have on a particular area. Project types and definitions for the rating levels are in Appendix A.

The WZ SA can also provide helpful information that agencies can use in performing 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.

Agencies completed the following two-part supplemental question in 2012:

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

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

Month \_\_\_\_\_ Year \_\_\_\_\_

COMMENTS:

## 4. DETAILED RESULTS

This section presents the results of the 2012 WZ SA at a more detailed level. The results represent a compilation of ratings and comments submitted from 52 Divisions/States. For each section of the WZ SA, the information includes:

- An explanation of the intent of the section;
- National average ratings for each question in the section and comparative data from the 2011 WZ SA; and
- The questions asked in that section with a question-by-question discussion of the ratings, including the percentage of agencies implementing the practice asked about in the question (meaning they rated themselves at 7 or higher) and a summary of comments included by respondents in the results they submitted.

This section also provides a summary of responses to the 2012 supplemental question on work zone process reviews.

Many respondents provided comments for some questions. The respondents that provided comments offer helpful examples of some of the specific practices and efforts being undertaken to make work zones work better. Examples of agency comments are included in the write-up after each question.

Another rich source of examples is the FHWA Work Zone Program website at <http://www.fhwa.dot.gov/workzones>. The website contains work zone publications, studies, links, training information, technical resources, and best practices, as well as guides and State DOT examples to support implementation of the Work Zone Safety and Mobility Rule (23 CFR 630 Subpart J).

Since 2007, the WZ SA has included linkages, as applicable by question, to the appropriate sections of the Work Zone Rule. As agencies worked to implement the Work Zone Rule by the October 12, 2007 deadline, these efforts have affected the ratings in a positive way.

### **Leadership and Policy**

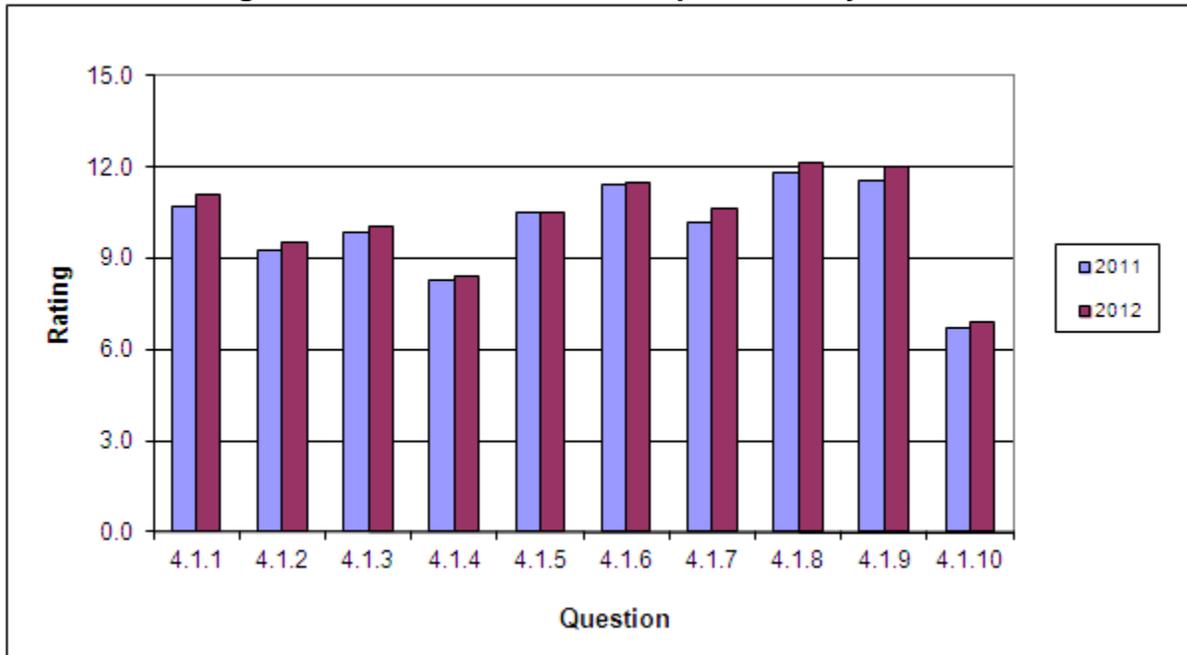
Agency leadership support should drive overall policy making for the agency. This support fosters an environment conducive to developing an effective work zone program. Project planning, design, and construction and maintenance activities should all incorporate consideration of work zone safety and mobility 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 enhance the safety of motorists and workers in work zones and minimize work zone delays.

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 percent in 5 years” establish a basis on which to develop strategies and actions. Use of performance measures helps 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 for a sample of work zones and track these values over time.

Figure 2 shows the average rating by question for 2011 and 2012 for the Leadership and Policy section. Table 3 shows the numeric ratings along with the percent change for each question.

**Figure 2. Results for Leadership and Policy Section**



**Table 3. Ratings for Leadership and Policy Section**

Section	2011	2012	Change	Percent Change
4.1.1	10.7	11.1	0.4	3%
4.1.2	9.3	9.5	0.3	3%
4.1.3	9.8	10.0	0.2	2%
4.1.4	8.3	8.4	0.1	2%
4.1.5	10.5	10.5	0.0	0%
4.1.6	11.5	11.5	0.0	0%
4.1.7	10.2	10.6	0.5	5%
4.1.8	11.8	12.2	0.3	3%
4.1.9	11.6	12.0	0.4	4%
4.1.10	6.7	6.9	0.2	3%

The average ratings increased for most of the questions in this section. Question 7 on establishing standards for work zone performance saw the largest increase (5 percent). Questions 5 and 6 stayed the same (question 5 decreased the previous year). Each question except for question 10 had a national average rating of 7 or greater, indicating that, on average, agencies are implementing the practices covered in this section. The average rating for question 10 continues to approach the implementation level (7).

**4.1.1 Has the agency developed a process to determine whether a project is impact type I, II, III, or IV?** Forty-nine agencies (94 percent) have developed a process to determine the impact type of projects. While the average rating on this question increased, one fewer agency is implementing this practice as compared with 2011. This agency commented that they have developed a process but that it has not been disseminated. Several agencies cited use of a process to filter out significant projects without classifying all projects based on impact type I, II, III, or IV. A few agencies cited use of a project classification process, but do not specifically categorize projects as type I, II, III, and IV, or indicated they use a different rating system. Nearly all agencies noted attention to the significance of projects, with a focus on mitigating the impacts. One agency noted that their process is new and has not yet been fully implemented and another indicated they have made progress with routinely categorizing projects and will continue to reinforce the importance of the process.

**4.1.2 Has the agency established strategic goals specifically to reduce congestion and delays in work zones?** Forty agencies (77 percent) indicated that they have strategic goals to reduce work zone congestion and delays, with some agencies noting that they are currently in the process of developing strategic goals. Several agencies cited specific performance measures as they relate to mobility goals. Several agencies noted that they do not have specific numeric goals due to a lack of performance measures or that their goals are inherent through process, but not written. A few agencies cited goals or strategies to lessen work zone congestion and delay that were defined in their Strategic Highway Safety Plan (SHSP). Two agencies indicated that reducing the impacts caused by work zones is integrated in the agency's culture or has been communicated strongly by leadership.

**4.1.3 Has the agency established strategic goals specifically to reduce crashes in work zones?** Forty-one agencies (79 percent) have strategic goals specifically to reduce crashes in work zones. Five agencies mentioned having work zones as an emphasis area in their SHSP. Several agencies mentioned a strategic goal of reducing work zone fatalities, with a small number of agencies mentioning a specific goal such as zero work zone fatalities. Several other agencies noted that they are monitoring work zone crashes, but no specific goals have been set. Three agencies responded that the lack of a specific goal was due to issues related to data. One agency noted that they try to anticipate upcoming crash patterns using similar projects and proactively address the anticipated crashes. Another agency indicated they use all crash data, not just severe, to assess work zone safety and include the frequency of intrusions. Several agencies cited the use of strategies for reducing crashes, even though goals may not have been formally established.

**4.1.4 Has the agency established measures (e.g., vehicle throughput or queue length) to track work zone congestion and delay?** Thirty-seven (71 percent) of the agencies are implementing measures to track work zone congestion and delay, an increase from 33 agencies in 2011. Several agencies indicated they are monitoring congestion and delay although formal performance measures have not been established. One agency has established a capacity value for a single lane in a work

zone as a first step toward establishing performance measures for congestion and delay. Another agency has established a specific delay measure that includes a maximum of 30 minutes of delay per project. Two agencies indicated the need to determine the state of the practice for establishing performance measures for work zone congestion and delay. Two agencies cited pending research that will help them determine performance measures, while one agency said they have defined performance measures but lack the funding to establish a tracking system.

**4.1.5 Has the agency established measures (e.g., crash rates) to track work zone crashes?** Forty-one agencies (79 percent) have established measures to track work zone crashes. The average rating for this question had no change from 2011. Most agencies cited work zone crashes as the primary performance measure established. One agency noted an emphasis on severe crashes, while another noted crash type as the primary performance measure. Several agencies mentioned regular reporting of work zone crashes, through quarterly or annual reports, through SHSP goals, or by project. Four agencies noted that they have recently implemented improvements to work zone crash reporting. Two of these agencies have created and populated or are in the process of creating a crash database, one agency has recently implemented a new crash reporting form, and another has started correlating crashes with lane closures. These improvements to data collection and reporting will support analysis and may help agencies further define and establish performance measures. A few agencies cited further need for timely dissemination of crash data and tracking of baseline data.

**4.1.6 Has the agency established a policy for the development of Transportation Management Plans to reduce work zone congestion and crashes?** Forty-nine agencies (94 percent) are implementing a policy for the development of Transportation Management Plans (TMPs) to reduce work zone congestion and crashes. Most agencies cited a policy or guidance document that outlines the considerations for development of a TMP. One agency mentioned their development of a TMP template. The average rating of this question had no change between 2011 and 2012. While all agencies may not have a TMP policy, all agencies are developing TMPs (per question 4.3.2).

**4.1.7 Has the agency established work zone performance guidance that addresses maximum queue lengths, the number of open lanes, maximum traveler delay, etc.?** Standards for work zone performance guidance have been established in 46 agencies (88 percent). The average rating of this question increased 5 percent (from 10.2 to 10.6) between 2011 and 2012. Several agencies noted use of proactive policies for when to allow lane closures and other capacity restrictions based on time of day, season, and anticipated demand, which are based on estimates of metrics such as queue length and delay. One agency cited their use of a requirement for a construction contingency plan to guarantee on-time opening of lanes. Several agencies noted the use of mobility guidance and tools to address maximum queue length and traveler delay, and to identify situations when lane closures may be appropriate at the project level. Some agencies cited specific values for maximum delay (e.g., 10 minutes additional travel time caused by the work zone) and Level of Service (e.g. LOS D). Two

agencies cited revisions to their current policies to include performance guidance to lessen impacts on interstates and ramps from cross street projects.

**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?** Fifty agencies (96 percent) have established criteria to support the use of project execution strategies. Two agencies crossed the implementation threshold in 2012. Several agencies noted use of lane closure strategies or nighttime construction to reduce public exposure. One agency noted that traffic volumes are generally used to establish work hours and lane closure schedules. Multiple agencies responded that strategies used to reduce public exposure to work zones are used on a case-by-case basis, generally for more significant work zones or those in urban areas. One agency noted that their use of full closure is based on detour lengths, and two agencies cited their development of a positive protection policy to reduce driver exposure to work zones.

**4.1.9 Has the agency developed policies to support the use of innovative contracting strategies to reduce contract performance periods?** All fifty-two agencies (100 percent) have developed policies to support the use of innovative contracting strategies to reduce contract performance periods. The average rating on this question increased 4 percent from 11.6 to 12.0 (the second largest increase of any question in this section). Strategies used include A+B bidding, alternate technical concepts, flexible start times, design-build, lane rental, value engineering (in design and also value engineering change proposals), and incentives/disincentives on major projects. Four agencies noted specifically using innovative contracting techniques to accelerate the delivery of bridge projects. An agency noted that it does not use some innovative contracting strategies such as A+B bidding and lane rental because of legislative limitations. Other agencies noted the development of new policies on A+B bidding, design-build, and public-private partnerships. Several agencies indicated they are currently evaluating the effectiveness of innovative contracting strategies.

**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?** Only 27 agencies (52 percent) have established an MOU with utility suppliers to promote the proactive coordination of long-range transportation plans with long-range utility plans. This continues to be one of the lowest rated questions and is tied with two other questions for the lowest rating of all WZ SA questions. Despite the 2011 wording change for this question to include a broader interpretation of agreements that qualify, only one agency crossed the implementation threshold in 2012 (although the average rating did increase from 6.7 to 6.9). Two agencies responded that they hold monthly meetings with utility suppliers to discuss utility issues and project schedules. Another agency includes utility construction coordination as a section within their TMP guidebook and provides training to regional office utility coordinators on use of their lane closure decision support tool. Several agencies reported having project-

specific MOUs. While many agencies do not have a formal MOU, several agencies have informal agreements and cooperative understandings in place with utility suppliers.

## **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 (LRTPs), transportation improvement program plans (TIPs), unified planning work programs (UPWPs), and in some cases congestion management system (CMS) plans.

Transportation management and operations (M&O) – including work zone management - is increasingly important to the planning professional. Metropolitan areas account for 83.5 percent of the Nation's population<sup>3</sup> and 90 percent of its economic output.<sup>4</sup> They are centers for social as well as economic activity and are the hubs of the national transportation system. To meet the challenge of continued mobility, the planning community needs to take an active role in the development and implementation of transportation system M&O strategies.

The complexity of our transportation systems and the impact of congestion on our Nation necessitate input from planners during project development in order to better assess and manage work zone impacts. The following are some example roles for planners:

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

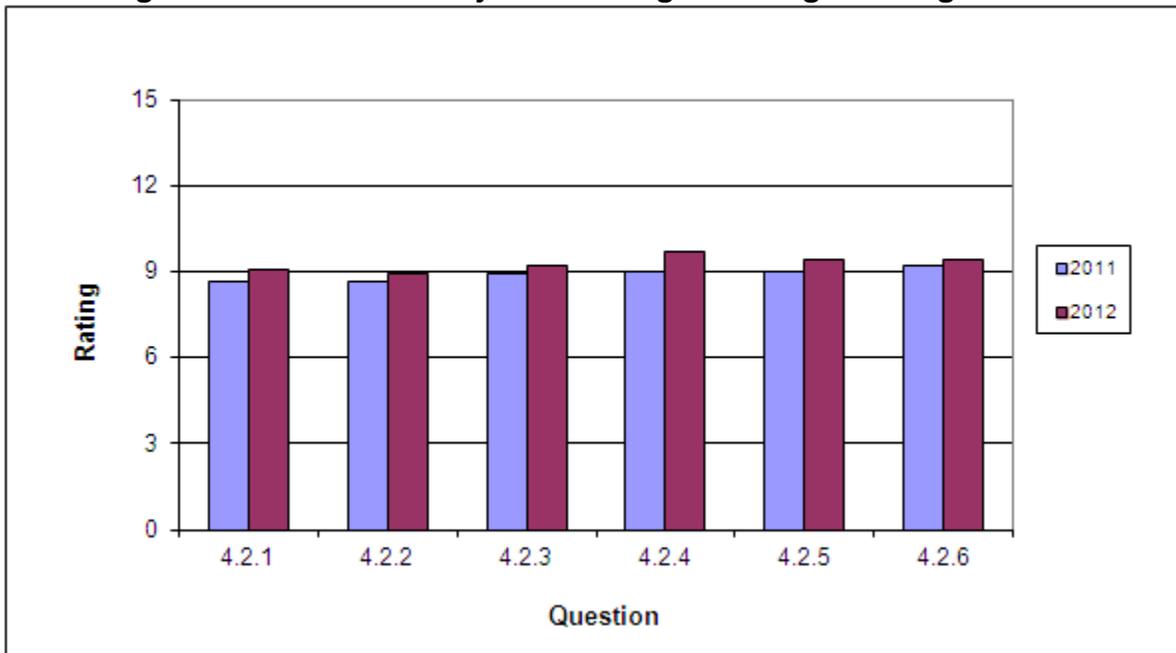
Figure 3 shows the average rating by question for 2011 and 2012 for the Project Planning and Programming section. Table 4 shows the numeric ratings along with the percent change in average rating for each question. The average ratings increased for all of the questions in this section.

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<sup>3</sup> U.S. Census Bureau, *Current Population Reports*, “Population Change in Metropolitan and Micropolitan Statistical Areas: 1990-2003,” P25-1134, by Paul J. Mackun, (Washington, DC: September 2005)

<sup>4</sup> U.S. Bureau of Economic Analysis, “Metropolitan Economic Growth Widespread in 2006 – 2006 and Revised 2004-2005 GDP-by-Metropolitan-Area Statistics,” News Release BEA 08-44, Regional Economic Accounts web page, December 13, 2012. ([http://www.bea.gov/newsreleases/regional/gdp\\_metro/2008/gdp\\_metro0908.htm](http://www.bea.gov/newsreleases/regional/gdp_metro/2008/gdp_metro0908.htm))

**Figure 3. Results for Project Planning and Programming Section**



**Table 4. Ratings for Project Planning and Programming Section**

Section	2011	2012	Change	Percent Change
4.2.1	8.6	9.1	0.5	5%
4.2.2	8.6	8.9	0.3	4%
4.2.3	8.9	9.2	0.3	3%
4.2.4	9.0	9.7	0.7	8%
4.2.5	9.0	9.4	0.4	4%
4.2.6	9.2	9.4	0.2	3%

**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?** Thirty-six agencies (69 percent) actively use analytical traffic modeling programs to determine the impact of future type I and II project activities. The average rating for this question increased by 5 percent. This topic has been promoted by FHWA recently in some additional work zone products and training as part of the Traffic Analysis Toolbox, potentially helping to explain the large increase in average rating. Some agencies perform analysis at the corridor level to identify cumulative road user impacts from multiple projects and surrounding road networks, while others reported using modeling at the project level on a case-by-case basis. Agencies cited use of a fairly broad range of software applications, including QuickZone, VISSIM, TransCad, FreeVal, HCS, CO3, TSIS/CORSIM, Synchro, HCS, Paramics, and Quadro for modeling construction impacts and network performance, and Dynamic Traffic Assignment is being considered by one agency. Two agencies noted the use of in-house developed impacts analysis tools. The tools cited range from macroscopic to microscopic and have varying levels of input and output detail. Several

agencies noted their use of a single in-house expert to perform work zone impacts modeling.

**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?** Forty agencies (77 percent) reported developing alternate network options for traffic volumes that could be delayed due to future road construction. One agency noted that in collaboration with a university, they developed a tool to visually represent traffic volumes and will begin using this tool to determine alternate network options that can be used during future lane closures. Another agency responded that these options are reviewed in conjunction with large planning studies. The same agency produces a congestion management plan that shows areas of potential impact by planned construction activities. One agency noted that alternative network options for traffic during construction are planned by consultants, and another noted that alternative network options for traffic during construction are planned informally. Two agencies noted specific projects where construction impacts were analyzed during the planning process and, as a result, capacity was added to adjacent road networks to mitigate impacts.

**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?** Forty agencies (77 percent) indicated they make efforts during the planning process to manage the transportation improvement program to eliminate network congestion caused by poorly prioritized and uncoordinated execution of projects. One agency responded that their TMP Guidelines promote coordination between projects. Other practices mentioned for facilitating coordination include: using internal applications, implementing a public traveler information map, and participating on committees to discuss upcoming construction activities. One agency indicated that progress was being made by coordinating letting schedules to minimize network congestion, while another instituted a TIP management process that collaborates with stakeholders to find synergy among projects. An agency that is not implementing this practice noted that programming occurs too far out for coordination to be considered.

**4.2.4 Does the agency's transportation planning process include a planning cost estimate review for project types I, II, and III that accounts for traffic management costs (e.g., incident management, public information campaigns, positive separation elements, uniformed law enforcement, and intelligent transportation systems [ITS])?** Forty-three agencies (83 percent) have a process for estimating and reviewing traffic management costs during the transportation planning process. The average rating for this question increased by 8 percent from 2011 (the highest increase for any question in the WZ SA), with three agencies crossing the implementation threshold. One agency noted that a planning cost estimate review is detailed in their Design Guidelines. Two agencies indicated that alternatives and their corresponding traffic management costs are estimated during conceptual or planning stages and are refined as more details are known. Several agencies stated that traffic management

costs for these types of strategies are not included until the design phase, as more specific information is known about each project during design. A few agencies stated that use of law enforcement personnel for work zone details is funded separately from the projects.

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

Planners assist in developing congestion mitigation strategies in 43 agencies (83 percent). Comments on this question reveal a range of involvement by planners during the project design stage. Levels of involvement include fully and actively involved, participation during quarterly meetings, participation on a case by case basis, or not at all. Several of the responding agencies noted that planners were not involved during the design stage yet acknowledged it would be beneficial. They also noted that progress is being made in formalizing the involvement of planners. One agency noted that TMP milestone information has been added to the planning process, and several agencies indicated that planners have started interacting more with work zone and traffic staff, or that traffic staff are accomplishing the same objectives as planners in this scenario. One agency cited that regional planning offices and MPOs are providing input on congestion management strategies.

#### **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?**

For 42 agencies (81 percent), the transportation planning process engages planners as a part of a multidisciplinary team in the development of TMPs. Many agencies indicated that planners are included as part of the team for overall project development, including TMP development and review. One agency said that city planners are now involved in TMP development while others responded that they use internal stakeholders as well as MPO and TMA planners in the process. Two agencies responded that their TMPs are reviewed by multi-disciplinary teams consisting of planners, designers, traffic engineers, and other professionals. One agency noted that the use of multidisciplinary teams to develop TMPs is left to the discretion of the designer.

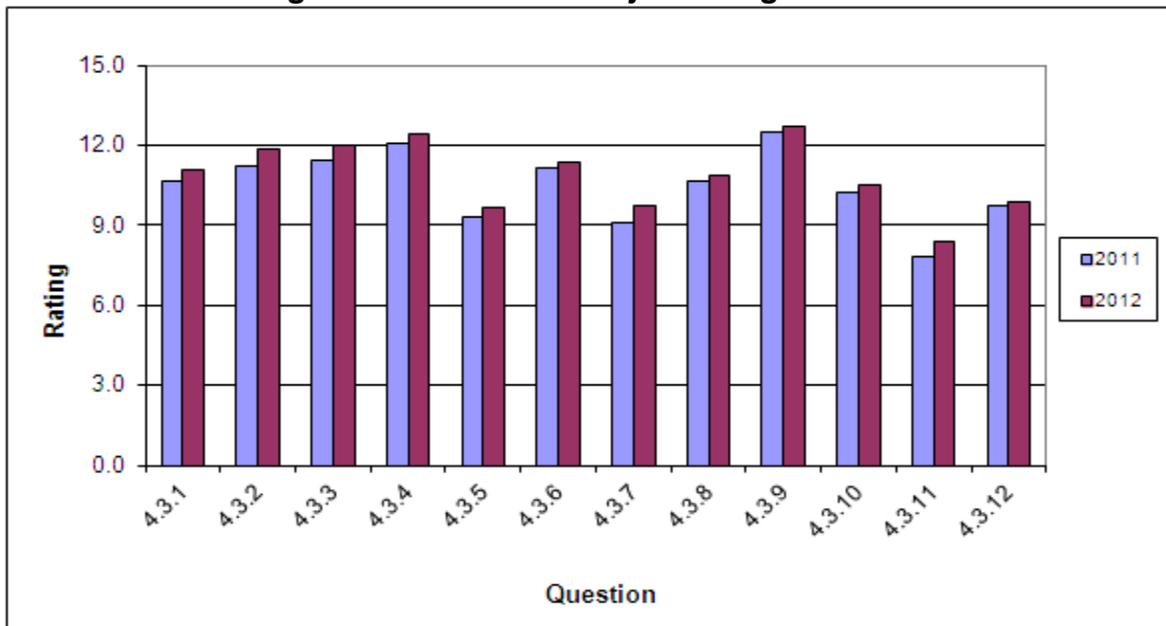
### **Project Design**

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. In addition, designers should actively lead the preparation of Transportation Management Plans (TMPs) that will mitigate the impact of work zone activities.

Figure 4 shows the average rating by question for 2011 and 2012 for the Project Design section. Table 5 shows the numeric ratings along with the percent change in average

rating for each question. The average ratings increased for all of the questions in this section. Questions 7 and 11 had the largest increases (7 percent) in this section, and had the second highest percentage increases of all questions in the WZ SA. Question 11 had the lowest average rating for the section in both 2011 and 2012, allowing more room for a large percentage increase. All the questions are at or above the implementation stage (rating of 7 or higher), meaning that agencies are typically implementing the practices addressed in this section. Many agencies are now in the assessment phase (rating of 10-12).

**Figure 4. Results for Project Design Section**



**Table 5. Ratings for Project Design Section**

Section	2011	2012	Change	Percent Change
4.3.1	10.7	11.1	0.4	4%
4.3.2	11.2	11.8	0.6	6%
4.3.3	11.4	12.0	0.5	5%
4.3.4	12.1	12.4	0.3	3%
4.3.5	9.3	9.7	0.3	4%
4.3.6	11.2	11.3	0.2	2%
4.3.7	9.1	9.7	0.6	7%
4.3.8	10.7	10.9	0.2	2%
4.3.9	12.5	12.7	0.2	2%
4.3.10	10.2	10.5	0.3	3%
4.3.11	7.8	8.4	0.5	7%
4.3.12	9.8	9.9	0.1	1%

**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?** Forty-seven agencies (90 percent) have a process to estimate road user costs. Multiple agencies noted the use of tools to estimate road user costs and one agency is currently updating their tool. Other agencies noted that while they do not specifically use road user costs to evaluate and select strategies, they use a lane closure chart or strategy to minimize work zone exposure and delay, ultimately resulting in reduced road user costs. One agency indicated that they are developing a benefit-cost guideline for work zone mitigation strategies. A few of the agencies noted that this type of evaluation is conducted on an as-needed basis, generally on select significant or mega projects. Two agencies stated that road user costs are not used to determine construction strategies. User costs for another stakeholder group – the boating community - were estimated by one agency for a significant bridge project that had anticipated impacts to the waterway.

**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?** All fifty-two agencies (100 percent) develop a TMP that addresses all operational impacts with a focus on project congestion for type I and II projects. This question also had a notably high percentage increase (6 percent) given that it also had a large rating increase from an already high average rating in 2011 (11.2). Two agencies commented that while TMP development occurs, evaluation and monitoring efforts could be improved. One agency indicated that TMP development occurs for all projects, regardless of size or significance. Another agency noted that they have added an event date in their project scheduling system to ensure that the TMP is reviewed in advance of the project. One agency stated that TMP development has been useful with estimating costs and developing a sequence of operations.

**4.3.3 Does the agency use multidisciplinary teams consisting of agency staff to develop Transportation Management Plans for type I & II projects?** All 52 agencies reported that they use multidisciplinary teams (the same as 2011). Agencies responded that these multidisciplinary teams consist of agency staff from many areas such as design, planning, right of way, environmental, structures, maintenance, traffic operations, and construction. Additionally, some agencies reported that they include other stakeholders such as local agencies (MPOs or TMAs), emergency response teams, law enforcement, citizens, and elected officials. Some agencies cited a specific policy requiring these teams, and some noted that the scope of the team is dependent on the type and size of the construction project.

**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?** All 52 agencies responded that they use constructability reviews on projects. Several agencies noted that reviews take place between the design and construction phases for projects, and sometimes involve the selected contractor. One agency noted that they host biannual TMP Constructability workshops where they share case studies and best practices with multi-disciplinary

stakeholders. Another agency said that constructability reviews are required on all projects and are performed in conjunction with the development of the project's TMP. While most agencies indicated that constructability reviews are performed in-house, one agency noted that consultants are used for constructability reviews on large projects. One agency indicated a need for consistency throughout the State on how and when constructability reviews are performed.

**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?** Forty-five agencies (87 percent) use contractor associations to provide construction process input. Many agencies noted that independent contractors or contractor associations are used to provide input on a case by case basis and the process is more often used on larger projects. A few agencies responded that this process is carefully used due to a potential conflict of interest in a low bid environment. Two agencies indicated that contractors are used in this capacity through either design-build efforts or using existing data from AASHTO's Site Manager Software, while another responded that contractors are used for the development and review of specifications. One agency noted that they believe contractors may not participate fully in the process because they would want to benefit fully from their ideas should they be awarded the contract at a later time.

**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?** Forty-seven agencies (90 percent) are using a technique to determine contract performance times for type I and II projects. Several agencies noted use of either Gantt charts or the Critical Path Method (CPM), especially for type I and II projects. Several agencies noted that production rates are used to calculate contract periods. Some agencies noted the use of software such as Primavera or agency-developed spreadsheet tools to assist with scheduling. One agency stated that the sophistication and complexity of their model is dependent on the size and monetary value of the contract. No agencies referenced the use of parametric models specifically.

**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?** Forty-five agencies (87 percent) have a process to consider ITS technologies to minimize work zone congestion. The average rating for this question increased 7 percent from 2011 to 2012, giving it one of the highest percentage increases of all questions in the WZ SA. Several agencies noted use of ITS, especially on significant projects, in metropolitan areas and on interstates. The range of agency use varies greatly – from regular use to an evolving process to being under consideration. Agencies noted the use of speed trailers, variable message signs, and portable sensors. Several agencies noted that ITS technologies are included in TMP guidelines, checklists, and policies.

**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?** Life-cycle costing (LCC) is used by 48 agencies (92 percent) to reduce the frequency and duration of work zones. Several agencies responded that they use life cycle costing on pavement and bridge materials, pavement markings, sign sheeting, concrete barrier, and guardrail selection, often citing that longer lasting material results in fewer future disruptions to traffic for maintenance. One agency cited their use of RealCost software to perform life cycle cost analyses for pavement designs. Another agency noted that they have a formal process for selecting pavement materials on projects exceeding \$1 million. Two agencies cited the development of alternate pavement specifications. A few agencies noted that life cycle costing is performed on a case-by-case basis while one agency noted that it is integrated into the project design process.

**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?** Fifty-one agencies (98 percent) have a process to assess projects for the use of positive separation (now referred to as positive protection) devices for type I and II projects. One agency increased their rating above the implementation threshold from 2011. Practices range from having multiple policies and guidelines encouraging the use of positive separation devices to an informal process to assess the need for positive separation devices. For example, one agency noted that although no written policy exists, the agency's position is to always consider the use of positive barrier systems on Interstates and during major construction projects on high-speed facilities. One agency responded that a study is underway to define criteria for use of positive protection and results will be used to assess current practice. Some agencies have tools developed to aid in selection of devices, and FHWA is currently developing a training course on decision-making for positive protection.

**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?** Fifty agencies (96 percent) incorporate features into their project designs that anticipate the need for future repair and/or maintenance activities. Ratings for one agency crossed the implementation threshold from 2011 to 2012. Several agencies reported that wider shoulders or additional lanes are considered in the design process for use in enhancing capacity and reducing delay during future rehabilitation projects. They also noted that full depth shoulders are routinely considered for future traffic management during maintenance and repair. Another agency noted that it installs longer lasting pavement markings, while two agencies cited their modifications to bridge approach end designs to reduce future maintenance needs.

**4.3.11 When developing the Traffic Control Plan for a project, does the agency involve contractors on type I and II projects?** Contractors are involved with the development of traffic control plans (TCPs) in 34 agencies (65 percent). This represents one additional agency implementing this practice in 2012 compared with 2011. This question received the lowest rating in the Project Design section, but has the largest percentage increase (7 percent) from 2011 for this section. The average rating for this question increased from 7.8 to 8.4. Many agencies noted that contractors

are allowed to submit proposed revisions to the TCP following the award of the contract to prevent any conflicts of interest that might arise if this were to be done prior to bidding. Some agencies noted that contractors did provide input on a project-by-project basis, specifically if the project was complex or unique, and cited use of contractor input through design-build contracts. One agency noted that contractors provide input on value engineering team reviews for projects exceeding \$25 million, and another responded that contractors are permitted to submit a value engineering change proposal during construction to reduce the cost of a project. Several agencies cited regular meetings held with State or national contracting organizations where traffic controls strategies are discussed.

#### **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?**

Forty-six agencies (88 percent) implement computer modeling in the development of traffic control plans. Agencies reported using software such as QuickZone, TSIS/CORSIM, Synchro/SimTraffic, VISSIM, TREX, COSMIX, Quadro, Paramics, CA4PRS, HCM, and CO3 for analyzing impacts. Additionally, two agencies noted that they have developed a spreadsheet to assist in analyzing impacts. One agency noted that they still use a demand versus capacity analysis to determine allowable hours for lane closures and restrictions, but they have used modeling and will continue to develop modeling expertise. Two agencies noted that modeling is used after an initial review indicates that a more detailed analysis would be beneficial. One agency noted they have provided training sessions for the use of modeling software and have recently employed a work zone modeling expert.

### **Project Construction and Operation**

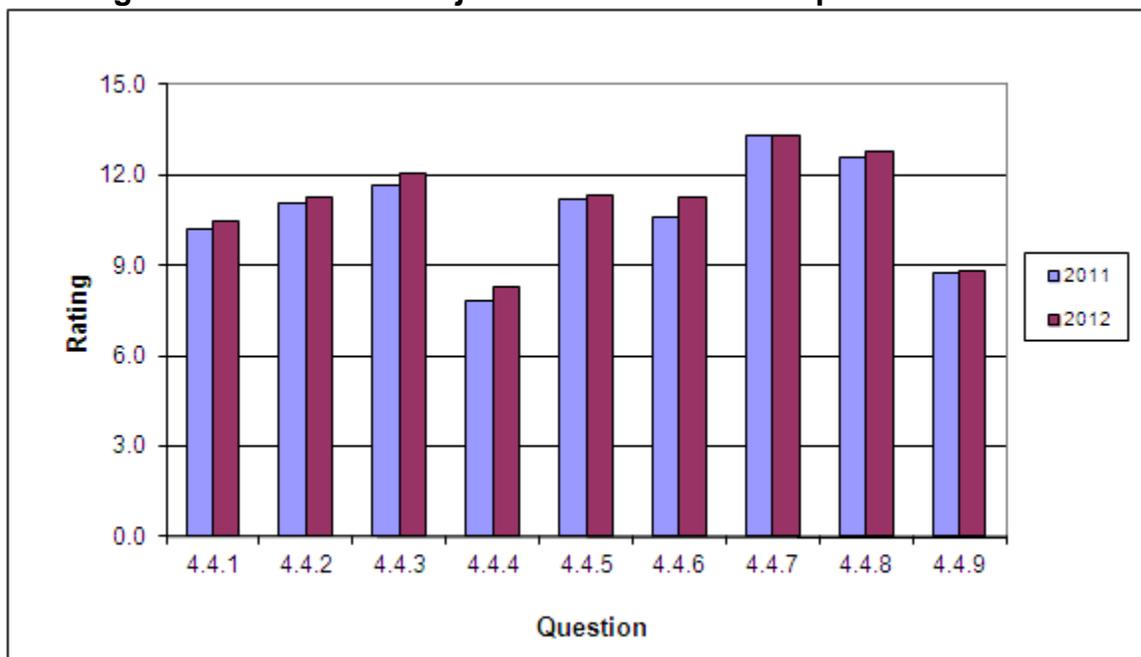
A roadway construction or maintenance site can be a very complex orchestration of activities that affect the public in many ways. There are many pieces to the project delivery process and everyone has a critical role, but what the public mostly sees and experiences is the construction phase of the process. 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 agencies improve the execution and public perception of transportation improvements.

Complaints from the traveling public often focus on the proper use and maintenance of traffic control devices, work zone lane closures when no work is occurring, and inadequate traveler information. Some common problems include signs that inform travelers of conditions that do not exist, striping that is misleading, changeable signs that show inaccurate messages, cones/drums that are improperly spaced, and lack of advance notice about lane closures, detours, or expected delays. These issues have an impact on agency credibility with the traveling public. Drivers develop work zone habits that are based on past observations. Agencies can 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 and the implementation of other TMP strategies.

Figure 5 shows the average rating by question for 2011 and 2012 for the Project Construction and Operation section. Table 6 shows the numeric ratings along with the percent change in average rating for each question. Overall, this section had the second highest average rating (11.1) of the six sections. The average rating increased slightly for most of the questions in this section, with two questions showing larger increases of 6 percent. All the questions are at or beyond the implementation stage (rating of 7 or higher), meaning agencies are generally implementing the practices addressed in this section.

**Figure 5. Results for Project Construction and Operation Section**



**Table 6. Ratings for Project Construction and Operation Section**

Section	2011	2012	Change	Percent Change
4.4.1	10.2	10.5	0.3	3%
4.4.2	11.0	11.3	0.2	2%
4.4.3	11.6	12.1	0.4	4%
4.4.4	7.8	8.3	0.4	6%
4.4.5	11.2	11.3	0.1	1%
4.4.6	10.6	11.3	0.7	6%
4.4.7	13.3	13.3	0.0	0%
4.4.8	12.6	12.8	0.2	1%
4.4.9	8.8	8.8	0.1	1%

**4.4.1 Is the letting schedule altered or optimized to reflect the available resources and capabilities of the construction industry?** Forty-four agencies (85 percent) alter or optimize their letting schedule based on contractor resources and capabilities. Several agencies noted that they spread out project advertisements so that a larger number of contractors have a chance to bid on jobs. One agency lets projects early in the year and provides a flexible notice to proceed to contractors. One agency noted that it uses a quarterly distribution of funds (20-30-30-20) to spread out its budget to match construction industry contractor resources. One agency said it is developing a master schedule which would allow schedule optimization. One agency noted that its letting schedule is often driven by fiscal process constraints. Another agency said that it does review the letting schedule based on available construction industry resources, but that a more significant factor in its letting schedule is the time needed to complete the job, as the agency tries to minimize the number of projects carried over winter. Several agencies cited the need to consider contractor resources due to American Recovery and Reinvestment Act funding and large scale bridge replacement projects.

**4.4.2 Is the letting schedule altered or optimized to minimize disruptions to major traffic corridors?** Fifty-one agencies (98 percent) are minimizing disruptions on major traffic corridors by optimizing the letting schedule. Projects are often reviewed to make sure that multiple projects do not adversely impact traffic along certain corridors. One agency noted that schedules are frequently optimized for major corridors. One agency noted flexibility in the start time if the same contractor is awarded two projects in close proximity to one another. The same agency said it may not issue a notice to proceed until the next season if a similar situation exists but involves two different contractors. One agency noted that its letting process has been adjusted in anticipation of traffic issues, and in some instances where the letting schedule cannot be adjusted, the construction schedule is modified. Another agency cited its intent is to optimize the letting schedule, but funding can be an obstacle preventing such optimization.

**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?** Fifty agencies (96 percent) include road user costs in establishing incentives/disincentives (I/D) to minimize road user delay in work zones. The overall rating for this question increased 4 percent (from 11.6 to 12.1). The rating for two agencies increased above the implementation threshold. Some examples of strategies used by agencies include A+B bidding, lane rental, accelerated work, construction manager at risk, and liquidated damages clauses. Agencies generally did not specify how road user costs are determined. Several agencies noted that they have been using A+B bidding and lane rental for some time. One agency responded that disincentives are more commonly used than incentives. Another agency cited guidance development for innovative contracting strategies.

**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?** Thirty-four agencies (65 percent) use performance-based selection to eliminate contractors that regularly

have difficulty completing quality jobs on-time. The average rating on this question increased 6 percent from 7.8 to 8.3, and experienced one of the highest percentage increases in this section and overall in the WZ SA. This increase may have been due in part to a continuing trend from a change in the wording of the question in 2011 to indicate it pertains to performance-based criteria, such as that used in prequalification, rather than performance-based selection. Many agencies noted the use of a prequalification process to analyze the eligibility of contractors that have demonstrated poor performance to bid on projects. Two agencies noted that they have established contractor evaluation criteria and are beginning to collect data, while another noted that they evaluate the contractor at the end of each contract, but these evaluations do not disqualify the contractor from the bidding process regardless of performance. Two agencies cited their inability to disqualify contractors due to State law.

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

Incident management (IM) services are used by 46 agencies (88 percent). Several IM services are employed, including enforcement located within the work zone, courtesy patrols, highway advisory radio, push-bumpers and wreckers, and coordination with fire and rescue organizations. Two agencies indicated that either data is collected or post incident reviews take place to ensure effectiveness of the services. One agency noted that they found it was not cost effective to keep IM services on site, but they do keep such services on stand-by if needed. One agency responded that specific guidance for IM services is being developed, while another agency responded that they do not have a need for these types of services.

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

Forty-eight agencies (92 percent) routinely use flexible starting provisions after the Notice to Proceed (NTP) is issued. This question was one of two that had the largest increase (6 percent) for this section (from 10.6 to 11.3). This large increase is especially notable given the high numerical value for the average rating which makes large percentage changes more difficult. Agency use of flexible starting provisions ranges from being a standardized practice to being used occasionally to not being used at all. One agency said this activity is generally done indirectly and due to weather. Another agency noted that all projects have some flexibility between award and NTP. The same agency said that the NTP is normally within 45 days of award; however, the NTP may be extended to after winter if a winter shutdown date occurs during or immediately after the 45 day window. This agency also noted that it may include a two-part NTP in a contract to allow procurement of materials prior to actual construction. One agency routinely uses flexible starting provisions and uses past results to determine future projects that are good candidates for this practice. Another agency noted that they do not use flexible starting provisions because their project schedule is based on the end date and not project duration/start date.

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

Fifty-one agencies (98 percent) use uniformed law enforcement on projects. While this question experienced no change in average rating, it had the

second highest average rating of any question in the WZ SA, indicating that the use of law enforcement in work zones is a well-established and assessed practice in many agencies. Some agencies use law enforcement personnel on a project-by-project basis, but most agencies noted that the use of law enforcement is well-integrated into the agency project development process. A few agencies noted that they are evaluating the use of law enforcement in work zones to ensure effective use. One agency uses law enforcement strictly for traffic control on most projects, but is currently pursuing an initiative to perform speed enforcement and is gathering data on speeds and the common types of driver infractions. Two agencies indicated that specific funds are dedicated for law enforcement operations in work zones. Two agencies cited use of enforcement on night projects, with one citing use in locations where the posted speed is over 45 mph and the other noting use on high speed, multilane facilities or locations with high traffic volumes.

**4.4.8 Does the agency provide/require training of contractor staff on the proper layout and use of traffic control devices?** Forty-nine agencies (94 percent) indicated that they provide and/or require training of contractor staff on proper use of traffic control devices. Some agencies hold training courses on traffic control that they make open to contractor staff, while many of the respondents cited that contractor personnel are required to complete training specific to their role from an approved set of courses such as those offered by the American Traffic Safety Services Association (ATSSA), the International Municipal Signal Association (IMSA), or the National Safety Council (NSC). One agency also reported that designers of traffic control are required to have Professional Traffic Operations Engineer certification. Another agency noted that classroom training is offered, but not required, and that flaggers are required to read a handbook and watch a video. One agency reported having trained over 28,000 designers, project construction and inspection personnel, District and Regional Traffic Engineering and District Residency maintenance personnel, and municipality staff in varying advancements of course work over 5 years. Another agency reported to have Temporary Traffic Control for Work Zones (MUTCD Part 6) training available online.

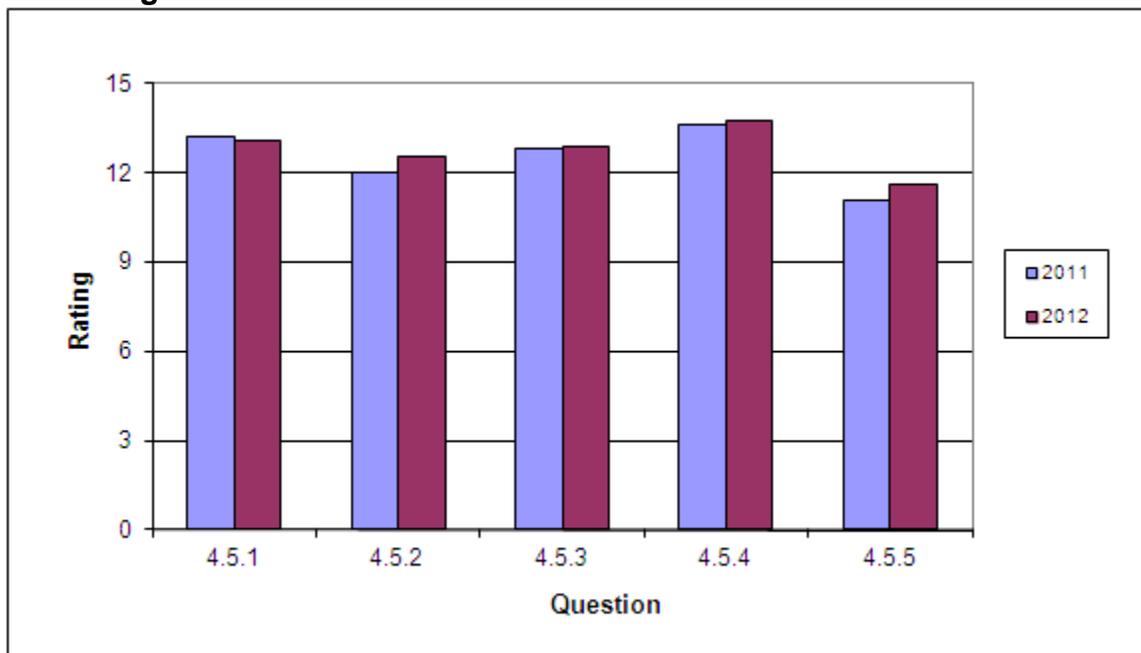
**4.4.9 Does the agency provide training to uniformed law enforcement personnel on work zone devices and layouts or ensure law enforcement personnel receive proper training elsewhere?** Thirty-six (69 percent) of the responding agencies provide training to uniformed law enforcement or otherwise require it. Two agencies responded that they are currently using FHWA's "Safe and Effective Use of Law Enforcement Personnel in Work Zones," while others mentioned the use of FHWA training material and train-the-trainer options. A few agencies have used the FHWA material to develop their own online course for law enforcement. Two agencies noted that they are currently developing law enforcement training materials that will be available online. FHWA's online course became available in October 2012. Another agency conducts incident responder workshops in 6 of its 7 regions and is hoping to expand the geographic presentation of these workshops in the future. Two agencies noted that limited funding and availability of law enforcement officers make it difficult to ensure all staff members receive work zone training. One agency requires project staff to meet with the State Police to review specific work zone practices at the end of a shift.

## **Communications and Education**

To reduce public anxiety and frustration regarding work zones, it is important to sustain effective communication and outreach with the public about road construction and maintenance activity, and the potential impacts of the activities. 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.

Figure 6 shows the average rating by question for 2011 and 2012 for the Communications and Education section. Table 7 shows the numeric ratings along with the percent change in average rating for each question. The average ratings increased for three out of the five questions in this section, while the question on maintaining and updating a Web site (4.5.1) experienced a slight decrease. The ratings in this section have consistently been among the highest in the WZ SA and remain so this year. Many agencies are now in the assessment phase (ratings of 10-12).

**Figure 6. Results for Communications and Education Section**



**Table 7. Ratings for Communications and Education Section**

Section	2011	2012	Change	Percent Change
4.5.1	13.2	13.1	-0.1	-1%
4.5.2	12.0	12.6	0.5	4%
4.5.3	12.8	12.9	0.0	0%
4.5.4	13.6	13.8	0.1	1%
4.5.5	11.1	11.6	0.5	5%

**4.5.1 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?** Fifty agencies (96 percent) implement a Web site to provide traveler impact information on projects to allow travelers to make effective travel plans. The average rating for this question decreased by 1 percent (from 13.2 to 13.1). One agency's rating decreased below the implementation threshold. Online information is becoming more sophisticated to include real-time delay updates, maps, and interactive features such as location-specific lane closure information. Many agencies have a Web site that provides information on various types of congestion, and supplement that with project specific Web sites for large projects. Agencies noted that one of the challenges with providing project specific information is the frequency in which they are able to update the information. One agency noted that they are exploring the potential for using social media sites (e.g., Facebook, Twitter) to provide updates to the traveling public.

**4.5.2 Does the agency sponsor National Work Zone Awareness week?** Forty-nine agencies (94 percent) sponsor National Work Zone Awareness week. After a decrease in average rating from 2010 to 2011, this question experienced a 4 percent increase in average rating from 2011 to 2012. Some agencies have no formal campaign but have activities that draw attention to work zone safety such as worker memorials, specific reviews of practices and procedures for construction and maintenance activities, and measures that will help drivers navigate the work zone (e.g. additional signing and technology for warning drivers). Three agencies noted a dedicated committee that organizes activities and sponsors events designed to raise awareness.

**4.5.3 Does the agency assume a proactive role in work zone educational efforts?** Fifty agencies (96 percent) are developing educational materials to inform the public on work zone safety. Most agencies that provided comments cited the use of educational efforts such as public service announcements, press releases, and brochures. One agency noted conducting work zone educational efforts targeted to drivers such as through a newly created section in the Department of Motor Vehicles Driver Education Manual. Two agencies noted partnerships with ATSSA for work zone educational efforts, while one agency noted teaming with their Department of Education to prepare a presentation for use in high school driver education courses in public high schools.

**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 Web site, newsletters, public meetings, radio, and other media outlets)?** This practice is implemented by all 52 agencies. As in 2011, this question has the highest rating of all questions in the WZ SA, with many agencies noting that it is a normal part of project delivery. The most frequently mentioned public information techniques used by agencies include publishing information on the agency's Web site and providing information to media outlets. Other techniques mentioned by agencies include highway advisory radio messages, press releases, public service announcements, radio, TV, newspaper ads, telephone hotlines, ITS (e.g., camera images on websites), 511, RSS

feeds, newsletters, and outreach to businesses. One agency noted that a project public information campaign reduced traffic during a closure by more than 50%.

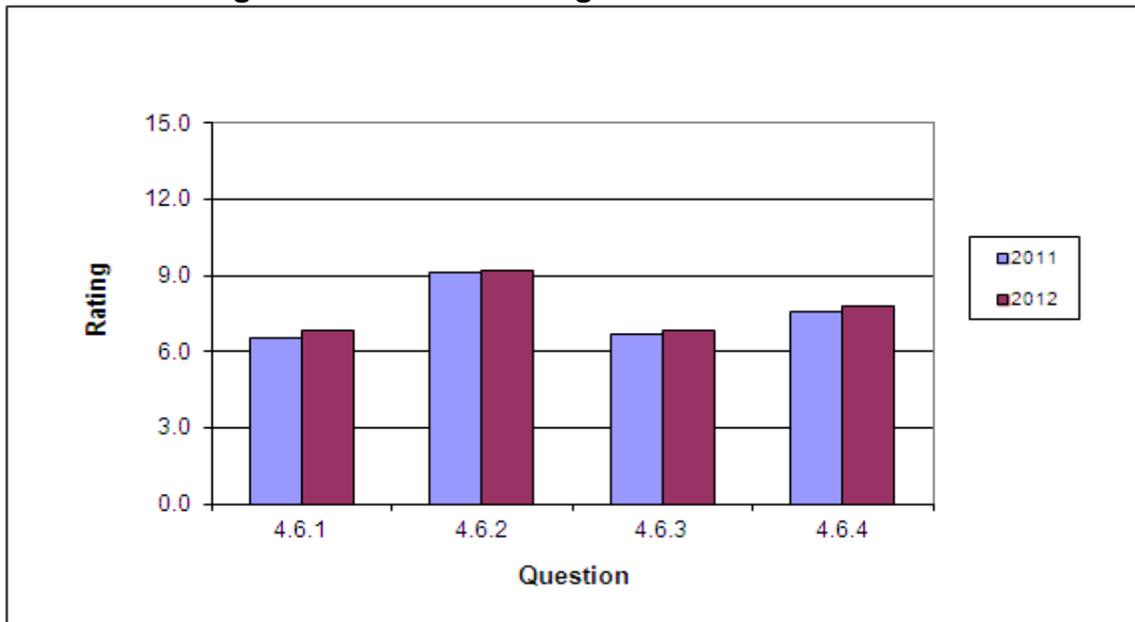
**4.5.5 During type I, II, and III projects, does the agency use ITS technologies to collect and disseminate information to motorists and agency personnel on work zone conditions?** Forty-nine agencies (94 percent) use ITS technologies to collect and disseminate work zone information. The average rating for this question increased by 5 percent (from 11.1 to 11.6) due to increases in ratings by 19 agencies. Several agencies provide real-time speed and delay information to motorists using ITS technology. Specific system applications cited by agencies include dynamic lane merge, 511, permanent message signs, and portable changeable message signs. One agency noted that ITS has not traditionally been included as a bid item in project documents, but is proposed as part of value engineering change proposals by contractors. The same agency is developing a specification for use of Automated Work Zone Information Systems on projects.

### **Program Evaluation**

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

Figure 7 shows the average rating by question for 2011 and 2012 for the Program Evaluation section. Table 8 shows the numeric ratings along with the percent change in average rating for each question. The average ratings increased for all of the questions in this section. This section remains the lowest rated in the WZ SA.

**Figure 7. Results for Program Evaluation Section**



**Table 8. Ratings for Program Evaluation Section**

Section	2011	2012	Change	Percent Change
4.6.1	6.6	6.9	0.3	4%
4.6.2	9.2	9.2	0.1	1%
4.6.3	6.7	6.9	0.2	3%
4.6.4	7.6	7.8	0.2	3%

**4.6.1 Does the agency collect data to track work zone congestion and delay performance in accordance with agency-established measures? (See section 4.1.4.)** Slightly more than half (28) of the responding agencies collect data to track work zone congestion and delay performance against agency measures. The average rating for this question increased by 4 percent to just below the implementation threshold where agencies, on average, would be using data to track work zone congestion and delay. This increase was due to increases in average ratings by 14 agencies. One agency noted that while they collect data, there are no established measures. Another agency noted the use of a Performance Measurement System to monitor the status of all lane closures on a daily basis, but did not identify the particular dissemination techniques used. Another agency has an ongoing research project to better understand work zone driving patterns and driver behavior, which may lead to future activity in performance measurement. One agency noted that they measure field conditions and compare conditions with an established 30 minute delay threshold. Another agency noted that they have purchased software to manage data from work zones with ITS devices and track total delay in hours. The same agency noted the potential for future travel time and speed data to develop a statewide congestion map.

**4.6.2 Does the agency collect data to track work zone safety performance in accordance with agency-established measures? (See section 4.1.5.)** Thirty-seven agencies (71 percent) are collecting data to track work zone safety performance. One agency reduced its rating on this question to below the implementation threshold. One agency noted nearing completion of a database that will assist with tracking and studying work zone crashes. Based on responses from several agencies, an issue continues to be identifying whether the crash or fatality was directly related to the work zone (i.e., would it have happened without the work zone in place). One agency noted that a challenge exists with providing resources for data collection and monitoring. Another agency noted that they use annual data on crashes, injuries, and fatalities to update work zone safety policies and SHSP strategies.

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

Twenty-seven agencies (50 percent) are using customer surveys to evaluate work zone performance, representing an increase of one agency. Customer surveys provide qualitative information for agencies to use in evaluating their work zone operations. Agencies that mentioned doing surveys indicated they were often specific to a project or an outreach campaign, or were part of a larger State or agency survey effort. Several agencies noted use of electronic resources such as Web sites to gather public input on programs and projects. One agency noted that it uses an email address to receive feedback from the public and users can submit feedback as part of an online form, while another agency noted they had a dedicated phone line. Other examples of feedback techniques include public forums – both formal public meetings and informal “coffee shop” meetings. Agencies did not specifically comment on the process for evaluating the feedback received and how it impacts policy and decisions.

**4.6.4 Does the agency develop strategies to improve work zone performance on the basis of work zone performance data and customer surveys?** Thirty agencies (58 percent) develop strategies to improve work zone performance based on work zone data and customer surveys. This represents a decrease of one agency implementing this practice compared with 2011. One agency noted updates to lane closure policies based on data and survey information to provide a proactive process. Another agency cited use of project specific efforts such as portable technology for speed monitoring to capture queue and delay information and develop criteria to define the limits of work zones and queues. One agency is considering development of a survey tool to gather data at rest areas. Another agency cited use of a congestion/safety team that mobilizes and visits a site, as needed, to evaluate issues and make recommendations to staff on how to alleviate them. One agency noted that project delays are monitored to ensure they do not exceed the thresholds established in the TMP.

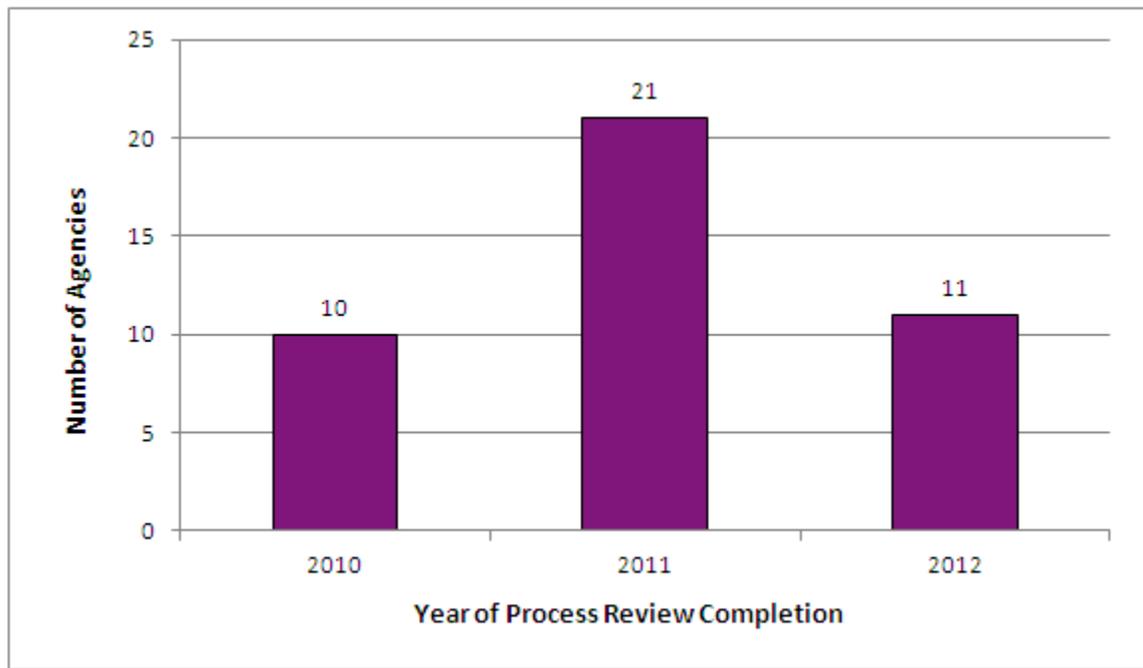
## 5. SUPPLEMENTAL QUESTION: WORK ZONE PROCESS REVIEWS

In order to gauge progress by agencies in performing the work zone process reviews required at least every 2 years by 23 CFR 630 Subpart J, the following two-part supplemental question was asked:

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

- Forty-three agencies (83 percent) responded that they have performed a comprehensive work zone process review in the last two years.
  - Figure 8 shows the distribution across years for when each process review took place. Of these 43 agencies, 11 responded that their most recent process review took place in 2012, while 21 responded that their most recent review took place in 2011. One agency left the year blank.
- Nine agencies (17 percent) responded that they have not performed a comprehensive work zone process review in the last two years.
  - Of these 9 agencies, 2 agencies noted that their last process review took place between 2007 and 2008, while 3 agencies noted that their last process review took place between 2009 and 2010. Four agencies left this question blank. FHWA is following up with these agencies that have not completed reviews in a timely manner.

**Figure 8. Agencies Performing Process Reviews in the Last 2 Years**



## 6. CONCLUSION

The results of the 2012 WZ SA show continued progress nationally toward implementation of the work zone best practices identified in the WZ SA. The 2012 WZ SA national average rating of 10.6 represents a three percent increase over the 2011 national average of 10.3. This increase is based on increases in average ratings for 43 agencies (83 percent). This increase continues a steady trend over the 10 years the WZ SA has been conducted.

In addition to the quantitative results, this report shares specific examples cited by various agencies in written comments they submitted to support their numeric ratings. FHWA encourages agencies to consider implementing some of these good practices from other agencies to enhance their own practices. FHWA continues to promote sound work zone management practices that can lead to reduced congestion and delay while improving safety in and around work zones. As a means of sharing these good examples further, FHWA will also review these examples for possible inclusion in future outreach and guidance documents.

## APPENDIX A: WZ SA SCORING AND PROJECT TYPES

Each assessment area contains a set of questions about a particular work zone related policy, strategy, process, or tool. For each question, respondents were asked to evaluate the extent to which a particular practice has been incorporated into an agency's way of doing business and select the most appropriate rating. Definitions for each of the rating levels are shown in Table A1.

**Table A1: WZ SA Rating/Scoring Scale**

Adoption Phase	Scoring Range	Description
Initiation	(0-3)	<ul style="list-style-type: none"> <li>Does agency management acknowledge the need for a particular item?</li> <li>Has exploratory research taken place to assess the benefits of this item?</li> <li>Does management support further development of this item's requirements?</li> </ul>
Development	(4-6)	<ul style="list-style-type: none"> <li>Has the agency developed a plan or approach to address the item's requirements? Has the agency started to investigate the feasibility of implementation?</li> <li>Does the agency have standards and guidance to enable the item's implementation?</li> <li>Does the agency have the approvals necessary for implementation?</li> <li>Are resources in place to support the adoption of this item?</li> </ul>
Execution	(7-9)	<ul style="list-style-type: none"> <li>Is the agency implementing/carrying out the requirements of this item?</li> <li>Has the agency allocated financial or staff resources necessary for the item's execution?</li> <li>Have appropriate personnel been trained to execute the item's requirements?</li> <li>Has a process owner been established?</li> </ul>
Assessment	(10-12)	<ul style="list-style-type: none"> <li>Has the agency assessed how well this item reduces work zone congestion and crashes?</li> <li>Has the agency assessed the process for carrying out this item?</li> <li>Has the agency implemented appropriate changes to the requirements of this item based on performance assessments?</li> </ul>
Integration	(13-15)	<ul style="list-style-type: none"> <li>Has the agency integrated the requirements of this item into quality improvement processes?</li> <li>Are the requirements of this item integrated into agency culture?</li> <li>Are the requirements of this item included as part of the employee performance rating system?</li> </ul>

Several questions in the WZ SA are based on the magnitude of impact that a project may have on a particular area. These project types (Types I through IV) are described in Table A2.

**Table A2. Project Types Used in the WZ SA**

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

**NOTE:** These levels may not encompass all possible combinations or degrees of work zone categories. Some terms are general to allow flexibility in categorizing borderline project types.