

A Quality Assurance Program For Work Zone Traffic Control  
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## ABSTRACT

This paper describes a quality assurance program developed and implemented by the NYSDOT to manage work zone traffic control on Department projects. Using a standardized process, a team of experienced engineers inspects a large sample of projects across the state each year. Standard rating forms are completed to describe the temporary traffic control observed on each project. “Emphasis points,” which describe recurring areas of concern, are evaluated on each project, and a quality rating is assigned using a standardized “1” to “5” scale to describe the overall condition and effectiveness of the project. Quality goals have been established both for average ratings for regional program areas, and for individual projects. Implementation of this quality assurance program over the past 14 years has led to a substantial improvement in the quality of work zone traffic control on New York State projects.

Key words:

work zone traffic control  
quality assurance

## A QUALITY ASSURANCE SYSTEM FOR WORK ZONE TRAFFIC CONTROL

### INTRODUCTION

The NYSDOT places a high priority on the safety of workers and the traveling public in the management of its capital construction and maintenance programs (1). Minimizing traffic congestion and adverse impacts on the local community, including environmental impacts, are also important considerations. To support these objectives, work zone traffic control (referred to as “maintenance and protection of traffic” or “M&PT”) is an integral element in the management of department programs. Work zone management is in turn comprised of several distinct elements. These include:

- establishment of overall goals and objectives
- development of standards and specifications
- provisions for project-specific traffic control plans
- providing staff training and development
- contractor/industry outreach
- maintaining an accident reporting and analysis system
- maintaining an ongoing traffic control quality assurance program

The Federal-Aid Policy Guide (2) describes these elements, including a recommendation to “--- annually review randomly selected projects throughout its jurisdiction for the purpose of assessing the effectiveness of its procedures.”

This paper describes the NYSDOT quality assurance program for work zone traffic control. This QA program is utilized for all temporary traffic control on DOT roadways and projects—construction, maintenance, and permits. However, the examples and sample data in this paper focus primarily on the construction program. The statewide work zone inspection program, as it is generally known, was initiated in the summer of 1987 in response to management concerns for the quality of temporary traffic control, and to comply with FHWA requirements. Over the ensuing years, the initial process has grown and evolved, and is now an integral part of work zone traffic control management.

The purpose of the program is to gather information to evaluate the overall quality and effectiveness of work zone traffic control throughout the Department, to identify areas where improvement is needed, and to facilitate open discussion of traffic control issues. It is not the purpose to manage individual projects, or to micro-manage program responsibilities assigned to the Department’s 11 Regional Offices. However, Regional staff are expected to use the inspection results to address and correct both project-specific and Region-wide issues. In those rare instances where hazardous situations are discovered during the course of an inspection, Regional staff are expected to initiate immediate corrections to the extent warranted, following the normal chain of command whenever possible.

### DESCRIPTION OF INSPECTION PROCEDURE

The work zone inspection procedure involves an on-site inspection of a sample of projects in each of the Department’s 11 regions. A standard procedure for the inspections, developed and refined over the years, is described in the sections that follow.

1. Inspection scheduling - the inspection is conducted statewide each year, during the peak construction season from June through October. This helps to ensure that adequate work is underway to provide an acceptable sample size, and that construction projects are fully active at the time of inspection. Each of the 11 Regions is scheduled separately, with a week set aside for each. For a few of the smallest Regions located in close proximity, it is occasionally possible to cover two Regions in one week. Typically, two inspection days are scheduled in each Region, one for construction projects and one for maintenance activities. Permit activities are covered each day as encountered. For Regions with very large programs, an extra half or full day may be added. In addition, time is allotted at night to conduct partial inspections of a limited number of sites to observe night performance of traffic control devices. If night work is active in the Region, time is also allotted for inspections when that work is active. In some cases, this results in the inspection team working split shifts. Following completion of each inspection, a debriefing meeting is held with Regional staff to provide a preliminary discussion of the results. Depending on the schedule, this meeting may be held late in the last day of inspections or the following morning. Time is also allowed for the Main Office team members to travel to and from each Region, varying from less than one hour to as much as five hours. A typical schedule involves the Main Office team leaving headquarters on Monday, conducting inspections through Wednesday or Thursday, and returning home at the end of the week after the debriefing is completed.

The schedule is arranged each year at the start of the season to ensure the availability of key staff in each Region. Adjustments are made if necessary to adjust to unforeseen circumstances such as unplanned unavailability of key participants, severe weather events, or other emergencies.

2. Sample size and selection - the inspection includes a number of projects in each Region. For construction, the sample typically includes at least 25 percent of the projects active at the time of the inspection. The goal is to inspect at least 10 projects, although the actual sample varies from as few as eight to nearly 20 in the largest regions. The construction sample is selected in advance by the Main Office team, based on several factors. Although this is not a truly random sample, team members are generally not familiar with project status and thus do not bias selection in favor of good or poor projects. Factors considered include geographic location to economize on travel time and distance, type of work, and contractor. The intention is to select a range of characteristics that provide a representative sample of work active at that time. Adjustments are made to the initial list to account for actual work status on individual projects. Projects with multiple work sites, such as bridge painting or minor safety improvements, are typically not included on the list because of uncertainties involved in work schedules. Instead, such projects are added as encountered in travel to other projects.

Maintenance work activities are typically not scheduled far in advance. Therefore, each Region compiles a list of maintenance work active on the day of the inspection. The inspection team then selects the sites to be inspected at the start of the day, with the goal of obtaining a representative sample that economizes on travel time and distance. The list typically includes larger work activities, with minor activities such as trash pickup or minor repairs added as encountered. Maintenance crews typically work eight-hour days or slightly longer. Combined with travel time from the maintenance facility to the sites, the window of opportunity for inspecting maintenance

activities is normally shorter than for construction. Sample sizes that can be inspected in a day are thus more limited, typically ranging from five to ten sites in each region.

Except for large projects, permit activities are not scheduled. Instead, these sites are inspected as encountered during the course of travel to the construction and maintenance sites. Regional samples range from two or three to as many as ten sites, and may encompass a full range of activities from minor utility repairs to full-scale construction.

3. Inspection team makeup - inspection teams typically consist of four to six members. Occasionally, a seventh member is added, although this results in overcrowding in the inspection vehicle. Main Office Construction Division and Traffic and Safety Division representatives form the nucleus of the team. These two members are selected from a small core group with extensive experience in work zone inspection, and thus ensure that the inspection procedures are followed consistently from Region to Region and year to year. A representative from the Federal Highway Administration Division Office with extensive work zone expertise joins the team for several inspections each year. This participation adds technical expertise, as well as providing an independent perspective to the procedure. A representative of the Transportation Maintenance Division participates in many of the inspections, at least for the maintenance projects. The Regions are assigned two or three representatives, depending on space available. The Regional Traffic and Safety groups coordinate work zone traffic control in the regions, and typically provide one team member. Other team members include regional construction, design, or maintenance groups, and the Regional Safety and Health Representatives. The final determination of Regional representatives varies with the program segment being inspected. Regional representatives also have extensive experience in work zone traffic control, either from a design or operational perspective. However, not all are familiar with the inspection process.

Early experience indicated that a four-member team was advantageous in terms of logistics, and in holding to one focused discussion during inspections. Additional members makes it more difficult to maintain one focused discussion, because of the additional members present, and because a larger vehicle is required. However, the larger team provides several advantages thought to outweigh the disadvantages. It permits broader participation in the process, and because more program areas can be involved, there is better buy-in into the process and the results. Additional members also provides more technical expertise and a broader range of experience. However, increasing team size beyond six or seven members would make it extremely difficult to maintain a single focused discussion.

4. Inspection process - Inspections consists of a drive-thru of each project with information and comments recorded on standard forms, and an overall quality rating assigned to each project. A standard form, shown in Figure 1, records descriptive information about the project and the temporary traffic controls observed. The form lists types of devices and safety features encountered, and condition or effectiveness. Features are listed in six broad categories; construction signing/advance warning, channelization, pavement markings, flagging, roadside safety, and miscellaneous traffic control. In addition to check-offs on the form, narrative comments are added to describe individual features observed. These typically include both points of concern and areas that need improvement, as well as features or treatments viewed as positive. Narrative comments are important to supplement and expand on standard points included on the form.

Based on experience gained over the years, a number of specific points have been identified that are especially problematic, and each region was directed to develop a plan to ensure that these points are adequately addressed on a regional basis. These points, referred to as “emphasis points,” are rated on each project as well. Emphasis points are listed and the rating explained in Subsection #5.

In 1999, NYSDOT implemented a number of work zone safety treatments specifically designed to reduce the risk of vehicle intrusions into work spaces occupied by workers (2). For the past two years, a separate rating form was added to rate the implementation of those treatments. For brevity, that form is not included in this paper.

Following completion of the inspection and entry of data and comments, an overall quality rating is assigned to each project. The rating definitions and process are described in Subsection #6.

The inspection consists of driving through the project in each direction, generally on each of the main approaches. In addition, one or more minor approaches, such as intersecting roadways or major driveways, are also examined. The inspection vehicle may stop from time to time to observe specific features in more detail, as traffic conditions and space permit. However, nearly all of observations are completed from inside the vehicle. Depending on the nature and complexity of the project, multiple trips through may be needed to obtain the needed details. On simple projects, on the other hand, a single drive-through in one direction often suffices. The objective is to obtain adequate information to characterize the project, while limiting time spent at each site so that a larger sample can be obtained. On projects with multiple work sites, one or more sites may be omitted. Because the focus of the program is on obtaining a representative sample for quality assurance purposes, rather than detailed project management, this is a reasonable compromise. In every case, the project description clearly indicates the portions of the project inspected if not inspected in its entirety.

5. Emphasis Points - Figure 2 lists 12 emphasis points evaluated on each project. This list has grown and evolved over the years, with new points added as needed, and others removed when scores indicate they are no longer a significant problem. The scoring of each point is based on simple definitions as follows;

- “ok” - no significant problems with the point were observed.
- “occasional problem” - while most observations were “ok”, minor concerns were noted in some cases, or more serious concerns for a few cases.
- “needs improvement” - minor deficiencies were widespread, or several serious deficiencies were noted.

Not every emphasis point is present on every project, and points not present are simply scored as “NA” to note that they were not present. Scoring for each point is based on team consensus, following discussion as needed. The emphasis point scoring form is shown in Figure 3.

6. Quality rating - the final step in the inspection process is assignment of an overall quality rating that defines traffic control effectiveness at the time of inspection. This rating is based on team consensus following adequate discussion. The six-point rating scale is shown in Figure 4. Ratings are assigned as whole points, with no fractional ratings used. Based on several years experience, the team is almost always able to reach unanimous agreement. When a significant difference cannot be

resolved, the majority rating is entered, and the minority rating is noted for discussion at the debriefing and for subsequent follow-up if appropriate.

The assigned rating represents a point sample of the project at the time of inspection. However, it is based on an assessment of how well the temporary traffic control serves all traffic conditions that can reasonably be expected. This means that traffic conditions at the time of inspection, as well as during peak traffic periods, are considered. Also considered are anticipated performance of traffic control devices and traffic control schemes during adverse conditions such as darkness and rainfall. Based on experience of the inspection team, and some inspections actually conducted under adverse conditions, combined with knowledge of the range of traffic conditions likely to occur on the project, it is reasonable to extend the inspection to assess the overall effectiveness of the traffic control. However, it is also recognized that traffic control on individual projects varies from day to day, and even within the day. The quality rating assigned is thus a point sample that may or may not be representative of the project at other times. Because a large sample is obtained, and is generally selected without prior knowledge of project conditions, the overall sample is thought to be representative of statewide conditions.

Several factors influence traffic control effectiveness on a project. These include effectiveness of implementation by the contractor or maintenance crew, oversight by the project inspection staff, design quality and overall approach of the traffic control plan, and Department specifications and standards reflected in the traffic control plan. While a rating may be influenced by the actions of the project engineer or designer, it is not intended as a report card on an individual's performance.

Ratings also consider the complexity and difficulty of traffic control on the project, with the rating reflecting overall effectiveness. On large, complex projects, some noncritical deficiencies can be encountered without lowering the rating as long as the overall effectiveness is not significantly affected. For example, a few signs or channelizing devices in less than optimum condition would not lower the rating on a large project. On small or simple projects, where only a few traffic control devices are needed, even a few relatively minor deficiencies have a greater relative effect, and thus may affect the overall rating. The nature of individual deficiencies is also considered in determining the overall rating. Minor flaws or deterioration on individual devices, and minor technical flaws in devices or their application, usually have little effect on the overall rating, as long as they can be corrected by minor adjustments or fine tuning. On the other hand, deficiencies that may induce a driver to make a serious error, or that increase the severity of a driver mistake or an accident, have a pronounced effect on the rating. Although the ratings are based on specific definitions, they are none-the-less subjective ratings. It is therefore important that the inspection team is thoroughly familiar with the rating system, and that as much continuity as possible is provided within the team from region to region and from year to year.

7. Inspection logistics - inspections are typically carried out using a minivan capable of carrying six or seven passengers. The vehicle is obtained either from the agency fleet or as a commercial rental. Because the inspection team works long days and travels long distances, it is important that the vehicle is in good condition and as comfortable as possible. Air conditioning is essential, because traveling with open windows in warm weather would make it impossible to carry on discussions and to complete the necessary paper work in the moving vehicle. Use of a minivan

or passenger car for the inspections is preferable to use of larger passenger vans, sport-utility vehicles, or similar vehicles, because the smaller vehicle presents the same view of the work zone as experienced by most drivers. Use of a larger vehicle may enhance visibility of devices and roadway conditions, thus creating a more favorable impression of the work zone.

The inspection vehicle is equipped with a rooftop warning light to provide enhanced visibility, because frequent speed changes, stops, and turns are necessary during the inspection. To minimize unnecessary turns and added travel, it is essential that one or more team members are generally familiar with the project location and traffic patterns. Adequate maps to facilitate travel between projects are also helpful.

In addition to the inspection forms, basic reference documents are carried in the vehicle. These include the Standard Specifications, MUTCD, and various Department standards and procedures. Project plans are rarely carried during inspections, but if specific questions come up regarding traffic control plan design, plans may be reviewed at the regional office. Team members are equipped with hard hats and high-visibility apparel, although out-of -vehicle inspections are rarely necessary.

8. Inspection follow-up - Immediately following each regional inspection, a debriefing meeting is held to review results with regional staff. Copies of the inspection forms are typically transmitted to the regions one to two weeks after the inspection to allow time to correct any errors in the form and clarify comments as necessary. While the completed forms are not available to the regions for several days, regional participants are expected to make adequate notes during inspections to permit timely follow-up with project staff on points requiring field changes. On rare occasions, if critical deficiencies are noted during an inspection, project staff are notified at once, either by cellular phone, or in person, so that corrective action can be initiated. Regardless of the project outcome, regional team members are expected to notify project staff of the project results as soon as practical.

Because of the tight schedule necessitated by the process, and the difficulty of locating project staff on the site of large projects, direct contact with project staff during inspections is rare. However, when time and conditions permit, brief stops are occasionally made to discuss results with project staff, especially when positive results are noted.

Following completion of each annual inspection, three separate reports are prepared. The first provides an overall summary of the statewide inspection, including all construction, maintenance, and permit work. This report is submitted to the FHWA in fulfillment of requirements for the federal-aid highway program. It summarizes quality ratings, and provides a detailed overview of specific strengths and weaknesses. Two other reports are prepared, one each for the construction and maintenance program areas. Quality ratings and emphasis point scores are tabulated program-wide, and for each region individually. Results are compared to past years to permit tracking of program progress. In addition to statewide assessments of strengths and weaknesses, similar assessments are made for each program area in each region.

Results of the annual inspections form the basis for identifying needed changes and improvements to ensure continuous improvement in program results. Regional staff are expected to make changes



as appropriate in the regional design process and in maintenance procedures, as well as in individual project management. The results may also indicate the need to conduct training or strengthen staffing assignments. Main office program staff use the results to identify and support needed improvements in standards, specifications, and procedures, as well as other program needs. Results are also used to provide executive management an overview of progress in meeting Department goals and objectives for work zone traffic control.

## PROGRAM RESULTS

1. Review of Program Results - Table 1 summarizes statewide construction project results from 1991 through 1999. Statewide average quality rating and sample sizes are noted, along with percentage of projects rated at specific quality levels. The column labeled "percent ok" includes projects rated "3" or higher, which are projects that are at least generally acceptable. This is regarded as the minimum acceptable level. The column labeled "percent good/excellent" includes projects rated "4" or "5", which have no worse than limited minor deficiencies.

Although the inspection program was implemented in 1987, the quality rating system described in this paper was not developed until 1991. Results summarized in Table 1 show that quality of temporary traffic control on construction projects, as measured by the quality rating system, increased markedly over the first few years the system was used, both in terms of average ratings, and in terms of fewer projects with very low scores. Over the past several years, average ratings have stabilized around 4.3 to 4.4, and the percent of projects rated "4" or "5" has stabilized near 85 percent. It is also important to note that projects rated less than "3", or less than generally acceptable, has continued to decline slightly, and now comprise only about two percent of the projects inspected.

These results confirm a widely held perception among Department staff and management that quality of work zone traffic control has increased markedly on construction projects since the inception of the inspection program. Most important, the numerical results provide an objective comparison of program results over time.

Table 2 provides an 8-year summary of statewide results for two emphasis points. The first point, "channelizing devices," concerns condition and proper use of channelizing devices, including cones, drums, vertical panels, and barricades. Based on continued improvements over the past several years, this emphasis point was deleted from the inspection process in 2000, and replaced with a new emphasis point that had become a concern. While not every concern relating to channelizing devices has been totally eliminated, significant problems needing attention were rare over the last two years. The emphasis point for flagger warning signs also shows significant improvement since 1992, but this concern has not yet been addressed to the extent desirable. It will therefore continue as an emphasis point until associated problems are further reduced.

Several other emphasis points have shown similar improvements. Considering all emphasis points combined, average scores have improved from 70.9 percent "ok", with 13.3 percent "needs improvement" in 1992 to 76.5 percent "ok" and only 7.5 percent "needs improvement" in 1999.

Considering that several new emphasis points with significant problems were added during that period, this clearly demonstrates a measurable improvement in these specific areas.

2. Establishment of Program Goals - Once sufficient data was compiled from annual inspections, it became possible to establish performance goals for work zone traffic control on Department projects. In 1997, the Department established a goal requiring each region to attain an average quality rating of 4.0 in each program area (construction, maintenance, and permits), with no individual projects rated below “3”. In 1997, all but one region reached the goal of 4.0 for construction, with only six construction projects below “3”. In 1998, two regions were below 4.0 for construction, but only three projects were below “3”. In 1999, for the first time, all 11 regions attained the 4.0 goal, and again, only three projects were below “3”. Performance on maintenance and permit projects has not been as high as on construction projects, but noticeable progress has been made toward achieving performance goals, especially on maintenance projects. In 1999, the statewide average for maintenance was 3.97, and 88 percent of individual projects were rated “3” or higher.

Department management supports the concept of program-directed quality assurance in general, and has “bought-in” to the benefits of the work zone quality control process. By establishing specific program goals, and tracking progress in meeting them, Department managers are better able to manage program resources to ensure high quality temporary traffic control in all work zones. Combined with information from inspection program results identifying specific strengths and weaknesses, resources can be directed to resolve specific concerns needed to improve performance. The following section lists several examples of traffic control program improvements that are attributable at least in part to concerns identified and tracked through the inspection program.

3. Traffic Control Enhancements - Over the past decade, NYSDOT has implemented widespread improvements in work zone traffic control. These include enhanced specifications, implementation of new technology, new design procedures, MUTCD improvements, and stricter compliance with existing requirements and basic principles. Several examples that were identified through or supported by the work zone inspection program include:

- Improved temporary traffic barriers - temporary concrete barrier receives added attention to ensure that it meets warrants, and that installations are properly designed to protect the hazard. Special emphasis is directed to protecting barrier ends.
- Improved flagging - inspection results have supported the Department change from signal flags to STOP/SLOW paddles, and have also focused attention on improved flagging techniques, better setups for flagger stations, and elimination of FLAGGER warning signs when flaggers are not present.
- Reduction of signing conflicts - an early concern identified by the inspections is the conflict caused by the close proximity of multiple temporary signs, warning drivers of different conditions in the same general area, and in some cases, providing conflicting information in terms of advisory speed or distance to the condition. Attention focused through several emphasis points, and discussed in the annual

summary reports and other correspondence, has achieved substantial improvements for this concern.

- Pedestrian and bicycle accommodations - inspection results over several years indicated that pedestrians and bicyclists are not always adequately accommodated in work zones, placing them at greater risk than they would otherwise face, or making it difficult for them to reach their destination. In 2000, a new emphasis point was added to address this issue, and the Department is developing design and construction guidelines to ensure safe, convenient accommodations for pedestrians and bicyclists in all Department work zones.
- Traffic control device condition guidelines - in cooperation with ATSSA, condition guidelines were developed for traffic control devices to guide project staff and contractors in determining when devices are in acceptable condition. New York's guidelines are based on those originally developed by ATSSA, modified to reflect actual experience on New York projects, as well as NYSDOT specifications and other requirements.
- Interaction between Main Office and Regional staff - a primary benefit of the inspection program has been increased interaction and communication between Department staff in the Main Office, where standards and specifications are developed, and the Regional offices, who have responsibility for project design and construction. Time spent together inspecting and evaluating projects in the field has led to a clearer understanding of issues that need to be addressed and the most appropriate means to provide high quality temporary traffic control in a cost-effective manner. Regional participants in the inspection have been successful in distributing knowledge gained through the inspection process to staff throughout the regions who design projects and supervise their construction. At the same time, Main Office staff have gained a clearer understanding of issues that need to be addressed in the specifications and standards.

## SUMMARY

NYSDOT has developed a quality assurance program to manage the quality of temporary traffic control in construction, maintenance, and permit work zones. This program consists of an annual statewide work zone inspection which evaluates a large sample of projects each year. In addition to the inspection itself, specific follow-up and reporting steps are built into the program. A formal inspection format has been developed to ensure consistent results. Inspections are performed by a team of four to seven members representing both the Main Office and the Regional Office where the work is located. Team members have extensive experience in work zone traffic control and with the inspection process, which helps to ensure consistency of results. Standard inspection forms are completed for each project describing condition and application of the work zone traffic control devices, and the traffic control schemes used. In addition, 12 "emphasis points," which describe recurring areas of concern, are scored. Each project is assigned a quality rating at the completion of

the inspection, based on a scale of “1” to “5”, which describes the overall effectiveness of the temporary traffic control in addressing actual project conditions.

A debriefing meeting is held in each region following completion of the inspection. At the end of the statewide inspection, a series of annual reports is prepared describing results for each program area and for each region, as well as an overall statewide summary. Quality goals have been established for regional averages for each program area, as well as for individual projects. The construction program in each region now routinely meets the average quality goal, and about 98 percent of the construction projects also meet the quality goal for individual projects. While quality levels are not as high for maintenance and permit projects, these program areas continue to improve, and maintenance projects are close to meeting the established quality goals.

In addition to tracking overall quality of work zone traffic control on a statewide, regional, and program basis, results of the quality assurance program are used to identify strengths and weaknesses in the work zone program. Over the past 10 years, a number of improvements in traffic control procedures have been developed and implemented, based in large parts on issues identified through the inspection program. A major benefit of the program has been improved discussion and communication between Department staff involved in various phases of work zone traffic control, leading to more effective standards and specifications, improved designs, and better implementation in the field.

This work zone quality assurance process has been very successful in improving the quality of temporary traffic control in New York work zones, and has led to numerous improvements in the overall temporary traffic control program on Department projects.

## REFERENCES

1. Andrew and Bryden - "Managing Construction Safety and Health - Experience of New York State Department of Transportation", Transportation Research Record 1585 - 1997.
2. Federal Highway Administration Federal-Aid Policy Guide December 9, 1991, Transmittal 1. Subchapter G, Part 630, Subpart J - "Traffic Safety in Highway and Street Work Zones".
3. NYSDOT Engineering Directive 99-002, May 1999 - Work Zone Intrusion Countermeasures.

## FIGURES AND TABLES

Figure 1 - Work Zone Inspection Forms

Figure 2 - Emphasis Points

Figure 3 - Emphasis Point Rating Form

Figure 4 - Quality Rating Definitions

Table 1 - Summary of Annual Inspection Effectiveness Scores on Construction Projects

Table 2 - Annual Summary - Typical Emphasis Point Scores

**FIGURE 1 Work Zone Inspection Forms**

**WORK ZONE TRAFFIC CONTROL INSPECTION FORM**

Project No. D \_\_\_\_\_ PIN \_\_\_\_\_ Region \_\_\_\_\_ Date \_\_\_\_\_ Fed Aid? \_\_\_\_\_

Location \_\_\_\_\_

Weather/Lighting Conditions \_\_\_\_\_ Project Type: \_\_\_\_\_

**CONSTRUCTION SIGNING/ADVANCE WARNING**

Quantity of Signs:	Good	_____	Sign Condition:			
Too many		_____		Good	Fair	Poor
Missing sign series		_____	Rigid sign	_____	_____	_____
Missing specific sign		_____	Flexible sign	_____	_____	_____
Credibility of Text:	Good	_____	Reflectivity	_____	_____	_____
Misleading sign text		_____	Arrowboard Use:	_____	_____	_____
Unneeded signs visible		_____	Placement	_____	_____	_____
Countdown but no work		_____	Performance	_____	_____	_____
Sign Placement:	Good	_____	Non-standard signs:			
Too low		_____	Text	_____		
Not readily visible		_____	Color	_____		
Poor sign spacing		_____	Shape	_____		
Overall Advance Warning:	Excellent	_____	Adequate	_____	Inadequate	_____
Comments:						

**CHANNELIZATION**

Devices Used/Condition:						
	Good	Fair	Poor			
Barricades	_____	_____	_____	Unsafe ballasting	_____	
Drums	_____	_____	_____	Unsafe battery mount	_____	
Cones	_____	_____	_____	Inadequate spacing	_____	
Vertical panels	_____	_____	_____	Inadequate taper length	_____	
Tubular markers	_____	_____	_____	More devices needed	_____	
Warning lights	_____	_____	_____	Non-standard device	_____	
Overall Channelization:	Excellent	_____	Adequate	_____	Inadequate	_____
Comments:						

**PAVEMENT MARKINGS**

No markings	_____	Confusing markings	_____			
Condition:	Good	Obscured		Faded	Damaged/Dislodged	
Paint or Tape	_____	_____		_____	_____	
Raised Markers	_____	_____		_____	_____	
Overall Markings:	Excellent	_____	Adequate	_____	Inadequate	_____

Comments:

## FLAGGING

Number/Effectiveness of Flaggers:

Effective \_\_\_\_\_

Ineffective \_\_\_\_\_

Poor coordination \_\_\_\_\_

Not enough flaggers \_\_\_\_\_

Flagger Signs: Good \_\_\_\_\_

Too close \_\_\_\_\_

Too far \_\_\_\_\_

No flagger \_\_\_\_\_

No sign \_\_\_\_\_

Flagging Technique

Good \_\_\_\_\_

Fair \_\_\_\_\_

Poor \_\_\_\_\_

Signal Device:

Flags \_\_\_\_\_

Paddles \_\_\_\_\_

Flagger Attire:

No hard hat \_\_\_\_\_

No vest \_\_\_\_\_

Overall Flagging: Excellent \_\_\_\_\_

Adequate \_\_\_\_\_

Inadequate \_\_\_\_\_

Comments:

## ROADSIDE SAFETY

Type of Barrier: Concrete \_\_\_\_\_ Timber Curb \_\_\_\_\_ Guiderail \_\_\_\_\_ Other \_\_\_\_\_

Barrier Condition: Good \_\_\_\_\_ Fair \_\_\_\_\_ Poor \_\_\_\_\_

Flared end treatment needed \_\_\_\_\_ Impact attenuator needed \_\_\_\_\_

Barrier Delineation:

Lights: Good \_\_\_\_\_ Fair \_\_\_\_\_ Not working \_\_\_\_\_

Reflectors: Good \_\_\_\_\_ Fair \_\_\_\_\_ Poor \_\_\_\_\_ Too small \_\_\_\_\_

Inadequate drop-off delineation \_\_\_\_\_

Inadequate clear zone \_\_\_\_\_

Overall roadside safety: Excellent \_\_\_\_\_

Adequate \_\_\_\_\_

Inadequate \_\_\_\_\_

Comments:

## MISCELLANEOUS TRAFFIC CONTROL

Unprotected operations or equipment in roadway \_\_\_\_\_

Poor temporary traffic signal operation/installation \_\_\_\_\_

Original signs/delineation in poor condition \_\_\_\_\_

Speed limit: \_\_\_\_\_ mph Too low \_\_\_\_\_ Appropriate \_\_\_\_\_

Pedestrian Safety:

Inadequate travel path \_\_\_\_\_ Inadequate protection from hazards \_\_\_\_\_

Access Control: Good \_\_\_\_\_ Fair \_\_\_\_\_ Poor \_\_\_\_\_

Overall Misc. Traffic Control: Excellent \_\_\_\_\_ Adequate \_\_\_\_\_ Inadequate \_\_\_\_\_

Comments:

**OVERALL RATING** \_\_\_\_\_

## FIGURE 2 Emphasis Points

### M&PT EMPHASIS POINTS (Revised 5/00)

1. Sign Condition - All are expected to be in good condition. Faded and deteriorated panels and non-standard legends are not acceptable. All signs should look like they appear in the MUTCD.
2. Unneeded Signs - are to be fully covered, removed, or otherwise completely eliminated from the driver's view.
3. No Low-Mounted Signs - should be permitted, except for flexible panels meeting the current specification requirements.
4. Countdown Signs - Overlapping, conflicting, and unneeded countdown signs are not to be permitted.
5. Flagger Signs - are to be used only when a flagger is actually present and visible to the motorist. They must be covered or removed at all other times.
6. Sign Visibility - All signs should be placed at locations that provide good visibility. Signs hidden by foliage, roadway geometry, or other signs are a waste of money, and they may result in a safety problem if an important message is missed.
7. Accommodation of Pedestrian and Bicycle Traffic - A reasonably smooth, continuous, safe and convenient travel way appropriate for anticipated bicycle and pedestrian demand shall be maintained at all times.
8. Merge Taper Lengths - Should meet minimum requirements in MUTCD Table 262-2. Location of tapers should provide optimal visibility to approaching motorists.
9. Flagging Procedures - are to follow the MUTCD and EI 93-022. Stop/Slow paddles are to be used where appropriate. Flaggers must be positioned to provide adequate visibility, and to enhance the safety of the flaggers.
10. Temporary Concrete Barrier - must adhere to Department guidelines in HDM 10.4.1. Barrier ends must be flared at least 12 ft. away from the pavement on high-speed roads, or protected by crash cushions. Precede barrier-flares with channelizing devices and buffer spaces. Barrier runs must be designed to fully protect the hazard.
11. Pavement Bumps - A reasonably smooth riding surface is to be maintained. Transverse pavement joints and paving rebates must be treated with temporary shims (60:1 taper). "BUMP" warning signs must be posted upstream, and a channelizing device or object marker at the bump.
12. Temporary Sign Supports - All temporary supports not protected by guiderail must meet the requirements of §619-3.02 of the Standard Specifications. Type A metal supports must meet §730-24 and Materials Details. Stub heights must not exceed 100 mm.



**FIGURE 3 Emphasis Point Rating Form**

**REGIONAL ACTION PLAN CHECKLIST  
EMPHASIS POINTS**

Project No. D \_\_\_\_\_ Region \_\_\_\_\_ Date \_\_\_\_\_

Location \_\_\_\_\_

	OK	Occasional Problem	Needs Improvement
1. Sign Condition	_____	_____	_____
2. Unneeded Signs inactivated	_____	_____	_____
3. Sign Height	_____	_____	_____
4. Countdown Series	_____	_____	_____
5. Flagger Sign Credibility	_____	_____	_____
6. Sign Location	_____	_____	_____
7. Pedestrian & Bike Control	_____	_____	_____
8. Merge Taper Lengths	_____	_____	_____
9. Flagging Procedure	_____	_____	_____
10. Temporary Concrete Barrier	_____	_____	_____
11. Pavement Bumps	_____	_____	_____
12. Temporary Sign Supports	_____	_____	_____

**FIGURE 4 Quality Rating Definitions**

**M&PT QUALITY RATING SYSTEM**

- 5      Excellent design and implementation of M&PT. Controls provide adequate driver guidance for virtually all situations. No significant deficiencies encountered, and comments were limited to fine-tuning or other minor adjustment. All TCDs are in good condition, appropriate for the actual situation, and properly placed.
- 4      Good design and implementation of M&PT. Controls provide adequate driver input for most situations likely to be encountered. Some minor deficiencies may be present, such as less than optimum choice, condition or placement of individual device.
- 3      Design and implementation of M&PT is generally acceptable. There may be a number of specific points that can be improved or refined, and occasional points that may be only marginally effective.
- 2      Design and implementation of M&PT is only marginally effective. Many specific points need refinement or adjustment, or a number of individual points are marginally effective. Although drivers familiar with the work zone can be expected to traverse it safely, unfamiliar drivers may experience difficulty, especially during adverse conditions, such as heavy traffic, rain, or darkness.
- 1      Although some traffic controls have been provided, they are not adequate to provide guidance through the work zone. Drivers familiar with the site may not experience difficulty during favorable conditions, but unfamiliar drivers will probably have problems in traversing the site during all conditions, and even familiar drivers during adverse conditions.
- 0      Other than occasional signs or other devices which are not coordinated or effective, no traffic control is provided, and motorists are left on their own to traverse the work zone. Guidance provided to drivers may be misleading such that drivers are directed to make inappropriate or dangerous responses.

**TABLE 1      Summary of Annual Inspection Effectiveness Scores on Construction Projects**

<b>Year</b>	<b>Statewide Average</b>	<b>% OK</b>	<b>% Good/Exc.</b>	<b>N</b>
1991	3.65	88.7	61.7	141
1992	4.05	96.5	70.9	141
1993	4.12	94.5	75.8	165
1994	4.28	96.3	81.5	162
1995	4.28	94.2	84.1	138
1996	4.40	97.3	85.6	146
1997	4.34	96.0	83.9	149
1998	4.26	97.9	80.6	144
1999	4.35	97.7	83.5	133

OK                      - Rating of 3 or Higher  
Good/Excellent   - Rating of 4 or Higher

**TABLE 2      Annual Summary - Typical Emphasis Point Scores**

<b>Channelizing Devices</b>			
<b>Year</b>	<b>% OK</b>	<b>Occ. Prob.</b>	<b>% Needs Improvement</b>
92	72.7	18.9	8.3
93	73.6	14.5	12.0
94	83.7	12.0	4.4
95	89.1	7.2	3.6
96	83.5	13.1	3.5
97	79.7	16.2	4.0
98	83.0	14.8	2.2
99	85.0	12.7	2.4
<b>FLAGGER WARNING SIGNS</b>			
92	51.1	10.6	38.3
93	55.9	16.2	28.0
94	68.1	12.8	19.2
95	69.8	9.4	20.8
96	65.3	10.2	24.5
97	70.6	17.7	11.8
98	77.8	8.9	13.3
99	83.3	8.3	8.3