



Maintenance of Traffic Plans

An Online Continuing Education Course for Engineers

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Credit: 3 Hours / 3 PDH / 3 CPD

Maintenance of Traffic Plans

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I. Introduction

Work zone traffic control is an important function that affects the safety of motorists, pedestrians, and work zone personnel. Every effort should be made to eliminate or reduce accidents within work zones. In addition to safety, the potential delay to the public—caused by traffic interruptions during construction—is another issue that needs to be addressed.

There are Federal Highway Administration (FHWA) rules that state that all department employees, contractors, consultants, and utility company personnel who are responsible for the design, inspection, and implementation of work zone traffic control must be trained in a department-approved course. In addition, personnel working on department projects or within the State Highway right-of-way are also to be trained.

The Federal Highway Program Manual (FHPM) requirements include:

1. Detailed Maintenance of Traffic Plans for each construction/maintenance project
2. A responsible person assigned during construction to ensure that work zone safety is properly administered
3. Individual pay items for work zone devices
4. Training for everyone responsible for the design, implementation, or inspection of traffic control
5. Annual process reviews

The objectives include:

- Utilize and/or modify typical layouts in the development of traffic control plans to specific site conditions.
- Identify the components of a quality traffic control plan and be aware of the general procedures.
- Recognize the importance of workable traffic control plans in the context of the entire project.
- Identify relevant fundamental and human factor principles in the design of traffic control plans.
- Identify and apply workable concepts and techniques for designing, installing, and maintaining controls in work zone situations.
- Utilize work zone traffic control devices as specified in the FDOT Standard Indexes in

appropriate situations.

- Recognize and apply proper procedures in developing quantities for work zone traffic control items.

II. Work Zone Maintenance of Traffic

A. Fundamental Principles of Work Zone Traffic Control

It is important for the engineer to understand these requirements and principles prior to developing a set of traffic control plans. Chapter 6 of the MUTCD provides the fundamental principles of work zone traffic control as follows:

1. Make traffic safety an integral and high priority element of every project.
 - Use geometrics and traffic control devices that are, as nearly as possible, comparable to those of normal highway situations
 - Prepare a traffic control plan that is understood by all persons responsible for work zone traffic control
2. Avoid inhibiting traffic as much as possible.
 - Avoid reduced speed zoning except where necessary
 - Avoid frequent and abrupt changes in geometrics
 - Provide for the safe operation of work vehicles
 - Minimize work time to reduce exposure
 - Schedule work during off-peak periods
3. Guide motorists in a clear and positive way.
 - Use adequate warning, delineation, and channelization to give positive guidelines for all light and weather conditions expected during the work activity
 - Remove inappropriate pavement markings
 - Use flagging only when other methods of traffic control are inadequate
4. Perform routine inspection of traffic control elements.
 - Assign the responsibility for safety at worksites to individuals trained in safe traffic controls
 - Make modifications in traffic controls or working conditions when necessary
 - Monitor worksite under varying conditions of traffic volume, light, and weather
 - Perform engineering analyses of all accidents in work zones

- Periodically analyze work zone accident records to guide officials in improving work zone operations
 - Remove traffic control devices immediately when they are no longer needed
5. Give constant attention to roadside safety.
- Provide clear roadside recovery area as wide as practical
 - Use lightweight channelization devices, which will yield on impact
 - Provide positive barriers
 - Store construction equipment, materials, and debris out of the clear zone in a manner that will minimize the opportunity for run-off-road vehicle impacts

B. Requirements for Maintenance of Traffic Devices

The MUTCD also sets forth the basic principles for the use of maintenance of traffic devices. The principles, which govern the use of regular traffic control devices also apply to work zone devices. Section 1A-2 of the MUTCD states, “To be effective, a traffic control device should meet five basic requirements:”

- Fulfill a need
- Command attention
- Convey a clear and simple meaning
- Command respect of road users
- Give adequate time for proper response

In addition, traffic controls in work zones are to

- Warn motorists and pedestrians of hazards
- Advise motorists of the proper travel path through the area
- Delineate areas where traffic should not operate
- Separate and protect motorists, pedestrians, and the workforce

C. Human Factor Principles for Work Zones

A Prior Knowledge

This is the sum of knowledge and information that the driver brings into the driving task. It includes the driver’s driving experience and knowledge of rules, regulations, language, symbols, and codes.

Any engineer responsible for work zone traffic control should carefully assess their assumptions of a driver’s prior knowledge. Engineers should cater to drivers *not familiar* with the work zone in question.

Expectancy

Expectancy is the anticipation of the occurrence or nonoccurrence of events and situations. It is formulated as a function of a driver's experience and a priori knowledge.

Events or situations that violate driver expectancies can lead to confusion and should be remedied by a proper warning. Work zones are prime violators of expectancies.

Decisions

The formation of a course of action on the part of the driver, based on information received, is called a decision. Because work zones violate driver expectancies, the designers must help drivers make decisions when traveling through the work zones. Proper TCP design minimizes the rate at which decisions must be made and keeps decisions as simple as possible.

Warning

This is a means of displaying information to the driver about events and situations prior to their occurrence. A proper warning is essential to all work zones. Sequential warnings should begin with the general warning signs and become progressively more specific.

Ambiguity

Ambiguity is the term used to describe information that is unclear, creates uncertainty, or has more than one meaning. Ambiguity leads to confusion.

General messages such as "DANGER AHEAD" or "ROAD WORK 1 MILE" are ambiguous if they stand alone. They must be followed by more specific warnings that tell the driver what to do. Negative information that tells the driver what *not* to do can also be ambiguous.

Improper delineation or roadway geometrics can also be ambiguous and lead to path confusion (e.g., improper or incomplete removal of old pavement markings; improper placement of cones, drums, or barricades).

Redundancy

This is accomplished by presenting the same message in two or more different ways. Doing this reduces the probability of error and ambiguity and enhances detectability (e.g., signs and markings that carry the same message; use of both symbols and verbal messages on a sign).

Repetition

This is a technique whereby important information is displayed in several successive locations for emphasis and to ensure that it is not missed. Repetition is a means of accomplishing redundancy.

III. Components of Maintenance of Traffic Plans

The components of maintenance of traffic plans apply to the mainline roadway, crossroads, side streets, and off-ramps. The components are as follow:

1. A typical section for each work zone phase should be provided for all projects except milling and resurfacing or simple intersection improvements. The typical section should include land widths, offsets to warning devices or barriers, the construction area, and any other pertinent items. A good typical section is one of the most effective tools in preparing quality traffic control plans.
2. The location of all warning signs should be identified. The designer should consider the location of existing signs when establishing the best location for the work zone signs. If there are no other signs near the beginning of the project, then exact stations may not be necessary.
3. Temporary pavement markings (including Raised Pavement Markers—RPMs) for diversions, transitions, or other special situations should be shown or noted in the plans. Often, traffic is shifted through an intersection. In most cases, it would be necessary to provide temporary guide stripes and/or RPMs to delineate this shift. Intersections are critical areas that are often overlooked.
4. The location of temporary barrier and crash cushions should be shown or noted in the plans, as these costs must be specified to obtain competitive bids.
5. The need for temporary drainage devices must be addressed in the Maintenance of Traffic Plan. Stage construction (or reconstruction) of drainage systems often results in the need for temporary measures to properly channel stormwater during construction. The designer must provide for these needs, including the proposed method payment for the temporary drainage devices. Each phase of construction should be looked at as the drainage for its own individual project.
6. Channelizing devices should be shown at special locations such as detours, transitions, gore areas, or other unusual maneuvers.
7. Variable Message Signs (VMS), Arrow Boards, and Temporary Signals are *costly* items. Therefore, the locations of these devices should be shown or noted in the plans. The engineer must establish the appropriate location based on sight distance restriction, warning needs, potential conflicts with other signs (existing or proposed), and other considerations of this nature.

8. VMS messages must be developed by the designer with input from construction. It is important that the VMS messages be *clear* and *concise*, conveying a simple message to the motorist. The message design must not be left up to the contractor or project personnel.
9. When there are existing traffic signals, timing, phasing, and actuation may need to be revised during the various construction activities. These items should be addressed in the plans in order to maximize traffic operations during construction.
10. The designer must show the location and geometry for all transitions and detours. This would include taper rates for transitions and curve radii, Point of Tangent (P.T.), Point of Curvature (P.C.), etc., for detours.
11. The proposed regulatory speed must be shown in the plans for each phase of work. Even if the speed is to remain the same as the current posted speed, the designer must still note this in the plans.
12. The designer should reference the appropriate standard indexed whenever they are applicable. It may be necessary at times to modify the standard indexes to more accurately reflect the actual project conditions.
13. The appropriate quantities, pay items, and pay items should be provided to further define the work and the project. For complex projects, it may be beneficial to break down the work into smaller items.
14. The designer must ensure that all markings and work that are to be removed or covered should be clearly identified. All conflicting pavement markings should be removed by one of several means. It may be necessary to use a paving machine for paving or a thin layer overlay for pavement overlay. The contractor should be responsible for removing old markings.
15. The designer should include the use of pavement markings to improve incident response. This may include the use of Highways Advisory Radio (HAR) and other communication devices. These may include services (patrol) and other services (toll collection); Highway maintenance equipment; and other equipment.
16. A quality Maintenance of Traffic Plan (MOT) should be used. These may include the use of good plan notes to clearly define the work and the project.

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